United States Department of the Interior

FISH AND WILDLIFE SERVICE
North Dakota Ecological Services Field Office
3425 Miriam Avenue
Bismarck, North Dakota 58501

FEB - 9 2017

In Reply Refer To:
2017-I-0069

Mr. Wendall L. Meyer
North Dakota Division Administrator
Federal Highway Administration
1471 Interstate Loop
Bismarck, ND 58503

Dear Mr. Meyer:

This is in response to a January 10, 2017, request from the Federal Highway Administration (FHWA) for informal consultation in regards to a proposed state-wide programmatic framework to streamline inter-agency coordination under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), for transportation projects having minimal environment impacts. The transportation programs comprising the action include preconstruction and construction activities for new roadways, and rehabilitation, structural improvement, and preventive maintenance activities for existing roadways. The U.S. Fish and Wildlife Service, North Dakota Field Office (Service) received the final December 2016 Programmatic Biological Assessment (PBA) on February 9, 2017.

The purpose of this action is to streamline the regulatory procedures for routine, low impact transportation construction activities jointly carried out by the NDDOT and the FHWA pursuant to the section 7 the Act. The PBA programmatically analyzes the effects of the transportation program in all 53 counties of North Dakota and presents a framework for identifying the means and methods to minimize the effects on threatened and endangered species as well as designated critical habitat listed under the Act.

In accordance with section 7 of the Act, the FHWA has requested Service concurrence with the determinations that the proposed programmatic "may affect, is not likely to adversely affect" the endangered interior least tern (*Sterna antillarum*), whooping crane (*Grus americana*), black-footed ferret (*Mustela nigripes*), pallid sturgeon (*Scaphirhynchus albus*), gray wolf (*Canus lupus*), poweshiek skipperling (*Oarisma poweshiek*), threatened piping plover (*Charadrius melodus*), western prairie fringed orchid (*Platanthera praeclara*), Dakota skipper (*Heperia dacotae*), rufa red knot (*Calidris canutus rufa*), and designated critical habitats for the powesheik skipperling, Dakota skipper and piping plover. Based upon the project description, proposed conservation measures, and analysis of potential effects included in the December 2016 PBA, the Service has concluded that the effects to the aforementioned species and critical habitat are either insignificant or discountable. Thus, the Service concurs with your determinations.

The PBA includes a "no effect" determination for the threatened northern long-eared bat (*Myotis septentrionalis*). There is no requirement under the implementing regulations of the Act (50 CFR Part 402) for action agencies to receive Service concurrence with "no effect" determinations, therefore the responsibility for "no effect" determinations remains with the FHWA. Accordingly, we recommend the FHWA retain the documentation for this listed resource in the decisional record for this federal action.

The PBA also lists the rusty patched bumblebee (*Bombus affinis*) as a proposed species. The final rule to list the rusty patched bumblebee as an endangered species was published in the Federal Register on January 11, 2017, and becomes effective on February 10, 2017. The final rule lists the rusty patched bumblebee as an endangered species wherever found. The rusty patched bumblebee has not been found in North Dakota since 2000 and therefore the Service recommends the FHWA consider the rusty patched bumblebee as extirpated in North Dakota for the purposes of section 7 consultation and implementation of the PBA. If the rusty patched bumblebee is found to occur in North Dakota in the future, the Service and/or the FHWA may reinitiate consultation on the PBA, pursuant to the conditions for reinitiation described below.

The Service is aware that a Memorandum of Understanding (MOU) will soon be executed between the FHWA and the NDDOT in order to designate the NDDOT as the FHWA's non-federal representative in accordance with 50 CFR 402.08. The MOU thus will establish NDDOT as FWHA's non-federal representative for the purposes of conducting informal section 7 consultation per implementation of the PBA. This concurrence become effective for the NDDOT to implement the programs of work described in the PBA when the Service receives a signed copy of the executed MOU.

Pursuant to the implementing regulations of the Act (50 CFR 402.13), this letter concludes informal consultation. This consultation should be re-initiated if: (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this consultation; (2) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this consultation; or (3) a new species is listed or critical habitat is designated that may be affected by this action.

We appreciate your efforts to ensure the conservation of listed and proposed species as part of our joint responsibilities under the Act. For further information, please have your staff contact Terry Ellsworth of my staff at (701) 355-8505, or contact me at (701) 355-8512 or at the letterhead address.

Sincerely,

Kevin J. Shelley
North Dakota State Supervisor
Ecological Services

cc: Mr. Grant Levi, North Dakota Department of Transportation, Bismarck, ND
Mr. Matt Linneman, North Dakota Department of Transportation, Bismarck, ND
Mr. Terry Steinwand, North Dakota Game and Fish Department, Bismarck, ND
Mr. Greg Link, North Dakota Game and Fish Department, Bismarck, ND
Mr. Garland Erbele, Office of the State Engineer, Bismarck, ND
Ms. Patricia.L.Mcqueary, U.S. Army Corps of Engineers, Bismarck, ND
Mr. Scott Larson, U.S. Fish and Wildlife Service, Pierre, SD

PROGRAMMATIC BIOLOGICAL ASSESSMENT

For

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION PROJECTS

Prepared By:
North Dakota Department of Transportation
Environmental and Transportation Services
Bismarck, North Dakota

On Behalf of:
Federal Highway Administration
North Dakota Division Office
Bismarck, North Dakota

In Partnership with:
U.S. Fish and Wildlife Service
Ecological Services Office
Bismarck, North Dakota

December 2016

Programmatic Biological Assessment

Through cooperation with the Federal Highway Administration (FHWA) and U.S. Fish and Wildlife Service (USFWS), the North Dakota Department of Transportation (NDDOT) has developed this programmatic biological assessment to be used to fulfill Section 7 of the Endangered Species Act for all federally involved projects with insignificant or discountable effects to listed species and critical habitat. This document is based on consideration of the life histories of the listed threatened and endangered species and designated critical habitat within North Dakota, potential direct and indirect effects from NDDOT project activities, and standardized conservation measures to be implemented to avoid or minimize effects. Approval of this document from the USFWS will be a programmatic concurrence letter and will cover all projects that fit within the scope of the programmatic biological assessment.

Wendall L. Meyer
Division Administrator, North Dakota Division
Federal Highway Administration

Date: 2/9/17

Ron Henke, P.E.
Deputy Director for Engineering
North Dakota Department of Transportation

Date: 1/4/17

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Appendices

Acronyms

APLIC- Avian Power Line Interaction Committee
ANWR- Aransas National Wildlife Refuge
BMPs- Best Management Practices
BMS- Bridge Management System
CFR- Code of Federal Regulations
CIR- Cold In-Place Recycling
CPR- Concrete Pavement Repair
CWS- Canadian Wildlife Service
DPS- Distinct Population Segment
EPA- Environmental Protection Agency
ESS- Environmental Sensor Station
ETS- Environmental and Transportation Services
FAST- Fixed Automated Spray Technology
FHWA- Federal Highway Administration
FR- Federal Register
FTA- Federal Transit Administration
HDD- Horizontal Directional Drilling
HPCS- Highway Performance Classification System
ITS- Intelligent Transportation System
HBP- Hot Bituminous Pavement
MSE- Mechanically Stabilized Earth
NOAA- National Oceanic and Atmospheric Administration
NDDOT- North Dakota Department of Transportation
NDGF- North Dakota Game and Fish Department
NEPA- National Environmental Protection Act
NGP- Northern Great Plains
NLEB- Northern Long-Eared Bat
NRM- Northern Rocky Mountain
PBA- Programmatic Biological Assessment
PBO- Programmatic Biological Opinion
PMS- Pavement Management System
PSI- Pounds per Square Inch
RMS- Root Mean Square
RPU- Remote Processing Unit
RWIS- Roadway Information System
SEL- Sound Exposure Level
SOV- Solicitation of Views
STIP- Statewide Transportation Improvement Program
SPCC- Spill Prevention Countermeasure and Control Plan
SOV- Solicitation of Views
SWPPP-Storm Water Prevention Pollution Plan
TTS- Temporary Threshold Shift
USACE- U.S. Army Corps of Engineers
USFWS- United States Fish and Wildlife Service
USGS – United States Geological Service
WBNP- Wood Buffalo National Park
WGL- Western Great Lakes

1. Introduction

The North Dakota Department of Transportation (NDDOT) in cooperation with Federal Highway Administration (FHWA) has developed a Programmatic Biological Assessment (PBA) to analyze the effects of the NDDOT transportation program on threatened and endangered species within North Dakota. The intent of this PBA is to streamline the Endangered Species Act (ESA) Section 7 consultation process for routine transportation construction activities carried out by NDDOT and FHWA. Programmatic Biological Assessments are particularly useful for meeting ESA requirements for uncomplicated and non-controversial low impact projects. See Section 2.3 for types of projects to be covered by this PBA. Only actions that result in “no effect” or “may affect, but not likely to adversely affect” determinations are covered by this PBA. Projects covered by the PBA may include more than one activity (action), in these cases, the applicant (FHWA/NDDOT) will be responsible for identifying all individual activities associated with the entire project. Activities or actions that are not covered by this PBA will be consulted individually, either informally or formally.

Section 2 of the Endangered Species Act of 1973 (ESA) requires that all Federal departments and agencies seek to conserve threatened and endangered species and utilize their authorities in furtherance of the purposes of the ESA. Section 7(a) (2) of the Endangered Species Act of 1973 as amended, requires Federal agencies to evaluate the impact of their actions on threatened or endangered species, and ensure such actions are "not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of (its) habitat". To this end, NDDOT, the FHWA, and U.S. Fish & Wildlife Service (USFWS) have entered into a PBA. Because the transportation program is active throughout the state of North Dakota (ND) and listed species as well as designated critical habitat occur or have the potential to occur throughout, this PBA will cover the entire state.

To determine whether a project or action will affect a listed or proposed species, whether informal or formal consultation with USFWS is required, and to achieve compliance with ESA, a biological assessment (BA) is generally required. Section 7(c) of the ESA requires that a BA be prepared for “major construction projects” if any of those species or their critical habitats are present in the proposed action area. Although few NDDOT projects would be considered major construction activities, transportation projects can have various direct and indirect effects to threatened and endangered species as well as designated critical habitat. This document addresses potential effects on species and critical habitat listed under the ESA within North Dakota and identifies applicable measures to avoid or minimize potential effects to listed species for projects involving FHWA to an insignificant (not measurable) or discountable (highly unlikely) level.

A Memorandum of Understanding (MOU) has been developed between FHWA and NDDOT, which delegates informal Section 7 consultation responsibilities to the NDDOT. A copy of the MOU is attached to this PBA as Appendix A.

1.1 Implementation Process for Programmatic Biological Assessment

Section 7 ESA requirements may be met for all partially or wholly federally NDDOT funded projects that fit within the scope of this PBA, provided that potential effects are avoided to the extent practicable through the use of standard and species specific conservation measures.

In certain situations, additional conservation measures not listed within this PBA may be developed and used to minimize potential effects to listed species or critical habitat. These additional conservation measures will be provided within the project submittal package for individual projects using this PBA. Additional conservation measures must be approved by the FHWA, NDDOT, and USFWS before they can be applied for projects.

The process for use of this document and fulfilling Section 7 requirements for a project includes the following.

- ***Kick-off Meeting:*** For all projects using this document for Section 7 requirements, a kick-off meeting will be required between the parties responsible (NDDOT Design/Bridge/Local Government/Materials and Research staff or consultant) for using the PBA as well as a representative from the NDDOT Environmental and Transportation Services, and in some instances FHWA, and USFWS. The objective of this meeting is to confirm the listed species and critical habitat that may occur in the counties that the specific project under the proposed action (defined in Section 2.0) is located in; identify whether a specific project will fit the scope of the programmatic; discuss any recommended/required fieldwork; and determine appropriate conservation measures.

- ***Project Submittal Package:*** project submittal package must be completed in order to track use of projects under the PBA/proposed action and to document the following; the scope and type of all work activities associated with the project, project location/limits/timing, results of any field inventories/surveys, and all conservation measures to be applied to that specific project. Maps of the project and any photos from field visits shall be included as an attachment to the project submittal package. The project submittal package can be found at the following link: http://www.dot.nd.gov/manuals/design/designmanual/reference-forms.htm

- ***Internal Review:*** Once a project submittal package has been completed, it will be submitted to NDDOT ETS for review to ensure that the scope of work activities and all potential effects to listed species or critical habitat are within the range of effects discussed in this document, appropriate conservation measures have been selected, and evaluate any completed fieldwork. If the project does not fit the scope of the PBA, additional conservation measures may be necessary, or separate Section 7 consultation may be required. If adverse effects cannot be avoided, formal consultation would be necessary.

  The formal consultation process can take up to 135 days or longer, so it is imperative in the project development process to identify projects that may adversely affect (take[1]) listed species or adversely modify designated critical habitat. Typically the types of projects where adverse

[1] **Take** is defined as to *harass*, *harm*, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct of listed species of fish and wildlife. **Harm** is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. **Harass** is defined as actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.

effects are anticipated will be known before a project is selected to use the PBA. However, certain situations may dictate that adverse effects cannot be avoided (i.e. fieldwork may discover threatened or endangered species or suitable habitat), which would not be known until later in the development of a project.

If a project under the proposed action (described in Section 2.0) has the potential for adverse effects to the Northern Long-Eared Bat (NLEB), an additional step must be followed. A form developed by the USFWS must be used for all activities under this proposed action that may have adverse effects to the species (i.e. tree removal during the active season). Although the FHWA has designated the NDDOT as their non-federal representative for informal Section 7 consultation, the NLEB 4 (d) Streamlined Consultation Form must be sent from FHWA to USFWS. This form can be submitted early in the project development process in order to speed up project delivery for projects using this PBA. For further information, see Section 6.11 – NLEB Stressor and Response.

- ***Project Monitoring Forms:*** The NDDOT will submit a project monitoring form within 60 days of construction of a project to FHWA and USFWS in order to document the use of conservation measures applied for each project.

- ***Tracking Process:*** All projects that use the PBA will be tracked in a spreadsheet and all project submittal packages will be on file at the NDDOT.

- ***Annual Coordination Meeting:*** The NDDOT will schedule an annual meeting to discuss/review projects conducted under this PBA during the previous year. In addition, the NDDOT, FHWA, and USFWS will meet on a monthly basis to discuss the status of current and future projects requiring Section 7 consultation either covered under the PBA or separate consultation.

- ***Revisions of PBA:*** The NDDOT will coordinate with FHWA and USFWS for any changes to the content of this PBA, including changes in listed species/critical habitat, scope of work activity descriptions, additions of work activities covered under the PBA, and any other edits to the document.

- ***Renewal:*** The coverage of this PBA will last for 5 years from the dated issuance of concurrence from USFWS on the determinations made on listed species and critical habitat as described in this PBA. After 5 years if the NDDOT and FHWA wish to renew programmatic coverage under this PBA, the USFWS will be notified.

- ***Re-initiation:*** Consultation will be reinitiated if there are any changes to listed species/critical habitat, new information becomes available that was not considered in this consultation, or new actions with effects to listed species not previously covered in the PBA are proposed.

2.0 Proposed Action

The proposed action consists of implementing transportation projects across the state of North Dakota for the NDDOT with FHWA involvement; including new road construction and all types of existing roadway improvement projects. The Statewide Transportation Improvement Program (STIP) includes federally-funded highway and transit projects to be constructed in North Dakota. Approval by the FHWA and Federal Transit Administration (FTA) is required for these types of projects. This PBA is created for projects that have a federal nexus (i.e. FHWA involvement); however can be used as a guide for state or local transportation projects without any Federal involvement to help design projects to avoid "take" of listed species, or to avoid adverse effects to critical habitats.

Each of the eight NDDOT District Engineers identifies their priority projects for non-interstate and non-interregional systems in preparation for the annual STIP update. A committee, including the district engineers, establishes priority projects on the interstate and interregional systems. The district engineers populate the roadway segments and type of improvements with their project nominations, as well as recommendations for the construction year and, in some cases, estimated costs. They also prioritize their districts' projects based on the NDDOT Highway Performance Classification System (HPCS), public comments, and the investment strategies outlined below. The Urban and County priorities may be secured in the same manner.

Once the district priorities have been submitted to the NDDOT Programming Division, available federal funding is divided between Interstate and Non-Interstate projects. Selection of projects on the National Highway System and the State Rural Highway System included use of the HPCS, investment strategies, Bridge Management System (BMS) and the Pavement Management System (PMS). The HPCS divides North Dakota highways into five categories: interstate, interregional corridors, state corridors, district corridors, and district collectors. Dollars are invested in these facilities according to their performance classification and the department's present investment strategy (Interstate and Non-Interstate). Efforts are made to ensure that work is distributed throughout the state and that the types of work are related to the investment strategy.

Other NDDOT projects may arise that are not identified in the STIP, such as emergency type activities, include grade raises as well as landslide and bridge/structure repairs.

2.1 Action Area

Action area is defined in the Code of Federal Regulations as "all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action". The action area encompasses the geographic extent of environmental changes created from an action (i.e. construction project) such as biotic, chemical, and physical effects. This PBA covers transportation projects across the state of North Dakota; therefore, the action area encompasses all 53 counties. Although the action area includes the entire state of North Dakota, potential effects from individual projects would be limited to the vicinity where construction activities occur for each individual project conducted under the PBA. Noise and visual disturbances from construction activities was determined to cause the greatest potential effects from individual projects. At 50 feet, noise generated from typical construction equipment (non-impact) ranges from 73-101 dBA (FHWA 2006). At a distance of 1,600 and 3,200 feet construction noise attenuates to ambient levels (WSDOT 2015). This is assuming general construction equipment is used (i.e. no pile driving) and traffic and ambient noise levels are approximately 66 dBA and 40 dBA, respectively; which are typical noise levels for a busy roadway in rural area. Therefore, a half-mile (2,640 feet) would be the distance at which noise would not be likely to cause any direct or indirect effects to listed resources as a result of individual projects under the proposed action.

2.2 Land Cover Types in North Dakota

Vegetation systems for the state of North Dakota were mapped through the U.S. Geological Survey (USGS) Gap Analysis Project (GAP) (U.S. Geological Survey, 2011). National GAP Land Cover Data provides information on the distribution of native prairie vegetation types, modified and introduced vegetation, as well as agriculture and developed areas of the United States. Native vegetation areas are classified to the Ecological System types developed by NatureServe. Ecological Systems provide detailed information on the vegetation communities of a geographic area that is not available in most other regional or national land cover products. Information about land cover is a key component of effective conservation planning and the management of biological diversity.

The state of North Dakota contains approximately 18,307,068 Hectares (45,238,000 acres). Table 1 breaks down the land cover types of North Dakota as well as hectares and percent cover within the state. Appendix B shows a map of the various land cover types throughout the state of North Dakota.

Table 1. Land Cover Types of North Dakota

Land Cover Name		**Hectares**	**% Total Area**
Forest and Woodland	***Cool Temperate Forest***	***496,419.84***	***69.5%***
	- Central Oak-Hardwood & Pine Forest	62,069.31	12.5%
	- Eastern North American Ruderal Forest and plantation	50.94	<1%
	- Northern Great Plains Woodland	421,599.51	84.93%
	- Central Mesophytic Hardwood Forest	5,086.53	1.02%
	- Northern Rocky Mountain Lower Montane & Foothill Forest	7,612.65	1.53%
	- Intermountain Singleleaf Pinyon – Western Juniper Woodland	0.9	0%
	Freshwater Aquatic Vegetation	**215,722.71**	**30.2%**
	- Great Plains Floodplain Forest	187,759.17	87.04
	- Northern & Central Swamp Forest	859.32	<1%
	- Southern Floodplain and Hardwood Forest	27,104.22	12.58
	Lowland & Montane Boreal Forest	**2,087.91**	**<1%**
	- Eastern & Central North American Boreal Conifer & Hardwood Forest	2,087.91	100%
	Boreal Flooded & Swamp Forest	***7.38***	***<1%***
	- North American Boreal Swamp Forest	7.38	100%
	Forest and Woodland Statewide Totals	***714,237.84***	***3.9%***
Shrubland and Grassland	***Temperate Grassland, Meadow & Shrubland***	3,575,048.76	83.83%
	-Great Plains Mixedgrass Prairie & Shrubland	3,401,508.78	95.15%
	- Great Plains Sand Grassland & Shrubland	38,259.45	1.07%
	- Great Plains Tallgrass Prairie & Shrubland	135,280.53	3.78%
	Temperate & Boreal Freshwater Wet Meadow and Marsh	686,178.90	16.09%
	- Eastern North American Wet Meadow & Marsh	1,093.59	<1%
	Great Plains Wet Meadow, Wet Prairie & Marsh	685,064.16	99.84%
	Warm Desert Freshwater Shrubland, Meadow & Marsh	21.15	<1%
	Salt Marsh	3,371.13	<1%
	Shrubland and Grassland Statewide Totals	***4,264,598.79***	***23.29%***
Semi-Desert	***Cool Semi-Desert Scrub & Grassland***	38,671.83	0.21%
	- Great Basin Saltbrush Scrub	0.63	<1%
	- Great Basin & Intermountain Tall Sagebrush Shrubland & Steppe	38,671.20	100%
	Semi-Desert Statewide Totals	**38,671.83**	**0.21%**
Nonvascular & Sparse Vascular Rock Vegetation	***Temperate & Boreal Cliff, Scree & Rock Vegetation***	7,744.95	0.04%

	Great Plains Badland Vegetation	7,475.67	96.52%
	Great Plains Cliff, Scree & Rock Vegetation	269.28	3.48%
Nonvascular & Sparse Vascular Rock Vegetation Statewide Totals		**7,744.95**	**0.04%**
Agricultural Vegetation	***Herbaceous Agriculture Vegetation***	10,642,232.43	58.13%
Agriculture Vegetation Statewide Totals		**10,642,232.43**	**58.13%**
Developed & Other Human Use	***Developed and Urban***	707,706.54	3.87%
Land Cover Name		**Hectares**	**% Total Area**
Developed & Other Human Use Statewide Totals		**707,706.54**	**3.87%**
Introduced & Semi Natural Vegetation	**Introduced & Semi Natural Vegetation**	101,328.93	<1%
Introduced & Semi Natural Vegetation Statewide Totals		**101,328.93**	**<1%**
Recently Disturbed or Modified	**Recently Disturbed or Modified**	1,040,410.35	5.68%
Recently Disturbed or Modified Statewide Totals		**1,040,410.35**	**5.68%**
Open Water	**Open Water**	790,136.91	4.32%
Open Water Statewide Totals		**790,136.91**	**4.32%**
OVERALL TOTALS		**18,307,068.57**	**100%**

Note- Statewide totals for each individual land cover type within North Dakota are included in the gray rows (ex. 3.9% of the state of North Dakota is Forest and Woodland).

Dominant land cover in North Dakota consists of agriculture vegetation, followed by shrubland and grassland. The types of land cover within North Dakota provide habitat for a variety of amphibians, birds, fish, insects, and mammals. Many species dependent on grassland habitat face a challenge in North Dakota into the future, as grassland conversion to uses such as agriculture, commercial, industrial, and rural developments have dramatically increased in the last 30 years.

2.3 NDDOT Project Types

The following section describes a large majority of NDDOT projects; however is not all-inclusive. There may be projects that arise such as safety projects (signing), bridge projects, and emergency type activities such as slide/slope repair and grade raises. In order to fit the scope of this programmatic, the activities and sub-activities from these types of additional projects would need to be consistent with what is described in the deconstruction matrix found in Appendix C of this document.

2.3.1 New Road Construction / Reconstruction

New road construction is defined as a planned strategy in which a new road is constructed. This work may also include work items such as relocating an existing route on new alignment, or completely removing the old pavement structure and restoring the roadbed and surfacing, or major widening on an existing roadway to increase traffic capacity (excludes realigning horizontal curves).

2.3.2 Major Rehabilitation

Major Rehabilitation is a planned strategy in which major work is performed to bring a highway up to an acceptable condition to extend the service life and provide operational improvements (i.e. adding turn lanes). Major rehabilitation projects may include reclaiming the existing surface material and base along with the placement of additional surface material and/or other work necessary to return an existing roadway, including shoulders, bridges, the roadside, and appurtenances to a condition of structural or functional adequacy. On these projects the roadway elevation may change, shoulders may be added, and fore-slope corrections may be made. The roadway will be resurfaced and safety improvements will be completed as required. A crash analysis will be completed and cost effective enhancements will be addressed. Examples of Major Rehabilitation treatments are: Mine and Blend and Hot Bituminous Pavement (HBP), Full depth Reclamation, and Major Concrete Pavement Repair (greater than 10% of the surface area per mile). Definitions of these work types are given below.

- **Full Depth Reclamation (Mine and Blend):** A process to rehabilitate distressed pavement that salvages the existing aggregate base and HBP as base material for new pavement. A reclaiming machine blends together the existing HBP with the existing aggregate base. The blended material is then compacted and acts as the base material for the new pavement. An alternative practice is to remove the existing HBP and aggregate base and process it off-site.

- **Full Depth Reclamation (Stabilized Base):** A rehabilitation technique in which all of the asphalt pavement section and a predetermined amount of underlying materials are treated to produce a stabilized base course. This procedure consists of the following steps: pulverization of existing material; introduction of the additive; shaping of the mixed material; compaction; and application of the wearing course.

- **Major Concrete Pavement Repair:** A process that removes and replaces a portion of a slab or full slab to the bottom of the concrete in order to restore deteriorated areas.

2.3.3 Structural Improvement

Structural improvement is a planned strategy to extend the useful life of a highway by restoring the pavement structure without necessarily improving existing geometrics. A structural improvement is a white topping project (covering existing asphalt pavement with a layer of Portland cement concrete) or an HBP overlay in excess of 3” and is designed based on an engineering analysis. A structural improvement will increase the load carrying capacity to meet the HPCS guidelines.

2.3.4 Minor Rehabilitation

Minor Rehabilitation is a planned strategy to extend the useful life of a highway by restoring the pavement structure without necessarily improving existing geometrics. The minor rehabilitation of roadways will use repair techniques designed to repair pavement distress areas primarily caused by the environment and by the daily wear and tear of traffic. A minor rehabilitation strategy will restore the load carrying capacity to its original condition. During the scoping process the department will determine if the in-slope criteria is being met. The appropriate National Environmental Policy Act (NEPA) process will be followed to address any environmental impacts. Examples of Minor Rehabilitation treatments are: Asphalt Overlay 2”-3”, Distress Area Repairs and Asphalt Overlay, Mill & Overlay, Cold In-Place Recycling (CIR), minor sliver grading to correct in-slope, Bridge Approach Repair, Bridge Rail Repair, Deck Overlay, and Guardrail. Definitions of these work items are described below, or are covered in subsequent sections.

- **Mill and Overlay-** A process that removes the top layers of asphalt to provide a new wearing surface on asphalt pavement.

- **Cold In-Place Recycling-** A process that removes the top layers of old asphalt pavement, crushes and screens it to size, mixes it with an asphalt recycling agent and sometimes other additives, then paves it on the same roadway.

2.3.5 Preventative Maintenance

Preventative maintenance is a strategy used to improve the quality and consistency of transportation systems and services. Preventative maintenance is performed to enhance the state highway system by improving ride, load capacity, preservation and maintenance service levels.

- **Chip Seal-** A seal coat generally consists of a layer of asphalt binder that is covered by a single layer of embedded aggregate or "chips". Seal coats are used as preventative maintenance treatment to prolong the life of a pavement, correct surface raveling, prevent oxidation, provide skid resistance to worn pavements, and seal the existing bituminous surface against the intrusion of air and water. A seal coat will often reduce the rate of deterioration until a future improvement is made.

- **Slurry Seal-** A slurry seal is a mixture of asphalt, water, fine aggregate, and a mineral filler that is used to fill existing pavement surface defects as either a preparatory treatment for other maintenance treatments or as a wearing course.

- **Microsurfacing-** Microsurfacing is an advanced form of slurry seal that uses the same type of mixture and combines them with advanced polymer additives for repair of slight to moderate pavement surface defects and to improve skid resistance.

- **Thin Lift Overlay-** Thin lift overlays are another method to extend the surface life of existing pavement using an asphalt mix that is usually placed 2 inches or less in thickness.

3.0 Project Development

The following section describes the work types covered under the proposed action. All activities and sub-activities required to facilitate completion of the work described within this section can be found in the deconstruction matrix in Appendix C of this document.

3.1 Preconstruction Activities

Once projects are selected for advancement, prior to initiation of construction activities; preconstruction activities are conducted in order to gain a better understanding of the project area and issues that may arise prior to commencement of construction. Preconstruction activities consist of surveys and studies for various areas related to project development including: biological studies, cultural resources, field reviews, geotechnical surveys, noise, utility locates, and other activities such as coring, potholing or painting. These types of activities help identify potential construction related issues early in the project phases as well as to assist in development of measures that can be taken to avoid/minimize/mitigate impacts to protected resources or identify other unique challenges that may arise when project construction activities initiate.

3.1.1 Topographic Surveys by means of Aerial or Ground Methods

Aerial surveys are used for transportation engineering in order to obtain reliable measurements by means of photographs, which produces dimensional data for mapping, cadastral purposes, design and computation of earthwork and other construction quantities. The result of stereo-compilation is used to obtain qualitative information about the natural terrain and other features which may influence the location of a transportation facility. Topographic surveys are performed to determine the configuration, relief or elevations of a portion of the earth's surface, including the location of natural or manmade features.

3.1.2 Environmental Surveys (Biological, Cultural, Wetland Delineations)

In early project development, it is critical to identify environmental concerns regarding a specific project. Environmental studies typically begin with desktop research or obtaining information from federal, state, and local agency databases or personnel, as well as on the ground surveys (if needed). Data obtained from these studies is used to predict environmental effects of a proposed project and also may assist in confirming the type of environmental document to be prepared. Environmental field studies are typically non-intrusive with very little, if any disturbance to the environment. Field studies for environmental issues consist of traversing the project area either by walking or use of ATVs/vehicles; obtaining cursory information such as vegetation, wildlife species, habitats, wetland/waterbody inventories; and performing cultural resource surveys. In some instances light ground disturbances is needed in order to examine soil properties for wetland inventories or to test for cultural resource features.

3.1.3 Geotechnical Surveys

Geotechnical studies are conducted early in project development to perform linear soil survey analysis and borrow area investigations. A linear soil survey analysis is conducted for roadways that are to be newly constructed, improved, reconstructed or realigned. The purpose of this type of analysis is to get a good representation of the soils, soil properties, groundwater conditions, and any other pertinent surface or subsurface information regarding the roadway embankment. The information is compiled and studied to generate a report to be used in the design and construction of the roadway. This report may lead to a more detailed and extensive study based on its findings.

The goal of the borrow investigation is to get a representation of the material that is within the identified borrow area(s). Once a Material Source Certificate of Approval (COA) for the optioned area(s) is obtained, the geotechnical investigation will include conducting soil borings in order to obtain and analyze samples. A Borrow Area Report will be generated from the data obtained detailing what was found and if it is suitable for the intended use.

Subsurface sampling is accomplished by drilling test holes up to 300 feet deep or digging soil pits up to 8 feet deep. Use of a drill rig is necessary to obtain soil samples and may be mounted on a variety of transportation vehicles such as trucks, tractors, skids, and barges. The drill is typically 5 to 10 inches in diameter. The drill shaft is lubricated using a mixture of bentonite (a natural, inert clay material) and water. The fluid is filtered and recycled back through the drilling operation.

When drilling is done off the road surface, impacts are minimized through the selection of an appropriate sized and mounted drill rig, and limiting vegetation removal. Typically, herbaceous and woody vegetation (shrubs) is removed as necessary for drill access, and trees are rarely removed. Subsurface sampling for hazardous materials may also be necessary (i.e. Phase II Environmental Site Assessment), which is similar to subsurface sampling for geotechnical purposes. Durations will vary for these activities depending on number of bore holes and substrate composition. Typically, one to several bore holes can be drilled in a day and most sampling is accomplished within a week, dependent on the scope of the project.

Geotechnical work may also need to occur within water, depending on the project. Flotation equipment is used when making borings within the water. Flotation equipment may be a barge, raft, boat, or platform of sufficient size to properly and safely support the drilling equipment. Typically a barge or platform with a drilling rig mounted is used to perform borings within the water. Borings that occur in water are backfilled with impervious grout seals or bentonite clay plugs as the casing is extracted from the completed borehole.

3.1.4 Noise Studies

Construction and highway traffic noise impacts vary for transportation projects. In some cases a noise analysis and noise abatement measures are conducted to help protect the public's health, welfare, and livability. A highway traffic noise impact occurs when the predicted existing or future highway traffic noise levels approach or exceed the existing highway traffic noise levels. Typically, noise studies are conducted by using a combination of traffic noise modeling and field measurements. Noise studies may also occur for wildlife species that are sensitive to increased noise above ambient levels. Noise modeling can be done in an office setting; however, field measurements require that receptors be placed along a project area. Disturbance for noise monitoring is very minimal and is limited to human presence, vehicle traffic, and use of stationary equipment.

3.1.5 Field Reviews/Site Visits/Bridge Inspections

Field reviews are conducted in order to gain a better understanding of a proposed project. Typically, field reviews consist of representatives from various NDDOT Districts/Divisions, city/county officials, consultants, as well as staff from various agencies. Field reviews originate at a centralized location and from there, vehicles are driven along a proposed project corridor with various stops along the route.

Site visits may also be conducted to examine specific locations along a proposed project and are conducted in a similar manner as field reviews; however, less people are present for site visits. Bridge inspections are conducted in order to determine the type and extent of work required on a bridge or other structure such as box culverts or pipes.

These types of work activities are completed in less than a day and are limited to human presence, noise, light equipment operation and vehicle operation.

3.1.6 Utility Locates

An important part of the planning and early design information gathered for a project includes subsurface site characterizations including subsurface utilities. Not all utilities are detectable; however, utility locating surveys will significantly reduce the uncertainty associated with a project in regards to subsurface utilities. A variety of methods may be used for utility locates such as electromagnetic line location, ground penetrating radar, and metal detection techniques. Once utilities are identified, steps are taken to mark and document the location of all detected utilities. This is accomplished by marking the location of the detected utilities on the ground and by surveying their locations and creating a site plan. Paint offers a temporary means of marking utilities. Depending on site conditions; stakes, lath and survey brush flags are used to provide a longer lasting way to mark utility alignments. State law requires these materials to be removed once work is completed. Utility locates are limited to human presence, noise, light equipment operation, minor ground disturbance, use of paint, and vehicle operation. The duration of utility locating surveys is dependent on the length of a project as well as the amount of known or unknown subsurface utilities. Utility locates are typically conducted by the North Dakota State One Call system.

3.1.7 Coring/Potholing/Painting

Coring is a procedure for obtaining asphalt roadway cores and involves the use of a coring machine and masonry saw. Asphalt cores are taken through the full depth of the asphalt pavement. After the core is removed the hole is filled in with a mix and tamped to a density close to the surrounding pavement. Core samples are taken to a laboratory for testing.

Potholing is completed to identify the exact location (horizontal and vertical position) of a subsurface utility, particularly in congested utility areas. Light/Heavy machinery may be needed in order to excavate material to locate a utility. Backhoes, shovels, air/water vacuums may be used in order to conduct potholing. Utilities exposed during potholing must be protected throughout a project. Exposed utilities can shift or sag when the soil that was supporting and protecting the utility is removed. Utilities that are rendered unsupported due to potholing are typically supported by shoring or other means. After the underground utility has been located, the pothole should be restored within 24 hours and appropriate erosion control measures are utilized during all potholing activities to prevent storm water pollution. Drilling mud or remaining spoil is cleaned up and the area is restored to original conditions. For any excavation requiring horizontal directional drilling (HDD), potholing should be used to expose utilities. Contractors are responsible for disposing of any drilling mud or remaining spoil in an environmentally suitable manner in accordance with state and federal laws.

Painting is frequently performed to mark various features for a project such as utility locations, right-of-way (ROW) boundaries, and may be used for marking locations to be viewed from airplanes.

Refer to Appendix C (deconstruction matrix) for summary of sub-activities associated with the preconstruction phase of a project.

3.2 Utility Relocations

Public utility companies legally share ROW with the NDDOT and frequently transportation projects require that above/below ground utilities be adjusted (lowered, raised, shifted) or in some cases; newly installed. Utilities can be both public and private; including but not limited to: electric power, communication, cable television, water, gas, oil, slurry, petroleum products, steam, sanitary sewers, wireless facilities (towers), drainage, irrigation and similar facilities that are to be located, adjusted, or relocated within NDDOT ROW. The amount of utilities to be adjusted/relocated varies on the length, location, and scope of a proposed project. The duration of utility work is also dependent on these factors.

The NDDOT is responsible to formally notify all affected utility owners as early as possible, and to coordinate utility adjustments with the utility owners. Utility companies are responsible for moving their own facilities. The Designer or Consultant Project Manager will meet with the NDDOT Utilities Engineer to discuss the alternative selected for a project, any preliminary potential utility impacts, review any available survey information or comments from solicitation of views (SOV) letters, and discuss future utility coordination. After these items have been discussed, a preliminary utility coordination letter is sent to all potential impacted utility companies to request comments, share preliminary information or any other correspondence with the potentially affected utility companies.

Utility work involves excavation to install/remove utility poles or bore/trench (including horizontal/directional drilling) to install or remove underground utilities. Trenching may also be required to run utilities from existing sources to features such as lighted signs. Work activities required to facilitate utility adjustments/installations may include the following: equipment staging, clear/grub vegetation (including trees), operate light/heavy equipment, install guy wires, and dewater/trench wetlands. Temporary erosion control measures are implemented as necessary.

Frac-out or inadvertent return of drilling lubricant (bentonite) is a potential concern when horizontal directional drilling is used in or near sensitive habitats, waterways, and cultural resource sites. In order to minimize the potential for a frac-out, a contingency plan or frac-out plan is prepared to provide for the timely detection of frac-outs. The frac-out plan is prepared by the drilling contractor to ensure that preventative and responsive measures can be implemented. Once a frac-out is identified, all work stops and the location and extent of the frac-out is determined. If the frac-out is terrestrial, the area is isolated to contain and remove the drilling mud. If the frac-out is aquatic, it is monitored to determine if the drilling mud congeals. Once the frac-out is stabilized, the congealed drilling mud is removed. If a frac-out becomes excessively large, a spill response team would be hired to contain and clean up excess drilling mud in the water. Typically, frac-out plans are only prepared for large-scale horizontal directional drilling projects, and may not be required for small distance (section) adjustments or relocations. Although frac-out plans are not required for small distance horizontal directional drilling projects, any inadvertent releases of drilling mud must be remediated.

3.3. New Road Construction or Reconstruction

New road construction may be warranted to meet mobility and/or safety improvements. New roadway projects may include the following activities; new interchanges, realignments, new road corridors, or bypasses/truck reliever routes. Installing bridges or replacing/widening older bridges could occur for new road construction projects. The following section describes the work activities associated with new road construction or reconstruction.

3.3.1 Site Preparation

Site preparation is necessary to prepare a project area for commencement of construction activities, and may require mobilization, establishment of fueling/staging areas, clearing and grubbing, preliminary earthwork, and pavement/base removal. In some instances, buildings may need to be demolished or relocated. Construction and removal of temporary access or haul roads and/or bypasses may be needed, depending upon the project. Field laboratory and offices are also assembled during this phase of project.

3.3.2 Mobilization/Project Staging/Fueling Areas/Temporary Haul and Access Roads

Establishment of staging areas is necessary to store construction materials, equipment, contractor offices, storage trailers, and to provide employee parking. Staging areas may vary in size depending on the scope of work and length of project. Staging area locations are selected by a contractor, and the locations are approved through the NDDOT material source approval process. A project may have multiple staging areas throughout the duration of a project. Establishing staging areas may require vegetation clearing, grubbing, and excavating/grading to level the site and installation of features to improve/maintain drainage, or connect to utilities (power/sewer). Cleared vegetation is typically hauled offsite, mulched and redistributed, or less commonly may be piled and burned onsite. Construction of haul roads, temporary access roads, and temporary bypasses are completed during site prep. These roads are typically unpaved and compaction is minimized so that materials can be easily removed and facilitate quicker site restoration and revegetation following construction activities.

Staging, fueling, and storage areas are typically located away from areas such as water features (streams, rivers, and wetlands), cultural resource sites, or sensitive habitats. Temporary erosion control measures (ECMs) and proper containment are used to minimize impacts to these areas. Contractors may mark clearing limits, establish construction access, install erosion/sediment controls (straw wattles, erosion control blankets, temporary seeding, etc.) and protect slopes. Items such as fuel, oil, and hydraulic fluid may need to be stored on a project site. Depending on the size of a project and amount of fuel needed to be on-site, a Spill Prevention Control and Countermeasure Plan (SPCC) may need to be implemented and appropriate containment installed. SPCC plans are not required if materials are stored in containers less than 55 gallons and can be demonstrated that spill material will not reach navigable waters of the U.S. Although SPCC plans are not required in these situations, contractors must have materials available to clean up a spill.

3.3.3. Material Sourcing

Material sourcing is needed for roadway projects in order to obtain aggregate/borrow material, rip-rap, and to establish waste sites, staging areas, stockpile areas, and plant sites. The locations of these sites vary, and it is the contractor's responsibility to obtain clearance for these locations. Material sourcing is cleared through the NDDOT material source approval process, and is not covered in this programmatic agreement. Compliance with the ESA, is part of the approval process. On occasion, state-optioned borrow/aggregate sites are available for contractor use. These sites are also cleared through the NDDOT material source process.

3.3.4 Plant Site Preparation

Plant site preparation (asphalt plant) may be required depending on the project. The purpose of an asphalt plant is to blend aggregates, asphalt and other additives at an elevated temperature to produce a homogenous hot mix asphalt paving mixture. An asphalt plant is mainly composed of a cold aggregate supply system, drum dryer, coal burner, coal feeder, dust collector, hot aggregate elevator, vibrating screen, filler supply system, weighing and mixing system, asphalt storage and bitumen supply system. Asphalt plants are portable, and are removed after a project is complete.

3.3.5 Clearing and Grubbing

Clearing and grubbing includes removal of all vegetation, trees, stumps, and roots and any other objects that are either resting or protruding through the surface of the ground (debris, rocks, etc.), except for features that are to remain. These features could be trees, shrubs, historical/survey markers, archaeological sites, wetlands, streams, rivers, sensitive habitats, utilities or any other feature shown on plan sheets to be preserved or maintained during construction. Therefore, it is critical that construction limits are accurately marked in the field before site preparation begins so that project construction activities disturb the smallest footprint possible, while allowing for successful completion of a project. Establishment of avoidance areas may also be needed to clearly demarcate areas of concern, so that they are not disturbed during construction activities.

In order to control movement of sediment off-site, stabilize areas, and minimize environmental impacts to water features, temporary construction BMPs are used for site preparation activities and varies from project to project. Erosion control measures may include the following: silt fences, berms, fiber/straw wattles, storm drain inlet protection, straw bale barriers, check dams, and detention or siltation ponds. Dust control may also be utilized with use of vacuum or street sweepers (if paved surfaces) and/or water or surfactants. Water is used for the majority of NDDOT projects. If surfactants are used they must be properly contained. If a spill occurs, measures are taken to properly contain and remediate the release.

Materials such as coal/shale, lead paint, asbestos, erionite, and contaminated soils may be encountered for certain projects. If these items are discovered, appropriate measures are taken to contain and dispose of these materials in accordance with state and federal laws.

Various types of light/heavy equipment are used to conduct site preparation and may include but are not limited to: bulldozers, scrapers, motor graders, backhoes, and rollers. The duration of clearing and grubbing is dependent on the length and scope of a project.

3.3.6 Pavement and Base Removal

This project activity involves the breaking, removal, and storage or disposal of existing asphalt pavement or stabilized base materials. Materials not designated as salvageable are disposed of in accordance with federal, state, and local regulations.

3.4 Earthwork/Grading

Earthwork consists of roadway excavations (cuts) and roadway embankments (fills) and consists of all types of materials excavated and placed in embankment. This may include soil, granular material, rock, shale, and random materials. Unsuitable fill material is disposed of at approved waste sites.

Roadway embankments are raised areas of fill used in roadway approaches. Construction of roadway embankments entails building up soil or rock to create a new ground surface at the elevation needed for the new roadway or structure. Since roadway embankments slope outward, the higher the embankment, the wider the surface area needed at the base. Heavy equipment such as rollers and hauling equipment are used to adequately compact and level each layer of soil or rock to avoid later settlement and to support the roadway for years to come.

3.4.1 Installation of Geotechnical Fabric (Geotextiles)

Geotextiles or geotechnical fabric are made from synthetic polymers which do not decay under normal biological and chemical processes which makes them useful in road construction and maintenance. When the native soil beneath a road is silty, or constantly wet and mucky, its natural strength may be too low to support traffic loads and has a tendency to shift under those loads. Therefore, geotextiles may be required to keep the levels of subgrade and base materials separate and manage water movement through or off the roadbed. Installation of geotechnical fabric includes clearing and grubbing to remove any objects that may be able to penetrate the fabric, the soil is smoothed and leveled, geotextile fabric is installed, fabric is secured with staples, pins, or soil, and then aggregate or other fill is placed on top of the fabric.

3.4.2 Roadbed Preparation

To prepare for paving, the subgrade (the soil on which the pavement is built) must be graded and compacted. Preparation of the subgrade is often followed by the placement of a sub-base. Sub-bases may be constructed of granular materials, cement-treated materials, lean concrete, or open graded, highly permeable materials. Dirt may be sprayed with water in order to compact to its maximum density. To complete earthwork, contractors will place gravel in layers on the road bed and will moisten and compact each layer. Layers are added and compacted until the road bed reaches the height called for in the design plans.

3.4.3 Sliver Grading

Sliver grading is a process to perform minor widening of a roadway (median/shoulders). Work activities involved with sliver widening requires clearing/grading and an asphalt overlay for the newly widened portion.

3.4.4 Temporary Erosion and Sediment Control

Earthwork leaves soil in a bare condition and measures must be taken to protect the exposed or disturbed areas resulting from the project work from the elements of nature. Generally, seeding for projects consists of seeding NDDOT approved mixtures and mulching. Additional dust and erosion control is performed for all projects as needed during earthwork activities to enhance soil stabilization and minimize siltation and sedimentation through the use of fiber rolls, erosion control mats, silt fences, ditch checks, mulching, hydro-seeding, sod, and riprap.

3.4.5 Wetland Construction and Management (Banking/Mitigation)

Many NDDOT projects cause temporary or permanent impacts to wetlands. Any given wetland improvement project can be classified into one of three general categories; creation, restoration, or enhancement. Creation makes wetlands where none existed previously, although the soil characteristics may be favorable for holding water and some wetland components may be present (e.g. water adapted plants and animals). Wetland restoration techniques seek to alter an existing site by returning it to a set of previous conditions. Wetland restoration builds on pre-existing wetland conditions. Enhancement involves making adjustments to existing wetlands that will cause more desirable conditions to prevail.

Wetland construction may occur adjacent to an existing project under the proposed action, or may occur off-site at approved mitigation banks throughout the state of North Dakota. Developing and establishing mitigation banks provide an efficient and effective way to offset unavoidable natural resource impacts, improve environmental compliance efforts, and create ecologically and sustainable mitigation and conservation projects. The banking program allows the NDDOT to efficiently mitigate for unavoidable wetland and natural resource impacts from highway construction and maintenance projects. Wetland mitigation banks for unavoidable impacts to jurisdictional wetlands are regulated by the U.S. Army Corps of Engineers (USACE) and by the FHWA for Executive Order 11990 impacts.

The objective of wetland banking is to restore drained prairie pothole, depressional wetlands by the installation of ditch blocks and sediment removal. Buffers installed around the wetlands will further protect the wetlands from sedimentation and encroachment due to potential cropping of surrounding uplands. Drained prairie pothole wetlands are relatively easy to restore by installing ditch blocks which allows wetland hydrology and vegetation to quickly return after snow melt or rainfall events.

Construction activities associated with wetland banking include building temporary access roads (if required), clearing/grading, general earthwork to construct basins and dikes, piping and valving, planting and seeding, fertilizing, and mulching disturbed areas. Noxious weeds may also need to be controlled through the use of herbicides or mechanical methods.

3.5 Installation of Drainage Features (Excluding Box Culverts and Bridges)

Drainage features such as culverts are used to transfer water from one side of a road to the other, equalize ponds/wetlands on both sides of a road, and to also permit cattle, wildlife, or vehicles to pass beneath the road. Culverts are made from a wide variety of materials, the most common are concrete, reinforced concrete, and corrugated metal pipe. Roadway profile, channel characteristics, flood damage evaluations, construction and maintenance costs, and estimates of service life must be considered when selecting a culvert for placement. The installation or replacement of drainage features (centerline culverts) requires that vegetation be removed at the outlet and inlet areas, pavement/roadbed be removed (if existing roadway), excavation of earth, establishment of culvert bed, culvert be removed or placed (either in its entirety or half-length at a time), backfilling soil and other materials (gravel), compaction, installing armoring and headwalls, re-paving, and revegetating the disturbed areas. If necessary, temporary berms and slope drains may be installed during this phase of a project. Temporary erosion control measures are utilized as needed throughout this process.

If flow is present, work area isolation (dewatering or stream diversions) may be necessary prior to initiation of work activities. This may require use of pumps or creation of trenches on either side of the excavation which are filled with washed rock. To reduce the amount of in-water work, installation of drainage features may occur during low flow or dry periods. Establishing a culverts vertical orientation is typically a matter of placing the upstream flow line and downstream flow line elevations of the culvert at the same elevations of the existing streambed.

Drainage areas frequently fill in with debris/sediment; therefore it may be necessary to restore or improve the conveyance of water through drainage features at the time of installation or replacement of drainage features. This work may include widening a drainage or stream channel, removing sediment/vegetation, and regrading/revegetating drainage or stream channel. Drainage improvement is explained in more detail in following sections.

Storm drains are implemented to optimize safe passage of vehicle traffic by collecting storm water from the roadway and conveying it safely to a receiving body (channel, water body, or piped system). Conduits, manholes, and inlets are installed during this project phase as needed in order to efficiently handle storm-water runoff events.

3.6 Roadway Surfacing

Once the subbase has hardened sufficiently, dowels, tie-bars, or reinforcing steel are placed and properly aligned in preparation for paving. After earthwork/grading and drainage feature installation is complete, the established road bed is ready to be surfaced. Pavement design is dependent upon the scope of the project. The Materials and Research Division of the NDDOT develops the design for the entire pavement section, and submits recommendations including; thickness and type of base (dense, blended, or permeable), thickness of surfacing (asphalt and cement/concrete), class of Hot Bituminous Pavement (HBP) to be used, and type and percentage of asphalt cement for asphalt pavements. Concrete is a long-lasting durable surface that can typically carry very heavy loads and is generally used for paving projects that need to support large commercial trucks and/or heavy traffic. Asphalt is also long lasting and durable, and is typically used for most paving projects and is the material of choice when a project calls for a combination of cost efficiency, strength, durability, ease of maintenance and aesthetics.

There are two methods for paving with concrete, slip form and fixed form. In slip form paving, a machine rides on treads over the area to be paved. Fresh concrete is deposited on the front of the paving machine which then spreads, shapes, consolidates, screeds, and float finishes the concrete in one continuous operation. In fixed form paving, stationary metal forms are set and aligned on a solid foundation and staked rigidly. Final preparation and shaping of the subgrade or subbase is completed after the forms are set. Once concrete is deposited near its final position on the subgrade, spreading is completed by a mechanical spreader which rides on top of the preset forms and the concrete. The spreading machine is then followed by one or more machines that shape, consolidate and float finish the concrete. After the concrete has reached a desired strength, the forms are removed and curing of the edges begins immediately.

Before an asphalt paving operation starts, an asphalt distributor is used to spray asphalt onto the unpaved surface. This initial film of asphalt serves as the prime and tack coats. The coats are then allowed to cure before the actual paving resumes. To start the paving operation, the paver is positioned properly onto the road. The screed of the paver is lowered onto a block of the same depth of the loose asphalt mat that is going to be laid on the road. The screed is responsible for the setting the depth of the asphalt mix. After that, the block is removed and paving begins.

When loading the asphalt mix into the receiving hopper, the haul truck is placed in front of the paver. The paver pushes the truck forward as it paves the road. Once an area has been laid with asphalt, the last process of paving asphalt is compaction by use of rollers.

3.6.1 Guardrail Installation

Guardrail is a safety barrier intended to shield a motorist who has left the roadway, and is installed, removed or replaced during this project phase. During guardrail installation, a grading operation is required to install concrete or metal guardrail. This action requires excavation or fill sections to be constructed within the roadway prism during the grading operation for placement of the guardrail. Borrow material is placed in layers and compacted uniformly and to the desired elevation. Occasionally, water conditions or soft soil conditions may require a course of aggregate base to be placed under the guardrail. If using metal guardrail, posts are installed by pounding them into the ground or using posthole diggers. The metal lengths of the guardrail are attached to the posts.

3.6.2 Miscellaneous Roadway Surfacing Project Activities

Other items completed during roadway surfacing include the following. Curb and gutter, pedestrian paths, trails, sidewalks and driveways are constructed/reconstructed during roadway surfacing. Retaining walls may be built for certain situations with slope/stability issues. Road median barriers, noise walls, rumble strips, roadway striping, pavement marking, and signage are installed during this project phase.

3. 7 Roadway Finishing

Once the roadway has been surfaced and other features installed, additional work items are performed to complete the newly constructed or reconstructed roadway. These items include placing/shaping topsoil, establishing/seeding vegetation, installation/removal of permanent and temporary erosion/sediment control, and landscaping/tree plantings.

3.8 Roadway Appurtenances

Other items are needed to complete a roadway project in order to for the roadway to be used by the traveling public. Installation of permanent lighting, signs, signals, intelligent transportation systems (ITS), automatic traffic recorders, weight in motion systems, rest areas, weigh stations, environmental sensor stations (ESS), rumble strips, guardrail, and fencing are needed to provide a safe roadway and inform the public of speed limits, vertical clearance limits, sharp curves, and other roadway features/hazards. Depending on the type of roadway, letter sizes, sign sizes, and vertical clearances will vary.

Other items such as median barriers, rumble strips, and in some instances noise barrier walls may be installed as part of a project. In addition, turnouts, overlooks, historic makers and viewpoints and are also completed during this phase, although general earthwork may be completed prior to the completion of these features. Light earthwork/ground disturbance may be required to install/trench wires for signs that require electricity. A variety of equipment may be used to complete this phase of a project and the duration of construction activities and amount and extent of roadway appurtenances are dependent on the scope and length of a project.

3.9 Workzone Traffic Control

One of the critical parts of highway construction projects is ensuring that effective provisions for proper control of traffic within the construction work zone is provided for on the project. Highway construction generally results in heavy equipment working in close proximity to highway traffic, many times with restricted roadway widths, alignment shifts, and/or temporary driving surfaces. These conditions not only have a direct impact upon public safety, but also present a significant hazard to contractor equipment and personnel working on the project. Therefore, every construction project must have an appropriate traffic control plan that will properly guide traffic through the work zone, at appropriate travel speeds, in both daytime and nighttime periods for the duration of the construction activity. In addition, if there are pedestrians in the project area, safe passage is provided through the project.

Access to adjacent properties is also an important consideration that must be provided for in the traffic control plan. The traffic control plan clearly identifies and conveys the concepts of project traffic control and the types of traffic control devices necessary to achieve the desired control. The selection of traffic control devices is based on the highway type, traffic conditions, duration of operations, physical constraints, and the proximity of the work area to the highway traffic. A variety of signs may be used to help direct/exclude traffic, reduce traffic, and/or to provide warnings. In addition, temporary detours as well as pilot cars and flaggers may be necessary to direct traffic through construction areas.

3.10 New Bridge Construction

New bridge construction are long-term projects that require one or more years to complete. There are various types of bridges including but not limited to concrete slab, concrete arch, concrete box girder, concrete T beam, steel beam, pre-tensioned concrete beam, post-tensioned concrete beam, steel truss and timber trestle. Bridges typically span over waterways (wetlands, streams, rivers, etc.); however bridges may be necessary to span over railroads, roadways and other infrastructure. Some bridges span the entire length of a waterway or other feature without piers, and some require that piers be placed both inside and outside of a stream/river channel (or other feature such as road or railway) and the number varies depending on the project area and type of bridge to be constructed. New bridges are designed to span as much of a river as possible in order to reduce the amount of piers within the water.

If a new bridge is being built for an existing roadway project (bridge replacement), construction of the new bridge may require a temporary detour bridge or traffic bypass. In some instances half of the new bridge is constructed next to the existing bridge and acts as the detour bridge while the existing bridge is removed and replaced. Temporary bridges or barges may be needed for construction platforms. Instream activity (in-water work) restrictions are typically applied to all NDDOT projects to protect fish spawning activities in many waters of North Dakota. These restrictions are identified in the plan sheets as well as Section 404 permits issued by the U.S. Army Corps of Engineers (USACE) or through the notification process under nationwide permits. For most waters in the state that contain fish populations, the in-water restriction dates are April 15th - June 1st. The Red River in-water restriction lasts from April 15th- July 15th.

Major bridge construction activities often include the following. Establishment of staging areas, utility adjustments, clearing and grubbing, construction of storm water facilities and placement of erosion control measures, excavation for abutments, construction of bridge columns/piers/abutments, concrete pouring, pile installation/removal, bridge demolition (described in following sections), riprap placement, and paving with asphalt or concrete.

3.10.1 Pile Installation

Construction of new bridges that span large distances, require the installation of large diameter steel piling to support the superstructure and bridge deck. When piles are required as part of new bridge design, they are installed using several different methods. Pile driving involves the use of an impact pile driving hammer, which is a large piston-like device that is typically attached to a crane. Many different pile driving hammers are commercially available, and the major distinction between hammers is how the ram is raised and how it impacts the pile. The size of the hammer is characterized by its maximum potential energy. The power source for impact hammers may be mechanical, "air-steam" diesel, or hydraulic. For most impact drivers, a vertical support holds the pile in place while a heavy weight or ram moves up or down, striking an anvil which transmits the blow of the ram to the pile. For hydraulic hammers, the ram is lifted by fluid, and gravity alone acts on the down stroke. A diesel hammer or internal combustion hammer carries its own power source, and can be open-end or close-end. An open-end diesel hammer falls under the action of gravity. A close-end hammer compresses air on its upward stroke and can therefore run faster than open-end hammers. Impact hammers can drive pile at a rate of approximately 40 strikes per minute.

Vibratory pile driving hammers can also be used to both install and remove piling. Compared to other types of hammers, vibratory hammers are heavier, and requires handling equipment of greater capacity than required for conventional pile hammers. A vibratory hammer has a set of "jaws" that clamp onto the top of a pile. The pile is held steady while the hammer vibrates the pile to the desired depth. Noise levels for vibratory hammers are not as high compared to impact hammers; however, piles installed with vibratory hammers must often be proofed. Proofing requires that the pile be struck with an impact hammer to determine the load bearing capacity of the pile. If this is required, noise will be similar to that of impact pile driving.

3.10.2 Cofferdam Construction

Cofferdams are temporary structures designed to keep water and/or soil out of the excavation in which a bridge pier is built. When construction must take place below the water level, a cofferdam is built to give workers a dry work environment. Sheet piling is driven around the work site, seal concrete is placed into the bottom to prevent water from seeping in from underneath the sheet piling, and the water is pumped out. The typical cofferdam, such as for a bridge pier, consists of sheet piles set around a bracing frame and is driven into the soil sufficiently far enough to develop vertical and lateral support and to cut off the flow of soil and in some cases the flow of water. The structure inside may be founded directly on rock or firm soil or may require pile foundations. In the latter case, these generally extend well below the coffer dam. Inside excavation of the coffer dam is done using clam shell buckets. In order to dewater the coffer dam, the bottom must be stable and able to resist hydrostatic uplift. Placement of an underwater concrete seal course is the fastest and most common method.

An underwater concrete seal course may then be placed prior to dewatering in order to seal off the water, resist its pressure, and also act as a slab to brace against the inward movement of the sheet piles in order to mobilize their resistance to uplift under the hydrostatic pressure. Every cofferdam is unique and requires a thorough analysis. The design must be compatible with the weather conditions, waves, currents, construction equipment, construction methods, internal permanent structures, and ground conditions. Typical cofferdam construction sequencing is described below.

- Drive temporary support piles.
- Temporary erect bracing frame on the support piles.
- Set steel sheet piles, starting at all four corners and meeting at the center of each side.
- Drive sheet piles to grade.
- Block between bracing frame and sheets, and provide ties for sheet piles at the top as necessary.
- Excavate inside the grade or slightly below grade, while leaving the cofferdam full of water.
- Drive bearing piles (impact or vibratory hammer)
- Place rock fill as leveling and support course.
- Place concrete seal.
- Check blocking between bracing and sheets.
- Dewater.
- Construct new structure (footing block, block between footing and sheet piles, pier pedestal, pier shaft).
- Flood cofferdam.
- Remove sheet piles.
- Remove bracing.
- Backfill.
- Repeat as necessary (number of piers dependent on specific situation)

3.10.3 Bridge Beams or Girders

The words beams or girders are used interchangeably when referring to bridges. They are designed to carry the different loads applied to the superstructure and transfer these loads through the bearings to the substructure. Beams are typically constructed of structural steel, pre-tensioned/pre-stressed concrete, or cast in place reinforced concrete.

3.10.4 Deck Construction

After all piles have been driven, piers completed, and beams installed; the deck of the bridge is constructed. A bridge deck normally consists of cast-in-place reinforced concrete. Deck placement operations begin by placing deck forms, installing reinforcing steel, and placing/pouring concrete. After concrete is in place, it is finished and cured. For construction of pedestrian bridges, wood planks are often laid down, which acts as the bridge deck.

3.10.5 Abutment and Approach Slabs

Bridge abutments are constructed at the ends of the bridge to join the structure with the roadway, support the ends of the bridge, and transfer the loads from the superstructure into the ground, and support the bearing devices and the back walls. Abutments are typically constructed out of pre-cast or cast-in-place concrete.

Approach slabs are constructed at the ends of bridges in order to reduce the effects of settlement. Typically approach slabs consist of concrete structural slabs supported at one end on the bridge abutment and at the other end on the embankment soil.

3.10.6 Lighting/Utilities

Lighting is typically installed on bridges to provide increased safety of the roadway and the type and quantity to be installed is dependent upon the project and length of bridge. Other utilities may be installed as part of new bridge construction and may include communication lines, gas or fuel lines, power lines and utility pipelines.

3.10.7 Temporary Shoring

Temporary shoring is a provision of a support system for trench faces used for installations of walls, footings, and other structures that require excavations. Temporary shoring is designed and constructed to hold the surrounding earth, water, or both out of a work area. It provides vertical or sloped cuts, benches, shields, support systems, or other systems to provide the necessary protection in accordance with the approved design. Unless complete details are included in the plans, the contractor is responsible for the design of the temporary special shoring. However, the contractor must submit details and design calculations bearing the seal of a licensed professional engineer for approval before constructing the shoring. Temporary shoring is used for the following situations: at the back of fill-type retaining structures in cut situations; in front of existing structures such as retaining walls, bridge supports, and header banks; on projects with staged construction; near railroads; and for bridge footings. Shoring systems consist of poles, wales, struts, and sheeting. There are two basic types of shoring, timber and aluminum hydraulic.

3.10.8 Causeway

In some instances to gain access to a work site (particularly for new bridge construction), equipment can cross a waterway only by means of a permitted crossing or causeway, which is a road atop an embankment. Regulatory permits from the USACE (Nationwide Permit 33) are required prior to any disturbance to the waterway. Appropriate measures must be taken to maintain near normal downstream flows and minimize flooding. Fill must consist of materials (typically clean rock), and be placed in a manner that will not be eroded by expected high flows. The use of dredged material may be allowed if the district USACE engineer determines that it will not cause more than minimal adverse effects on aquatic resources. A causeway is constructed as narrow as practical to provide for passage of equipment while preventing the movement of any fill into the water. Culvert pipes may be required if filling more than a one-third of the waterway. Pipes may also be required per the terms of the USACE permit. Temporary fills must be removed in their entirety and the affected areas returned to preconstruction elevations. The affected areas must be revegetated, as appropriate. Contractors are required to install and maintain erosion control measures throughout the functional life of a causeway. As part of the pre-construction notification for construction of a causeway, a restoration plan must be developed showing how all temporary fills and structures will be removed and how the area will be restored to pre-project conditions.

3.11 Bridge Demolition

Bridges can be removed (demolished) using several methods, and is ultimately up to the contractor on how they choose to remove the structure, as site and project specific conditions as well as costs may warrant a certain method of removal. Site and project-specific conditions may include: size of bridge and/or water feature, location within the system, environmental concerns, topography and the type of access to the bridge and stream/river banks. One method of bridge demolition is to dismantle the structure over water from an adjacent bridge deck or approach. Dismantling a bridge is completed by using concrete cutting elements, and removing pieces by crane. This can be done by sawing, water-jetting, or thermic lance. If a wet-blade concrete saw is chosen, a catch basin would be constructed at the site to collect cutting water/slurry. A vacuum would be used to collect the slurry for off-site disposal.

In order to maintain traffic, bridges are often dismantled half at a time. Traffic control is set up for one lane of traffic on half of the existing bridges. Removal of one half of the existing bridge including deck, girder, and rail is accomplished via saw cutting and lifting. Partial or complete removal of piers and walls between pier columns is accomplished down to natural channel bottom. Pier removal may require the use of handheld saws or an excavator mounted jackhammer (stinger). Portions of the deck and rail, girder, and end beam abutments will be removed as one piece, if possible. Portions to be removed would need to be cut free from the portion to remain, and then the piece would be lifted and removed using large or multiple construction cranes.

Another method for bridge demolition is pressure bursting which is classified into two categories; mechanical bursting and chemical bursting. Both mechanical and chemical pressure bursting split the concrete, either with a splitting machine operating on hydraulic pressure, or through insertion of an expansive slurry into a predetermined pattern of boreholes. Concrete is then split in a controlled manner for removal. The split concrete is then removed. Both mechanical and chemical splitting works by applying lateral forces against the inside of holes drilled into the concrete, and can do virtually any job other demolitions are capable of. However, rather than shattering the concrete into bits as dynamite and impact tools would, the lateral forces built up over time to crack the concrete into smaller sections.

Full containment may be installed in some situations to prevent debris from entering the water. Any materials (bridge portions, dredged/excavated materials) obtained from demolition activities are properly disposed of off-site by the contractor. Removal of asbestos and other potential hazards (i.e. lead paint) are completed in accordance with regulations set by the Occupational Safety and Health Act and the Environmental Protection Agency (EPA). Water quality degradation is minimized by implementing a number of best management practices (BMPs), selection dependent upon the bridge to be removed. For larger structures, a SPCC plan may be required in order to reduce the potential for spills or leaks within surface waters. To minimize erosion and sedimentation during demolition activities a variety of temporary and permanent erosion control measures may be implemented such as; silt fence and turbidity barriers, fiber rolls, mulching, matting, netting, and sediment traps and ponds.

Other methods such as use of explosives can be used to dismantle a bridge. However, this is a rare method to demolish a bridge, and is not covered in this programmatic biological assessment.

Dewatering may accompany bridge demolition activities. Dewatering of the stream channel is typically accomplished using structures such as aqua-barriers, sandbags, concrete barriers, or culverts placed within the active channel. These structures will either divert water to a portion of the channel away from active construction, or dam the channel and completely dewater the work area in order to pass all the water through the work site in a culvert or by pump. A temporary causeway or barge may be needed to facilitate bridge demolition as well. All in-water structures will be temporary and are removed after construction is complete.

3.12 Road and Right-of-Way Maintenance

The state of North Dakota is divided into eight districts and major responsibilities of each of the districts include maintenance operations, highway construction activities, and road/right-of-way management. Routine maintenance involves keeping all roads, roadsides, structures, and miscellaneous facilities as close to their original or improved condition as possible. Responsibilities of maintenance personnel include maintaining roadway surfaces true to type, cross-section, alignment, and grade as originally constructed or reconstructed; to preserve the original roadway in the safest and best condition possible; and to provide the services necessary to keep traffic moving in a safe manner.

In order to achieve the goals of maintaining a safe functioning roadway system, several activities are needed. These activities may include but are not limited to HBP overlays, chip-sealing, patching, roadway reconstruction, bridge maintenance, rest area maintenance, noise barrier maintenance, drainage and erosion control structure maintenance, scour and erosion repair (described in following section), system quality enhancements, pedestrian facility additions or improvements, landscaping or reseeding, curb and gutter work, and other items such as snow/ice/debris removal, noxious weed control, installation/removal of signage, drainage repair, cattle pass and wildlife crossing maintenance, and installing/removing fence.

A wide variety of equipment is used for road and right-of-way maintenance including, but not limited to: dump trucks, backhoes, rollers, snow plows, tractors, rotary mowers, and bridge snoopers. Although maintenance activities do not necessarily have a federal nexus involved (FHWA), this PBA can be used to minimize potential effects to ESA listed species and designated critical habitat as a result of routine NDDOT maintenance activities.

3.12.1 Cattle Pass Maintenance

Typically the NDDOT does not clean snow, ice, dirt/sedimentation, or water from the approaches, ends, or inside of a cattle pass, as it is the adjacent landowner’s responsibility to maintain the cattle pass for livestock use. However the NDDOT is responsible for maintaining the structural integrity of the cattle pass. If a cattle pass is being abandoned, the district checks with NDDOT Right-of-Way and Environmental staff for proper disposal/removal. Cattle pass structures are to be maintained as constructed and are similar to concrete box culverts or pipes. Concrete on cattle passes may occasionally need to be repaired with grouted rock or concrete.

3.12.2 Chemical Vegetation Control

North Dakota Century Code requires the NDDOT to provide for eradication or control of noxious weeds on NDDOT land. Applicators of pesticides and/or their direct supervisors (depending on pesticide label requirements) need to be certified by the Pesticide Control Board and must follow all applicable laws for use of pesticides. Typically, the NDDOT contracts with the county weed board for the control of noxious weeds.

3.12.3 Chip Seal/Seal Coat (Pavement Preservation)

A seal coat generally consists of a layer of asphalt binder that is covered by a single layer of embedded aggregate or “chips”. Seal coats are used as a preventative maintenance treatment to prolong the life of a pavement, correct surface raveling, prevent oxidation, provide skid resistance to worn pavements and seal the existing bituminous surface against the intrusion of air and water. The average life of a seal coat is approximately 7 years. The type of asphalt to be used for a seal coat is dependent upon the type of cover coat material in the area, the amount of traffic on the highway to be sealed, and the condition of the existing pavement. NDDOT typically uses cutback asphalt or emulsified asphalt for a seal coat. Equipment used for a chip seal includes an asphalt distributer, aggregate spreader, rollers, brooms, supply tanks, and aggregate haul trucks. Because chip seals remain entirely on an existing roadway surface, environmental effects are minimal and are limited to noise and visual disturbances.

3.12.4 Litter Collection

The NDDOT has the authority to collect any litter that accumulates along the highway right-of-way. There are also a number of programs that allow for volunteer groups to collect the litter in the right-of-way. Litter taken from the right-of-way is disposed of off-site.

3.12.5 Microsurfacing and Patching (Slurry Seal)

Slurry seal patching and microsurfacing are methods to help prevent further deterioration of roadway surfaces. The main difference between slurry seal and micro surfacing is that slurry seal uses a standard asphalt emulsion which requires evaporation to occur and sets in several hours. Microsurfacing uses a polymer-modified asphalt emulsion that produces a chemical reaction to force the moisture out and can set in less than an hour. Slurry seal is typically applied on residential streets, while microsurfacing is applicable for all roads, including interstate highways.

Microsurfacing is a mix of crushed aggregate, mineral filler, and latex-modified, emulsified asphalt and is applied with a squeegee or spreader box. Microsurfacing is often chosen to inhibit raveling and oxidation, as well as improving surface friction and filling minor irregularities and rutting in a roadway. Microsurfacing also addresses raveling, friction loss, moisture infiltration, bleeding, and roughness.

3.12.6 Mowing/Haying

NDDOT District staff initiates the first mowing of the season to allow for completion by early-mid July. The initial mowing provides for one pass along all shoulders and ramps. Medians on expressways are mowed to full width. On all other highways, the Districts work with the NDDOT Office of Operations each year to determine the timing, method, and width of cut for the initial mowing. Medians and in-slopes in rural areas are also typically mowed in the fall.

The adjacent landowner has the first opportunity for harvesting hay from the right-of-way of state highways. The District Engineer(s) may elect to restrict or delay mowing of a specific segment of right-of-way based on construction schedules, maintenance repairs, or environmental concerns. For harvesting hay from the right-of-way for interstates, a solicitation of bids for contract mowing will be offered to the public on a yearly basis.

3.12.7 Removal of Roadway Traffic Hazards

District staff provides the removal of any hazardous objects or debris from the traffic lanes as soon as possible, and if the debris is a safety issue, immediately. Animal carcasses are typically hauled off of the road and are either placed in the ROW as far from road as possible as to decompose naturally, or are hauled to a compost site. Other objects such as trees, rocks, etc. are removed and taken off-site. Automobiles are typically removed by the Highway Patrol.

3.12.8 Slope Protection Repair

Concrete slopes are checked yearly and repaired as needed. Cracks and open joints in concrete slope protection under structures are sealed with polymer modified or crumb rubber sealant. Cracks that are out of reach from the roadway are sealed with silicon sealant with backer rods, when necessary. Voids under concrete caused by erosion are repaired first by placing earthen fill prior to sealing cracks and open joints. Loose rock riprap slope protection may need to be reset or replenished at this time. If riprap is needed to be replaced with larger rock, it is grouted in place.

3.12.9 Snow/Ice Control

Snow and ice control is conducted by NDDOT maintenance staff for the safety of the traveling public. Controlling snow and ice is typically confined to the roadway surface, however stockpiling large amounts of snow may occur within or outside of the ROW. The use of salt, sand, and liquids may be used to help with melting snow, ice, or frost. When the intent is to provide traction, sand mixed with salt is often used. Anti-Icing of the road surface before or after the onset of a weather event assists in creating a bond breaker between snow or ice on the pavement. This can be done by using liquid or straight salt.

3.12.10 Tree Control

Tree control on rural highway right-of-way is required for safe roadside, adequate site distances, disease control, and to reduce the snow removal costs and billboard obstruction. Safe roadside is a clear zone of approximately 40 or more feet beyond the edge of the driving lane regardless of traffic volumes. Zones of more than 40 feet are desirable and trees are normally limited to the outer edge of the right-of-way.

Trees that are to be removed are cut at the ground line and disposed of off-site. Damaged or diseased trees are removed as necessary and tree control requires continuous management and includes the removal of trees while in the sapling stage.

Best management practices and conservation measures that will be employed to avoid minimize and offset impacts from these actions are detailed later in this document in the conservation measures section.

3.13 Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction

The following work activities may be required when stability issues affect the safety and usability of a roadway. Temporary and permanent erosion control measures are used as necessary throughout these work activities.

3.13.1 Slide Abatement/Landslide Correction

Slide abatement involves the removal of the slide material (debris, rocks, and snow), stabilizing slide areas, and repairing of roads damaged by slides. Regardless of the type of material from a slide, immediate cleanup of the material on the roadway is required to maintain safe driving conditions. Cleanup involves the use of dump trucks, backhoes, tractors, and other heavy equipment. Slide materials are typically deposited at NDDOT gravel pits or waste material locations. Suitable slide material may also be used as fill for other construction or maintenance activities.

Slide stabilization typically occurs during the summer months. Methods of stabilization of slides include; re-contouring of the slope, installation of shotcrete, buttresses, soil nails, retaining walls, and ditches. Pile driving, drilling, and other noise generating activities may be required to complete slide stabilization.

3.13.2 Bank Stabilization

Bank stabilization is often needed to support a roadway embankment by construction of a revetment (retaining wall). These actions typically occur in, or immediately above a river or waterway. Construction of a hard armor rip-rap revetment is done to prevent further undercutting and loss of roadway or roadway shoulder. Excavation and in-water work may be required to facilitate this activity, and may be performed below the ordinary high water mark to establish a foundation for the structure. Typically, an excavator is used for the excavation and placement of fill material and rock armoring. The excavator will create a trench along the washed area and filter fabric is used to line the toe and slope. Clean rip-rap is then placed in the toe trench and used to armor the fill. Granular material is often used as fill behind the rip-rap. This method is typically used to replace or repair existing embankments that have been previously armored.

Mechanically stabilized earth embankment walls (MSE Wall) may be used as a retaining wall, roadway embankment, or as a mattress to line an existing channel. The height and length of an MSE wall will vary according to the project. MSE walls consist of alternating rock or soil layers separated by wire, fabric, or metal strips holding the fill in place. In certain situations, the face of the MSE wall will be lined or covered with fascia of concrete or rock. Walls filled with rock are used to armor the bed and/or banks of channels, divert flow away from eroding channel sections, or support a roadway section to avoid or minimize filling into a stream.

Installation of the MSE wall requires excavation and preparation of the foundation material. The MSE layers are placed on the prepared foundation and carefully filled in lifts to allow for uniformity and to avoid deformation. Material resulting from the excavation may be used in backfilling the wall, or disposed of at an approved waste site.

Willow staking provides structural stabilization of a bank and involves the insertion of live, vegetative cuttings into the ground in a manner that allows the cutting (stake) to take root and grow. Willow stakes are a live “rebar’, while willow poles are generally much longer and used for structure reinforcement. Joint planting or face planting involves tamping live stakes of rootable plant material or rooted cuttings into soil in the spaces of porous revetments, rip-rap, or other retaining structures.

3.13.3 Flood/Scour/Sinkhole Repair

Bridge scour is defined as the removal of soil from around bridge foundations (abutments/piers). Flowing water transports soils from around a bridge foundation and moves it downstream, leaving the foundations exposed and in some cases undermined. Depending on the severity of a scour, the integrity of a bridge could be at risk and in some cases a scour can lead to a partial or total collapse. In order to correct scours around foundations, several techniques may be used. These include; installation of re-directional barbs in the water to redirect the flow of water away from the piers, parallel buried groin in banks, anchor points, drop structures, debris jams, porous weirs, turning rocks, rip-rap on the banks, and bio-engineered bank stabilization materials.

Minor erosion under a bridge is typically repaired by first placing earthen fill and then is protected with riprap or other slope protection if existing slope protection is present. If high water causes scour that displaces or removes loose rock riprap protection around foundations, riprap is replaced and grout (one part Portland cement and two parts sand, by volume) may be used to anchor riprap and prevent scour reoccurrence. Various types of light and heavy equipment may be used to complete these repairs.

3.13.4 Landslide Correction

Landslides can affect the safety and function of a roadway. In order to correct a landslide, earthwork is needed to repair the slide, and in some instances to relocate the existing roadway. Landslide areas are excavated and modified to a determined slope with bench sections. Perforated pipe underdrains may be placed along the ditch bottom to assist in preventing future slides. If roadways need to be realigned, pavement and base from the existing roadway is removed and salvaged. Excess materials are hauled to approved waste sites.

3.14 Bridge Painting

Steel bridges are painted on an as-needed basis, typically every 10 to 17 years. Bridge painting involves abrasive blasting (typically sand) to remove all corrosion, washing the bridge, and then applying a number of coats of paint. Paint is applied when temperatures are above freezing and is not raining. Prior to pressure washing a bridge, all debris is removed by hand or vacuumed and is disposed of off-site. Pressure washing is then completed in order to prepare the surface for spot abrasive blasting and painting. The wash water from pressure washing is passed through a filter fabric prior to entering a receiving water body. Filter fabric is sized to capture loose debris and materials collected in the filter fabric is removed daily and disposed of properly. Full containment is used to complete abrasive blasting and the contractor is responsible for spent material removal to an approved off-site location. During painting, the use of drip tarps and tarp containment is required to prevent overspray and paint from entering water. Scaffolding may be required in order to complete bridge painting activities. Various types of equipment are used to complete bridge painting activities including, but not limited to: hand tools, power tools, and light/heavy equipment including bridge snoopers. Typically, multiple bridges needed to be repainted are tied together in a single project. The length of bridge painting activities is dependent on the size of the structure(s) as well as weather conditions. The testing for lead paint may be required for bridge painting projects, if lead paint is detected, measures are taken to properly remove and dispose of lead containing materials in accordance with state and federal laws.

3.15 Bridge Preservation/Rehabilitation

Various types of maintenance are needed in order to keep bridges in working order as well as to prevent or minimize deterioration. The following section describes common types of bridge preservation/rehabilitation activities. Items such as erosion, scour, slope protection repair, and core sampling may also occur during this project phase; however are covered in previous sections.

3.15.1 General Bridge Maintenance

Mechanical sweeping is needed in order to remove accumulation of salt and debris from winter snow and ice control activities. Cleaning and washing of the bridge deck requires that the deck is power-washed to remove any sand or salt that may remain after bridge sweeping activities. Bridge expansion joints typically need to be cleaned annually in the spring after sanding operations have ceased. Expansion joints must be free of dirt and debris in order for them to perform properly and to prevent damage to the joint seal.

Cleaning and repairing deck drains are also completed annually in the spring after sanding operations have ceased so that debris is not plugging the drain. Spalled concrete (concrete that is broken up, flaked or pitted) on a bridge deck, beam, or substructure is repaired as needed. Bridge decks, beams, or substructures that have spalling/delamination are repaired by applying a thin layer of bonding agent and is patched with various materials. Expansion joints are also cleaned as needed.

Bridge deck surfaces may be treated every six years with a surface treatment of Silane or Linseed Oil. The treatment is applied to bridge decks to prevent water and anti/deicing materials for seeping into the deck surface. Bridge decks are swept and power-washed before surface treatment is applied. When a bridge deck is 10-15 years old, surface treatments such as Safe Lane, epoxy overlays, or urethane-based or methacrylate overlays are sometimes applied based on the condition of the bridge deck.

Approach slabs on bridges are repaired as needed. Repair of spalls and delamination are completed with the appropriate patch material to smooth the ride for motorists. Permanent repair consists of mud jacking, which consists of pumping a water, dirt, and cement mixture under a slab in order to lift it.

Other work items conducted for general bridge maintenance include the repair/replacement of: degraded steel, bridge railing, joint seals, bearings, and structural support elements.

3.15.2 Chloride Extraction

Electrochemical chloride extraction (ECE) is a process that extracts chloride ions from chloride-contaminated reinforced concrete structures by applying an electrical current between the embedded steel and an external anode. ECE is becoming increasingly popular as a rehabilitation option for chloride-contaminated reinforced concrete structures to mitigate ongoing corrosion of embedded steel.

The process for chloride extraction are as follows. An anode embedded in an electrolyte media is applied to the surface of the concrete. The electrolyte media is saturated using an appropriate electrolyte. The anode and the reinforcing steel in the concrete are connected to the two terminals of a direct current (DC) power supply such that the anode is positively charged and the rebar is negative.

Chloride ions are removed from the concrete by ion migration. Chloride ions being negative ions migrate toward the positive electrode, the anode. Since this is external to the concrete, the chloride ions will leave the concrete and concentrate around the anode. Thus, the chloride content of the concrete is reduced, particularly on and around the negatively charged reinforcing steel where the concrete for all practical purposes becomes free of chlorides. Simultaneously, the electrolytic production of hydroxyl ions at the reinforcing steel surface results in a high pH being generated around the steel. Therefore, when the process is terminated and the installation is removed, the reinforcing steel will be situated in chloride free, highly alkaline concrete. The result is a strong re-passivation of the embedded reinforcing steel. Corrosion of the reinforcing steel is halted. Electrochemical chloride extraction requires a number of site utilities and services. The most notable of these are; a power supply, a water (electrolyte) supply, and physical access to the site.

Electrochemical chloride extraction can be used to remove chloride ions from chloride contaminated concrete. A number of anodes, electrolytes, and electrolyte mediums are available for this purpose. Each material or system option has its own advantages and disadvantages. The most appropriate choice of materials and configuration will depend on site conditions and project requirements. Electrochemical chloride extraction will occur with any selection of anode, electrolyte, and electrolyte media, but the efficiency of the chloride removal process, the time required to complete the work, the cost, and the ease of operation will depend on the combination selected and the specific site conditions.

3.15.3 Deck Repair and Replacement

Bridge deck repairs and complete deck replacement may be necessary to keep a bridge operating in a safe manner. Bridge decks that are made of concrete are partially removed and replaced. Removal may involve jackhammers, concrete saws, and hydro-demolition (high-pressure water). Longer bridges have expansion joints that must be repaired and replaced as needed. Bridge repair, painting and retrofit projects may involve hanging scaffolding and containment devices under and around the bridges, and work is conducted in a manner which minimizes the chance of materials entering the water.

3.15.4 Deck Overlay

Deck overlays significantly increase the life of a bridge deck by sealing the deck surface which reduces the impact of aging and weathering. The overlay process begins by setting up traffic control and closing all or parts of a bridge. Contractors then use a hydro-milling machine or other similar equipment to remove portions of the top layer of the existing deck concrete and any previous patches. The removal of the top layer of concrete also removes a high percentage of salt in the bridge deck. Any waste water generated during this process is properly disposed of by the contractor. The next step is to fill repair areas below the top mat of reinforcing steel with concrete. A finishing machine is used to place the concrete overlay and to ensure uniform placement of the desired thickness. The overlay is checked for strength, and if at or above desired strength, the bridge is opened to traffic.

3.15.5 Fixed Automated Spray Technology

Fixed automated spray technology (FAST) systems chemically treat roadways to prevent the formation/bonding of frost, ice and snow. Key components of a FAST system include pavement sensors; weather sensors/station; a pump house containing pumps, storage tanks, power/communication equipment, and a computer controller; spray nozzles; and plumbing (electrical/anti-icing chemical) connecting the pump house to the spray nozzles. The NDDOT pump houses also have a warning light on the outside of the structure in case a problem occurs with the system, such as having a low quantity of anti-icing solution in the storage tank.

The FAST systems incorporate a Road Weather Information System (RWIS) Environmental Sensor Station (ESS) to measure pavement and atmospheric conditions to determine the optimal time to activate the FAST system. When the FAST systems are activated, a self-priming pump sequentially activates the spray nozzles. Once the spray cycle is completed, the remote processing unit (RPU) pressurizes the system to approximately 200 pounds per square inch (psi). The systems can be activated automatically using spray algorithms and manually using various methods of communication.

Several chemicals are available for FAST systems, which include magnesium chloride ($MgCl_2$), sodium chloride (NaCl), calcium chloride ($CaCl_2$), calcium magnesium acetate (CMA), and potassium acetate (KAc). These chemicals have various corrosive properties, treatment effectiveness, environmental impacts, and costs. The NDDOT's FAST systems use Cryotech CF_7, which is manufactured by Cryotech Deicing Technology. CF_7 is a potassium acetate based deicing/anti-icing liquid that contains no nitrates, sodium, or chlorides. The product has a freezing point of -76°F and is effective to temperatures of -20°F and below.

The chemical CF_7 is generally safe for the environment since it readily biodegrades and has a low biological oxygen demand. In addition, CF_7 is generally non-corrosive, which is highly desirable for structures, such as bridges, consisting of reinforced concrete.

3.15.6 Heat Straightening

Heat-straightening is conducted on bridges by applying a limited amount of heat in specific patterns to the deformed regions of steel in repetitive heating and cooling cycles to produce a gradual straightening of the material. The process relies on internal and external restraints that thicken during the heating phase and contract during the cooling phase. Unlike many other methods, force is not used as the primary instrument of straightening. Rather, the thermal expansion/contraction during the heating process leads to a gradual straightening. When properly done, heat-straightening is a safe and economical way to repair damaged steel. The three key elements to the heat straightening process are: selecting the proper heating patterns and sequencing to fit the damage, properly control the heating temperature and rate of heating and cooling, and provide the appropriate restraints during the heating cycle.

3.15.7 Hydro-Demolition

Hydro-demolition is a method of removing deteriorated or unsound concrete that utilizes direct impact of a water jet through a combination of pressure and water flow. The basic steps in the hydro-demolition process are as follows. The first step is scarifying of the original bridge deck is required before hydro-demolition of the surface. Hydro-demolition is completed with a computerized self-propelled robotic machine that uses a high pressure water jet stream in the range of 15,000-20,000 PSI and usually removes all unsound concrete in one pass. In areas inaccessible to the hydro-demolition robot, hand held high pressure wands or 35 lb. maximum jackhammers are used. Contractors then remove hydro-demolition debris with vacuum equipment before the debris and water is allowed to dry on the deck surface. After debris is removed, the deck surface and exposed reinforcing steel is clean and ready for concrete placement (Deck Overlay).

3.15.9 Shotcrete or Gunnite Application

Shotcrete is frequently used to repair concrete bridges. Shotcrete refers to a process in which compressed air forces mortar or concrete through a hose and nozzle onto a surface at high velocity and forms structural or nonstructural components of bridges. There are two processes for applying shotcrete. Dry-mix shotcrete, in which most of the mixing water is added at the nozzle; and wet-mix shotcrete as shotcrete in which the ingredients, including water, are mixed before introduction into the delivery hose. An accelerator, if used, is normally added at the nozzle.

Based on these definitions, shotcrete can be either mortar (containing sand for aggregate) or concrete (containing sand and coarse aggregate) and can be applied by either the dry-mix or the wet-mix process. There are numerous other terms and brand names that have been used over the years for shotcrete. One of the most commonly used terms is Gunnite, actually a brand name that is frequently used to mean shotcrete mortar applied by the dry-mix process.

In dry-mix shotcreting, cement and damp aggregate are mixed. The aggregate is dampened with about 5 percent water by weight of aggregate to reduce dust. This dry-mix material is then fed into the shotcrete machine or gun. The gun feeds the material into a hose where the material is transported by compressed air to a nozzle. The nozzle contains a water ring that injects water into the material stream just before it exits and travels to the application surface at high velocity (about 500 feet/second). A water valve allows the nozzleman to control water content. Final mixing occurs as the materials hit the application surface, and the nozzle is usually moved in a circular pattern to assist in mixing. Set accelerating admixtures, frequently used in tunnel support shotcrete, can be added as a powder as the mixture enters the gun, or can be added as a liquid in the water supply. Other materials can be added in a similar manner or can be mixed with the dry material, depending on the type of material being added.

In wet-mix shotcrete, all ingredients except accelerators are mixed to form a concrete or mortar. No water is added at the nozzle. The concrete or mortar then enters the gun that forces the mixture through the delivery hose to the nozzle, where compressed air is used to increase the velocity of the stream and improve the gunning pattern. Accelerators can be added at the nozzle. Many wet-mix guns are essentially concrete pumps of the proper capacity for shotcreting.

Advantages of the dry-mix process include an excellent bond to existing materials, longer hose lengths, dry material can be easier to remove from plugged hoses than wet concrete, water content can be instantly adjusted to meet field conditions, set accelerators are easier to add, and equipment is usually cheaper to buy and maintain.

Advantages of the wet-mix process include large capacity guns, less rebound due to complete mixing, less dust, more uniform in-place material, more accurate control of water content, and better success in adding air-entraining admixtures.

3.15.10 Debris Removal

Debris removal from bridge piers is accomplished in a variety of methods depending on the type and quantity of debris as well as the size and configuration of the bridge. Hand removal is possible in some situations, while others require mechanical features such as chainsaws, winches, and heavy equipment.

3.16 Drainage Improvements

Drainage structures perform the vital function of conveying, diverting, or removing surface water from the highway ROW (or county road ditches). In order to prevent problems caused by surface water, drainage improvements may need to be performed. The following section describes measures taken to maintain drainage along a ROW/road.

3.16.1 Drainage (Culvert) Maintenance

Drainage features (culverts) occasionally become obstructed with dirt, silt, rocks and other debris and requires cleaning to maintain proper function. Several methods are used to clean out culverts and the chosen method is dependent upon culvert size, type of obstruction(s), as well as the sensitivity or type of the channel or stream the culvert conveys. Manual methods are used when the culvert is big enough for access by laborers to remove debris by hand, where debris is taken from the inside or ends of the culvert and is removed and disposed of. Mechanical methods are used when there is ample space for excavators or backhoes to remove obstructions such as sediment, rocks, branches, etc. Erosion control methods may be required to minimize sediment transport.

Drag lines may also be used in certain situations, particularly for small diameter culverts. This method requires that a cable or chain attached to a solid rod is threaded through the culvert. The cable or chain is then attached to an object that has a smaller diameter than the culvert. The object is then pulled through the culvert to mechanically clear the debris from the culvert. Hydraulic pressure is another method that may be used for small diameter culverts. This method uses a water tank truck, high pressure pump, and a special rotating hose head. The hose is fed into the culvert and the pressure causes it to rotate and spray simultaneously, loosening and washing the debris out of the culvert.

Dewatering may be a necessary component in order to facilitate cleaning out drainage structures. Dewatering is often accomplished using structures such as aqua-barriers, sandbags, concrete barriers or culverts placed in the active channel. These structures will either divert water to a portion of the channel away from active construction, or dam the channel and completely dewater the work area in order to pass all the water through the work site in a culvert or by use of a pump. All structures placed in a channel are temporary and are removed once construction is complete. Cofferdams may also be needed to dewater/isolate the project area during cleaning operations to reduce sediment transport into the aquatic resource. Depending on the location, time restrictions for in-water work may be implemented to avoid impacts to aquatic species, typically April 15th – June 1st.

3.16.2 Culvert Liner Installation

Culvert liner installation is another method that can be utilized to refurbish a failing or old culvert. Culvert liners can be a spray or sleeve, and are installed on the inside of an existing culvert. The liner is typically constructed of high density polyethylene and is inserted into the failing culvert. Generally, the liner comes in sections that are connected together using a gasket or an O-ring. As the liner is installed, following liner sections are added until the culvert has been completely lined from the inlet to the outlet. The ends of the culvert liner are then trimmed to conform to the ends of the culvert and the bank/slope of the surrounding terrain. After installation the space between the culvert and liner are filled with grout so that water stays in contact with the liner and away from the natural soil adjacent to the culvert. Once grouting is complete, if necessary, the inlet and outlet ends are dressed with rip-rap, concrete, or other material. Shotcrete or gunnite may also be used to line a culvert.

3.16.3 Culvert Extension

If culverts need to be extended, the process is similar to new installation of a culvert. Depending on the situation, soil will need to be removed to accommodate the new length of the culvert. Prior to placement, the excavated area is bedded and the culvert extension is installed and banded to the existing culvert. Material is then brought in to cover the culvert and properly compact to avoid settlement in the future. In order to prevent scouring at the inlet and outlet, concrete aprons may need to be poured or riprap may need to be installed.

3.16.4 Ditch Cleaning/Reshaping

The purpose of ditch cleaning is to restore the interceptor ditches that are located adjacent to the highway and control drainage from the roadway. Work activities consist of removing material from the roadside ditch that has been deposited over time by erosion and in some instances rock-falls. Excavation and haul may be needed to improve the ditch to convey drainage. After cleaning/reshaping, the foundation will be prepared and embankment properly compacted to prevent future settlement and washouts of the ditch. In some situations it may be necessary to line the ditch with coarse gravel or other material to prevent erosion. Certain situations may also require that rock check dams be installed to prevent excessive erosion. Equipment that is common to this work activity includes loaders, excavators, and dump trucks.

3.16.5 Bank Stabilization

See Section 3.13.2 for a description of bank stabilization.

4.0 Construction Equipment for Roadway Construction

Table 2 is a list of equipment most commonly used in roadway construction and maintenance. The selection and use of the various equipment within this table is dependent upon the scope of the proposed project.

Table 2. List of Commonly Used Construction Equipment for Roadway Construction

Asphalt Emulsion Truck	**Excavators**	**Rock Drills**
Auger Drill Rig	**Fork Lift/Skid Steers**	**Rock Crushers/Trucks**
Backhoes	**Front End Loaders**	**Sand Blasters**
Bar Benders	**Generators**	**Sander Trucks**
Boring Jack Power Units	**Haul Trucks**	**Scrapers**
Boom/Bucket Trucks	**Horizontal Boring Hydraulic**	**Semi-Tractor Trailers**
Bulldozers	**Jack**	**Slurry Trenching Machine**
Chain Saws	**Impact Pile Drivers**	**Soil Mix Drill Rig**
Chip Spreaders	**Jackhammers**	**Snow Plows**
Cold Planers	**Loaders**	**Sweepers**
Compactors	**Man Lift**	**Tractors**
Compressor (air)	**Rollers**	**Trenchers**
Concrete Mixer Trucks	**Mounted Impact Hammer**	**Vacuum Excavator**
Concrete Pump Trucks	**Oil Distributers**	**Vacuum Street Sweeper**
Concrete Saws	**Pavement Scarifier**	**Ventilation Fans**
Curb Machines	**Pavers**	**Vibrating Hoppers**
Cranes	**Pickup Trucks**	**Vibratory Concrete Mixers**
Drill Rig Trucks	**Pneumatic Tools**	**Vibratory Pile Drivers**
Drum Mixers	**Pumps**	**Water Trucks**
Dump Trucks	**Rivet Busters**	**Welders/Torches**

Noise levels generated by individual pieces of construction equipment and site-specific construction operations form the basis for the prediction of construction-related noise levels. Stationary equipment consists of equipment that generates noise from one general area and includes items such as pumps, generators and compressors (FHWA 2006). These kinds of equipment operate at a constant noise level under normal operation and are considered non-impact equipment. Other types of stationary equipment including pile drivers, jackhammers, pavement breakers, and blasting operations produce variable and sporadic noise levels and often produce impact type noises. Noise levels at 50 feet from stationary equipment can range from 68-88 dBA (FHWA 2006). Impact equipment is equipment that generates impulsive noise (i.e. short duration, generally less than one second). Impulsive noise is also high-intensity, abrupt onset, rapid decay, and often rapidly changing composition. Noise levels at 50 feet from impact equipment can range from 79-110 dBA (FHWA 2006). Blasting may be associated with impact equipment use and can reach 126 dBA.

Natural factors such as topography, vegetation, and atmospheric conditions (wind, temperature) can reduce in-air noise over distance. Dense vegetation can reduce noise levels by as much as 5 dB for every 100 feet of vegetation, up to a maximum reduction of 10 dB over 200 feet (USDOT 1995). Wind can reduce noise levels by as much as 20 to 30 dB at long distances (USDOT 1995). Point source noise associated with a source that remains in place for long periods of time, typical of most construction activities. Examples of point source noise are pile drivers, jackhammers, and excavators working in one location. Point source noise for construction activities is typically measured by maximum decibel level (Lmax). Line source noise is generated by moving objects along a linear corridor. Example of line source noise is highway traffic.

5.0 ESA Listed Species and Critical Habitat in North Dakota

This PBA addresses the following species and critical habitat that occur or could occur across the state of North Dakota. Several species are seasonal residents of the state, while others can be found within the state year-round. In addition certain species are only found within certain areas of the state as described by counties in Table 3. Further information on individual species can be found in the following section of this document.

Table 3. Threatened and Endangered Species and Critical Habitat of North Dakota

Common Name	***Scientific Name***	***Status***	***Presence in North Dakota***
Whooping Crane	*Grus americana*	Endangered	Spring: April 1 – May 15*
			Fall: September 15 – November 15*
Counties - Statewide			
Black-Footed Ferret	*Mustela nigripes*	Endangered	Year Round; However, Presumed Extirpated in North Dakota
Counties - Adams, Billings, Bowman, Dunn, Golden Valley, Grant, Hettinger, McKenzie, Mercer, Morton, Oliver, Sioux, Slope, Stark			
Pallid Sturgeon	*Scaphirhynchus albus*	Endangered	Year Round
Counties - Burleigh, Dunn, Emmons, McKenzie, McLean, Mercer, Morton, Mountrail, Oliver, Sioux, Williams			
Gray Wolf	*Canis lupus*	Endangered	Year Round
Counties - Statewide			
P***oweshiek Skipperling***	*Oarisma Poweshiek*	Endangered	Year Round; However, Presumed Extirpated in North Dakota
Counties - Richland (DCH) and Sargent			
Piping Plover	*Charadrius melodus*	Threatened	April 15 – August 31*
Counties - Benson, Burke, Burleigh, Divide, Dunn, Eddy, Emmons, Kidder, Logan, McHenry, McIntosh, McKenzie, McLean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Sheridan, Sioux, Stutsman, Ward, Wells, Williams. DCH in all counties aside from Wells.			
Western Prairie Fringed Orchid	*Platanthera praeclara*	Threatened	Year Round
Counties - Ransom and Richland			
Dakota Skipper	*Hesperia dacotae*	Threatened	Year Round
Counties - Barnes, Bottineau, Burke, Dunn, Eddy, Griggs, McHenry (DCH), McKenzie (DCH), McLean, Mountrail, Oliver, Pierce, Ransom (DCH), Richland (DCH), Rolette (DCH), Sargent, Stutsman, Ward, Wells			
Rufa Red Knot	*Calidris canutus*	Threatened	Spring: April 15-May 31*
			Fall: August 1 – September 15*
Counties - Benson, Burke, Burleigh, Divide, Dunn, Eddy, Emmons, Kidder, Logan, McHenry, McIntosh, McKenzie, McLean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Sheridan, Sioux, Stutsman, Ward, Wells, Williams			
Northern Long-Eared Bat	*Myotis septentrionalis*	Threatened	Year Round
Counties - Statewide			
Rusty Patched Bumblebee	*Bombus affinis*	Proposed	Year Round; However, Presumed Extirpated in North Dakota
Found in southeast North Dakota			

*Species may be found in the state outside of these ranges, depending on the year. (DCH) – Designated Critical Habitat

5.1 Threatened and Endangered Species and Designated Critical Habitat

The following section provides descriptions for each threatened and endangered species, as well as designated critical habitat found within North Dakota. A deconstruction matrix was prepared to describe all aspects of NDDOT projects and is included as Appendix C in this document. The matrix breaks down NDDOT project phases into activities and sub-activities and identifies potential stressors and responses for each listed species and critical habitat as well as conservation measures that can be applied to reduce potential effects to listed species or critical habitat.

5.1.1 Interior Least Tern (*Sterna antillarum*)

Figure 1. Least tern adults and chick.

Species Description and Life History

The least tern is the smallest member of the gull and tern family, and measures approximately 9 inches long with narrow pointed wings and a forked tail. Least terns are further characterized by a black-capped crown, white forehead, grayish back and dorsal wing surfaces, snowy white undersurfaces, orange or yellow legs, and a black-tipped bill (USFWS 1990). The least tern is a migratory species and historically bred along the Mississippi, Red and Rio Grande River systems as well as the rivers of central Texas. The breeding range extended from Texas to Montana (including North Dakota) and from eastern Colorado and New Mexico to southern Indiana, including the Red, Missouri, Arkansas, Mississippi, Ohio, and Rio Grande River systems (USFWS 1990). Currently, the interior least tern continues to breed in a majority of the above listed rivers; however their distribution is generally restricted to less altered river segments.

The breeding season for least terns typically lasts from May 1st - August 31st, and the peak of nesting occurs from mid-June through mid-July. Least terns construct nests in shallow depressions on open sandy areas, gravelly patches, or exposed flats that are sparsely vegetated. Least terns nest in colonies, and nests can be scattered up to hundreds of meters apart, or as close as a few meters. In addition to colonial nesting, breeding behavior incudes courtship, egg-laying (two to three eggs per clutch), incubation of eggs (20 to 25 days), brooding (one week), and fledging (after three weeks). Least tern reproductive success can vary greatly along a stretch of river or shoreline, as the species are susceptible to frequent nest and chick loss (USFWS 1990).

The least tern feeds primarily on fish, and may also feed on crustaceans, insects, mollusks, and annelids (Whitman 1988). Foraging behavior involves hovering and diving over standing or flowing water. Typically, adult least terns forage in close proximity to nesting colonies; however the species has been documented to travel 7.5 miles or more from their nest sites to forage in wetlands or riverine habitat (USFWS 1994).

Least terns will spend 6-7 months at wintering sites along coastal areas of Central and South America and the Caribbean Islands; however more information is needed regarding least tern wintering areas.

Threats

Channelization, irrigation, and the construction of reservoirs and pools have contributed to the elimination of much of the least tern's sandbar nesting habitat in the Missouri, Arkansas, and Red River systems (USFWS 1990). Current regulation of Missouri River dam discharges pose additional issues for least terns nesting in remaining habitats (Nebraska Game and Parks Commission 1985, Schwalbach 1988). Before widespread regulation of river flows, there was more predictability in summer flow patterns. Peak flows occurred in March from local runoff and then again in May and June when mountain snowmelt occurs. Least terns were then able to nest when flows were declined as sandbars were exposed due to dropping water levels.

Currently, water demands are unpredictable and flows can fluctuate greatly from year to year as well as during the breeding season for least terns. High flow periods may extend into the prime nesting season which reduces quality of nesting sites, and may cause least terns to nest in poor quality habitat conditions. Large fluctuations in water flows can destroy/flood nests, inundate potential nesting areas, or dewater feeding areas (USFWS 1990). Least terns will re-nest if conditions allow, and this behavior may be an adaptation to fluctuating river conditions.

Many rivers have become recreational areas throughout the United States, which creates human disturbance that can cause nest abandonment from breeding least terns. Predation and vegetation encroachment may also contribute to poor reproductive success for this species.

Current Status

The interior least tern was listed as an endangered species on June 27, 1985 (50 FR 1985). Current census data indicates that there are approximately 8,000 least terns in the interior population. In North Dakota, the species is mainly found on the Missouri River from the Garrison Dam south to Lake Oahe, and on the Missouri and Yellowstone Rivers upstream of Lake Sakakawea. Although Lake Sakakawea has large amounts of shoreline, this reservoir is seldom used by least terns. Available habitat on the lake is dependent on the water levels during the breeding season. Least tern use of Lake Sakakawea has never been observed to be high even in drawdown state; and it is expected that only a small number of least terns nest on the lake (Shaffer et al. 2013). Approximately 100 breeding pairs are thought to occur in North Dakota (USFWS 2013).

5.1.2 Whooping Crane (*Grus americana*)

Figure 2. Whooping Crane adults and chicks.

Species Description and Life History

The whooping crane is the tallest bird in North America, approaching 5 feet when standing upright, and has a wingspan of up to 7 feet. Adult plumage is snowy white except for black wingtips and red markings on the head (USFWS 2011). Juvenile whooping cranes plumage is a reddish cinnamon color. Whooping cranes are a migratory species and historically the species range extended from the Arctic coast south to central Mexico, and from Utah east to New Jersey, South Carolina, Georgia, and Florida (Allen 1952, Nesbitt 1982). Historical nesting areas extended from central Illinois, northwestern Iowa, northwestern Minnesota, northeastern North Dakota, western Manitoba, southern Saskatchewan, and into east central Alberta (Allen 1952). Historical wintering areas included tall grass prairies in Louisiana, Gulf Coast of Texas, and northern Mexico. The current nesting range of the self-sustaining natural wild population is restricted to Wood Buffalo National Park (WBNP) in Saskatchewan, Canada; and the current wintering grounds of this population is restricted to the Texas Gulf Coast at Aransas National Wildlife Refuge (ANWR) and vicinity (USWFS 2014).

Whooping cranes are monogamous and form life-long pair bonds, but will re-mate following the death of a mate. Whooping cranes reach the same breeding grounds in WBNP, Canada in April and will nest in the same general area every year. Whooping cranes generally do not produce fertile eggs until age 4. Nests are constructed of bulrush and whooping cranes lay one to three eggs in late April to early May. Incubation period lasts approximately 29-31 days, and whooping cranes may re-nest if the first clutch is destroyed before mid-incubation (USFWS 2014). Although the species generally lays two eggs, seldom does more than one chick reach the fledging stage. Autumn migration to wintering grounds begins in mid-September, and most birds arrive on the wintering grounds of ANWR by late-October to mid-November. Whooping cranes migrate singly, in pairs, in family groups or small flocks, and sometimes migrate with sandhill cranes (*Grus canadensis*). Pairs with young are among the last to leave the breeding grounds. Whooping cranes are diurnal migrants, and will stop regularly to rest and feed, using traditional migrating staging areas. Spring migration is preceded by dancing, unison calling, and frequent flying. Family groups and pairs are the first to leave ANWR in late-March to mid-April (USFWS 2014).

Whooping cranes are omnivorous and probe the surface of soil with their bills, taking foods from the soil surface or vegetation (CWS and USFWS 2007). Young chicks are fed by adults. Summer foods include large nymphal or larval forms of insects, frogs, rodents, small birds, minnows and berries (Allen 1956). Foods utilized during migration are poorly documented, but include frogs, fish, plant tubers, crayfish, insects, and agriculture grains (CWS and USFWS 2007). Winter diet consists of predominately animal foods (small mammals, amphibians, crustaceans, fish, insects, etc.).

Whooping cranes utilize a variety of habitats during migration (CWS and USFWS 2007).
They use shallow, seasonally and semi-permanently flooded palustrine (marshy) wetlands for roosting, and various cropland and emergent wetlands for feeding. In addition, whooping cranes are often recorded in riverine habitats, including the Missouri River. Suitable migratory stopover habitat for whooping cranes includes areas of shallow water without visual obstructions (i.e., high or dense vegetation, rolling terrain, etc). Whooping cranes have been documented to utilize a wide range of wetland sizes for roosting, from small natural palustrine wetlands and manmade stock ponds (≈0.25 acres) to large lakes and rivers. Feeding and roosting sites are typically less than 0.6 mile apart, but can occasionally be separated by more than 5 miles (USFWS 2012).

Threats

The whooping crane became endangered primarily from hunting/shooting and habitat loss prior to the enactment of major conservation legislation, such as the ESA and Migratory Bird Treaty Act. The growth of the human population has resulted in significant whooping crane habitat alteration and destruction (CWS and USFWS 2007). Conversion of pothole and prairie to hay and grain production made much of the historic nesting habitat unsuitable for whooping cranes. Migration habitat has also been altered due to drainage of wetlands in the prairie pothole region.

Collisions with power lines are a substantial cause of whooping crane mortality in migration, and at least 44 whooping cranes have been killed or seriously injured since 1956 (CWS and USFWS 2007). Currently, approximately 804,500 km of bulk transmission lines and millions of distribution lines exist in the U.S. (Manville 2005). Additional power line construction throughout the principal migration corridor will increase the potential for collision mortalities. The Avian Power Line Interaction Committee (APLIC) was established in 1989 to address the issue of whooping crane collisions (Lewis 1997). The APLIC provided voluntary guidelines to the transmission industry on avoiding power line strikes. Tests of line marking devices, using sandhill cranes as a research species, have identified techniques effective in reducing collisions by up to 61 %. Techniques include marking lines in areas frequented by cranes and avoidance of new line corridors around wetlands or other crane use areas.

Coupled with habitat loss; delayed sexual maturity, small clutch size, and low recruitment makes rapid population recovery of this species difficult (CWS and USFWS 2007). Other factors that may pose a threat to whooping cranes include human disturbance on breeding grounds, disease/predation, food availability and sibling aggression, climatic factors, loss of genetic diversity, chemical spills and pesticides (CWS and USFWS 2007).

Current Status

The whooping crane was listed as threatened with extinction in 1967 and endangered in 1970, and both listings were grandfathered into the ESA of 1973. Critical habitat was designated in 1978; however no critical habitat is located within North Dakota. Currently, whooping cranes are still listed as endangered except where nonessential experimental populations exist. There are three wild populations of whooping cranes. Of these flocks, only the Aransas Wood Buffalo Population (AWBP) is self-sustaining and migrates more than 2,400 miles twice annually between summer nesting grounds and winter habitat. In April 2011, the population of the flock was estimated at 279 individuals (USFWS 2012). Adult and juvenile whooping cranes are documented annually during migration using roosting and feeding habitat (primarily agriculture and wetland associations) in North Dakota along a band running from the south central to the northwestern part of the state; although sightings of this species has occurred all over North Dakota. The migration corridor for the AWBP follows a relatively straight-line path that approximately follows the Missouri River corridor through the Midwestern United States. The primary migration corridor can be over 200 miles wide, as cranes can be pushed east or west depending on winds during migration periods. See Appendix D for a map of the whooping crane migration corridor in North Dakota. The migration period for the AWBP whooping cranes in North Dakota occurs from approximately April 1 to May 15 and September 10 to October 31, but may slightly vary depending on the year and environmental conditions. Whooping cranes generally spend less than a week at any migration stopover site.

5.1.3 Black-footed Ferret (*Mustela nigripes*)

Figure 3. Black-Footed Ferrets.

Species Description and Life History

The black-footed ferret is a medium-sized mustelid (a member of the weasel family), typically weighing 1.4 to 2.5 pounds and measuring 19 to 24 inches in total length, with a 5 to 6 inch tail. The species is further characterized by black feet, a black face mask, and a black-tipped tail. Coloration is yellow-buff, and is lighter on the belly and nearly white on the forehead, muzzle, and throat. Black-footed ferrets have an elongated body, short legs with large front paws, and claws developed for digging. The species is a carnivore, brandishing a large skull with a strong jaw. The black-footed ferret is a highly specialized predator that depends upon prairie dogs for survival. Prairie dogs (*Cynomys spp.)* make up more than 90% of the black-footed ferret's diet, and prairie dog burrows provide ferrets with suitable dens to raise their young, as well as a means to escape from predators and harsh weather (USFWS 2010).

Suitable black-footed ferret habitat overlaps with prairie dog habitat, in which they have co-evolved. Black-footed ferrets can occupy shortgrass and mid-grass prairie, and also semi-desert shrublands where prairie dogs are present. Historically, ferret habitat largely coincided with the habitats of the black-tailed prairie dog (*C. ludovicianus*), Gunnison's prairie dog (*C. gunnisoni*), and the white-tailed prairie dog (*C. leucurus*). The black-footed ferret is the only ferret species native to the Americas. Historic range of this species spanned a majority of western North America's intermountain and prairie grasslands, extending from Canada to Mexico. The species now exists in the wild at 16 re-introduction sites across 8 states, Canada, and Mexico (USFWS 2010).

The mating season of the black-footed ferret runs from March -April. Gestation is 41 to 43 days. Young ferrets (kits) are born May through June. Size of litter is typically 3 to 4 kits. Kits are born blind and helpless, and stay below ground until they are about 2 months old. At this age, mother black-footed ferrets move their litters to various burrows within their home range, and begin to take them hunting. At 90 days of age, kits reach 90% of their adult size, and are able to hunt prairie dogs alone.

The USFWS has determined that a minimum colony size of black-tailed prairie dogs that is considered suitable habitat for the black-footed ferret is 80 acres. However, much larger prairie dog colonies in the range of 5,000-10,000 acres are needed to support a population of ferrets (USFWS 1989).

Threats

Despite significant recovery successes, the black-footed ferret remains one of the most endangered animals in the world. The primary reasons the species remains at risk are the same that nearly caused the animal's extinction, loss of habitat and prey. Conversion of native grasslands to agricultural land, widespread prairie dog eradication programs, and fatal, non-native diseases such as sylvatic plague have reduced ferret habitat to less than two percent of its original range. The remaining habitat is now fragmented, with prairie dog towns separated by expanses of agricultural land and other human developments (USFWS 2010).

Current Status

The black footed ferret was listed as endangered on March 11, 1967 under early endangered species legislation and was grandfathered in under the ESA on June 2, 1970 No critical habitat has been designated for this species. As of 2011, USFWS program for a black-footed ferret breeding and re-introduction program has since produced more than approximately 8,000 kits in captivity, and more than approximately 3,000 have been re-introduced into their natural habitat. As a result of these re-introduction sites, there are approximately 500-1,000 black-footed ferrets in the wild, and another 300 in captivity (USFWS, 2015). Large prairie dog colonies needed to support a black-footed ferret population do not currently exist in North Dakota. With widespread negative sentiment toward prairie dogs within the state it is uncertain whether prairie dog complexes would be allowed to expand sufficiently to support ferret re-introduction (NDGF 2012).

5.1.4 Pallid Sturgeon (*Scaphirhynchus albus*)

Figure 4. Pallid Sturgeon.

Pallid sturgeon are a prehistoric species of fish identified by a flattened shovel-shaped snout; a long, slender, and completely armed caudal peduncle (tapered portion of the body which terminates at the tail; and lack a spiracle (small openings found on each side of the head) (USFWS 2014b). Like other species of sturgeon, pallid sturgeon's mouths are toothless, protrusible (capable of being extended and withdrawn from its natural position, and ventrally positioned under the head (USFWS 2014b). Skeletal structure of this species is primarily composed of cartilage rather than bone. The back and sides of pallid sturgeon are grayish white, versus the brownish tan color of a similar species, the shovelnose sturgeon. Pallid sturgeon can weigh up to 80 pounds and reach lengths of 6 feet; whereas the shovelnose sturgeon rarely surpasses 8 pounds.

Historical distribution of the pallid sturgeon included the Missouri and Yellowstone Rivers in Montana downstream to the Missouri-Mississippi confluence and the Mississippi River possibly from near Keokuk, Iowa downstream to New Orleans, Louisiana (USFWS 2014b). Pallid sturgeon were also documented in the lower reaches of some of the larger tributaries to the Missouri, Mississippi, and Yellowstone Rivers. The total length of the pallid sturgeon's historic range was about 3,515 river miles.

Since 1990, wild pallid sturgeon have been documented in the Missouri River between Fort Benton and the headwaters of Fort Peck Reservoir, Montana; downstream from Fort Peck Dam, Montana to the headwaters of Lake Sakakawea, North Dakota; downstream from Garrison dam, North Dakota to the headwaters of Lake Oahe, South Dakota; from Oahe Dam downstream to within Lake Sharpe, South Dakota; between Fort Randall and Gavins Point Dams, South Dakota and Nebraska; downstream from Gavins Point Dam to St. Louis, Missouri; in the lower Milk and Yellowstone Rivers, Montana and North Dakota; the lower Big Sioux River, South Dakota; the lower Platte River, Nebraska; the lower Niobrara River, Nebraska; and the lower Kansas River, Kansas (USFWS 2014b). Pallid sturgeon observations have increased with sampling efforts in the Mississippi River basin. The downstream extent of pallid sturgeon ends near New Orleans, Louisiana.

In North Dakota, generally pallid sturgeon reside in the Missouri River downstream from the confluence of the Missouri and Yellowstone Rivers during fall and winter months. As discharge increases in the spring, adult pallid sturgeon migrate upstream. Typically pallid sturgeon migrate into the unregulated Yellowstone River to spawn. Spawning success has been documented recently in the Missouri River downstream from Fort Peck Dam; confirming that suitable spawning areas still exist in this stretch of the Missouri River and if conditions are suitable, pallid sturgeon will use this reach for spawning (USFWS

2014b). From the headwaters of Lake Sakakawea above Garrison Dam, North Dakota, to Gavins Point Dam, South Dakota; the Missouri River retains little of its historical riverine habitat, and most of this reach is impounded in reservoirs. As a result, successful spawning and recruitment is unlikely (USFWS 2014b).

Pallid sturgeon can be long-lived (up to 50 years), with males reaching sexual maturity before females. Estimated age at first reproduction for females was 15-20 years, compared to approximately 5 for males (Keenlyne and Jenkins 1993). As with most species of fish, growth and maturity are influenced by water temperatures. Pallid sturgeon in artificially controlled environments can attain sexual maturity at age 6-9. Thus, age at first reproduction can vary greatly between hatchery-reared and wild fish and is dependent on local conditions. In addition, females do not spawn each year (Kallemeyn 1983). Observations from data collected in the northern range of pallid sturgeon indicate that female spawning periodicity is 2-3 years (Rob Holm, USFWS Garrison Dam Hatchery, unpublished data).

Spawning appears to occur between March and July, with fish in the southern portion of its range spawning earlier than those in the northern portions. Adult pallid sturgeon can move large distances upstream prior to spawning, and females likely spawn at or near the apex of these movements, laying from 43,000 to 170,000 eggs at a time. (Bramblett and White 2001; DeLonay et al. 2009). Spawning appears to occur adjacent to or over coarse substrate such as boulders, cobble, gravel, or bedrock, in deeper water with relatively fast converging flows. Environmental stimuli such as day length, water temperature, and flow play a large factor in spawning (U.S. Geological Survey, 2007; DeLonay et al. 2009).

Incubation rates are dependent upon water temperature. In a hatchery environment, fertilized eggs will hatch in approximately 5-7 days (Keenlyne 1995), although may deviate slightly in the wild. Newly hatched larvae are predominately pelagic (neither close to the bottom nor near the shore), drifting in the currents for 11-13 days and likely disperse several hundred km downstream from spawn and hatch locations (USFWS 2014b).

Since much of the historic range of the pallid sturgeon has been altered from natural settings, current understanding of habitat use may not necessarily reflect preferred habitats for the species, but rather define suitable habitat within an altered ecosystem (USFWS 2014b). Pallid sturgeon primarily use main channel, secondary channel, and channel border habitats throughout the species range. Adult and juvenile pallid sturgeon are rarely observed in habitats lacking flowing water which are removed from the main channel such as backwaters and sloughs. Specific patterns of habitat use and the range of habitat parameters used may vary with availability and by life stage, size, age, and geographic location. In the upper reaches of the species' range, juvenile hatchery raised pallid sturgeon select main-channel habitats (Gerrity 2005). In the Yellowstone and Platte Rivers, adult pallid sturgeon select areas with frequent islands and sinuous channels while rarely occupying areas without islands or with straight channels (USFWS 2014b). Pallid sturgeon habitat preferences vary in the southern portion of the species range.

Habitat requirements of young pallid sturgeon (larval and young-of-year) is not well understood; primarily due to low populations of spawning adults and poor recruitment (USFWS 2014b). However, early stage habitats in channelized river reaches may be similar among *Scaphirhynchus* species in the lower Missouri River were found in habitats associated with the main channel border and moderate velocities (0.5-0.7 meters per second - m/s) (Ridenour et al. 2011).

Pallid sturgeon have been documented over a variety of available substrates, but are often associated with sandy and fine bottom materials, and exhibit a selection for sand over mud, silt, or vegetation (USFWS 2014b). Pallid sturgeon spend the majority of their life at or near the bottom of a river (benthic species). Across the species range, pallid sturgeon have been documented in waters of varying depths and velocities. Depths at survey sites range from 0.58 m to > 20m (1.9->65 feet). Bottom water velocities associated with survey locations are generally <1.5 m/s (4.9 ft/s) with averages ranging from 0.58 m/s to 0.88 m/s (1.9 ft/s to 2.9 ft/s (USFWS 2014b). Pallid sturgeon are physically adapted to live in high turbidity levels, and it is reasonable to infer that historically high turbidity levels the Missouri and Mississippi Rivers was a component of the natural ecological processes under which the species evolved (USFWS 2014b).

Information on food habits of age-0 pallid sturgeon are limited; however in hatchery environments young pallid sturgeon (fry) will readily consume brine shrimp, indicating that zooplankton and/or small invertebrates are likely the food base for this age class of wild pallid sturgeon. Juvenile and adult pallid sturgeon diets are generally composed of fish and aquatic insect larvae (USFWS 2014b).

Threats

Large river alterations including river channelization, bank stabilization, impoundment, and altered flow regimes have contributed to widespread modification and curtailment of pallid sturgeon habitat through its historic range. Historically, the Missouri River was dynamic, ever-changing, and composed of multiple channels, chutes, sloughs, backwater areas, side channels, and migrating islands and sandbars (USFWS 2014b). In the last century, the Missouri River has been altered as a result of the Flood Control Act of 1944 to address social needs. Installation of dams in upper Missouri River and some associated tributaries as well as channelization and stabilization of the lower Missouri River for navigation has contributed to the greatest habitat changes. The anthropogenic modifications to the Missouri River system have drastically reduced the ability of the river to satisfy the life history requirements of pallid sturgeon by: blocking movements to spawning and feeding areas; affecting historical genetic exchange among reaches; decreasing turbidity levels by trapping of sediment in reservoirs; reducing distances available for larvae to drift; water temperature alterations; altering conditions and flows in spawning areas; altering flows and temperatures associated with spawning movements; and possibly reducing food sources by lowering productivity (USFWS 2014b).

Water levels impounded by Fort Peck Dam and Garrison Dam (Lake Sakakawea) may be impediments to larval pallid sturgeon survival by reducing the amount of available riverine habitat for pallid sturgeon to complete the transition from free embryos to feeding larvae.

Water quality can have both immediate and long-term effects on pallid sturgeon during many life phases and localized and/or regionally poor or degraded water quality should be viewed as a threat to the species. Other factors that may pose a threat to pallid sturgeon include entrainment (water cooling structures, towboat propellers, dredge operations, irrigation diversions), climate change, disease and predation, energy development, hybridization, and aquatic/invasive nuisance species (USFWS 2014b).

Current Status

The pallid sturgeon was listed as endangered on September 6, 1990 (55 FR 1990). Since the species was listed as endangered, the overall status of the pallid sturgeon has improved and the population is currently stable. However, despite increased research efforts; data regarding recruitment mortality, habitat use, and abundance remain limited. Population estimates for wild pallid sturgeon within certain reaches of the Missouri River indicate that the extant wild populations are declining or extirpated. An estimated 125 wild pallid sturgeon remain in the Missouri River downstream of Fort Peck Dam to the headwaters of Lake Sakakawea, which includes the lower Yellowstone River (USFWS 2014b). Accurate estimates of pallid sturgeon in other stretches of Missouri River/Lake Sakakawea within North Dakota are not known. To prevent further extirpation, maintaining species' presence within the Missouri River basin via augmentation of hatchery raised pallid sturgeon is necessary in order to avoid local extirpation within several reaches throughout this river system.

5.1.5 Gray Wolf (*Canis lupus*)

Figure 5. Gray Wolves.

Species Description and Life History

The gray wolf is the largest undomesticated member of the canid family. Fur coloration generally is gray, with a lighter underside, but can vary from pure white to jet black. Males weigh between 57-102 lbs., while females range in weight from 46-75 lbs (NDGF 2012b). Historically, the gray wolf was present across most of North America, Europe, and Asia. Within North America, the gray wolf occurred from northern Alaska, Canada, and Greenland, south to the central mountains and into southern Mexico (Young and Goldman, 1944). Currently there are two populations of wolves that occur in the interior United States, that may be occasionally present in North Dakota. The Northern Rocky Mountain (NRM) population of the gray wolf (*Canis lupus*) occurs primarily in Idaho, Montana, Oregon, Washington, and Wyoming and areas where the species is considered experimental or nonessential (USFWS 2012c). Due to dispersal habits of the species, the NRM population of gray wolves may be occasionally found in other states. The Western Great Lakes (WGL) population of the gray wolf, occurs within Michigan, Minnesota, and Wisconsin, but may be occasionally observed in surrounding states such as North Dakota.

Wolves occupy a wide range of habitats where large ungulates, including elk, white-tailed deer, mule deer or moose are found. In Midwestern states, habitats currently used by wolves range from mixed hardwood-coniferous forests in wilderness and sparsely settled areas, to forest and prairie landscapes. More suitable wolf habitats are typically characterized by large blocks of public land, mountainous forested habitat in the Midwest (including transition areas between boreal and deciduous forests), abundant year-round wild ungulate populations, low road density, low agricultural use, and low human populations. Non-forested rangeland and croplands associated with intensive agricultural use (prairie and high desert) preclude wolf pack establishment and persistence (NatureServe 2013; USFWS 2012c).

Likely habitat for the gray wolf in North Dakota is the forested areas in north central and northeast North Dakota; however, they may appear anywhere within the state at any time of year (USFWS 2013b).

Wolf packs live within territories, which they defend from other wolves. Home range sizes of wolves vary, depending on prey density and pack size, but may vary from 100-1000km^2. Wolves travel over large areas to hunt, as far as 30 miles in a day (USFWS 2011b). The breeding season for gray wolves occurs in the late winter. Gestation for these animals is 63 days with a litter size of 6 pups (NDGF 2012b). Gray wolves usually hunt large animals such as moose and deer, although beaver and other smaller animals supplement their diet. Gray wolves are territorial and will keep other gray wolves and coyotes out of their home range.

Rural areas throughout the state of North Dakota function as dispersal corridors for wolves representing the WGL (east of the Missouri River and US Highway 83) distinct population segment (DPS) and the Montana/Wyoming portion of the NRM DPS. Dispersal habitat may be important for maintaining gene flow between DPSs, but is not thought to be a limiting factor for the recovery of the species (USFWS 2009). Depending on population density and availability of food sources, wolves may begin dispersal between nine to 28 months of age, and commonly do so in the fall as yearlings (17 to 20 months of age). The average gray wolf has a life span of 4 years (USFWS 2011d).

Threats

Gray wolves have become exterminated by man throughout most of the species historical range. Shooting, trapping, and poisoning of wolves were often subsidized by the government. Other primary threats include habitat loss, as most populations of wolves have been pushed out of historic habitat due to widespread human development throughout the species range. Relatively high densities of roads could preclude their re-establishment in many areas.

Current Status

The Northern Rocky Mountain (NRM) population of the gray wolf (*Canis lupus*) was entirely delisted under the ESA on September 10, 2012, with the recovery finding for the Wyoming segment of the population (USFWS 2012c). The WGL population of the gray wolf was delisted on December 28, 2011 (USFWS 2011d). On February 20, 2015, due to court orders to reestablish regulatory protections for the gray wolf; the USFWS issued a final rule as it relates to gray wolves in the western Great Lakes including endangered status for gray wolves in the eastern halves of North Dakota and South Dakota as well as the northern portion of Iowa; threatened status for gray wolves in Minnesota; critical habitat for gray wolves in Minnesota; and the rule promulgated under section 4(d) of the ESA for gray wolves in Minnesota (USFWS 2012c). The rule does not affect the status of gray wolves in Montana. The gray wolf is still listed as endangered within western North Dakota (south and west of the Missouri River upstream to Lake Sakakawea and west of the centerline of Highway 83 from Lake Sakakawea to the Canadian border), western South Dakota (south and west of the Missouri River), and throughout Nebraska. No critical habitat for the gray wolf has been designated in North Dakota.

5.1.6 Poweshiek Skipperling (*Oarisma poweshiek*)

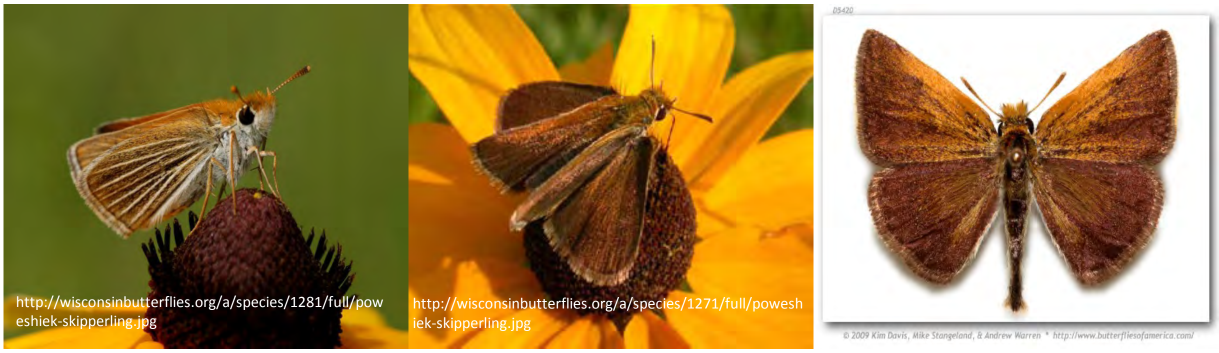

Figure 6. Poweshiek skipperlings.

Species Description and Life History

Poweshiek skipperlings are a small butterfly with an approximate wingspan of 1 inch. This butterfly is dark brown in color with some light orange along the wing margins and a lighter orange head. The underside of the wings are dark to light brown with very prominent white veins that may make the wings look striped (USFWS 2015b).

Historically, Poweshiek skipperlings were found in tallgrass prairie as well as prairie fens from Manitoba to Iowa, with populations also found in Michigan and Wisconsin. Due to habitat loss and fragmentation, the species current range is much smaller, and the species may have been extirpated from the Dakotas, Minnesota and Iowa in the last ten years. Currently, the only known areas that contain Poweshiek skipperlings include Wisconsin, Michigan, and Manitoba (USFWS 2015b).

Poweshiek skipperlings live in high quality tallgrass prairie in both low, moist areas as well as upland, dry areas. McCabe and Post (McCabe and Post 1977) describe the species' habitat in North Dakota as high dry prairie and low, moist prairie stretches as well as old fields and meadows.'' Royer and Marrone (1992) describe Poweshiek skipperling habitat in North Dakota and South Dakota as moist ground in undisturbed native tallgrass prairies. Poweshiek skipperlings have been historically documented at 17 sites in seven North Dakota Counties (Selby 2010, USFWS 2014, unpubl. geodatabase): Cass, Dickey, LaMoure, Ransom, Richland, and Sargent in the southeastern corner of the state and Grand Forks County in the northeast. Currently in North Dakota, Poweshiek skipperlings are now considered extirpated or possibly extirpated from nine sites and four counties (Cass, Dickey, LaMoure, and Grand Forks). The status of the species in North Dakota is unknown at 8 sites, where the species was last observed between 1996 and 2001, but was not observed in more recent years.

Poweshiek skipperling larvae (caterpillars) hibernate during winter on the ground and they resume activity in the spring and continue developing until they pupate and emerge as adult butterflies. Adults have a short lifespan of only one to three weeks, during mid-June and mid-July. During this time period, they mate and lay eggs. Larvae hatch during late summer and they feed and develop through early fall and then overwinter to continue development the following spring (USFWS 2015b).

Adult butterflies feed on nectar from prairie flowers such as purple coneflower (*Echinacea angustifolia*), blackeyed susan (*Rudbeckia hirta*) and palespike lobella (*Lobelia spicata*). Since there little research has been conducted on the Poweshiek skipperling, it is uncertain which plant species are necessary for the larvae to develop; however, it is known that they select native fine-stemmed grasses and sedges such as little bluestem (*Schizachyrium scoparium*) and prairie dropseed (*Sporobolus heterolepis*)(USFWS 2015b).

Threats

Although there is limited information on Poweshiek skipperlings, habitat loss and fragmentation are the main contributors to decline of this species. Approximately 4 percent of the original tallgrass native prairie is left in the United States. Much of what is left of the tallgrass prairie are small isolated sites, so this butterfly cannot generally move from site to site. If Poweshiek skipperlings are lost at a site, there are generally no nearby populations to recolonize.

In addition to the loss of large blocks of contiguous prairie, the remaining native grasslands are often not managed in ways that support Poweshiek skipperlings. Wildfire helped maintain the treeless nature of the prairies in the past. Today, grazing, haying and prescribed burns may replicate that effect; however, grazing or burning that is too intense, conducted to frequently, or conducted during the wrong time of year may not create conditions that are suitable for the Poweshiek skipperling, or may kill too many individuals to sustain the population.

Current Status

The Poweshiek skipperling was listed as an endangered species on October 24, 2014 (79 FR 2014). During surveys in 2014, the species could be found only at a few sites in a single Michigan county, in very limited numbers at one site in Wisconsin, and in Canada at the single Manitoba site. The species was last observed in North Dakota in 2001. The species is only believed to potentially occur in Richland and Sargent Counties in North Dakota. Critical habitat for this species has been designated in these counties. See Poweshiek skipperling critical habitat section for more information.

5.1.7 Piping Plover (Charadrius melodus)

Figure 7. Piping plover adults and chick.

Species Description and Life History

Piping plovers (*Charadrius melodus*) are small stocky shorebirds that measure approximately seven inches long with sand-colored plumage on their backs and crown and white underparts. During the breeding season, adult birds have a single black breast-band, a black bar across the forehead, bright orange legs and bill, and a black tip on the bill. During winter, the birds lose the black bands, the legs fade to pale yellow, and the bill becomes mostly black (USFWS 2015c).

Historically, piping plovers bred across three geographic regions: U.S. and Canadian Northern Great Plains (NGP) from Alberta to Manitoba, and south to Nebraska; Great Lakes Beaches; and Atlantic coastal beaches from Newfoundland to North Carolina (USFWS 1998). Currently, the species' range remains similar to historic range. Although their wintering grounds are not fully understood; piping plovers from all three breeding populations winter along the south Atlantic, Gulf Coast, Caribbean beaches and barrier islands; primarily on intertidal beaches with sparsely vegetated sand or mud flats. Currently, the species' range remains similar to historic range.

Of the three populations of piping plovers; only the NGP population is found in North Dakota; in which critical habitat has also been designated for the species. The piping plovers that occur in the Great Plains portion of the species range make their nests on open, sparsely vegetated sand or gravel beaches adjacent to alkali wetlands, and on beaches, sand bars, and dredged material islands of major river systems. Beach/shore width as well as abundance and distribution of vegetation are important factors that affect piping plover habitat selection and reproductive success (USFWS 1988).

Plovers arrive on the breeding grounds during mid-March through mid-May and remain for 3 to 4 months per year. In North Dakota they are typically present between April 15 and August 31. Courtship behavior includes aerial flights, digging of several nest scrapes and a ritualized stone-tossing behavior (USFWS 1988). Territories are actively defended by both adults. Egg laying generally begins in the second or third week in May, although the species may re-nest depending on local conditions. They lay 3 to 4 eggs in shallow depressions lined with pebbles and shell fragments. The eggs camouflage well with the environment.

Male and female piping plovers are involved in the care of young, taking turns incubating the eggs (which hatch within 30 days), as well as feed the young (until about 30 days after hatching). Plovers depart for the wintering grounds from mid-July through late October. Piping plovers feed on exposed wet sandy beaches/shorelines; intertidal ocean beach; wrack lines; washover passes; mud-, sand-, and algal flats; and shorelines of streams, ephemeral ponds, lagoons, and salt marshes by probing for invertebrates at or just below the surface (USFWS 2015d). They use beaches adjacent to foraging areas for roosting and preening. Home range of piping plovers during the breeding season is usually limited to the wetland, lakeshore, or section of beach on which the nest is located.

Threats

Piping plovers is a species with variable annual reproductive success. Habitats used by plovers are often ephemeral that render birds susceptible to frequent nest destruction and drastic population fluctuations. Shorebird hunting in the early 20th century caused the first major decline of the species (USFWS 1988). Within the Great Plains region, reservoirs, channelization of rivers, and modification of river flows have eliminated or reduced sandbar/shoreline nesting habitat along the Missouri and Platte Rivers (USFWS 1988). Prior to dam construction and regulation of flows, summer flow patterns were relatively predictable. Currently, regulated flows can be unpredictable and may fluctuate dramatically from year to year.

High flow periods into the nesting season are now more common, which reduces the amount of optimal nesting sites, causing plovers to nest in less suitable nesting locations, or not at all (USFWS 1988). Encroachment of vegetation has also reduced the amount of suitable habitat. Piping plovers prefer to nest on beaches in which humans also use for recreation and other purposes. Nests are exposed on open sandy beaches and can get accidentally stepped on or crushed by vehicles. Human presence may also cause plovers to abandon nests, expose eggs or chicks to hot sun, cold weather, and predators. Predation is a problem for piping plovers, as unnaturally high populations of gulls and mammalian predators are located throughout the species range. Unleashed pets, such as cats and dogs may also harass or kill plovers and/or their chicks. The impact of agriculture runoff into wetlands, pesticide drift, botulism and environmental contaminants on piping plovers has not been fully investigated; but may also be detrimental to the species (USFWS 1988).

Current Status

On December 11, 1985, the piping plover was listed as threatened in all areas where populations exist other than the Great Lakes population, where the piping plover is listed as endangered (USFWS 2013, April). The Northern Great Plains population of piping plovers is the largest of the three breeding populations and consisted of approximately 4,462 adults in 2006 (Eliott-Smith et al. 2009). In North Dakota, piping plovers breed in 25 counties; including along the Missouri River as well as alkali wetlands throughout central and western North Dakota (USFWS 1988). Nearly all natural lakes used by plovers in North Dakota are alkaline in nature and have salt-encrusted, white beaches (USFWS 2013f). These lakes are likely selected by plovers due to the sparsely vegetated shorelines. Critical habitat has been designated in North Dakota for the piping plover on the Missouri River, Lake Sakakawea, Lake Oahe as well as multiple alkali lakes and wetlands. For further information, see Piping Plover Designated Critical Habitat section.

5.1.8 Western Prairie Fringed Orchid (*Platanthera praeclara)*

Figure 8. Western Prairie Fringed Orchids.

Species Description and History

The western prairie fringed orchid is a long lived herbaceous perennial flower that arises from a fleshy tuber. Vegetative shoots (stalks) emerge in late May. The orchid flowers in June and July and is pollinated by hawk moths. The orchids achieve a height of roughly 1 to 4 feet. Each stalk has up to 40 white flowers about an inch long. The plant can display flowers for about 21 days (3 weeks) with individual flowers lasting up to 10 days. The western prairie fringed orchid's flowers are somewhat larger than those of the closely related eastern prairie fringed orchid (USFWS, 2003). The orchid is believed to overwinter as a tuber that divides after pollination (Bragg and Stubbendieck 1989).

Western prairie fringed orchids are associated primarily with native tallgrass prairie; however they have been occasionally found in disturbed sites, such as roadside ditches. Habitat within intact grassland areas for this species includes moist areas within upland sites, wet prairies, sedge meadows, sub-irrigated prairies, and swales in sand dune complexes (Sather 1991). The species is seldom found in full shade or in dry upland habitat types. The majority of the sites where orchids exist occur on moist, neutral to slightly alkaline, fertile sandy loam soils (NDPRD 2015). Common plants found in orchid habitat include Baltic rush (*Juncus balticus*), northern reedgrass (*Calamagrostis stricta*), Canada anemone (*Anenome canadensis*), heath aster (*Symphyotrichum ericoides*), softstem bulrush (*Scirpus validus*), white clover (*Trifolium repens*), Canada goldenrod (*Solidago canadensis*), leadplant (*Amorpha canescens*), white meadowsweet (*Spiraea alba*), and sandbar willow (*Salix interior*) (NDPRD 2015). The western prairie fringed orchid is restricted to west of the Mississippi River and is known from about 75 sites in Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, and in Manitoba.

The nocturnally fragrant flowers of these perennial orchids attract hawkmoths that feed on nectar and transfer pollen from flower to flower and plant to plant. Seed germination and proper plant growth depend on a symbiotic relationship between the plants' reduced root systems and a soil inhabiting fungus for proper water uptake and nutrition (USFWS 1996).

Threats

The geographic range of the western prairie fringed orchid was historically correlated with tallgrass prairie. The greatest threat to the prairie fringed orchids is habitat loss, mostly through conversion of native prairie to cropland (USFWS 2003). Competition with invasive grasses/forbs, filling of wetlands, intensive hay mowing, fire suppression, collection of plants, and overgrazing also threatens these species. The prairie fringed orchids depend on hawkmoths for pollination. Any threat to these insects, including the use of insecticides, is a threat to the orchid.

Status

The prairie fringed orchids were added to the U.S. List of Endangered and Threatened Wildlife and Plants on September 28, 1989 (USFWS 1996). The species is known to occur at 175 sites in 8 ecoregions, including 41 counties of 6 states and 1 population complex in Manitoba. In North Dakota, the Sheyenne National Grasslands, a tract of over 70,000 acres located in the southeastern portion of the state, contains approximately 3,000 individual plants (NatureServe 2013); and is believed to contain one of the four largest remaining populations of the species. Privately owned lands in this area of the state of North Dakota that contain native grasslands may also support populations of orchids.

5.1.9 Dakota skipper (*Hesperia dacotae*)

Figure 9. Dakota Skipper adults.

Species Description and Life History

The Dakota skipper is a small to medium sized butterfly with a wingspan of 2.4-3.2 centimeters (0.9 -1.3 inches) and hooked antennae (Royer and Marrone 1992). Adult Dakota skippers are variable in colorations. The dorsal (back) portion of adult male wings ranges in color from tawny-orange to brown and there is a prominent mark on the forewing, and the ventral (abdominal) portion is dusty yellow orange (Royer and Marrone 1992). The dorsal portion of adult females is darker brown with diffused tawny orange spots and a few diffused white spots located near the forewing. Ventral portions of female Dakota skippers are dusty gray-brown with a faint white spotband across the middle of the wing. Dakota skipper pupae are reddish-brown and the larvae are light brown with black collar and dark brown head (McCabe 1981).

The historical range for the Dakota skipper extended from southern Saskatchewan and Manitoba, through the Dakotas, Minnesota, and Iowa, east to Illinois (Cochrane and Delphey 2002). The full historical range of this species is not known however, because widespread conversion of native prairie preceded biological surveys in the central United States. Dakota skippers likely lived throughout the unbroken, vast grasslands of the north-central United States and south-central Canada. Dakota skippers have been extirpated from Illinois and Iowa and are present only in scattered isolated sites in Minnesota, the Dakotas, and Southern Canada (USFWS 2015e).

Dakota skippers have four basic life stages: egg, larva, pupa, and adult. Dakota skippers only survive one generation. Adults emerge from pupae mid-June to early July, depending on weather conditions (McCabe 1979). Males emerge as adults approximately five days earlier than females and the flight period in a local population lasts for up to four weeks and mating occurs during this flight period (McCabe 1979, Dana 1991). Dakota skippers lay eggs on broadleaf plants and grasses, and females lay approximately 180 and 250 eggs.

Eggs hatch after incubating for 7-20 days. Larvae then crawl to the bases of grasses where they form shelters at or below the ground surface with silk and is fastened together with plant tissue (Dana 1991). As larvae grow, they construct 2-3 larger shelter as they develop. At night the larvae emerge from their shelters to forage (McCabe 1979). Little bluestem (*Schizachyrium scoparium*) has been observed as a favorite food source for larva, but several grass species may be used (Royer and Marrone 1992). Dakota skippers have six or seven larval stages and overwinter in their ground level / subsurface shelters

(McCabe 1979). In the spring, larvae resume feeding and undergo two additional molts before they pupate into adults.

Nectar from various plants provides food and water, which is crucial for survival of both sexes during the short adult flight period (USFWS 2015e).

Dakota skippers live in two types of prairies. One type is moist bluestem prairie in which three wildflower species are usually blooming when adult Dakota skippers are in flight: wood lily (*Lilium philadelphicum*), harebell (*Campanula rotundifolia*) and smooth camas (*Zygadenus elegans*)(USFWS 2015e). The second type is upland prairie that is relatively dry and often located on hillsides or ridges. Bluestem grasses and needlegrasses dominate these habitats, and purple coneflower (*Echinacea angustifolia*) is typical of high quality sites that support the Dakota skipper, although the species uses other forbs for nectar (USFWS 2015e). Both of these types of habitats are unlikely to be successfully reestablished on a site that has been plowed; therefore, activities that maintain original native prairie habitat are vital to the conservation of the Dakota skipper.

Threats

Dakota skipper populations declined historically due to widespread conversion of native prairie to farms, ranches, and other land uses. States and Canadian provinces within the historical range of the Dakota skipper have lost between 85-99 percent of their original tallgrass native prairie (USFWS 2015e). Small isolated patches of native prairie are often what remain of this once-vast ecosystem. Dispersal of Dakota skippers is expected to be no more than 1 km between patches of prairie habitat separated by structurally similar habitats (crop fields or pasture). Many populations of Dakota skippers that remain are isolated and are too far away from each other to be re-colonized if a local extinction occurs (USFWS 2015e). Other factors of decline include over-grazing, inappropriate fire management, herbicide/pesticide use, woody plant invasion, road construction, gravel mining, and invasive plant encroachment.

Current Status

The Dakota skipper was listed as threatened on October 24, 2014 (79 FR 2014). The Dakota skipper is currently present in 6 North Dakota counties. The majority of the 36 known Dakota skipper occurrences are within the Towner-Karlsruhe complex in McHenry County. Additional sites are found within the Sheyenne National Grasslands complex in Ransom County, in northern McKenzie County, Mountrail County, Rolette County, and Wells County (Terry Ellsworth, pers. comm., August 9, 2016). Of the sites where the Dakota skipper is considered to be present, 15 sites had positive observations in 2012. The remaining site had positive observations in 2002. The status of the Dakota skipper is unknown at 14 sites; 10 of these sites have not had positive records since the mid to late 1990s, and the other 4 sites had positive records between 2001 and 2003 (79 FR 2014). The Dakota skipper is presumed extirpated from 13 sites and four counties, primarily due to heavy grazing, weed control, and other disturbances. In addition the species is possibly extirpated from 11 additional sites and 3 additional counties. Although only a small fraction of all grassland in North Dakota has been surveyed for Dakota skippers, a significant portion of the un-surveyed area is not likely suitable for the Dakota skipper (79 FR 2014). The species was not detected at an additional 108 (approximate) locations in North Dakota that were surveyed for the Dakota skipper in the period during 1991-2013 (USFWS 2014, unpubl. Geodatabase).

Surveys for the Dakota skipper are typically conducted only in areas where floristic characteristics are indicative of their presence. New potential sites surveyed for this species are generally focused on prairie habitat that appears suitable for the species and has a good potential of hosting the species. In other words, sites are not randomly selected across the landscape. Therefore, researchers have a higher likelihood of detecting the species at these sites than at sites randomly selected across the landscape. Based on these surveys, the likelihood that significant numbers of undiscovered Dakota skipper populations occur in North Dakota is low (79 FR 2014); however, twelve new Dakota skipper sites have been identified in North Dakota since 2015.

5.1.10 Rufa Red Knot (*Calidris canutus rufa)*

Figure 10. Rufa Red Knots.

Species Description and Life History

The Rufa red knot is a medium-sized bulky shorebird about 9 to 11 inches in length, with a short straight black bill. The red knot is easily recognized during the breeding season by its distinctive red plumage. The face, prominent stripe above the eye, breast, and upper belly are a rich rufous-red to a brick or salmon red, sometimes with a few scattered light feathers mixed in (USFWS 2014c). The feathers of the lower belly and under the tail are whitish with dark flecks. Upperparts are dark brown with white and rufous feather edges; outer primary feathers are dark brown to black (Harrington 2001; Davis 1983).

Rufa red knots migrate annually between its breeding grounds in the Canadian Arctic and multiple wintering regions, including the southeast United States, the northwest Gulf of Mexico, northern Brazil and Tierra del Fuego at the southern tip of South America (USFWS 2014c). The rufa red knot makes one of the longest annual migrations of any species of bird, travelling up to 18,000 miles between artic breeding grounds in northern latitudes to non-breeding areas in South America. During both the northbound (spring) and southbound (fall) migrations, groups of a few individuals to thousands of knots can be found anywhere along the coastal and inland U.S. migration corridors from Argentina to Canada. In the spring, key staging and stopover areas include Patagonia, Argentina; eastern and northern Brazil; the southeast United States; the Virginia barrier islands; and Delaware Bay. In the fall, key migration stopovers include Hudson Bay, James Bay, St. Lawrence River, Mingan Archipelago and Bay of Fundy in Canada; Massachusetts and New Jersey coasts; Altamaha River in Georgia; the Caribbean; and the northern coast of South America from Brazil to Guyana (USFWS 2014c). Most occurrences of rufa red knots in the United States are individuals migrating along the Atlantic coast. Transient individuals are rarely witnessed in interior flyways (USFWS 2014c). Small numbers of this species (less than 10 individuals) can be found during the migration periods in every inland state over which the red knot flies between its wintering and breeding grounds.

Breeding of the red knot occurs in central Canadian Artic from the northern Hudson Bay west to Victoria Island (Niles et al. 2008; Morrison and Harrington 1992). Red knots tend to nest in arid and higher tundra locations, these are often slopes with little to no vegetation. Once hatched, the red knot chicks will leave the elevated tundra nest site in search of freshwater wetland locations. During the time spent at the breeding ground, the red knot's diet will consist of insects, arthropods and other invertebrates (Niles et al. 2008, Harrington 2001).

Threats

During the 1800's legal and illegal hunting of the red knot greatly reduced the population, and it is unknown if the species has ever fully recovered (Karpanty et al. 2006, Cohen et al. 2009, Harrington 2001). Current threats to red knot habitat include sea-level rise, dredging, reduced food availability at stopover areas, climate change, shoreline stabilization, coastal development, and disturbance by vehicles, people, dogs, aircraft, and boats.

Current Status

The rufa red knot was listed as a threatened species under the ESA on December 11, 2014. The estimated population of the subspecies of rufa red knot is about 18,000 to 35,000 (Niles et al. 2008). The rufa red knot is considered to be a rare transient throughout the upper Great Plains, and little is known of its use of stopover sites in North Dakota. As a shorebird species, it is anticipated that rufa red knots would utilize stopover wetland habitats similar to those selected by other shorebirds in North Dakota; such as the piping plover and interior least tern.

5.1.11 Northern Long-Eared Bat *(Myotis septentrionalis)*

Figure 11. Northern Long-Eared Bats.

Species Description and Life History

The northern long-eared bat (NLEB) is a medium sized bat with a body length of 3 to 3.7 inches and wingspan of 9-10 inches. Color ranges from medium to dark brown on the back and tawny to pale-brown on the underside. This species is distinguished form other bats in its genus by its long ears (USFWS 2015f). The NLEB is found along the Atlantic Coast in the United States from Maine to North

Carolina, and westward to eastern Oklahoma and north through the Dakotas, as well as eastern Montana and Wyoming. Range also includes southern states from Georgia to Louisiana; as well as several Canadian provinces. In total, species range in Unites States includes 37 states. Historically, the species has been found in greater abundance in the northeast and portions of the Midwest and southeast, and has been more rarely encountered along the western edge of the range (USFWS 2014d).

The summer maternity season for this species in the northern portion of its range lasts from approximately April 1st - September 30th (USFWS 2014d). Breeding occurs in late summer or early fall when males begin to swarm near hibernating locations (hibernacula). After mating, females store sperm during the hibernating months until spring. When spring arrives, they emerge from hibernacula, ovulate and the stored sperm fertilizes an egg (known as delayed fertilization). After fertilization occurs, pregnant females migrate to summer areas where they roost in small colonies and give birth to a single pup. Compared to other bat species, NLEBs have smaller maternity colonies, typically 30-60 bats, although larger colonies have been observed (USFWS 2014d). During late-May or early June to late July, females in a maternity colony typically give birth at the same time. Young bats begin to fly approximately 18-21 days after birth. Lifespan of NLEBs is estimated to be up to 18.5 years. The northern long-eared bat is not considered a long-distance migratory bat species. Research has shown that migratory movements between seasonal habitats have been documented to be between 35-55 miles (Nagorsen and Brigham, 1993, Caire et. al. 1979).

Suitable winter habitat (hibernacula) for this species includes underground caves, and cave-like structures such as abandoned / active mines or railroad tunnels. Typically these hibernating locations have large passages with significant cracks and crevices for roosting; relatively cool constant temperatures (0-9 degrees Celsius) and have high humidity and minimal air currents (USFWS 2014d). NLEBs hibernate between mid-fall through mid-spring every year, although may vary depending on where the species is located within its range. Other features may be used as hibernacula, but have not been determined.

Suitable summer habitat as well as spring staging/fall swarming habitat consists of a wide variety of forested/wooded habitats where they forage, roost, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agriculture fields, old fields, and pastures. This includes forests and woodlots containing potential roosts (i.e. live trees and/or features such as fencerows, riparian forests, and other wooded corridors. These types of wooded areas may be dense or loose aggregates of trees with varying amounts of canopy closure (USFWS 2014d). Suitable roosting trees for the NLEB include trees with a diameter at breast height (dbh) of three inches or greater that exhibits any of the following characteristics: exfoliating bark, crevices, cavity, or cracks. Individual or isolated trees may be considered a potential roosting site when they exhibit characteristics of suitable roost trees and are located within 1,000 feet of other forested wooded habitat. Trees found in highly developed areas (street trees, downtown areas) are extremely unlikely to be suitable NLEB habitat (USFWS 2014d).

Compared to other bat species, NLEBs appear to be opportunistic in selecting roosts, using a variety of tree species based on presence of cavities, crevices or other imperfections such as peeling bark (USFWS 2014d). NLEBs have also been observed roosting in structures such as barns, bridges, buildings, culverts, and sheds. NLEBs typically occupy their summer habitat from Mid-May through Mid-August each year. In a study on the movement of NLEBs, Henderson and Broders (2008) found that NLEBs have a strong preference for foraging and commuting within forested landscapes. They also noted that if NLEBs were located in open areas, they were clustered within 255 ft of forest features.

NLEBs emerge at dusk to forage in upland and lowland woodlots and tree lined corridors and feed on insects that they catch in flight using echolocation. This species also feeds by gleaning insects from vegetation and water surfaces.

Threats

The disease white-nose syndrome (WNS) is the most severe and immediate reason of decline for the NLEB throughout a significant portion of the species range (USFWS 2014d). The disease was first discovered in 2006 in New York, and has since rapidly spread from the Northeast to the Midwest and Southeast, covering much of the species range. The species has declined substantially in portions of its range, up to 99 percent in the Northeast. Due to the uncertainty of rate of the spread of this disease, WNS is expected to continue to spread throughout the United States in the foreseeable future. Although WNS is the greatest contributor to species decline, other sources of mortality such as impacts to hibernacula, loss or degradation of summer habitat, and wind farm operation may now also be important factors affecting the viability of the northern long-eared bat (USFWS 2015f).

Current Status

The northern long-eared bat was listed as a threatened species on April 2, 2015. The USFWS has developed an interim 4(d) rule under the ESA for the NLEB and opened a 90-day public comment period on the interim 4(d) rule. The final rule listing this bat as threatened and the interim 4(d) rule were published in the Federal Register on April 2, 2015 (USFWS 2015g and 2015h). The rules are effective as of May 4, 2015. The final 4(d) rule, published in the Federal Register on January 14, 2016, identifies prohibitions that focus on protecting the bat’s sensitive life stages in areas affected by white-nose syndrome (WNS). The final 4(d) rule went into effect on February 16, 2016.

The USFWS determined that WNS is such an overwhelming threat to the NLEB that regulating most other sources of harm or mortality will not help conserve the species at this time. Focusing on WNS will allow the USFWS and their partners to concentrate on finding a solution to the disease. Applying blanket prohibitions on all forms of take across the 37-state range of the bat would not slow the spread and impact of WNS nor would it benefit the northern long-eared bat at the population level. Therefore, the 4(d) rule focuses prohibitions on protecting bats when and where they are most vulnerable: maternity roost trees during June and July pup-rearing and at hibernation sites, within the WNS Zone (USFWS 2016b). North Dakota is not located within the WNS Zone and does not have known maternity roost sites or hibernacula.

Critical habitat has not been designated for this species. Throughout the species current range, population estimates are not fully understood at this time. In North Dakota, the species has been found in areas of continuous wooded habitat, including the Missouri River corridor, Badlands, and Turtle Mountains (Gillam and Barnhart 2009). No hibernacula have been identified for this species in North Dakota; however due to the short-distance migration habits of this species, hibernacula is likely present within the state.

5.2 Critical Habitat Descriptions

North Dakota contains designated critical habitat for three species; the piping plover, Dakota skipper, and Poweshiek skipperling. Physical and biological features (Primary Constituent Elements) that are essential to conservation of threatened/endangered species include: space for individual population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing (or development) of offspring; and habitats protected from disturbance or that are representative of the historic geographical and ecological distributions of a species.

5.2.1 Piping Plover Designated Critical Habitat

Critical habitat for the piping plover (*Charadrius melodus*) was designated in North Dakota, as published in the Federal Register on September 11, 2002. In the entire UGP region (Minnesota, Montana, Nebraska, North Dakota, South Dakota), designated critical habitat consists of 19 units totaling approximately 184,000 ac (74,228.4 ha) and portions of four rivers totaling approximately 1,207.5 river miles (67 FR 2002). Within North Dakota, piping plover critical habitat (11 Units – 86 areas) occurs within the following counties: Benson, Burke, Burleigh, Divide, Dunn, Eddy, Emmons, Kidder, Logan, McHenry, McIntosh, McKenzie, McLean, Mercer, Morton, Mountrail, Pierce, Oliver, Renville, Sheridan, Sioux, Stutsman, Ward, and Williams. See Appendix E, Piping Plover Critical Habitat Unit Maps. Several State and U.S. Highways are located directly adjacent or within close proximity to piping plover critical habitat units. Appendix E also breaks down the piping plover critical habitat units with associated counties and names of lakes/rivers that have been designated as well as highway name (if within 0.5 miles of critical habitat).

Primary Constituent Elements

Primary constituent elements for the NGP population of piping plovers are habitat components essential for the biological needs of the life history of piping plovers in the breeding range including: courtship, nesting, brood rearing, foraging, roosting, intraspecific communication, and migration. The primary constituent element that must be present at all sites is the dynamic ecological processes that create and maintain piping plover habitat. These processes develop an assortment of habitats on the landscape that provide the essential combination of prey, forage, nesting, brooding, and chick-rearing area. Annual, seasonal, daily, and even hourly availability of habitat for the piping plover is dependent on local weather, hydrological conditions and cycles, and geological processes (67 FR 2002).

On prairie alkali lakes and wetlands, the physical primary constituent elements that sustain the northern great plains population of piping plovers include: shallow, seasonal to permanently flooded, saline wetlands with sandy to gravelly, sparsely vegetated beaches; salt encrusted mud flats, and/or gravelly salt flats; springs and fens along edges of alkali lakes and wetlands; and adjacent uplands 200 ft. above the high-water mark of the alkali lake or wetland (67 FR 2002).

On rivers the primary constituent elements include sparsely vegetated shoreline beaches, peninsulas, islands composed of sand, gravel, or shale, as well as their interface with the water bodies. On inland lakes (such as Lake Sakakawea in North Dakota) the physical primary constituent elements include: lightly vegetated and windswept sandy to gravely islands, beaches, and peninsulas, and their location to the water body.

The suitability of the various habitat types for piping plovers within North Dakota is dependent on a system of dry/wet cycles. Abundance of prey (insects), brood and nesting cover, and vegetation cover are all directly linked to changing water levels. In dry years, alkali wetlands lacking water may be unsuitable for piping plovers. In following years as the wetlands fill again, there may be an abundance of habitat. When wet cycles peak, there may be little to no shoreline habitat available.

Threats to Piping Plover Critical Habitat

The following actions may destroy or have adverse effects to piping plover critical habitat.

- Activities that result in changes in the hydrology of the critical habitat unit, including activities associated with drainage activities, flowage control and operations, flooding, hydropower, irrigation, sediment transfer changes or removal, construction or maintenance of dams, construction of bridges and marinas, dredging, and bank stabilization.

- Activities that result in the development or alteration of the landscape within or immediately adjacent to a hydrological component of the unit including activities associated with construction for urban and industrial development, roads, marinas, bridges or bank stabilization; agriculture activities, off road vehicle activity, mining, and sale, exchange, or lease of Federal land that contains suitable habitat that is likely to result in the habitat being destroyed or degraded.

- Activities that result in introducing significant amounts of emergent vegetation into the critical habitat unit.

- Any activity that significantly and detrimentally alters water quality in the critical habitat unit.

- Activities that alters that inputs of sediment and nutrients necessary for the maintenance of geomorphic and biological processes that ensure appropriately configured and productive systems.

- Any activity that may reduce the value of a site by significantly and detrimentally disturbs plovers from activities such as foraging, brooding, and nesting.

5.2.2 Dakota Skipper and Poweshiek Skipperling Designated Critical Habitat

Critical habitat for the Dakota skipper (*Hesperia dacotae*) and Poweshiek skipperling (*Oarisma poweshiek*) has been designated in North Dakota, as published on the Federal Register on September 30, 2015 (80 FR 2015). Approximately 19,900 acres of critical habitat for the Dakota skipper was designated in 38 units in Minnesota, North Dakota, and South Dakota. Eleven units have been designated in North Dakota including the following counties: McHenry (5 units), McKenzie (2 units), Ransom (2 units), Richland (1 unit), and Rolette (1 unit) (80 FR 2015).

Approximately 25,888 acres of critical habitat for the Poweshiek skipperling have been designated in Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin. Two units have been designated in North Dakota in Richland County, in which one of the units (Unit 1) is also designated critical habitat for the

Dakota skipper (80 FR 2015). See Appendix F– Dakota skipper and Poweshiek skipperling Critical Habitat Unit Maps with breakdown of units, counties, occupancy, acreage and land ownership.

Primary Constituent Elements – Dakota Skipper

Based on the current knowledge of the habitat characteristics required to sustain the life-history processes of the Dakota skipper, the primary constituent elements necessary for this species include the following.

Constituent element 1 includes wet-mesic tallgrass or mixed-grass remnant untilled prairie that occurs on near-shore glacial lake soil deposits or high-quality dry-mesic remnant untilled prairie on rolling terrain consisting of gravelly glacial moraine soil deposits that contains: a predominance of native grasses and native flowering forbs; glacial soils that provide the soil surface or near surface (between soil surface and 2 cm depth) micro-climate conducive to Dakota skipper larval survival and native prairie vegetation; if present, trees or large shrub cover of less than 5 percent of area in dry prairies and less than 25 percent in wet-mesic prairies; if present nonnative invasive plant species occurring in less than 5 percent of area (80 FR 2015).

Constituent Element 2 includes native grasses and native flowering forbs for larval and adult food and shelter, specifically; at least one of the following native grasses to provide larval food and shelter sources during Dakota skipper larval stages: Prairie dropseed (*Sporobolus heterolepis*) or little bluestem (*Schizachyrium scoparium*); one or more of the following forbs in bloom to provide nectar and water sources during the Dakota skipper flight period: Purple coneflower (*Echinacea angustifolia*), bluebell bellflower (*Campanula rotundifolia*), white prairie clover (*Dalea candida*), upright prairie coneflower (*Ratibida columnifera*), fleabane (*Erigeron spp*.), blanketflower (*Gaillardia spp.*), black-eyed Susan (*Rudbeckia hirta*), yellow sundrops (*Calylophus serrulatus*), groundplum milkvetch (*Astragalus crassicarpus*), common gaillardia (*Gaillardia aristata*), or tooth-leaved primrose (*Calylophus serrulata*) (80 FR 2015).

Constituent Element 3 includes dispersal grassland habitat that is within 1 km (0.6 mi) of native high-quality remnant prairie (as defined in Primary Constituent Element 1) that connects high-quality wet-mesic to dry tallgrass prairies or moist meadow habitats. Dispersal grassland habitat consists of undeveloped open areas dominated by perennial grassland with limited or no barriers to dispersal including tree or shrub cover less than 25 percent of the area and no row crops such as corn, beans, potatoes, or sunflowers (80 FR 2015).

Primary Constituent Elements – Poweshiek skipperling

Based on the current knowledge of the habitat characteristics required to sustain the life-history processes of the Poweshiek skipperling, the primary constituent elements necessary for this species include the following.

Constituent Element 1 includes wet-mesic to dry tallgrass remnant untilled prairies or remnant moist meadows containing: a predominance of native grasses and native flowering forbs; undisturbed (untilled) glacial soil types including, but not limited to, loam, sandy loam, loamy sand, gravel, organic soils (peat), or marl that provide the features conducive to Poweshiek skipperling larval survival and native prairie vegetation; depressional wetlands or low wet areas, within or adjacent to prairies that provide shelter from high summer temperatures and fire; if present, trees or large shrub cover less than 5 percent of area in dry prairies and less than 25 percent in wet-mesic prairies and prairie fens; and if present, non-native invasive plant species occurring in less than 5 percent of area (80 FR 2015).

Constituent Element 2 includes prairie fen habitats containing: a predominance of native grasses and flowering forbs; undisturbed (untilled) glacial soil types; depressional wetlands or low wet areas, within or adjacent to prairies that provide shelter from high summer temperatures and fire; hydraulic features necessary to maintain prairie fen groundwater flow and prairie fen plant communities; if present, tree or large shrub cover less than 25 percent of the unit; if present, non-native invasive plant species occurring in less than 5 percent of area (80 FR 2015).

Constituent Element 3 includes native grasses and native flowering forbs for larval and adult food and shelter, specifically; at least one of the following native grasses available to provide larval food and shelter sources during Poweshiek skipperling larval stages: prairie dropseed (*Sporobolus heterolepis*), little bluestem (*Schizachyrium scoparium*), sideoats grama (*Bouteloua curtipendula*), or mat muhly (*Muhlenbergia richardsoni*s), and; at least one of the following forbs in bloom to provide nectar and water sources during the Poweshiek skipperling flight period: purple coneflower (*Echinacea angustifolia*), black-eyed Susan (*Rudbeckia hirta*), smooth ox-eye (*Heliopsis helianthoides*), stiff tickseed (*Coreopsis palmata*), palespike lobelia (*Lobelia spicata*), sticky tofieldia (*Triantha glutinosa*), or shrubby cinquefoil (*Dasiphora fruticosa ssp. floribunda*) (80 FR 2015).

Constituent Element 4 includes dispersal grassland habitat that is within 1 km (0.6 mi) of native high quality remnant prairie (as defined in Primary Constituent Element 1) that connects high quality wet-mesic to dry tallgrass prairies, moist meadows, or prairie fen habitats. Dispersal grassland habitat consists of the following physical characteristics appropriate for supporting Poweshiek skipperling dispersal: undeveloped open areas dominated by perennial grassland with limited or no barriers to dispersal including tree or shrub cover less than 25 percent of the area and no row crops such as corn, beans, potatoes, or sunflowers (80 FR 2015).

Threats to Dakota Skipper and Poweshiek Skipperling Designated Critical Habitat

- Direct and indirect impacts to designated critical habitat from activities such as urban and energy development, construction of roads, gravel mining, and conversion of prairie to agriculture.
- Encroachment of invasive species and woody vegetation.
- Grazing that reduces or continues to suppress the availability or predominance of native plants that provide larval food and adult nectar.
- Wetland destruction and degradation such that the affected area is flooded or drained of water permanently or over a long term that it increases the risk of invasive species invasion, changes in the plant community, or eliminates wet areas used as relief from high temperatures and fire.
- Herbicide application.
- Drought or floods.

6.0 Effects Analysis

A deconstruction matrix was prepared to describe all aspects of NDDOT projects and is included as Appendix C in this document. The matrix breaks down NDDOT project phases into activities and sub-activities and identifies potential stressors and responses for each listed species and critical habitat. The primary threats and stressor categories from the proposed action as well as responses from each species/critical habitat are described in more detail within this section.

Direct and indirect effects are terms used to describe potential stressors to listed resources. Direct effects are defined as effects that are caused by or will result from, and occur at the same time of the proposed action (i.e. noise, vibrations, and visual disturbances). Indirect effects are those that are caused by the proposed action and occur later in time, but still are reasonably certain to occur (i.e. establishment of noxious weeds). Species specific survey methods can be found on the references and forms page at http://www.dot.nd.gov/manuals/design/designmanual/reference-forms.htm

6.1 Interior Least Tern Stressor and Response

Transportation projects that occur adjacent to or within the Missouri River, Lake Oahe, and Lake Sakakawea have the potential to have direct or indirect effects to interior least terns or their habitat. Disturbances such as noise/vibrations from various types of construction activities, increased human presence, water quality modification, habitat alteration/removal can have various effects to the interior least tern. The section below details potential effects to the least tern from NDDOT project stressors.

Disturbance (Noise/Vibrations/Human Presence)

Noise, vibrations, and human presence from construction activities can temporarily discourage interior least terns from foraging, nesting, or roosting in suitable habitat that is adjacent to a roadway construction project (i.e. habitat avoidance). Effects of highway noise to species such as the least tern may include: producing significant changes in behavior (i.e. expending additional energy to find alternate foraging or nesting sites which could cause a depletion of lipid reserves); masking signals birds use to communicate between individuals/young or to recognize biological signals; impairing detection of sounds of predators; decreasing hearing sensitivity temporarily or permanently; and increasing stress and altering reproductive and other hormone levels (Dooling and Popper 2007). The presence of people in close proximity to birds, particularly during nesting or brood-rearing seasons) can displace species from key nesting, foraging or brooding habitats; destroy nests or kill adults and young; or disrupt or alter other important behaviors (Carney and Sydeman 1999, Jorgensen et al. 2016).

Noise from construction activities has the potential to cause flushing from nests or nest abandonment if the disturbances occur frequently and at an intensity that is above ambient noise levels (i.e. new bridge construction). Eggs, young chicks, or juveniles may become separated from adults by human activities or displaced from preferred foraging habitats, which may make them more susceptible to the elements (i.e. hot, cold, or other adverse weather conditions such as storms) and predators; ultimately affecting their survival (Flemming et al. 1988). If least terns have initiated nesting prior to any construction activities in close proximity to a NDDOT project, the species could be adversely affected. Unless avoidance or minimization measures could be implemented (avoidance buffers, timing restrictions, etc.), separate consultation would be required in these situations.

There have been no studies that have determined how noise from construction specifically affects least terns. However, it is reasonable to assume that least terns could be adversely affected from construction generated noise, dependent on the scope and duration of a project as well as site-specific conditions such as the projects distance to suitable habitat. Although the following statements are related to piping plovers, least terns utilize the same type of habitat in North Dakota on the Missouri River/Lake Sakakawea. Therefore, it is reasonable to assume that least terns would respond similarly to piping plovers in regards to human-related impacts.

Piping plovers nest in anthropogenic habitats (areas impacted by human activities); including recreation, aggregate mining, and residences (Jorgensen et al. 2016). Human disturbances can cause behavioral changes that lead to negative consequences such as reduced nesting success (low egg hatching rate, or nest abandonment) (Jorgensen et al. 2016). However, piping plovers appear to be able to habituate to human disturbances. In a study that determined flight initiation distances to piping plovers in response to human disturbance; the species responded less vigorously to disturbance as the incubation period progressed (Jorgensen et al. 2016). The birds responded to stimuli at the greatest distances early in the incubation period, and at the smallest distances later in the incubation period. However, the species became slightly more responsive to stimuli over the course of a day, suggesting that there is a cumulative effect of stimuli experienced by the bird, but that value reset every morning (Jorgensen et al. 2016).

Although least terns may be habituated to short-term disturbances to a certain extent, construction activities may cause noise levels to exceed background noise levels for extended periods of time. This could create direct effects to least terns (nest abandonment, increased energy expenditure) that use suitable habitat near a construction project, particularly if construction begins after nesting has been initiated. Topography and other visual barriers such as riparian forest would significantly reduce the potential for noise and visual disturbances to the interior least tern.

Because of the duration of time required to complete road construction or new bridge construction/bridge demolition in the Missouri River/ Lake Sakakawea; the associated potential stressors from these types of NDDOT projects could adversely affect least terns. Therefore these types of projects may not fit the scope of this programmatic biological assessment. However, conservation measures such as least tern monitoring surveys can be implemented prior to and during construction. Should least terns be identified during monitoring surveys as part of the proposed action, construction activities would not be allowed to resume until it has been demonstrated that the birds have left the area, or minimization measures have been approved and installed/implemented to reduce potential project effects to the species to an insignificant or discountable level. Further information on monitoring surveys can be found in the conservation measure section for this species.

Water Quality Modification

Degradation of water quality from construction activities such as erosion, sedimentation, increased turbidity or release of contaminants including oil, gas, or hydraulic fluid can cause direct and indirect effects to the least tern. The least tern is dependent upon primarily small fish and invertebrates for prey items. Excessive erosion or sedimentation that reaches foraging habitat of the least tern, may result in sub lethal and behavioral effects to small fish and invertebrates such as increased activity, stress, and emigration rates; loss or reduction of foraging capability; reduced growth and resistance to disease; physical abrasion; clogging of gills; and interference with homing and migration (Kjelland et al., 2015). In addition, increased turbidity may negatively affect foraging success for least terns by decreasing visual detectability of fish in the surface layer (USFWS 1999). Becker et al. (1997) performed a study on the foraging success of common terns (*Sterna hirundo*) and discovered that increased turbidity resulted in limited feeding efficiency. In a similar study for little terns (*Sterna albifrons*), prey mass, capture rate, and food intake rate was higher in clearer water (Brenninkmeijer et al. 2002). Conversely, another study found that least terns were found more frequently in more turbid water than would be expected suggesting that the species is capable of foraging in turbid conditions (Haney and Stone 1988). There is also some evidence that turbidity may provide some advantage to plunge divers such as least terns by attracting juvenile fish seeking refuge from fish predators (Blaber and Blaber 1980). Fish tend to rise to the surface in more turbid waters making them more vulnerable to aerial predation (Safina and Burger 1988).

The long term effects of increased suspended sediments can cause changes in the abundance and/or type of food organisms preferred by least terns, alterations in fish habitat, and long-term impacts to fish populations. Potential effects from roadway construction to water quality in least tern habitat would be temporary, and any modification to water quality would be reduced through the implementation of Storm Water Pollution Prevention Plans (SWPPP) and associated best management practices. Increased turbidity resulting from roadway construction could potentially decrease foraging success of least terns as a result of decreased visibility; however there is also evidence that higher turbidity may benefit least tern foraging by concentrating prey in the surface layer. Considering the implementation of SWPPP's and relatively short duration of potential turbidity generated by road construction, overall impacts to least terns as a result of potential water quality impacts from roadway construction are insignificant.

Exposure to Contaminants

Roadway construction activities adjacent to or within the Missouri River or Lake Sakakawea have the potential to inadvertently introduce contaminants into suitable habitat for the least tern. Items such as fuel, oil, and hydraulic fluid may need to be stored on a project site. Exposure to contaminants may directly or indirectly affect interior least terns, depending on the location and quantity of release as well as distance to suitable habitat. Injury to the interior least terns from exposure to contaminants potentially includes a poisoned food source, decrease in food supply, or habitat degradation. Direct exposure of contaminants to adults, young, or eggs, including ingestion of invertebrates or fish exposed to contaminants or oiling of plumage/nests, has the potential to adversely affect the interior least tern through direct injury or mortality. The primary problem caused when a bird becomes exposed to contaminants such as oil is alteration of the feather structure (UC Davis 2016).

When oiled, feathers lose the ability to trap air and repel water. As a result, birds can no longer maintain body heat and become hypothermic. This can cause an increase in metabolism, causing a greater need for food. Birds also frequently preen themselves; therefore, when exposed to contaminants, birds may inadvertently ingest oil when preening (UC Davis 2016). Once contaminants such as oil are ingested, it can cause direct damage to the gastrointestinal tract, causing physical damage to organs which can lead to decreased ability to absorb nutrients and can cause birds to have anemia and lower white blood cells to fight infections (UC Davis 2016). Exposure of eggs to contaminants such as oil can cause mortality and developmental effects on affected embryos. In extreme cases, contaminants may remain in interior least tern habitat for long periods of time, and may be transferred up the food chain through the process of bioaccumulation (Wilford et. al. 1987). Large releases of contaminants are unlikely to occur for a roadway construction project; however potential direct effects may occur if appropriate measures are not taken to remediate any releases.

Storm Water Pollution Prevention Plans are prepared in order to identify potential sources of sediment and other sources of pollution associated with construction activities, and to ensure practices are implemented and maintained to reduce the contribution of pollutants in storm-water discharges from the construction site to waters of the state as well as storm sewer systems. The SWPPP describes how litter, debris, chemicals and parts will be handled to minimize exposure to storm-water. The SWPPP also describes spill prevention and response procedures where potential spills can occur. Specific handling procedures, storage requirements, spill containment, cleanup procedures, and disposal must be identified. Storage structures for petroleum products and other chemicals must have adequate leak and spill protection to prevent any spilled materials from entering waters of the state or storm sewer systems.

Although not common for NDDOT projects, depending on the size of a project and amount of fuel or other contaminants needed to be on-site, a Spill Prevention Control and Countermeasure Plan (SPCC) may be implemented and appropriate containment installed. The SPCC plan describes oil handling operations, spill prevention practices, discharge or drainage controls, and the personnel, equipment, and resources at the facility that are used to prevent oil spills from reaching navigable waters or adjoining shorelines. Each SPCC plan is unique to a project; however there are elements that must be described in every plan including: operating procedures at a site to prevent oil spills; control measures such as secondary containment installed to prevent oil spills from entering navigable waters or adjoining shorelines; and countermeasures to contain, clean up, and mitigate the effects of an oil spill that has impacted navigable waters or adjoining shorelines.

SPCC plans are not required if materials are stored in containers less than 55 gallons and can be demonstrated that spill material will not reach navigable waters of the U.S. Although SPCC plans are not required in these situations, contractors must have materials available to clean up a spill. For large construction projects such as new bridge construction and bridge demolition, due to the amount of equipment used and fuel required, SPCC plans may be required. With the design of a SPCC and/or SWPPP plan specific to a project that may occur in least tern habitat, adverse effects to the species are not likely.

For geotechnical investigations and utility relocations, the use of bentonite is required to act as a drilling lubricant. Frac-out or inadvertent return of bentonite is a potential concern when horizontal directional drilling is used in or near sensitive habitats, waterways, and cultural resource sites. In order to minimize the potential for a frac-out, a contingency plan or frac-out plan is prepared to provide for the timely detection of frac-outs. The frac-out plan is prepared by the drilling contractor to ensure that preventative and responsive measures can be implemented. Once a frac-out is identified, all work stops and the location and extent of the frac-out is determined. If the frac-out is terrestrial, the area is isolated to contain and remove the drilling mud. If the frac-out is aquatic, it is monitored to determine if the drilling mud congeals, once the frac-out is stabilized the congealed drilling mud is removed. If a fracture becomes excessively large, a spill response team would be hired to contain and clean up excess drilling mud in the water. Typically, frac-out plans are only prepared for large-scale horizontal directional drilling projects, and may not be required for small distance (section) adjustments or relocations. Although frac-out plans are not required for small-scale horizontal directional drilling projects, any inadvertent release of drilling mud must be remediated.

Other contaminants such as asbestos or lead/non-lead paint (i.e. from bridge demolition activities) or application of herbicides/pesticides has the potential to reach least tern habitat; however adverse effects are not likely to occur due to the following reasons. Appropriate measures are taken to test for and dispose of asbestos and lead paint, and must be done in accordance with state and federal laws. Applicators of pesticides and/or their direct supervisors (depending on pesticide label requirements) need to be certified by the Pesticide Control Board and must follow all applicable laws for use of herbicides/pesticides. Therefore, with the proper handling of these types of materials, the potential for these types of contaminants to adversely affect least terns is insignificant or discountable.

Habitat Alteration/Fragmentation/Removal

Marina construction, inlet dredging, artificial structures, and other types of construction can eliminate breeding areas and disrupt natural processes that maintain shoreline habitats (Wemmer 1999). Habitat alteration, fragmentation, or removal can occur from roadway construction activities, particularly for new bridge construction and bridge demolition that occurs within the Missouri River/Lake Sakakawea. If least terns lose nesting sites and are forced to use breeding sites that may be marginally suitable, the species may have lower reproductive success. In addition, roads, residences, and high use areas can fragment bird populations and limit travel to foraging areas (NYNHP 2015). Direct impacts to least tern habitat (removal of sandbar habitat for bridge construction for example) would not be covered under this PBA due to the likelihood of adverse effects to piping plover critical habitat, which includes all areas suitable for the least tern within North Dakota. Further information on impacts to piping plover critical habitat can be found in the piping plover critical habitat stressor and response section.

Bridge construction has the potential to affect water velocities and flow patterns in the Missouri River, which could affect the natural processes that create and maintain suitable least tern habitat as a result of both water speed and changes in turbidity. However, bridge piers are typically designed to be parallel to the direction of the flow of water which minimizes the effects on water velocity. In addition, more recent bridge pier design reduces the length and width of piers compared to the design of older bridges which minimizes the footprint within water. Given that the Missouri River has a relatively wide river channel, design of piers to reduce footprint within the water; negligible impacts to water velocities, flow patterns, or channel morphology are anticipated due to new bridge construction.

Natural succession and vegetative regrowth of the open sandy beaches used for nesting decrease habitat quality for piping plovers (NYNHP 2015). Vegetation encroachment would be expected to have this effect to habitat quality for least terns as well. Vegetation may restrict movements of adults and chicks from high quality foraging habitats and starvation in some situations has been a problem (Loegering and Fraser 1995). Habitat availability for least terns may become an issue if smaller habitat patches become heavily vegetated without nearby expanses of sand scoured habitat for the birds to move into. Vegetation may also provide cover for a variety of potential predators. Due to the localized nature of transportation projects, the encroachment of vegetation onto suitable least tern/piping plover habitat as a result of the proposed action is highly unlikely. Any temporary impacts to terrestrial areas would be reclaimed to match surrounding conditions.

Sediment and erosion caused by earthwork adjacent to the Missouri River or Lake Sakakawea has the potential to reach suitable habitat for the least tern. However, with the implementation of SWPPP plans and associated BMP’s, adverse effects to the least tern or their habitat due to erosion or sedimentation would not be anticipated. Further details on potential effects on the least tern from erosion/sedimentation is discussed previously in the water quality modification section.

Lighting

Lighting used during bridge construction/demolition, or new permanent lighting installed for a new bridge may cause direct or indirect effects to the interior least tern. Temporary lighting used during construction in the active season for least terns has the potential to cause behavioral effects to the species such as habitat avoidance, which could in-turn cause increased energy expenditure. Permanent lighting installed for NDDOT projects also has the potential to cause behavioral effects such as habitat avoidance to the interior least tern after the project is completed. However, given that new bridge construction typically occurs along an existing structure, baseline conditions are not expected to change. In addition, lighting is used during low-light periods when least terns are typically not actively foraging or initiating nests, compared to daylight hours. No adverse effects to the interior least tern are anticipated from temporary or permanent lighting. Listed as a standard conservation measure in Section 7 downcast or shielded lighting should be used during construction projects to avoid potential effects to listed species.

Conservation Measures Specific to the Interior Least Tern:

General conservation measures to be applied to all projects to lessen the potential for effects to all listed species are described in Section 7 of this document.

Interior least terns may be present in North Dakota from approximately April 15 – August 31. Although the species may remain in North Dakota until the end of August, nest initiation is not anticipated to occur past July 15. Projects in or adjacent to suitable least tern habitat (Missouri River and Lake Sakakawea), can implement construction phasing to avoid construction activities within 0.5 mile of potential nesting and foraging areas. If construction phasing is an option, the following conservation measure should be used.

- *Construction activities shall be avoided within 0.5 miles of suitable habitat (between Station X and Station X) for the interior least tern and piping plover between the dates of April 15 and August 31.*

If construction phasing is not an option, surveys may be performed by a qualified biologist[2] prior to commencement of construction activities within 0.5 miles of the Missouri River or Lake Sakakawea for the least tern to determine if birds or active nests are present.

Initial Survey: If construction occurs during the least tern and piping plover breeding season (April 15 – August 31), an initial field survey will be conducted within piping plover designated critical habitat located inside a 0.5 mile buffer area of construction activities. The survey will occur two days before beginning construction to identify suitable habitat (e.g. islands, sandbars, or exposed shoreline). *Note- Although the least tern does not have designated critical habitat in North Dakota, piping plover designated critical habitat contains the Missouri River/Lake Oahe/Lake Sakakawea, which are the only areas where the least tern nests in North Dakota.*

[2] A qualified biologist is required to have a four year Bachelor of Science degree in wildlife management, biology/zoology or closely related natural resources degree from an accredited university and to be trained in the identification of the threatened and endangered species of North Dakota.

No Habitat Present: If no suitable habitat is identified during the initial survey, surveys will be conducted weekly to identify any new habitat uncovered by the river. End surveys July 15 if no suitable nesting habitat, nesting pairs, or nests have been identified. Construction can resume without surveys on July 16 if it has been determined no active nests are located within 0.5 miles of any construction activities.

Habitat Present: If suitable habitat has been identified and construction activities will take place within 0.5 miles of the habitat, 2 surveys will be conducted daily:

1) The first survey will be conducted for 2 hours during daylight before starting construction activities for that day.

2) The second survey will be conducted for 1 hour beginning after work has stopped for that day. Construction activities will stop early enough to allow for the survey to be completed no later than 30 minutes after sunset.

If nests, an individual, or pair of birds are detected during surveys, the Engineer will be notified, construction activities will cease, and at least a 0.5 mile avoidance area will be established. The Engineer will contact USFWS, FHWA, and NDDOT ETS Division to determine methods to be implemented to avoid adverse effects to the species. If active nests are discovered construction activities will be prohibited within 0.5 mile of the active nest. Construction activities will not resume within the avoidance area until one of the following has been fulfilled: daily surveys show that the birds have vacated the area, mitigation measures determined by the contacted agencies have been implemented, or September 1 has been reached.

Note: Surveys will be conducted only until July 15 as nest establishment is not anticipated to occur past this date. However, if active nests or individuals/pairs are discovered on July 15 or earlier, surveys must resume until the fate of the nest has been determined (abandoned, destroyed, hatched, fledged), or the birds have left the area.

Survey Report: A report will be submitted to the Engineer and NDDOT ETS detailing the following information:

- Date and time of surveys
- Locations of suitable habitat and distance from construction activities
- Results of the surveys
- Photos and map(s) of the survey area
- Qualifications of individuals performing the surveys

Effect Determination

Disturbance from construction activities, water quality modification, exposure to contaminants, habitat modification/removal, and lighting has the potential to directly or indirectly affect the interior least tern. However, with the implementation of least tern surveys, design/implementation of SWPPP and SPCC plans, standard conservation measures, and construction phasing (if applicable), adverse effects to this species are not anticipated. Therefore, the proposed action ***may affect, but is not likely to adversely affect*** the interior least tern.

6.2 Whooping Crane Stressor and Response

Transportation projects that occur within rural areas with wetland/cropland associations have the potential to have direct or indirect effects to whooping cranes or their habitat. Disturbances such as noise/vibrations from various types of construction activities, increased human presence, overhead utility adjustments/installations, water quality modification, habitat alteration/removal can have various effects to the whooping crane. The section below details potential effects to the whooping crane from NDDOT project stressors.

Disturbance (Noise/Vibrations/Human Presence)

There have been no studies that have determined how construction noise specifically affects whooping cranes. However, it is reasonable to assume that whooping cranes could be directly affected from construction generated noise, dependent on the scope and duration of a project as well as site-specific conditions such as the projects distance to suitable stopover habitat. Whooping cranes generally avoid areas of human activity, and prefer to be in areas isolated from human disturbances. However, adverse weather conditions such as heavy fog, may cause cranes to use stopover habitat in close proximity to roads. In normal weather conditions, whooping crane use of wetlands and croplands within close proximity (0.5 mile or less) to highways is extremely unlikely. Howe (1989) reported that during migration, whooping cranes tended to be wary and found that the mean distance of whooping crane stopover habitat from the nearest road and human habitation was 0.5 - 1.3 km (0.3 – 0.8 mile, respectively). This distance is likely to be greater in areas of high traffic such as interstates as well as rural commercial/industrial development, where disturbances are frequent and habitat is highly fragmented.

Noise, vibrations, and human presence from construction activities can temporarily discourage whooping cranes from foraging or roosting in suitable habitat that is adjacent to a roadway construction project (i.e. habitat avoidance). Direct effects of highway noise to species such as the whooping crane may include: producing significant changes in behavior (i.e. habitat avoidance - expending additional energy to find foraging or roosting sites); masking signals birds use to communicate between adults/juveniles or to recognize biological signals; impairing detection of sounds of predators; decreasing hearing sensitivity temporarily or permanently; and increasing stress and altering reproductive and other hormone levels (Dooling and Popper 2007). Expending additional energy during migration periods may result in depletion of energy reserves and can cause whooping cranes to take additional time during migration to replenish lost energy (USGS 2012). Extra days spent foraging to replenish depleted energy reserves may cause delays in reaching breeding and wintering grounds for whooping cranes. Delays may translate into reduced breeding success (i.e. less time to hatch and fledge young). Additionally, whooping cranes may continue migration and arrive on breeding grounds with a lipid deficit, which may cause whooping cranes to spend extra time building required reserves in order to breed and nest, or their reproductive effort could be reduced (lower clutch size and lower egg mass)(USGS 2012).

Noise from construction activities also has the potential to cause flushing from feeding or roosting areas if the disturbances occur frequently and at an intensity that is above ambient noise levels. Adults and juveniles may become separated by human disturbances or displaced from preferred foraging habitats, which may make them expend additional energy as well more susceptible to predators.

Indirect effects from human disturbances could occur to the whooping crane could occur after a project has been completed. For example, new road construction would cause traffic and associated noise in new areas where whooping crane stopover habitat has been bisected. This could cause habitat avoidance and behavioral responses including expending additional energy to find more secluded roosting and foraging areas. However, stopover habitat for the whooping crane is not limited in North Dakota and the species is capable of long distance flights. Land cover analysis for North Dakota indicates that approximately 58 percent of the state is agriculture, therefore harvested grain fields are in great abundance within North Dakota. Although only approximately 4 percent of the state is open water; small, shallow wetlands within or in close proximity to agriculture fields are abundant throughout the whooping crane migration corridor in North Dakota. Therefore, due to the abundance of suitable stopover habitat within the whooping crane migration corridor, adverse effects to this species as a result of new road construction are not anticipated.

Modification of Overhead Utilities

Rural electrification in North America has resulted in the rapid increase of power lines into areas used by migratory birds during migration, resulting in substantial mortality (Brown et al. 1987, USFWS 1994). Collisions with power lines become biologically significant when they affect a bird populations ability to sustain or increase its numbers, particularly with endangered species (APLIC 2012). Whooping cranes are susceptible to striking powerlines because of their large body size and wing span, slower wing beat, and relative lack of maneuverability (Stehn and Wassenich 2008). Juveniles are more vulnerable to collisions than adults, presumably due to lack of experience and flight skills (APLIC 2012). Collisions with power lines are known to have accounted for the death or serious injury of at least 45 whooping cranes since 1956. However, the bulk of power line mortalities to whooping cranes have occurred in the experimental introduced flocks (WAPA and USFWS 2014). The percentage of whooping crane mortality caused by collisions with power lines is difficult to quantify for the AWBP wild population because of the less intense monitoring of that population during migration compared to reintroduced flocks.

Cranes and other birds collide with distribution or transmission lines because they do not see the lines in time to avoid them and suffer traumatic injury from the collision itself, or from the impact of falling to the ground (Brown et al. 1987). Non-conducting lines (ground wires), which are typically installed above conductor wires to intercept lightning strikes and prevent power outages, are the wires most often struck by birds in flight (Scott et al. 1972, Willard et al. 1977, Ward and Anderson 1992). Normally, ground wires are 0.9 – 1.3 cm in diameter and are smaller than conductor wires, they sometimes appear to be invisible because of background conditions such as lighting. Therefore, birds often see and avoid conductor wires only to strike the less visible ground wires, and are more prone to strike wires mid-span between utility poles, rather than near the poles themselves (Ward et al. 1986).

Encounters with power lines usually occur as whooping cranes are making short, low altitude flights between foraging and roosting areas. These local flights frequently occur near sunrise and sunset when light levels are diminished. During migration, whooping cranes make approximately 12-15 stopovers during each 4,000 km migration (Kuyt 1992); therefore there are multiple chances that whooping cranes may encounter power lines. Adverse weather conditions, such as dense fog, rain or snow, may increase the potential for whooping cranes to collide with power lines.

Transportation projects frequently require the adjustment (raising/lowering) or relocation of existing above-ground utilities in rural areas where cropland/wetland associations are abundant. Although whooping cranes tend to avoid areas of human development such as roads and residential areas, whooping crane observations have been documented using stopover habitat within 1 mile of highways as well as county roads in North Dakota, primarily in the 95-percent sighting corridor (Appendix D). The amount of utility adjustments required for a specific project depends on the scope and length of a project. In some cases the utility adjustments may localized and minor, and in other cases, overhead utilities may need to be adjusted throughout the length of a project, particularly for roadway widening projects. Terrain also plays a factor in potential effects to whooping cranes from utility adjustments. Utilities that need to be adjusted in areas of rolling/steep terrain or wooded areas, would likely have no potential effects to the whooping crane because the species is highly unlikely to fly low altitude through areas of rugged terrain or forested/wooded areas.

Direct effects from the adjustment of utility lines during construction activities to whooping cranes are not anticipated. However, disturbances associated with the activities required to facilitate the utility adjustments may cause habitat avoidance, or other behavioral responses from whooping cranes such as premature departure from stopover sites.

Indirect effects such as direct injury or mortality to whooping cranes may occur after utility adjustments have been completed for a project. In most cases transportation projects modify existing overhead utilities. Therefore, there is already a potential that whooping cranes may collide with existing utilities, especially if the utilities to be adjusted or relocated have not been fitted with line marking devices (bird diverters). However, since transportation projects alter the baseline condition of existing utilities, there is a potential to directly affect whooping cranes at a future point in time. The placement of line markers (bird diverters) on overhead utilities adjusted as a result of NDDOT projects would reduce potential effects to an insignificant or discountable level. Line markers increase the visibility of power lines; thereby allowing species such as the whooping crane to see power lines more clearly, allowing them to better avoid colliding with overhead lines. Most studies have shown a reduction in collisions and/or increase in behavioral avoidance at marked lines when compared to unmarked lines; however this can vary with location, type of line marking device, and bird species (Jenkins et al. 2010, Barrientos et al. 2011).

Modification/Removal of Stopover Habitat

A large majority of NDDOT projects are improvements/rehabilitations to existing roads, including highways, interstates, and county roads. In these instances, modification or removal of stopover habitat is not anticipated due to the avoidance habits of whooping cranes. Migrating whooping cranes appear to avoid areas near human residences and prefer areas with good visibility. Most locations where whooping cranes have been observed were more than 0.5 miles away from any human structures or developments (Austin and Richert 2011). Visibility and adequate distance from human activity may be important whooping crane requirements during the spring and fall migration periods.

Wetland impacts frequently occur for NDDOT projects. Due to the whooping cranes avoidance habits of developed areas (including roads), wetlands directly adjacent to an existing roadway would not function as stopover habitat for whooping cranes, particularly for high traffic highways and interstates. In addition, erosion control BMP’s are used throughout construction activities to reduce impacts to wetlands. Impacts to wetlands are also mitigated either on-site, or at approved mitigation banks. The creation of off-site wetland mitigation banks may provide a benefit to the species by improving and restoring wetland habitat that could be used as stopover sites during the spring and fall migrations.

Potential impacts to water quality from NDDOT projects are discussed further in the next section. In addition to small shallow wetlands, foraging habitat for whooping cranes also consists of harvested grain crops.

Similar to wetlands adjacent to exiting roadways, because of the avoidance habits of whooping cranes of developed areas, cropland that may be impacted immediately adjacent to an existing roadway is not likely to have potential effects to the species. Aside from potential direct effects to the species during construction (habitat avoidance and premature departure from stopover habitat causing increased energy expenditure), cropland impacts directly adjacent to existing roads would have no effect to the whooping crane.

New road construction (bypasses, truck reliever routes, new alignments) in rural areas within the whooping crane migration corridor has the potential to fragment, modify, or remove potential stopover habitat for the whooping crane. The stressors and response of reduction or loss of habitat for the whooping crane are discussed in previous sections. The construction of a new road within the whooping crane migration corridor in North Dakota could result in habitat avoidance (causing increased energy expenditure) as a result of both construction activities as well as indirectly after construction is completed. In an opinion by the South Dakota USFWS Field Office, the USFWS states that the loss of stopover habitat use would be relatively small considering the large amount of stopover habitat within the whooping crane migration corridor (USFWS 2010a).

The loss or reduction of quality of stopover habitat for whooping cranes in North Dakota due to new road construction would be relatively small considering the large area within the migration corridor for whooping cranes within the state. Although there may be habitat avoidance from new road construction as well as potential habitat loss, the small amount of potentially affected habitat should not be limiting to or have adverse effects on whooping cranes. Given the abundance of wetland/cropland matrixes within the state of North Dakota within the 95% sighting corridor; suitable stopover habitat for the whooping crane is not limited at this point in time. Land cover analysis for North Dakota indicates that approximately 58 percent of the state is agriculture, therefore harvested grain fields are in great abundance within North Dakota. Although only approximately 4 percent of the state is open water; small, shallow wetlands within or in close distance to agriculture fields are abundant throughout the whooping crane migration corridor in North Dakota. Therefore, whooping cranes have ample areas to find stopover habitat located away from human developments, including new roads. No designated critical habitat exists in North Dakota for this species.

Water Quality Modification

Temporary impacts to water quality could occur from roadway construction activities such as erosion, sedimentation, and inadvertent releases of contaminants. Reduced water quality caused by erosion/sedimentation or release of contaminants in suitable stopover habitat for the whooping crane has the potential to cause direct injury or mortality to the species, affect invertebrates and other potential aquatic organisms used by cranes as food sources, and reduced habitat quality. The primary problem caused when a bird becomes exposed to contaminants such as oil is alteration of the feather structure (UC Davis 2016). When oiled, feathers lose the ability to trap air and repel water. As a result, birds can no longer maintain body heat and become hypothermic. This can cause an increase in metabolism, causing a greater need for food. Birds also frequently preen themselves; therefore, when exposed to contaminants, birds may inadvertently ingest oil or other contaminants when preening (UC Davis 2016). Once contaminants such as oil are ingested, it can cause direct damage to the gastrointestinal tract, causing physical damage to organs which can lead to decreased ability to absorb nutrients and can cause birds to have anemia and lower white blood cells to fight infections (UC Davis 2016).

Kauffeld (1981) noted a reduction of food led to an early spring departure by cranes from traditional stopover sites. The loss or reduction of aquatic organisms used by cranes as food sources such as frogs, crayfish, small fish, salamanders and tadpoles (Armbruster 1990), may cause whooping cranes to expend additional energy to forage. Reduced habitat quality as a result of water quality modification may also cause whooping cranes to expend additional energy to relocate to new areas of suitable stopover habitat. Expending additional energy during migration periods may result in depletion of energy reserves and can cause whooping cranes to take additional time during migration to replenish lost energy (USGS 2012). Extra days spent foraging to replenish depleted energy reserves may cause delays in reaching breeding and wintering grounds for whooping cranes. Delays may translate into reduced breeding success (ex. less time to hatch and fledge young). Additionally, whooping cranes may continue migration and arrive on breeding grounds with a lipid deficit, which may cause the species to spend extra time building required reserves in order to breed and nest, or their reproductive effort could be reduced (lower clutch size and lower egg mass).

Erosion control measures as part of SWPPP plans are used throughout construction activities to reduce impacts to wetlands and fueling sites are not located in wetland areas. Small releases of contaminants such as oil or gas from vehicles or construction equipment may occur near a wetland; however any release of a contaminant must be remediated according to state and federal laws. In some cases, SPCC plans may be required for projects, which details measures to properly contain contaminants as well as what measures would be taken to address any inadvertent releases. With the implementation of erosion control measures and measures taken to properly contain and clean contaminants, adverse effects to the whooping crane as a result of water quality modification are not likely to occur from the proposed action.

Lighting

Lighting used during construction, or new permanent lighting installed for a project has the potential to cause behavioral effects to the whooping crane such as habitat avoidance or premature departure from stopover habitat. See disturbance section for further details on effects to whooping cranes as a result of habitat avoidance or premature departure from stopover habitat. However, given the species preference to select habitat away from features such as roads and abundance of suitable stopover habitat within North Dakota, no adverse effects to the whooping crane are anticipated from temporary or permanent lighting.

Exposure to Contaminants

Roadway construction activities adjacent to or within areas with cropland/wetland associations have the potential to inadvertently introduce contaminants that may reach suitable habitat for the whooping crane. Items such as fuel, oil, and hydraulic fluid may need to be stored on a project site. Exposure to contaminants may directly or indirectly affect whooping cranes, depending on the location and quantity of release as well as distance to suitable habitat. Injury to the whooping crane from exposure to contaminants potentially includes a poisoned food source or habitat degradation. Direct exposure of contaminants to adults or juveniles including ingestion of invertebrates, fish, or grain exposed to contaminants as well as oiling of plumage, has the potential to adversely affect the whooping crane (i.e. direct injury or mortality). See water quality modification section for further details on the potential effects to whooping cranes as a result of exposure to contaminants. In extreme cases, contaminants may remain in whooping crane habitat for long periods of time, and may be transferred up the food chain through the process of bioaccumulation (Wilford et. al. 1987). Large releases of contaminants in suitable whooping crane stopover habitat are unlikely to occur for a roadway construction project; therefore, adverse effects to the whooping crane as a result of inadvertent releases of small amounts of contaminants are highly unlikely.

Storm Water Pollution Prevention Plans are prepared in order to identify potential sources of sediment and other sources of pollution associated with construction activities, and to ensure practices are implemented and maintained to reduce the contribution of pollutants in storm-water discharges from the construction site to waters of the state as well as storm sewer systems. The SWPPP describes how litter, debris, chemicals and parts will be handled to minimize exposure to storm-water. The SWPPP also describes spill prevention and response procedures where potential spills can occur. Specific handling procedures, storage requirements, spill containment, cleanup procedures, and disposal must be identified. Storage structures for petroleum products and other chemicals must have adequate leak and spill protection to prevent any spilled materials from entering waters of the state or storm sewer systems.

Although not common for NDDOT projects, depending on the size of a project and amount of fuel or other contaminants needed to be on-site, a Spill Prevention Control and Countermeasure Plan (SPCC) may be implemented and appropriate containment installed. The SPCC plan describes oil handling operations, spill prevention practices, discharge or drainage controls, and the personnel, equipment, and resources at the facility that are used to prevent oil spills from reaching navigable waters or adjoining shorelines. Each SPCC plan is unique to a project; however there are elements that must be described in every plan including: operating procedures at a site to prevent oil spills; control measures such as secondary containment installed to prevent oil spills from entering navigable waters or adjoining shorelines; and countermeasures to contain, clean up, and mitigate the effects of an oil spill that has impacted navigable waters or adjoining shorelines.

SPCC plans are not required if materials are stored in containers less than 55 gallons and can be demonstrated that spill material will not reach navigable waters of the U.S. Although SPCC plans are not required in these situations, contractors must have materials available to clean up a spill. For large construction projects such as new bridge construction and bridge demolition, due to the amount of equipment used and fuel required, SPCC plans may be required. With the design of a SPCC and/or SWPPP plan specific to a project that may occur in least tern habitat, adverse effects to the species are not likely.

For geotechnical investigations and utility relocations, the use of bentonite is required to act as a drilling lubricant. Frac-out or inadvertent return of bentonite is a potential concern when horizontal directional drilling is used in or near sensitive habitats, waterways, and cultural resource sites. In order to minimize the potential for a frac-out, a contingency plan or frac-out plan is prepared to provide for the timely detection of frac-outs. The frac-out plan is prepared by the drilling contractor to ensure that preventative and responsive measures can be implemented. Once a frac-out is identified, all work stops and the location and extent of the frac-out is determined. If the frac-out is terrestrial, the area is isolated to contain and remove the drilling mud. If the frac-out is aquatic, it is monitored to determine if the drilling mud congeals, once the frac-out is stabilized the congealed drilling mud is removed. If a frac-out becomes excessively large, a spill response team would be hired to contain and clean up excess drilling mud in the water. Typically, frac-out plans are only prepared for large-scale horizontal directional drilling projects, and may not be required for small distance (section) adjustments or relocations.

Conservation Measures Specific to the Whooping Crane:

General conservation measures to be applied to all projects to lessen the potential for effects to all listed species are described in Section 7 of this document.

In order to reduce the potential for future overhead utility strikes that have been adjusted as a result of transportation projects; the following conservation measure should be applied to all projects that require overhead utility adjustments in rural areas with wetland/cropland associations within the 95% whooping crane sighting corridor in North Dakota. There may be situations where applying line marking devices would not be applicable, such as areas of rugged terrain or areas with high tree abundance.

Note – The NDDOT will request to affected utility companies that diverters be placed between 5 – 30 meters apart, on 60% of the span of adjusted line between each pole, and should be placed towards the central portion of the span. These recommendations come from the Avian Power Line Interaction Committee (APLIC). Utility companies ultimately need to determine the type, number and placement/spacing of line markers for engineering concerns such as weight burden on the line and snow/ice buildup issues.

- Line markers (bird diverters) will be placed along the segment(s) of overhead utilities to be raised, lowered, and/or moved within 1 mile of whooping crane stopover habitat to reduce the risk of flight collisions.

If it is not feasible to install bird diverters as part of utility adjustments occurring from the proposed action; adverse effects to the whooping crane are not anticipated. The baseline condition of the utilities would not significantly change as a result of short-distance localized adjustments as the utilities were already present on the landscape. In most situations, the placement of bird diverters would not be an issue, however the utility company may determine that the placement of diverters on overhead utilities may not be feasible due to engineering concerns.

Effect Determination

NDDOT projects may cause whooping cranes to avoid potential stopover habitat, cause the species to prematurely depart from stopover sites, fragment and remove potential stopover habitat, and potentially expose whooping cranes to contaminants such as oil, gas, and hydraulic fluid. With the implementation of SWPPP plans and SPCC plans (if required), standard conservation measures (Section 7), cease of work activities if whooping cranes are observed near a project site, as well as the installation of line markers (bird diverters) on adjusted overhead utilities; the proposed action ***may affect, but is not likely to adversely affect*** the whooping crane.

6.3 Black-Footed Ferret Stressor and Response

NDDOT projects in western North Dakota may impact prairie dog towns, which are required for black-footed ferret survival. Currently, the black-footed ferret is believed to be extirpated from North Dakota

(NDGF 2012). Large expansive prairie dog towns 5,000-10,000 acres needed to support breeding populations of black-footed ferrets do not currently exist in North Dakota (NDGF 2012). The minimum prairie dog town needed to support a small population of black-footed ferret is 80 acres (USFWS 1989). There are several prairie dog towns in North Dakota that are 80 acres or larger; however no re-introductions have occurred within the state. The following sections describe potential effects to the black-footed ferret should re-introductions occur in North Dakota in the future. Refer to Appendix G for a map that shows prairie dog range within North Dakota.

Disturbance (Human/Noise/Vibrations)

Disturbance from construction activities adjacent to or within prairie-dog towns occupied by black-footed ferrets may cause behavioral effects such as habitat avoidance/displacement, increased alertness, and abandonment of young. These stressors may cause black-footed ferrets to expend additional energy causing a depletion of fat reserves in order to relocate to new areas. Behavioral responses in animals from human disturbances can also cause changes in foraging and reproduction (Magle et al. 2005). In addition, communication behavior essential for survival and reproduction in many animals can be altered by human disturbance (Magle et al. 2005). Due to the level of disturbance caused by construction activities, adverse effects to the species would be likely, depending on the distance of construction activities to an occupied site. Individual consultation would be required in these situations where adverse effects to the black-footed ferret are anticipated.

Removal/Modification of Suitable Habitat

Construction activities that occur in or directly adjacent to prairie-dog towns occupied by the black-footed ferret have the potential to cause direct injury or mortality to the species. Earthwork, including clearing/grubbing, excavation, utility adjustments, geotechnical investigations, and other activities that cause direct impacts to prairie dog towns may kill or injure black-footed ferrets. Removal or modification of prairie-dog towns, particularly for new road construction, also has the potential to directly or indirectly affect the black-footed ferret through habitat fragmentation/loss (reduction of quality of habitat) and loss of prey base and burrows needed for survival of black-footed ferrets adults and young. Individual consultation would be required in these situations where direct or indirect effects to prairie dog towns occupied by the black-footed ferret would occur, should re-introductions happen within North Dakota in the future. Impacts to prairie dog towns that are unoccupied by the black-footed ferret may indirectly affect the species through loss or reduction in quality of potential habitat should re-introductions occur in North Dakota in the future.

Exposure to Contaminants

If fueling sites are stored on active prairie dog towns occupied by black-footed ferrets, there is a potential for adverse effects including direct injury or mortality if a release were to occur. The black-footed ferret may also be indirectly affected by release of contaminants if prairie dogs are directly exposed to the release of contaminants or consume vegetation that has been coated with oil, gas, or hydraulic fluid. Since black-footed ferrets are dependent upon prairie dogs for prey base, prairie dogs that have been exposed to contaminants may be consumed by black-footed ferrets, which could cause adverse effects to the species including direct injury or mortality. Contaminants such as oil can affect organisms both from internal exposure through skin and eye irritation and can coat fur, reducing mammal’s ability to maintain body temperatures (NOAA 2016). However, these potential effects are highly unlikely to occur, due to the low potential for spills to happen in active prairie-dog towns occupied by black-footed ferrets. Fueling sites would be stored away from prairie dog towns occupied by black-footed ferrets to avoid these potential effects. Small inadvertent releases of contaminants from vehicles or construction equipment are not anticipated to have any potential effects to the black-footed ferret, provided that the spill is contained and any contaminated soils/vegetation are removed.

Lighting

Temporary lighting used during construction near or within active prairie dog towns occupied by black-footed ferrets has the potential to cause direct effects such as habitat avoidance/displacement. This could cause black-footed ferrets to expend additional energy to relocate to new areas. However, the possibility of a NDDOT project occurring near/within a prairie dog town that is occupied by black-footed ferrets is extremely unlikely. Should re-introductions occur in the future and a proposed NDDOT project occurs near or within an introduction site, separate consultation would be needed due to the high likelihood of adverse effects to the black-footed ferret.

Conservation Measures Specific to the Black-Footed Ferret

No conservation measures have been identified for the black-footed ferret as the species is not known to occur in North Dakota at this time. Should re-introductions occur in North Dakota in the future and a NDDOT project would occur within or directly adjacent to a prairie dog town occupied by black-footed ferrets, separate consultation would be necessary as it is highly unlikely adverse effects could be avoided to the species.

Effect Determination

For projects that impact prairie dog towns less than 80 acres, the proposed action would have ***No Effect*** to the black-footed ferret. For projects under the proposed action that impact a prairie dog town 80 acres or larger, a loss of potential habitat for future re-introduction of the species could occur. However, it is highly unlikely new road construction would occur through a large prairie dog town as many of the larger prairie dog towns in North Dakota are located in remote areas. A small loss of prairie dog towns adjacent to an existing roadway would have negligible amounts of potential habitat loss for the black-footed ferret. Therefore, the proposed action ***may affect, but is not likely to adversely affect*** the black-footed ferret (note- this determination is made under the assumption that the impacted prairie dog town is unoccupied by the black-footed ferret, if re-introductions occur for this species in the future in North Dakota and the prairie dog town would be directly impacted, separate consultation would be necessary).

6.4 Pallid Sturgeon Stressor and Response

NDDOT projects that occur adjacent to or within the Missouri River, Lake Oahe, or Lake Sakakawea have the potential to directly or indirectly affect the pallid sturgeon. Disturbances such as noise/vibrations from various types of construction activities (particularly bridge construction/demolition), water quality modification, habitat alteration/removal, and exposure to contaminants can have various effects to this species. The section below details potential effects to the pallid sturgeon from NDDOT project stressors.

Disturbances (Noise/Vibrations/Operation of Equipment/Installation of Pile/Geotechnical)

Noise and vibrations caused by new bridge construction or bridge demolition has the potential to cause adverse effects to the pallid sturgeon adults, eggs, and larvae. In particular, pile driving is a common construction method used in new bridge construction, including temporary bridges, for the construction of bridge piers. When a pile-driving hammer strikes a pile, the sound from the impact propagates in the air and a transient wave or pulse, propagates down the length of the pile. The impact will also create transverse stress waves in the wall of the pile which combine with surrounding air and water to radiate sound into the water and additional sound into the air (Hastings and Popper, 2005).

Additionally, the pulse propagating down the length of the pile reaches the substrate at the water bottom, and causes waves to propagate outward through the bottom sediment. The sound waves that reach the substrate can be transmitted from the bottom onto the water at some distance away from the pile to create localized areas of very low and/or very high sound pressure and acoustic particle motion because of the interference with the sound pulse traveling outward through the water directly from the pile (Hastings and Popper 2005). See Figure 1 below for the propagation of underwater sound caused by pile driving activities.

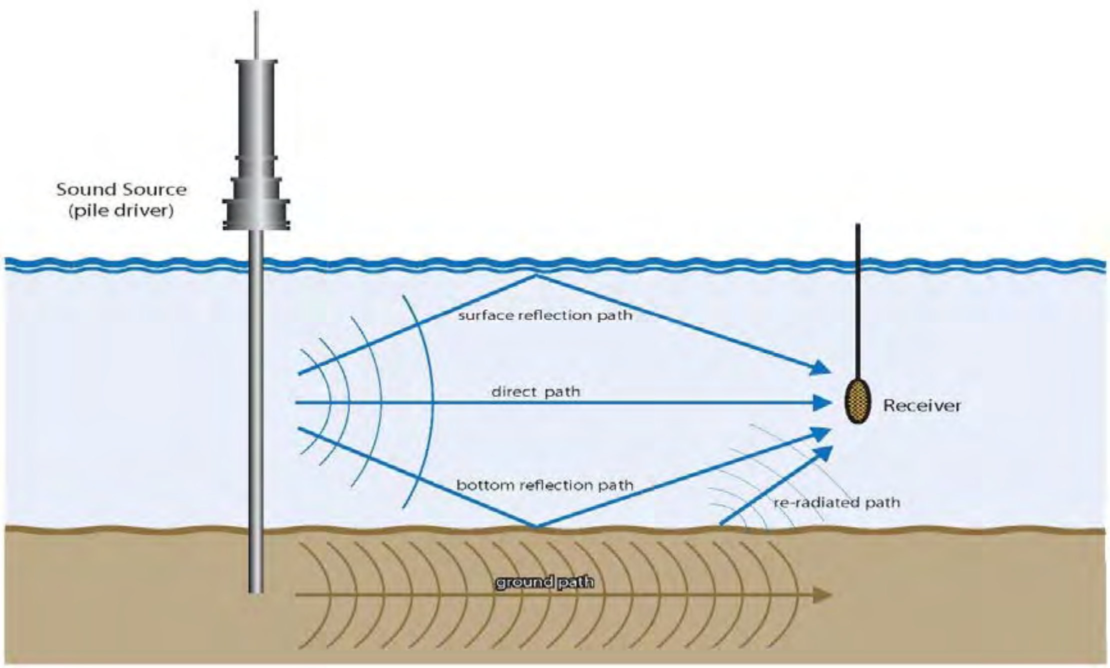

Figure 12. Propagation of underwater sound caused by pile driving activities (Caltrans 2015).

Sound pulses as a function of time are referred to as waveforms. The passage of a waveform and associated sound pressure at some point away from the pile can be measured at a select location in the water column using an underwater microphone referred to as a hydrophone. In most instances, pile driving sounds underwater are characterized by multiple rapid increases and decreases in sound pressure over time. The peak pressure is the highest absolute value of the measured waveform, and can be a negative or positive pressure peak.

Piles are generally fabricated out of wood, concrete, or steel. The various types and sizes of pile produce different levels of underwater sound when they are driven. The peak sound pressure levels have been measured 10 meters from driving the piles of different sizes and compositions. These levels range from 177 dB (for a 10-12 inch wood pile) to 220 dB (for a 96 inch steel pile) (Caltrans 2015).

Fish are able to detect and respond to a wide range of sounds. Various species of fish differ in the range of frequencies, or bandwidth, that they are able to detect, and in the lowest sound pressure level that they are able to detect. Like other vertebrates, fish have two inner ears that lie within the brain cavity. The inner ear of a fish is similar to other vertebrates; however, fish have no middle or external ear. The basic mechanism for transduction of sound into electrical signals compatible with the nervous system in fish is the sensory hair cell (Hastings and Popper 2005). This cell is found in the ears of all vertebrates. The same cells are also found in the lateral line system, which is a series of receptors along the body of the fish that detects water motion relative to the fish that arise from sources within a few body lengths of the animal (Coombs and Montgomery 1999). Fish continue to produce sensory hair cells throughout much of their lives (Lomberte and Popper 1994). There is also evidence that fish can replace damaged sensory cells that have been damaged in both the inner ear and lateral line (Meyers and Corwin 2008).

Hearing in fish is based on the detection of the mechanical motions in the medium imparted by sound. The otolith organs in fish are directly stimulated by the velocity of acoustic particles associated with underwater sound fields. In addition, the otolith organs can be stimulated indirectly by particle motions created when sound pressure fluctuations are transformed into motion by a gas-filled accessory organ such as the swim bladder (Hastings and Popper 2005). Tissue damage can occur to fish when sound passes through a fluid tissue into the swim bladder (Caltrans 2015). When fish are exposed to sound waves, gas in the swim bladder expands more than surrounding tissue. The expansion and contraction in the swim bladder may cause it to rupture.

There are two classes of effects of exposure to sound to the ear. Low level exposure of sound for long periods of time or high level exposure of sound for shorter periods of time may result in a temporary hearing loss, referred to as a temporary threshold shift or TTS (Lonsbury-Martin et al. 1987). Factors such as repetition of rate of sound, pressure level, frequency, duration, health of the organisms, as well as many others can affect the level of duration and exposure that causes TTS. The duration and extent of the TTS may continue from minutes to days after the end of the exposure, and is dependent on many variables. The second possible effect is referred to as permanent threshold shift (PTS), which is a permanent loss of hearing and is usually accompanied by the death of the sensory hair cells of the ear (Saunders et al. 1991).

In coordination with FHWA and the departments of transportation in Oregon and Washington, an interim criteria for injury to fish as a result of noise was established through a Fisheries Hydroacoustic Working Group (FHWG). The FHWG consists of representatives from the National Oceanic and Atmospheric Administration (NOAA), the USFWS, the USACE, and the Oregon and Washington Department of Fish and Wildlife. This group is also supported by a panel of hydroacoustic and fisheries experts who are recommended and approved by FHWG members. A meeting of the FHWG in 2008 resulted in an agreement that sound pressure levels of 206-dB-Peak (SPL_{PEAK}[3]) and 187 dB accumulated

[3] SPL is defined an expression of the sound pressure using the dB scale and the standard reference (re) pressures of 1 micro-Pascal (μPa) for water and 20 μPa for air. Sound pressure is the sound force per unit area, usually expressed in micro-Pascals (or micro- Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The SPL is expressed in dB as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure. SPL is the quantity that is directly measured by a sound level meter in air or a hydrophone in water.

SEL ($SEL_{ACCUMLULATED}$[4]) for fish larger than 2 grams and an accumulated SEL of 183 dB for fish under 2 grams are the levels to be used for all underwater sound pressure studies that involve impact pile driving until there is sufficient information available to indicate that different criteria should be used (Caltrans 2015).

Available data on the effects of pile driving on fish are somewhat limited; however there is clear evidence from literature that pile driving can potentially kill fish of several different species if they are close enough to the source. There is also data that suggest that fish further from the source are not likely to be killed. Available literature suggests that there have been no studies that have examined long-term effects of pile-driving sound exposure that may lead to delayed death, or perhaps, other alteration in behavior that could affect the survival of individuals or populations of fishes. While not immediately apparent, effects that result in injury but not mortality may have significant effects on fish and may include temporary injury that heals, injury that leads to slow death, temporary or permanent hearing loss, movement of fish away from feeding or spawning areas, and many other potential effects (Hastings and Popper 2005). Eggs and larvae of fish could also be exposed to sounds generated from pile driving activities.

New bridge construction requires the construction of piers within the waterway. The amount of pile driving activities required for new bridge construction would be dependent on the location of the project and length of bridge needed. In order to reduce costs and impacts to the environment, the number of piers needed to safely support the bridge is kept to a minimum. The process of new bridge construction is detailed in Section 3.10 of this document. Depending on the contractor's preference and environmental conditions such as type of substrate, impact or vibratory hammers may be used to drive pile.

In order for a bridge replacement project (or new bridge construction) to fit the scope of this programmatic biological assessment, potential adverse effects to the pallid sturgeon (direct injury/mortality) must be avoided or minimized through the implementation of various measures. Avoidance and minimization measures must be implemented into the design phase of the project to minimize/reduce the potential effects of exposure of fish to sound generated by pile driving activities. In-water work restrictions are set for NDDOT projects to reduce the effects of construction on fish species, including the pallid sturgeon. In-water work is avoided between April 15th and June 1st to reduce potential effects to aquatic resources during migration/spawning periods. Some in-water activities associated with new bridge construction or bridge demolition may be conducted during this window as approved by the North Dakota Game and Fish Department, U.S. Fish and Wildlife Service, or the U.S. Army Corps of Engineers.

The type of pile driving equipment, type of pile, and pile size can reduce potential effects to the pallid sturgeon. The type of pile driving equipment selected for new bridge construction can also minimize or reduce potential impacts to the pallid sturgeon. The pile size and composition, the bearing capacity needed for the pile, and substrate conditions are factors that must be considered when choosing the type of pile driving equipment to be used. Impact hammers are typically the most used equipment to drive pile. Alternative methods include the use of vibratory hammers, push or press-in pile installation,

[4] SEL is the time integral of frequency-weighted squared instantaneous sound pressures. Proportionally equivalent to the time integral of the pressure squared and can be described in terms of $\mu Pa^2 \cdot sec$ over the duration of the impulse. Measured in dB re 1 $\mu Pa^2 \cdot sec$. SEL is the constant sound level in one second, which has the same amount of acoustic energy as the original time-varying sound (i.e., the total energy of an event). SEL is calculated by summing the cumulative pressure squared over the time of the event.

or oscillating pile installation. However, in most cases, even if alternative methods are used; piles typically need to be tested for bearing capacity and structural integrity with an impact hammer.

The type of pile used for construction of bridge piers are typically composed of concrete, steel, or wood and can come in various shapes including tube, H-type, and I-type steel piles as well as square, octagonal, or circular cross-section concrete. Pile size, composition and shape depend on a number of factors, including bearing capacity, pile length and diameter, pile function, and cost. To reduce underwater sound levels from individual pile strikes, alternative pile types can be used to reduce underwater sound levels. If alternative types of piles are used, the project engineer must review the engineering feasibility before any alternative methods are used as an avoidance or minimization measure to reduce potential impacts to pallid sturgeon.

Selecting smaller piles can also be considered to reduce impacts to the pallid sturgeon, other aquatic species, or sensitive habitats, as long as engineering constraints do not limit smaller pile feasibility. However, use of smaller piles requires that more piles be driven, which results in a larger number of pile strikes than if larger piles were used.

In the summer and fall of 2015, a noise monitoring study was completed within the Missouri River for the construction of the Lewis and Clark Bridge near the city of Williston, North Dakota. The purpose of the study was to assess the potential for project-related impacts on fish, particularly for the pallid sturgeon. The following paragraphs provide a summary of the results. The full hydro acoustic monitoring report can be found in Appendix H.

A hydro acoustic monitoring plan was prepared prior to initiation of pile driving operations. The plan outlined the process and procedures for conducting hydro acoustic monitoring and establish decibel thresholds for peak and accumulated (206 dB and 187 dB, respectively) sound levels. A copy of the plan can be found in Appendix H of this document.

Construction of the Lewis and Clark Bridge included installation of five piers within the Missouri River; each pier requiring 54-60 fourteen-inch wide H-piles to be driven into the bed of the river. Hydro acoustic monitoring was conducted for the pile driving operations for piers 2 and 3 during the months of July-September for pier 2 and October for pier 3. A total of 60 piles were driven for each pier over the course of 17 days.

The Missouri River in the area for this project was approximately 1,200 feet (365 meters) wide, flowing generally west to east. The thalweg of the river was located along the southern bank, near the location of Pier 2. During the course of monitoring, water depths at Pier 2 ranged from 23 to 24 feet (7.0 to 7.5 meters) (due to fluctuating river levels), and the water depth at Pier 3 was approximately 6 feet (1.9 meters). Flow velocities recorded during the course of this study never exceeded 1.5 meters[5] per second. Geotechnical borings completed adjacent to the project corridor reveal the structural composition of the underlying subsurface geology. The upper 45 feet (13.7 meters) were composed primarily of medium dense to dense sands transitioning to a dense sand gravel mix. The lower 40 feet (12.2 meters) were composed of tightly laminated, hard to very hard impervious clays.

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[5] When collecting sound measurements in flowing environments, flow velocities of 1.5 meters per second or greater are expected to generate significant flow-induced noise, which can interfere with the detection and analysis of low-level sounds such as the sounds from a distant pile driver or background sounds. In situations where flow velocities exceed 1.5 meters per second, it is recommended that a flow shield be installed around the hydrophone to provide a barrier between the irregular, turbulent flow and the hydrophone.

Three different types of hammers (one vibratory and 2 impact) were used to drive the piles for piers 2 and 3. The two impact hammers used during this study included an International Construction Equipment, LLC (ICE) Model 80S and ICE Model I-46v2. The ICE Model 80S, the smaller of the two hammers, was used to drive the initial piles associated with Pier 2. This hammer was later replaced with the larger ICE Model I-46v2 for driving the remaining piles at Pier 2 and all of the piles at Pier 3. Specifications for the three hammers can be found in the hydro acoustic monitoring report in Appendix H.

Pile driving operations at both pier locations occurred within flooded cofferdams. These cofferdams were installed prior to the onset of pile driving operations and remained in place for the entire duration. These cofferdams were not dewatered until after pile driving operations were complete. Prior to pile driving operations, approximately 25 feet (7.6 meters) of river bottom substrate was excavated from within each cofferdam to accommodate for the seal slab and footer.

A total of 60, 14-inch wide (35.6-centimeter) H-piles, weighing 102 pounds per linear foot (152 kilograms per linear-meter) were driven at both Piers 2 and 3. The average depth each pile was driven below the excavated bottom elevation of the cofferdam was approximately 82.4 feet (25.1 meters) at Pier 2 and 85.2 feet (26.0 meters) at Pier 3.

The type of equipment, calibration methods, and monitoring set up for the hydro acoustic monitoring can be found in Appendix H.

Background noise measurements were taken within the project area when no pile driving activities were being conducted. The measurements were taken at piers 2 and 3 at a distance of 10 meters downstream of the respective cofferdams. Background noise levels averaged 127 dB with no significant difference between the two locations. Based on the background noise measurements a threshold limit of 130 dB was used for calculating the $SEL_{ACCUMULATED}$.

Two monitoring sessions were completed to assess noise levels associated with the vibratory hammer. These monitoring session occurred at Pier 2, 10 meters downstream of the cofferdam. The vibratory hammer resulted in an approximate 15-dB increase over ambient conditions, with an SPL_{PEAK} of 145.5 dB and an $SEL_{ACCUMULATED}$ of 152.4 dB over a 15-hour recording session. These levels did not exceed any of the established thresholds.

Underwater sound levels for pile driving operations involving the use of impact hammers at Piers 2 and 3 were recorded over a total of 24 monitoring sessions. A detailed summary of each monitoring event is provided in the hydro acoustic monitoring report in Appendix H. None of the monitoring events resulted in noise levels exceeding established thresholds. Maximum dB levels recorded outside of the cofferdam were 169.7 dB SPL_{PEAK} and 171.7 dB $SEL_{ACCUMULATED}$ at Pier 2 and 166.6 dB SPL_{PEAK} and 171.3 dB $SEL_{ACCUMULATED}$ at Pier 3. The final monitoring session completed for this study (i.e., session 24) involved placing the hydrophone inside of the cofferdam at Pier 3 to assess the attenuation properties of the cofferdam. This session resulted in the highest SPL_{PEAK} and $SEL_{ACCUMULATED}$ values for Pier 3 as well as the highest $SEL_{ACCUMULATED}$ value for the study as a whole. However, these levels remained below established thresholds. RMS[6] levels in excess of 150 dB may be a threshold where behavioral effects to fish begin to occur, although this suggestion is not backed by scientific evidence. Maximum RMS levels recorded

[6] RMS sound pressure level is a dB measure of the square root of mean square (RMS) pressure. For impulses, the average of the squared pressures over the time that comprise that portion of the waveform containing 90 percent of the sound energy of the impulse.

during this study exceeded 150 dB in 10 of the 24 monitoring sessions with the greatest level at 160.7 dB.

There have been no studies specifically on the behavioral responses of pallid sturgeon to pile driving activities. To date there is no data available with regard to behaviors such as swimming away from feeding or reproductive areas or changes in migration routes as a result of pile driving. One study on a coral reef showed little or no effect on overall behavior and movement patterns of fish and invertebrates as a result of deployment of seismic air guns (Wardle et al. 2001). Observations of marine fish and invertebrates on an inshore reef were made using TV and acoustic tags one week before, during, and four days after seismic airguns were deployed and repeatedly fired. Peak sound pressure levels of 210 dB at 16 meter range and 195 dB at 109 meter range were measured at positions were the fish were being observed (Wardle et al. 2001). Neither the fish nor invertebrates showed any signs of moving away from the reef (Wardle et al. 2001). Firing the guns did not interrupt a diurnal rhythm of fish gathering at dusk and passing the TV camera position while the guns were firing. The long-term day to night movements of two tagged pollack were slightly changed by the arrival and banging of the guns, particularly when positioned within 10 m of their normal living positions. The study concluded that although there were some startling (reflex movements called C-start) when the explosions from air guns were visible to fish, the sound produced from the air guns had little effect on the day to day behavior of the resident fish and invertebrates (Wardle et al. 2001). Since pile driving does not have visible explosions, but generated sound levels are similar to the sound generated from seismic air guns, effects to fish as a result of pile driving (at RMS levels less than 160.7 dB) is anticipated to have similar minor behavioral effects on the pallid sturgeon.

In a study on the movement of pallid sturgeon, the species exhibited the ability to travel long distances in relatively short periods (DeLonay and Little 2002). Distances greater than 40 km/day downstream and greater than 25 km/day upstream were recorded (DeLonay and Little 2002). Extreme movements occurred during flow events in the spring and late fall. Some data suggests the possibility of lengthy seasonal movements indicating that pallid sturgeon respond to environmental variables associated with seasonal changes in habitat (DeLonay and Little 2002). Significant movement by these fish also indicates that the species is mobile (DeLonay and Little 2002). Given this information; short term habitat avoidance is not likely to adversely affect a mobile fish species such as the pallid sturgeon.

A summary of this study's findings/conclusions are as follows:

- The 206 dB SPL_{PEAK} threshold was not exceeded.
- The 187 dB $SEL_{ACCUMULATED}$ threshold was not exceeded.
- Of the two impact hammers used during this study, the smaller hammer resulted in higher SPL_{PEAK} and $SEL_{ACCUMULATED}$ levels than the larger hammer and required approximately twice as many blows per pile to reach bearing.
- Maximum RMS levels exceeded 150 dB in 10 of the 24 monitoring sessions. The actual impact/implications associated with exceeding this level are unknown.
- Based on the measurements collected during this study, it can be reasonably predicted that future pile driving operations for similar projects will not exceed established thresholds. This prediction is based on the assumption that future pile driving operations will be completed in a similar manner, using similarly sized equipment.

In order for a new bridge construction project within the Missouri River/Lake Sakakawea to fit the scope of this PBA, site-specific conditions will need to be taken into account on whether separate consultation may be required in order for a project to fulfill Section 7 requirements under the ESA.

Sound attenuation devices can be incorporated into the construction phase of a project to avoid or minimize exposure of fish to sound generated during pile driving if it has been determined that noise from pile driving activities may exceed SPL_{PEAK} or $SEL_{ACCUMULATED}$ levels for fish. Measures such as air bubble curtains, coffer dams, isolation casings, and use of smaller piles can help attenuate underwater sound generated by pile driving. See following section for further information on sound attenuation measures to reduce underwater noise.

Geotechnical investigations within the Missouri River/Lake Sakakawea may be required; however noise and disturbances from these activities are not anticipated to have adverse effects to the pallid sturgeon. Sound source verifications for drilling rigs in the Cook Inlet, revealed that underwater sound generated by rotary drilling from elevated platforms generally does not exceed the underwater ambient sound levels at the source (MAI 2011).

Washington DOT (WSDOT) has conducted noise monitoring for over-water geotechnical test boring activities. The WSDOT Acoustics, Air Quality, and Energy group performed measurements on November 8, 2007 for underwater noise levels for the Mukilteo Ferry terminal during sediment test boring/geotechnical survey activities (WSDOT 2007).

Measurements for underwater and airborne noise were taken during the boring operations and during operational down time in order to measure ambient sound levels. The hydrophone was secured at a location of 10 meters from the boring machine at a water depth of 22.5 feet below the water surface. The overall water depth was 45 feet at the boring location. Peak dB levels for activities conducted during boring activities ranged from 152 – 181 dB. Average peak dB ranged from 151 – 178 dB. Sound energy level (SEL) during boring operations ranged from 147 – 148 dB. Both the peak and accumulated SEL recorded for this project were well below injury thresholds for fish. Therefore, noise generated from geotechnical borings are not anticipated to cause direct injury or mortality to pallid sturgeon. The presence of equipment within water as well as noise during drilling operations may cause pallid sturgeon to temporarily avoid habitat; however, given that the pallid sturgeon is a highly mobile fish species as well as amount of habitat available compared to the small amount of habitat to be temporarily disturbed, adverse effects to the pallid sturgeon are highly unlikely.

Sound Attenuation Measures

- ***Air Bubble Curtains***

Air bubble curtains creates a screen that surrounds a pile with bubbles, and helps reduce the propagation of sound from the pile. A variety of research has shown that generally air bubble curtains used on a steel or concrete pile with a maximum dimension of 24 inches or less will provide approximately 5 dB of sound reduction. For a mid-sized steel pile (24-48 inches), air bubble curtains will provide about 10 dB of sound reduction. For piles greater than 48 inches, air bubble curtains will provide 20 dB of sound reduction (Caltrans 2015). Because of the many environmental variables that could affect air bubble curtains ability to reduce sound levels from striking piles, it is recommended that attenuation assumed for any attenuation be limited to 5 dB (Caltrans 2015).

- ***Cofferdams***

Cofferdams are often used for pile driving during in-water and near-water work. Cofferdams may be used for acoustic/non-acoustic reasons. Cofferdams full of water provide limited attenuation, compared to cofferdams that have been dewatered down to the substrate. In some instances, bubble curtains are used within a watered cofferdam if dewatering is not practical. Although dewatered cofferdams provide the best isolation, sound is not eliminated because some of the energy is transmitted through the ground (Caltrans 2015).

- ***Isolation Casings***

Isolation casings are hollow casings that are slightly larger than the diameter of the pile that is used for pier construction. The process for using isolation casings includes inserting the larger hollow casing into the water column and bottom substrate. The casing is dewatered and piling is driven within the dewatered isolation casing. The use of isolation casings is similar to dewatered cofferdams because they isolate the work area from the water column; however they do not provide as much attenuation (Caltrans 2015).

- ***Vibratory Hammers***

There are no established injury criteria for vibration pile driving. Peak sound levels produced by vibratory hammers can be substantially less than those produced by impact hammers. However, the total energy imparted can be comparable to impact driving because the vibratory hammer constantly operates and requires more time to install piles. Depending on site-specific conditions, piles may need to be struck multiple times with an impact hammer. Vibratory hammers can be used as a mitigation measure to reduce the potential for effects from an impact hammer (Caltrans, 2015).

Other sources of noise that may have potential effects to the pallid sturgeon include the operation of boats and barges within suitable pallid sturgeon habitat. Noise from operation of equipment within the Missouri River or Lake Sakakawea is not anticipated to have adverse effects to the pallid sturgeon. In addition, direct injury or mortality from operation of vessels within the water, such as strikes from propellers, is not anticipated as pallid sturgeon are a bottom dwelling species, and would not be anticipated to be found high in the water column where propellers would be present.

Other noise from bridge demolition activities includes the use of other impact type devices such as saws or mechanical breaking. However, compared to pile driving activities, noise generated from these types of construction techniques are anticipated to be well below the injury threshold to the pallid sturgeon.

Habitat/Water Quality Modification

Work within or directly adjacent to the Missouri River (including Lake Sakakawea), has the potential to temporarily modify water quality, which could have both direct and indirect effects to pallid sturgeon including adults, juveniles, larvae and eggs. In addition, construction activities associated with new bridge construction or bridge demolition include dredging, dewatering, concrete pouring, welding, painting and paint removal, and other factors such as inadvertent release of contaminants all have the potential to affect pallid sturgeon and their habitat. Although the pallid sturgeon may be found in Lake Sakakawea, the pallid sturgeon is a bottom oriented, large river obligate that is adapted to live in large, free-flowing, warm water, turbid habitats with a diverse assemblage of attributes that were in a constant state of change (USFWS 1993). Floodplains, backwaters, chutes, sloughs, islands, sandbars, and main channel waters formed the river ecosystem that provided macro-habitat requirements for all life stages of pallid sturgeon and other large river fish (USFWS 1993). Within the Missouri River, the pallid sturgeon tends to select main channel areas with islands or sandbars. The confluence of the Missouri and Yellowstone Rivers in northwest North Dakota, provides the most ideal habitat for this species. Little is known about pallid sturgeon abundance or habitat preference in Lake Sakakawea as well as downstream in the Missouri River, below Garrison Dam.

Currently, the effects from altered turbidity levels to the pallid sturgeon are poorly understood. Pallid sturgeon have small eyes, four barbells with taste buds, taste buds on lips, and ampullary electroreceptors on the underside of the snout which enable them to sense other animals and locate them (USFWS 2014b). Given this information, the species appears to be highly adapted to low-visibility environments. Therefore, it is reasonable to infer that the historical high turbidity levels in the Mississippi and Missouri Rivers was a component of the natural environmental processes under which the species evolved (USFWS 2014b). In-water activities associated with bridge construction, including installation and removal of piling, placement of fill material, and in-water excavation, could generate localized and short duration turbidity events. However, the stirring of sediments and resulting turbidity during pile driving activities is expected to be localized and minor. Widespread sedimentation/turbidity would not be anticipated for in-water work required for bridge construction and demolition.

Although the duration and risk of exposure to sedimentation/turbidity caused by in-water work to the pallid sturgeon is small due to the species adaptations to live in turbid environments; increases in sediment/turbidity can alter fish habitat or the utilization of habitat. Changes in water quality, degradation of spawning and rearing habitat, and habitat avoidance are all factors that can be created as a result of increased sedimentation/erosion. The biological implications of habitat modification include underutilization of habitat, abandonment of traditional spawning habitat, displacement of fish from their preferred habitat, and habitat avoidance (Newcombe and Jensen 1996). Increased turbidity and suspended sediments could also potentially affect factors related to pallid sturgeon feeding such as feeding rates, reaction distance, as well as prey selection/abundance and ability to detect predators. The deposition of sediment can also bury aquatic invertebrates and harm small fish used by the pallid sturgeon for food sources. In extreme cases, high levels of erosion and sedimentation creating increased levels of turbidity could in-turn create other direct effects to the pallid sturgeon such as gill trauma, or smothering of eggs, larvae, and fry.

Measures identified in the SWPPP include plans for responding to and managing accidental spills during construction, a plan for the management of chemicals and hazardous materials used during construction, a plan for management and performance of all construction activities conducted over water and from barges to minimize the potential for inadvertent releases, a plan for management of excavation activities to minimize or eliminate the potential for groundwater contamination resulting from such activities, and a plan for the management and disposal of all pumped water and dredged materials. The SWPPP plan also addresses the overall management of the project including BMPs for concrete pouring, the application of concrete curing compounds, material storage, equipment fueling, concrete washout, and stockpiles. The transport and use of equipment and construction materials are also covered in SWPPP plans.

Depending upon the project, a separate SWPPP specific for bridge demolition work would be prepared. The BMPs for this project phase, whether included in the overall SWPPP or a separate document, would address specific dismantling activities to be implemented to minimize the discharge of pollutants associated with these activities. Temporary erosion and sedimentation created as a result of roadway construction (including bridge construction/demolition), is not anticipated to create adverse effects to pallid sturgeon due to the species adaptations to live in turbid environments, and implementation of a SWPPP plan and the many measures used before, during and after construction to minimize impacts to aquatic resources as a result of erosion/sedimentation, including the use of cofferdams and floating silt curtains. In addition, in water timing restrictions (April 15 – June 1) reduces potential effects to the pallid sturgeon during sensitive spawning and migration periods.

Bridge construction/demolition activities, including temporary bridges, could result in the short-term modification of pallid sturgeon habitat resulting in temporary avoidance of habitat located near construction activities. Changes to streamflow patterns has the potential to impact water velocities and flow patterns which could affect habitat suitability for the pallid sturgeon through changes in velocity of the movement of water. Typically piers are designed to be parallel to the direction of the flow of water which minimizes the effects on water velocity. In addition, more recent bridge pier design reduces the length and width of piers compared to the design of older bridges which minimizes the footprint within water. Given that the Missouri River has a relatively wide river channel, design of piers to reduce footprint within the water; negligible impacts to water velocities, flow patterns, or channel morphology are anticipated due to new bridge construction.

The introduction or spread of invasive and aquatic nuisance species (ANS) as a result of NDDOT projects has the potential to indirectly affect the pallid sturgeon. Potential threats to this species as a result of spread of invasive fishes include increased predation on eggs, larval, or juvenile life stages, competition for food, exclusion from preferred habitats, spread of disease or parasites, and reduced habitat quality. Vegetative ANS introduced or spread by NDDOT projects may also cause indirect effects to pallid sturgeon such as reduced habitat quality. The introduction or spread of invasive fish from NDDOT projects is highly unlikely. However, aquatic vegetation that is considered ANS as well as zebra mussels could spread or be introduced as a result of NDDOT projects if measures are not taken to inspect and properly clean equipment to be used in habitat utilized by the pallid sturgeon.

Zebra mussel colonization has occurred in areas occupied by the pallid sturgeon outside of North Dakota, but data are limited on direct and indirect effects. In other sturgeon species, zebra mussel presence has shown reduced foraging effectiveness of juvenile lake sturgeon, and areas occupied by mussels were avoided by study fish more than 90% of the time (McCabe et. al 2006). North Dakota state law requires that all watercraft, watercraft motors, watercraft trailers, and recreational and commercial equipment used in fishing, hunting, and watercrafting or construction shall be free of prohibited or regulated aquatic nuisance species, as defined in the state's aquatic nuisance species list. All equipment is subject to inspection by a duly appointed agent of the director.

In addition, North Dakota state law requires that no aquatic vegetation, or parts thereof, shall be in or on watercraft, watercraft motors, watercraft trailers, and recreational, commercial, or construction equipment when out of water. Watercraft and recreational, commercial, or construction equipment on lifts suspended above the water from which they originated are excluded. Time out of the water needed to clean aquatic vegetation from the watercraft, watercraft motors, watercraft trailers, and recreational, commercial, or construction equipment at the immediate water access area (e.g., boat ramp) is allowed.

NDDOT uses the following environmental note to ensure contractors are aware of state law regarding the spread or introduction of ANS for in-water work on transportation construction projects and are responsible for compliance.

The Contractor shall prevent the introduction of ANS into North Dakota waters, or transport of aquatic vegetation to or from any waters of the state, or transport of any aquatic vegetation into the state. The contractor shall follow the North Dakota Game and Fish Department's (NDGFD) Administrative Rules 30-3-06 for compliance with ND Century Code Chapter 20.1-17 on Aquatic Nuisance Species (ANS). Contractor shall notify the NDGFD at least 72 hours prior to the placement in or on the waters of the State of North Dakota of any and all vehicles, vessels, pumps and equipment that will be used in the project, to allow the Department sufficient time to inspect any and all such equipment for ANS. The NDGFD ANS Coordinator, Jessica Howell, shall be contacted by phone (701.368.8368) or e-mail jmhowell@nd.gov for equipment inspections, or any additional information regarding ANS prevention protocol.

With the implementation of measures used to clean equipment as well as prevent the transport of ANS according to NDGFD Administrative Rules, the chance for introduction or spread of ANS as a result of NDDOT projects creating adverse effects to the pallid sturgeon is highly unlikely.

Geotechnical drilling within the Missouri River or Lake Sakakawea may temporarily damage small amounts of benthic habitat, however drill bore sizes are small typically 10 inches or less in diameter; therefore, the amount of disturbance is extremely small to the relative size of the Missouri River system. Geotechnical drilling is anticipated to have discountable effects on pallid sturgeon habitat.

Exposure to Contaminants

Roadway construction activities adjacent to or within the Missouri River or Lake Sakakawea have the potential to inadvertently introduce contaminants into suitable habitat for pallid sturgeon. Items such as fuel, oil, and hydraulic fluid may need to be stored on a project site. Exposure to contaminants may directly or indirectly affect pallid sturgeon, depending on the location and quantity of release. Injury to the pallid sturgeon from exposure to hazardous materials includes a poisoned food source, decrease in food supply, or habitat degradation. Direct exposure of contaminants to adults, juvenile, larvae, or eggs, including ingestion of oil from contaminated fish or oiling of gills, would adversely affect the pallid sturgeon through direct injury or mortality. In extreme cases, contaminants may remain in pallid sturgeon habitat for long periods of time, and may be transferred up the food chain through the process of bioaccumulation (Arnold et. al. 2002). Large releases of contaminants are unlikely to occur for a roadway construction project; however potential adverse effects may occur if appropriate measures are not taken to remediate any releases.

Storm Water Pollution Prevention Plans are prepared in order to identify potential sources of sediment and other sources of pollution associated with construction activities, and to ensure practices are implemented and maintained to reduce the contribution of pollutants in storm-water discharges from the construction site to waters of the state as well as storm sewer systems. The SWPPP describes how litter, debris, chemicals and parts will be handled to minimize exposure to storm-water. The SWPPP also describes spill prevention and response procedures where potential spills can occur. Specific handling procedures, storage requirements, spill containment, cleanup procedures, and disposal must be identified. Storage structures for petroleum products and other chemicals must have adequate leak and spill protection to prevent any spilled materials from entering waters of the state or storm sewer systems.

Although not common for NDDOT projects, depending on the size of a project and amount of fuel or other contaminants needed to be on-site, a Spill Prevention Control and Countermeasure Plan (SPCC) may be implemented and appropriate containment installed. The SPCC plan describes oil handling operations, spill prevention practices, discharge or drainage controls, and the personnel, equipment, and resources at the facility that are used to prevent oil spills from reaching navigable waters or adjoining shorelines. Each SPCC plan is unique to a project; however there are elements that must be described in every plan including: operating procedures at a site to prevent oil spills; control measures such as secondary containment installed to prevent oil spills from entering navigable waters or adjoining shorelines; and countermeasures to contain, clean up, and mitigate the effects of an oil spill that has impacted navigable waters or adjoining shorelines.

SPCC plans are not required if materials are stored in containers less than 55 gallons and can be demonstrated that spill material will not reach navigable waters of the U.S. Although SPCC plans are not required in these situations, contractors must have materials available to clean up a spill. For large construction projects such as new bridge construction and bridge demolition, due to the amount of equipment used and fuel required, SPCC plans may be required. With the design of a SPCC and/or SWPPP plan specific to a project that may occur in least tern habitat, adverse effects to the species are not likely.

For geotechnical investigations and utility relocations, the use of bentonite is required to act as a drilling lubricant. Frac-out or inadvertent return of bentonite is a potential concern when horizontal directional drilling is used in or near sensitive habitats, waterways, and cultural resource sites. In order to minimize the potential for a frac-out, a contingency plan or frac-out plan is prepared to provide for the timely detection of frac-outs. The frac-out plan is prepared by the drilling contractor to ensure that preventative and responsive measures can be implemented. Once a frac-out is identified, all work stops and the location and extent of the frac-out is determined. If the frac-out is terrestrial, the area is isolated to contain and remove the drilling mud. If the frac-out is aquatic, it is monitored to determine if the drilling mud congeals, once the frac-out is stabilized the congealed drilling mud is removed. If a frac-out becomes excessively large, a spill response team would be hired to contain and clean up excess drilling mud in the water. Typically, frac-out plans are only prepared for large-scale horizontal directional drilling projects, and may not be required for small distance (section) adjustments or relocations. Although frac-out plans are not required for small-scale horizontal directional drilling projects, any inadvertent release of drilling mud must be remediated.

Other potential contaminants that could enter pallid sturgeon habitat as a result of bridge demolition activities include asbestos and lead paint. However, these materials must be tested for, and if identified; measures must be taken to properly contain and dispose of in accordance with state and federal law. Lead paint may also be discovered during bridge painting projects. If lead paint is detected during testing, containment systems are used to keep lead based paint from entering the environment. Captured materials must be properly disposed of at approved locations. If asbestos is detected during testing of bridge materials, asbestos containing materials must be removed by a licensed and registered asbestos abatement contractor and disposed of at a facility that is approved to receive asbestos-containing material. Therefore, no adverse effects to the pallid sturgeon as a result of exposure to asbestos or lead paint are anticipated.

Conservation Measures Specific to the Pallid Sturgeon

General conservation measures to be applied to all projects to lessen the potential for effects to all listed species are described in Section 7 of this document.

Depending on the scope of the project and site-specific conditions, the following conservation measures should be used to minimize potential effects to the pallid sturgeon. When a conservation measure is selected for a project, the text may be revised for project-specific conditions before it gets entered into design plans.

- No work will occur within the Missouri River, Lake Sakakawea, or direct tributary from April 15 – June 1). *Note- this is a standard environmental commitment used to protect aquatic resources, not necessarily for just the pallid sturgeon. Therefore, this would not be applied specifically as a conservation measure for this species since it would be listed as an environmental note in the plan sheets for a project.*

- The contractor will notify the NDGFD at least 72 hours prior to the placement in or on the waters of the State of North Dakota of any and all vehicles, vessels, pumps and equipment that will be used in the project, to allow the Department sufficient time to inspect any and all such equipment for ANS. The NDGFD ANS Coordinator, Jessica Howell, shall be contacted by phone (701.368.8368) or e-mail jmhowell@nd.gov for equipment inspections, or any additional information regarding ANS prevention protocol. An inspection report would be submitted to the engineer prior to work taking place in the water. *Note- this is also standard environmental commitment used to protect aquatic resources, not necessarily for just the pallid sturgeon. Therefore, this would not be applied specifically as a conservation measure for this species since it would be listed as an environmental note in the plan sheets for a project.*

- *Noise monitoring was conducted for a bridge construction project within the Missouri River south of Williston in 2015. For future projects in similar conditions, sound levels produced as a result of pile driving operations are not anticipated to adversely affect the pallid sturgeon. The location of the project, type of pile, as well as site-specific conditions will need to be taken into consideration. If conditions vary greatly from the study conducted in 2015, additional noise monitoring may be required to ensure exposure levels do not exceed accumulated and peak threshold levels for the pallid sturgeon and that adverse effects do not occur. Note- If noise monitoring reveals that sound levels produced by pile driving activities exceed the threshold for adverse effects to the pallid sturgeon, separate consultation would be needed. The following attenuation measures could be used to reduce exposure levels to avoid adverse effects to the pallid sturgeon. Noise monitoring should continue if sound attenuation measures are used to determine the effectiveness of the measure and to see if sound levels have dropped below threshold levels.*

    - Air Bubble Curtains
    - Vibratory Hammers
    - De-watered Cofferdam- Note- Due to engineering constraints, dewatered cofferdams may not be feasible.
    - Isolation Casings

Effect Determination

Disturbances caused by noise/vibrations resulting from operation of equipment and installation of pile has the potential to adversely affect the pallid sturgeon, particularly pile driving operations. Other potential direct or indirect effects to this species includes habitat modification/removal, water quality modification, introduction or spread of ANS, and exposure to contaminants. The potential effects that could result from these project stressors are described in detail within this section. With the implementation of noise monitoring and attenuation measures (if deemed necessary), design and implementation of SWPPP and SPCC plans, timing restrictions for in-water work, and measures taken to reduce the introduction/spread of ANS, potential effects to the pallid sturgeon are expected to be reduced to an insignificant or discountable level. Therefore, the proposed action ***may affect, but is not likely to adversely affect*** the pallid sturgeon.

6.5 Gray Wolf Stressor and Response

No resident populations of gray wolves are known to exist in North Dakota, and the state is considered to act as dispersal habitat between two Distinct Population Segments (DPS). Rural areas in North Dakota function as dispersal corridors for wolves representing the Western Great Lakes DPS and the Northern Rocky Mountain DPS. Dispersal habitat may be important for maintaining gene flow between the DPSs, but is not thought to be a limiting factor for recovery of the species. NDDOT projects occurring in rural areas have the potential to disturb gray wolves.

Disturbance (Human/Noise/Vibrations)

North Dakota lacks the key components of wolf habitat throughout much of the state. These components include the following; a sufficient year-round prey base of ungulates (big game) and alternate prey, suitable and secluded denning and rendezvous sites, and sufficient space with minimal exposure to humans (USFWS 1987). Due to the lack of wolf habitat in North Dakota as well as lack of required constituents required for gray wolves to establish a home range, the probability of a gray wolf traversing through the project or action area of a NDDOT project is extremely unlikely as confirmed sightings of wolves are rare in the state. In the event a wolf was to disperse through an active construction site, no adverse effects are anticipated. Dispersing gray wolves can travel vast distances, and have moved as far as 1,092 km (678.5 miles) straight line distance from their original pack territories (Wabakkan et al., 2007). Wolves can also cover large distances to hunt, traveling as far as 30 miles per day (USFWS 2011c).Gray wolves may avoid areas of construction activities but due to the wide ranging ability of the species, habitat avoidance is not anticipated to cause adverse effects to the species such as increased energy expenditure leading to reduced fitness. The species is more than capable of moving several miles in a day, and it is highly unlikely that increased energy burdens would occur to the species as a result of dispersal habitat avoidance. Other potential effects such as direct injury or mortality as a result of collisions of wolves with construction machinery or other vehicles as a result of roadway construction projects or traffic created after a new roadway project completed is also highly unlikely.

Remove/Modify Dispersal Habitat (Habitat Fragmentation)

New road construction may fragment potential dispersal habitat to be used by wolves traveling between the two DPSs. However, because North Dakota does not have the constituents to provide home ranges for wolf populations within the state, adverse effects as a result of new road construction is not anticipated. Dispersal habitat is not limited in North Dakota, and the gray wolf is a highly mobile, wide ranging species. Removal and modification of potential dispersal habitat may cause temporary habitat avoidance, but after the project is completed, gray wolves would be able to continue to disperse throughout the area.

Conservation Measures Specific to the Gray Wolf

General conservation measures to be applied to all projects to lessen the potential for effects to all listed species are described in Section 7 of this document.

No conservation measures specific to the gray wolf have been identified due to the unlikelihood of the species being exposed to a NDDOT project. However, all projects that use the programmatic biological assessment will be required to report any sightings of threatened or endangered species and cease construction activities, establish and avoidance area, until coordination with the FHWA, USFWS, and NDDOT ETS has been conducted to evaluate the level of disturbance and implement mitigation measures if necessary.

Effect Determination

Disturbance from construction activities and the removal/modification of dispersal habitat may cause the gray wolf to temporary avoid habitat near active construction. However, adverse effects to the species is not anticipated due to the lack of known populations within the state and ability of the species to cover large distances. After a project is complete, potential effects such as traffic in new areas causing habitat avoidance or direct injury/mortality is insignificant or discountable. Therefore, the proposed action ***may affect but is not likely to adversely affect*** the gray wolf.

6.6. Poweshiek Skipperling Stressor and Response

The Poweshiek skipperling is presumed to be extirpated in North Dakota. However, should the species be detected in the future at previously occupied sites, or re-introductions occur, transportation projects have the potential to directly or indirectly affect this species. Until re-introductions occur in the future, the proposed action is not likely to adversely affect the Poweshiek skipperling (i.e. potential effects to suitable habitat or designated critical habitat). Currently, only Richland and Sargent Counties are listed as areas where suitable habitat may be found for the Poweshiek skipperling. Richland County has two units of designated critical habitat for the Poweshiek skipperling.

Disturbance (Ground/Soil/Vegetation)

Direct and indirect effects could occur to the Poweshiek skipperling as a result of ground, soil, or vegetation disturbance. The crushing/killing of eggs, larvae, or adults could occur if construction equipment operates in areas of occupied habitat where the species may be found, particularly for new road construction. The species is highly dependent on high quality undisturbed native tallgrass prairie, which would not be found within the ditch of an existing road. However, existing ditches with native vegetation may serve as dispersal corridor for Poweshiek skipperlings; therefore adults may be directly affected if construction activities occurs during the flight period of this butterfly (typically mid-June to mid-July). Direct effects could include habitat displacement (arousal/fleeing), or crushing/killing of adults, eggs, or larvae. New road construction also has the potential to convert/remove suitable

Poweshiek skipperling habitat; however this is highly unlikely as potential habitat for this species is limited, and new road construction is not anticipated in these few areas. If the species is discovered or re-introductions occur, NDDOT projects that cause ground disturbance in occupied habitat for the Poweshiek skipperling would adversely affect the species and separate consultation would be required.

Dust/Erosion/Sedimentation

Dust from construction activities has the potential to spread into adjacent areas outside of NDDOT ROW; which could cause vegetation preferred by the Poweshiek skipperling to be affected physiologically. The effects of dust on grasslands can affect photosynthesis, respiration, transpiration, and allow the penetration of phytotoxic gaseous pollutants (Farmer 1993). Large amounts of dust could also cause various effects to Poweshiek skipperling adults, eggs, and larvae, which could cause impaired functioning/reduced fitness. Dust may be lethal to insects either directly or indirectly. Dust may cause death or injury directly through desiccation, or indirectly through reducing insects ability to find food and may bring about starvation by forming a mechanical barrier to their food supply, by impeding their movement, or by clogging their digestive systems (Fleschner 1958). If suitable habitat for the Poweshiek skipperling is identified, dust abatement measures would be implemented. On unpaved surfaces, dust would be controlled using water. In addition, erosion control measures required as part of the SWPPP plan would be implemented as necessary. Erosion control measures such as mulching, stabilizes soils and lessens the amount of fugitive dust created. Therefore, with the implementation of dust abatement and erosion control measures; no adverse effects from dust, erosion, or sedimentation to the Poweshiek skipperling or its habitat are likely.

Introduction/Spread of Noxious Weeds

Earthwork leaves soil in a bare condition, therefore if appropriate measures are not taken to establish vegetation on disturbed areas, there is a potential for undesirable plants to establish within the project limits and disperse into native prairie locations outside of the ROW (including the CH unit portions) after this project is constructed. This could in-turn cause a reduction in the quality of habitat for the Poweshiek skipperling (reduced nectaring forbs, cool season grasses over-competing with native grasses). North Dakota Century Code requires the NDDOT to provide for eradication or control of noxious weeds on NDDOT land.

The NDDOT maintenance staff coordinates noxious weed control with outside agencies, typically the Commissioner of Agriculture. Controlling noxious weeds is also typically coordinated with appropriate county and local officials. Applicators of pesticides and/or their direct supervisors (depending on pesticide label requirements) need to be certified by the Pesticide Control Board and must follow all applicable laws for use of pesticides. The application of pesticides as part of this project is not anticipated by the contractor. Such application would be conducted by district staff or hired pesticide applicators during routine maintenance operations. Spot spraying is typically used to control noxious weeds in NDDOT ROW, rather than broadcast applications.

In addition, as part of erosion control measures for SWPPP plans as well as NDDOT seeding requirements; disturbed areas that are seeded must be free of all prohibited noxious weed seed and should not contain more than 1/2 of 1% by weight of restricted noxious weed seeds as classified by the ND State Seed Department. If seeding is required before April 20 or between July 16 and August 9, a temporary cover crop (oats) is applied to disturbed areas. If this is the case, these areas are re-seeded with NDDOT approved permanent seed mixtures between April 20 and July 15, or after August 10 (must be seeded before the ground freezes). Given this information, the chance for indirect effects such as noxious weeds or other undesirable species establishing in areas disturbed by this project and encroach outside the ROW onto adjacent land is highly unlikely.

Exposure to Contaminants

Depending on the size of a project and amount of fuel or other contaminants needed to be on-site, a Spill Prevention Control and Countermeasure Plan (SPCC) may be implemented and appropriate containment installed. SPCC plans are not required if materials are stored in containers less than 55 gallons and can be demonstrated that spill material will not reach navigable waters of the U.S. Although SPCC plans are not required in these situations, contractors must have materials available to clean up a spill. Due to contractor requirements to properly store contaminants as well as clean up inadvertent spills in accordance with state and federal regulations, releases of potentially hazardous materials into occupied Poweshiek skipperling habitat is not anticipated.

Conservation Measures Specific to the Poweshiek Skipperling

General conservation measures to be applied to all projects to lessen the potential for effects to all listed species are described in Section 7 of this document.

No conservation measures specific to the Poweshiek skipperling have been identified. However, conservation measures identified for the Dakota skipper would also afford protection to the Poweshiek skipperling, should re-introductions occur in the future as they are found in the same counties as well as similar habitat. NDDOT work activities occurring outside of the ROW in high quality prairie has the potential to cause adverse effects to the Dakota skipper and Poweshiek skipperling (if re-introductions occur). The conservation measures identified for the Dakota skipper are listed in the Dakota skipper section.

Effect Determination

The Poweshiek skipperling has not been identified in North Dakota since 1997. If re-introductions of Poweshiek skipperling occurs in the future, the proposed action has the potential to directly or indirectly affect this species through disturbance (i.e. direct injury/mortality to eggs, larvae, or adults), removal/modification of habitat, dust/erosion/sedimentation, and exposure to contaminants. However, adverse effects can be avoided to both the Dakota skipper and Poweshiek skipperling if surveys are conducted to determine if suitable habitat for these species is present within an action area for the proposed action. If suitable habitat is identified, and project would directly affect areas that may be occupied by either the Dakota skipper or Poweshiek skipperling during their various life stages, adverse effects would occur and separate consultation would be required, unless surveys can demonstrate that the species is not present. If suitable habitat is present within an action area for a project, but would not be directly impacted, measures can be taken to reduce potential direct and indirect effects to an insignificant or discountable level.

Until re-introductions occur in North Dakota, the proposed action would have no direct effects to Poweshiek skipperling individuals or populations. However, although currently believed to be unoccupied, suitable habitat for the Poweshiek skipperling may be directly or indirectly affected. With the various measures to reduce impacts to high quality native prairie, adverse effects to the Poweshiek skipperling or its habitat are not likely to occur. Therefore, the proposed action ***may affect, but is not likely to adversely affect*** the Poweshiek skipperling.

6.7 Piping Plover Stressor and Response

Transportation projects that occur adjacent to or within the Missouri River/Lake Sakakawea or alkali lakes within central and western North Dakota (particularly adjacent to or within designated critical habitat) have the potential to have direct or indirect effects to piping plovers or their habitat. Disturbances such as noise/vibrations from various types of construction activities, increased human presence, water quality modification, habitat alteration/removal can have various effects to the piping plover. The section below details potential effects to the piping plover from NDDOT project stressors.

Disturbance (Noise/Vibrations/Human Presence)

Noise, vibrations, and human presence from construction activities can temporarily discourage piping plovers from foraging, nesting, or roosting in suitable habitat that is adjacent to a roadway construction project (i.e. habitat avoidance). Effects of highway noise to species such as the piping plover may include: producing significant changes in behavior (i.e. expending additional energy to find foraging or nesting sites); masking signals birds use to communicate between individuals/young or to recognize biological signals; impairing detection of sounds of predators; decreasing hearing sensitivity temporarily or permanently; and increasing stress and altering reproductive and other hormone levels (Dooling and Popper 2007). The presence of people in close proximity to birds, particularly during nesting or brood-rearing seasons) can result in direct effects to piping plovers such as displacement from key nesting, foraging or brooding habitats; destroy nests or kill adults and young; or disrupt or alter other important behaviors (Carney and Sydeman 1999, Jorgensen et al. 2016).

Noise from construction activities has the potential to cause flushing from nests or nest abandonment if the disturbances occur frequently and at an intensity that is above ambient noise levels (i.e. new bridge construction). Eggs, young chicks or juveniles may become separated from adults by human activities or displaced from preferred foraging habitats, which may make them more susceptible to the elements (i.e. hot, cold, or other adverse weather conditions such as storms) and predators; ultimately affecting their survival (Flemming et al. 1988). If piping plovers have initiated nesting prior to any construction activities in close proximity to a NDDOT project, the species could be adversely affected. Unless avoidance or minimization measures could be implemented (i.e. avoidance buffers, timing restrictions, etc.), separate consultation would be required in these situations.

There have been no studies that have determined how noise from construction specifically affects piping plovers. However, it is reasonable to assume that piping plovers could be adversely affected from construction generated noise, dependent on the scope and duration of a project as well as site-specific conditions such as the projects distance to suitable habitat. Piping plovers nest in anthropogenic habitats (areas impacted by human activities); including recreation, aggregate mining, and residences (Jorgensen et al. 2016). Human disturbances can cause behavioral changes that lead to negative consequences such as reduced nesting success (low egg hatching rate, or nest abandonment) (Jorgensen et al. 2016). Piping plovers appear to be able to habituate to human disturbances. In a study that determined flight initiation distances to piping plovers in response to human disturbance; the species responded less vigorously to disturbance as the incubation period progressed Jorgensen et al.

2016). The birds responded to stimuli at the greatest distances early in the incubation period, and at the smallest distances later in the incubation period. However, the species became slightly more responsive to stimuli over the course of a day, suggesting that there is a cumulative effect of stimuli experienced by the bird, but that value reset every morning (Jorgensen et al. 2016).

Although piping plovers may become habituated to short-term disturbances to a certain extent, construction activities may cause noise levels to exceed background noise levels for extended periods of time. This could create direct effects to piping plovers (nest abandonment, increased energy expenditure/reduced fitness) that use suitable habitat near a construction project, particularly if construction begins after breeding courtship or nesting has been initiated. Topography and other visual barriers such as riparian forest would significantly reduce the potential for noise and visual disturbances to the piping plover.

Because of the duration of time required to complete road construction or new bridge construction/bridge demolition in the Missouri River, Lake Sakakawea, or alkali lakes and wetlands; the associated potential stressors from these types of NDDOT projects could adversely affect piping plovers. Therefore these types of projects may not fit the scope of this programmatic biological assessment. However, conservation measures such as piping plover monitoring surveys can be implemented prior to and during construction. Should piping plovers be identified during monitoring surveys as part of the proposed action, construction activities would not be allowed to resume until it has been demonstrated that the birds have left the area, or minimization measures have been approved and installed/implemented to reduce potential project effects to the species to an insignificant or discountable level. Further information on monitoring surveys can be found in the conservation measure section for this species.

Water Quality Modification

Degradation of water quality from construction activities such as erosion, sedimentation, increased turbidity or release of contaminants including oil, gas, or hydraulic fluid can cause direct and indirect effects to the piping plover. The piping plover is dependent upon primarily small invertebrates for prey items. Excessive erosion or sedimentation that reaches foraging habitat of the piping plover, may result in sub lethal and behavioral effects to small invertebrates such as increased activity, stress, and emigration rates; loss or reduction of foraging capability (reduced plankton); reduced growth and resistance to disease; and physical abrasion (Kjelland et al. 2015).

The long term effects of increased suspended sediments can cause changes in the abundance and/or type of food organisms preferred by piping plovers. The abundance of food within a territory for piping plovers can have a significant effect on nesting density and reproductive success (Catlin et al. 2012). Food availability may also contribute to lower chick survival (Loegering and Fraser 1995). Potential effects from roadway construction to water quality in piping plover habitat would be temporary, and any modification to water quality would be reduced through the implementation of SWPPP plans and associated erosion control measures. Therefore, potential effects to the piping plover as a result of potential water quality impacts resulting from roadway construction are expected to be insignificant or discountable.

Exposure to Contaminants

Roadway construction activities adjacent to or within suitable piping plover habitat have the potential to inadvertently introduce contaminants into suitable habitat for the piping plover. Items such as fuel, oil, and hydraulic fluid may need to be stored on a project site. Exposure to contaminants may directly or indirectly affect piping plovers, depending on the location and quantity of release. Injury to piping plovers from exposure to hazardous materials includes a poisoned food source, decrease in food supply, or habitat degradation. Direct exposure of contaminants to adults, young, or eggs, including ingestion of oil from contaminated invertebrates or oiling of plumage/nests, would adversely affect the piping plover through direct injury or mortality. The primary problem caused when a bird becomes exposed to contaminants such as oil is alteration of the feather structure (UC Davis 2016). When oiled, feathers lose the ability to trap air and repel water. As a result, birds can no longer maintain body heat and become hypothermic. This can cause an increase in metabolism, causing a greater need for food. Birds also frequently preen themselves; therefore, when exposed to contaminants, birds may inadvertently ingest oil when preening (UC Davis 2016). Once contaminants such as oil are ingested, it can cause direct damage to the gastrointestinal tract, causing physical damage to organs which can lead to decreased ability to absorb nutrients and can cause birds to have anemia and lower white blood cells to fight infections (UC Davis, 2016). Exposure of eggs to contaminants such as oil can cause mortality and developmental effects on affected embryos. . In extreme cases, contaminants may remain in piping plover habitat for long periods of time, and may be transferred up the food chain through the process of bioaccumulation (Arnold et. al. 2002). Large releases of contaminants are unlikely to occur for a roadway construction project; however potential direct or indirect effects may occur if appropriate measures are not taken to remediate any releases.

Storm Water Pollution Prevention Plans are prepared in order to identify potential sources of sediment and other sources of pollution associated with construction activities, and to ensure practices are implemented and maintained to reduce the contribution of pollutants in storm-water discharges from the construction site to waters of the state as well as storm sewer systems. The SWPPP describes how litter, debris, chemicals and parts will be handled to minimize exposure to storm-water. The SWPPP also describes spill prevention and response procedures where potential spills can occur. Specific handling procedures, storage requirements, spill containment, cleanup procedures, and disposal must be identified. Storage structures for petroleum products and other chemicals must have adequate leak and spill protection to prevent any spilled materials from entering waters of the state or storm sewer systems.

Although not common for NDDOT projects, depending on the size of a project and amount of fuel or other contaminants needed to be on-site, a Spill Prevention Control and Countermeasure Plan (SPCC) may be implemented and appropriate containment installed. The SPCC plan describes oil handling operations, spill prevention practices, discharge or drainage controls, and the personnel, equipment, and resources at the facility that are used to prevent oil spills from reaching navigable waters or adjoining shorelines. Each SPCC plan is unique to a project; however there are elements that must be described in every plan including: operating procedures at a site to prevent oil spills; control measures such as secondary containment installed to prevent oil spills from entering navigable waters or adjoining shorelines; and countermeasures to contain, clean up, and mitigate the effects of an oil spill that has impacted navigable waters or adjoining shorelines.

SPCC plans are not required if materials are stored in containers less than 55 gallons and can be demonstrated that spill material will not reach navigable waters of the U.S. Although SPCC plans are not required in these situations, contractors must have materials available to clean up a spill. For large construction projects such as new bridge construction and bridge demolition, due to the amount of equipment used and fuel required, SPCC plans may be required. With the design of a SPCC and/or SWPPP plan specific to a project that may occur in piping plover habitat, adverse effects to the species are not likely.

For geotechnical investigations and utility relocations, the use of bentonite is required to act as a drilling lubricant. Frac-out or inadvertent return of bentonite is a potential concern when horizontal directional drilling is used in or near sensitive habitats, waterways, and cultural resource sites. In order to minimize the potential for a frac-out, a contingency plan or frac-out plan is prepared to provide for the timely detection of frac-outs. The frac-out plan is prepared by the drilling contractor to ensure that preventative and responsive measures can be implemented. Once a frac-out is identified, all work stops and the location and extent of the frac-out is determined. If the frac-out is terrestrial, the area is isolated to contain and remove the drilling mud. If the frac-out is aquatic, it is monitored to determine if the drilling mud congeals, once the frac-out is stabilized the congealed drilling mud is removed. If a fracture becomes excessively large, a spill response team would be hired to contain and clean up excess drilling mud in the water. Typically, frac-out plans are only prepared for large-scale horizontal directional drilling projects, and may not be required for small distance (section) adjustments or relocations. Although frac-out plans are not required for small-scale horizontal directional drilling projects, any inadvertent release of drilling mud must be remediated.

Other contaminants such as asbestos or lead/non-lead paint (i.e. from bridge demolition activities) or application of herbicides/pesticides has the potential to reach piping plover habitat; however adverse effects are not likely to occur due to the following reasons. Appropriate measures are taken to test for and dispose of asbestos and lead paint, and must be done in accordance with state and federal laws. Applicators of pesticides and/or their direct supervisors (depending on pesticide label requirements) need to be certified by the Pesticide Control Board and must follow all applicable laws for use of herbicides/pesticides. Therefore, with the proper handling of these types of materials, the potential for these types of contaminants to adversely affect piping plovers is insignificant or discountable.

Habitat Alteration/Fragmentation/Removal

Habitat destruction, habitat alteration and human development of shorelines has resulted in the extirpation of piping plovers from most formerly occupied Great Lakes states (Wemmer 1999). Marina construction, inlet dredging, artificial structures, and other types of construction can eliminate breeding areas and disrupt natural processes that maintain shoreline habitats (Wemmer 1999). Habitat alteration, fragmentation, or removal can occur from roadway construction activities, particularly for new bridge construction and bridge demolition, but also for roadway projects that may intersect potential habitat for the piping plover (i.e. alkali lakes/wetlands). If piping plovers lose nesting sites and are forced to use breeding sites that may be marginally suitable, the species may have lower reproductive success. In addition, roads, residences, and high use areas fragment piping plover populations and limit travel to foraging areas (NYNHP 2015). Direct impacts to piping plover habitat (removal of sandbar habitat for bridge construction for example) would not be covered under this PBA due to the likelihood of adverse effects. Further information on impacts to piping plover habitat can be found in the piping plover critical habitat stressor and response section.

Bridge construction has the potential to affect water velocities and flow patterns in the Missouri River, which could affect the natural processes that create and maintain suitable piping plover habitat as a result of both water speed and changes in turbidity. However, bridge piers are typically designed to be parallel to the direction of the flow of water which minimizes the effects on water velocity. In addition, more recent bridge pier design reduces the length and width of piers compared to the design of older bridges which minimizes the footprint within water. Given that the Missouri River has a relatively wide river channel, design of piers to reduce footprint within the water; negligible impacts to water velocities, flow patterns, or channel morphology are anticipated due to new bridge construction.

Natural succession and vegetative regrowth of the open sandy beaches used for nesting decrease habitat quality for piping plovers (NYNHP 2015). Vegetation may restrict movements of adults and chicks from high quality foraging habitats and starvation in some situations has been a problem (Loegering and Fraser 1995). Habitat availability for piping plovers may become an issue if smaller habitat patches become heavily vegetated without nearby expanses of sand scoured habitat for the birds to move into. Vegetation may also provide cover for a variety of potential predators. Due to the localized nature of transportation projects, the encroachment of vegetation onto suitable piping plover habitat as a result of the proposed action is highly unlikely. Any temporary impacts to terrestrial areas would be reclaimed to match surrounding conditions.

Sediment and erosion caused by earthwork adjacent to the Missouri River, Lake Oahe, Lake Sakakawea, or alkali lakes and wetlands has the potential to reach suitable habitat for the piping plover. However, with the implementation of SWPPP plans and associated BMP’s, adverse effects to the piping plover or their habitat due to erosion or sedimentation would not be likely. Further details on potential effects on the piping plover from erosion/sedimentation is discussed previously in the water quality modification section.

Lighting

Lighting used during bridge construction/demolition, or new permanent lighting installed for a new bridge may cause direct or indirect effects to the piping plover. Temporary lighting used during construction in the active season for piping plovers has the potential to cause behavioral effects to the species such as habitat avoidance (which could cause increased energy expenditure). Permanent lighting installed for NDDOT projects also has the potential to cause behavioral effects such as habitat avoidance to the piping plover after the project is completed. However, given that new bridge construction typically occurs along an existing structure, baseline conditions are not expected to change. In addition, lighting is used during low-light periods when piping plovers are typically not actively foraging or initiating nests, compared to daylight hours. No adverse effects to the piping plover are anticipated from temporary or permanent lighting. Listed as a standard conservation measure in Section 7, downcast or shielded lighting should be used for construction projects to avoid potential effects to listed species.

Conservation Measures Specific to the Piping Plover:

General conservation measures to be applied to all projects to lessen the potential for effects to all listed species are described in Section 7 of this document.

Piping plovers may be present in North Dakota from approximately April 15 – August 31. Although the species may remain in North Dakota until the end of August, nest initiation is not anticipated to occur past July 15. Projects in or adjacent to suitable piping plover habitat (Missouri River, Lake Oahe, Lake

Sakakawea, and other Designated Critical Habitat), can implement construction phasing to avoid construction activities within 0.5 mile of potential nesting and foraging areas. If construction phasing is an option, the following conservation measure should be used.

- *Construction activities shall be avoided within 0.5 miles of suitable habitat (between Station X and Station X) for the piping plover between the dates of April 15 and August 31.*

If construction phasing is not an option, surveys may be performed by a qualified biologist[7] prior to commencement of construction activities within 0.5 miles of the Missouri River, Lake Oahe, Lake Sakakawea, or other Designated Critical Habitat for the piping plover to determine if birds or active nests are present.

Initial Survey: If construction occurs during the least tern and piping plover breeding season (April 15 – August 31), an initial field survey will be conducted within designated critical habitat located inside a 0.5 mile buffer area of construction activities. The survey will occur two days before beginning construction to identify suitable habitat (e.g. islands, sandbars, or exposed shoreline).

No Habitat Present:

- ***For Projects Adjacent/Within the Missouri River/Lake Sakakawea:*** If no suitable habitat is identified during the initial survey, surveys will be conducted weekly to identify any new habitat uncovered by receding water levels. End surveys July 15 if no suitable nesting habitat, nesting pairs, or nests have been identified. Construction can resume without surveys on July 16 if it has been determined no active nests are located within 0.5 miles of any construction activities. Nest establishment is not anticipated to occur past this date, however, if nests hatch on or before July 15, the adults and juveniles will remain in the area until juveniles are capable of long distance flight, which is approximately August 31 at the latest.

- ***For Projects Adjacent to / Within Other Designated Critical Habitat (i.e. Alkali Lakes/Wetlands):*** If no suitable habitat is identified during the initial survey, surveys may cease, as it is highly unlikely water levels would fluctuate enough in these locations to reveal suitable habitat during the breeding season for this species. Water levels in North Dakota since the early 1990's have dramatically reduced the amount of available habitat for the piping plover on smaller lakes designated as critical habitat. For example, many islands traditionally used as nesting area for this species are completely inundated as of 2016. Until water levels recede, many of these critical habitat areas are unsuitable for the species due to lack of primary constituent elements from years of high water levels. However, each project that occurs adjacent to or within these critical habitat units will need a cursory review of the habitat closer to the time of project construction as it cannot be predicted when water levels will recede in the future. Once water levels recede, many of these areas will have high quality habitat available for the piping plover.

[7] A qualified biologist is required to have a four year Bachelor of Science degree in wildlife management, biology/zoology or closely related natural resources degree from an accredited university and to be trained in the identification of the threatened and endangered species of North Dakota.

Habitat Present: If suitable habitat has been identified and construction activities will take place within 0.5 miles of the habitat, unless visual barriers are present between the work activities and habitat (i.e. wooded areas, rolling topography), 2 surveys will be conducted daily:

1) The first survey will be conducted for 2 hours during daylight before starting construction activities for that day.

2) The second survey will be conducted for 1 hour beginning after work has stopped for that day. Construction activities will stop early enough to allow for the survey to be completed no later than 30 minutes after sunset.

If nests, an individual, or pair of birds are detected during surveys, the Engineer will be notified. The Engineer will contact USFWS, FHWA, and NDDOT ETS Division to determine methods to be implemented to avoid adverse effects to the species. If active nests are discovered, an avoidance area will be established, prohibiting construction activities within 1 mile of the active nest. Construction activities will not resume within the avoidance area until one of the following has been fulfilled: daily surveys show that the birds have vacated the area, mitigation measures determined by the contacted agencies have been installed, or September 1 has been reached.

Note: Surveys will be conducted only until July 15 as nest establishment is not anticipated to occur past this date. However, if active nests or individuals/pairs are discovered on July 15 or earlier, surveys must resume until the fate of the nest has been determined (abandoned, destroyed, hatched, fledged), or the birds have left the area.

Survey Report: A report will be submitted to the Engineer and NDDOT ETS detailing the following information:

- Date and time of surveys
- Locations of suitable habitat and distance from construction activities
- Results of the surveys
- Photos and map(s) of the survey area

Effect Determination

Disturbance from construction activities, water quality modification, exposure to contaminants, habitat modification/removal, and lighting has the potential to directly or indirectly affect the piping plover. However with the implementation of piping plover surveys, design/implementation of SWPPP and SPCC plans, and construction phasing (if applicable), adverse effects to this species are highly unlikely. Therefore, the proposed action ***may affect, but is not likely to adversely affect*** the piping plover.

6.8 Western Prairie Fringed Orchid Stressor and Response

NDDOT projects in Ransom and Richland Counties, particularly within or near the Sheyenne National Grasslands have the potential to have direct or indirect effects to the western prairie fringed orchid. This species has been documented growing in previously disturbed sites including roadside ditches in addition to high quality prairie. Projects occurring in Ransom or Richland Counties that stay entirely on the surface of the roadway are not anticipated to have any potential effects to this species. The following section describes the various potential effects to the species as a result of ground disturbing activities.

Disturbance (Ground/Soil/Vegetation)

New road construction, roadway widening, or any other ground disturbing activities within Ransom and Richland Counties, has the potential to directly or indirectly affect the western prairie fringed orchid causing direct injury or mortality. Although the species is typically found in remnant native prairie, wet prairies and wet meadows, they have also been observed in roadside ditches and other disturbed areas. In areas where orchids are present, construction activities can cause adverse effects to this plant species. These activities include; clearing and grading, operation of equipment, utility relocations, and any other activity that has the potential to crush or remove vegetation.

Dust/Erosion/Sedimentation

Dust, erosion, or sedimentation has the potential to directly affect western prairie fringed orchids. Large amounts of dust particles suspended in the air can affect surrounding vegetation. The effects of dust on grasslands can affect photosynthesis, respiration, transpiration, and allow the penetration of phytotoxic gaseous pollutants (Farmer 1993). As part of standard practice for all NDDOT projects; dust would be controlled on paved surfaces using a vacuum or pickup sweeper. On unpaved surfaces, dust would be controlled using water. In addition, erosion control measures required as part of the SWPPP plan would be implemented as necessary. Erosion control measures such as mulching, stabilizes soils and lessens the amount of fugitive dust created. Other erosion control measures are used to reduce the potential for erosion/sediment transport. Excessive erosion or sedimentation caused by construction activities could also affect western prairie fringed orchids, primarily damaging younger plants early in the growing season, which may kill the plant, or prohibit natural growth which may delay or prevent flowering. However, with the implementation of dust abatement and erosion control measures; no adverse effects from dust, erosion, or sedimentation to the western prairie fringed orchid are anticipated.

Introduction/Spread of Invasive/Noxious Species

The introduction or spread of invasive/noxious weeds could indirectly affect western prairie fringed orchids. Earthwork leaves soil in a bare condition, therefore if appropriate measures are not taken to establish vegetation on disturbed areas, there is a potential for undesirable plants to establish within the project limits and disperse into native prairie locations both inside and outside of the ROW) after a project is constructed. This could in-turn cause a reduction in the quality of habitat for the western prairie fringed orchid (cool season grasses, noxious weeds, or other undesirable species over-competing with native grasses and forbs). North Dakota Century Code requires the NDDOT to provide for eradication or control of noxious weeds on NDDOT land.

NDDOT maintenance staff coordinates noxious weed control with outside agencies, typically the Commissioner of Agriculture. Controlling noxious weeds is also typically coordinated with appropriate county and local officials. Applicators of pesticides and/or their direct supervisors (depending on pesticide label requirements) need to be certified by the Pesticide Control Board and must follow all applicable laws for use of pesticides. The application of pesticides as part of this project is not anticipated by the contractor. Such application would be conducted by district staff or hired pesticide applicators during routine maintenance operations. NDDOT District staff writes restrictions on spraying in known orchid areas into their weed control contracts (i.e. must spot spray instead of broadcast herbicides)

In addition, as part of erosion control measures for SWPPP plans as well as NDDOT seeding requirements; disturbed areas that are seeded must be free of all prohibited noxious weed seed and should not contain more than 1/2 of 1% by weight of restricted noxious weed seeds as classified by the ND State Seed Department. If seeding is required before April 20 or between July 16 and August 9, a temporary cover crop (oats) is applied to disturbed areas. If this is the case, these areas are re-seeded with NDDOT approved permanent seed mixtures between April 20 and July 15, or after August 10 (must be seeded before the ground freezes). Given this information, the chance for indirect effects such as noxious weeds or other undesirable species establishing in areas disturbed by this project and encroach either inside or outside the ROW is highly unlikely.

Exposure to Contaminants

Construction projects may inadvertently release contaminants onto a project site. Release of contaminants could cause adverse effects to western prairie fringed orchids, including physiological effects such as reduced growth, or direct injury/mortality. Depending on the size of a project and amount of fuel or other contaminants needed to be on-site, a Spill Prevention Control and Countermeasure Plan (SPCC) must be implemented and appropriate containment installed. SPCC plans are not required if materials are stored in containers less than 55 gallons and can be demonstrated that spill material will not reach navigable waters of the U.S. Although SPCC plans are not required in these situations, contractors must have materials available to clean up a spill. Due to contractor requirements to properly store contaminants as well as clean up inadvertent spills in accordance with state and federal regulations as well as potential requirements for pre-construction surveys for western prairie fringed orchids, potential releases of hazardous materials that would adversely affect western prairie fringed orchids is not anticipated.

Conservation Measures Specific to the Western Prairie Fringed Orchid

General conservation measures to be applied to all projects to lessen the potential for effects to all listed species are described in Section 7 of this document.

- A survey for western prairie fringed orchids shall be conducted prior to construction for projects occurring within Ransom and Richland Counties that require ground disturbing activities. Note- Guidelines for conducting western prairie fringed orchids can be found on the NDDOT Design Manual References and Forms webpage. In order to detect the species, surveys would need to be conducted in late June to mid-July.
    - If orchids are discovered during surveys, measures shall be taken to avoid direct impacts to the species. Note - If avoidance is not possible, separate consultation would be required as adverse effects to threatened or endangered species are not covered under this PBA.
    - If no orchids are discovered, the project may proceed as planned under a “may affect, not likely to adversely affect” determination. Although there may not be direct impacts to plants, indirect effects to the species could occur after the project is completed (i.e. introduction or spread of invasive/noxious weeds.

Effect Determination

Projects that require ground disturbing activities in Ransom and Richland counties have the potential to directly or indirectly affect the western prairie fringed orchid through direct injury or mortality, dust/erosion/sedimentation, reduced habitat quality from establishment of invasive/noxious vegetation, and to a lesser extent exposure to contaminants. With the implementation of preconstruction field surveys, avoidance of discovered individuals/populations, and standard conservation measures, the proposed action ***may affect, but is not likely to adversely affect*** the western prairie fringed orchid. If known individuals or populations of this species are discovered during surveys and cannot be avoided, adverse effects would occur and separate consultation would be required.

6.9 Dakota Skipper Stressor and Response

The Dakota skipper occurs in multiple counties throughout the state of North Dakota. In areas containing high quality native prairie where skippers may be found, transportation projects have the potential to directly or indirectly affect this species. The following section details potential direct and indirect effects to the Dakota skipper as a result of NDDOT projects.

Disturbance (Ground/Soil/Vegetation)

Direct and indirect effects could occur to the Dakota skipper as a result of ground, soil, or vegetation disturbance. The crushing/killing of eggs, larvae, or adults could occur if construction equipment operates in areas of suitable habitat where the species may be found, particularly for new road construction. The species is highly dependent on high quality undisturbed native prairie, which is unlikely to be found within the ditch of an existing road. However, existing ditches with native vegetation may serve as dispersal corridor for Dakota skippers in areas where the species is known to be present (i.e. occupied critical habitat); therefore adults may be directly affected if construction activities occurs during the flight period of this butterfly (typically mid-June to mid-July). Direct effects could include habitat displacement (arousal/fleeing), or crushing/killing of adults, eggs, or larvae. New road construction also has the potential to convert/remove suitable Dakota skipper habitat; however this is highly unlikely as potential habitat for this species is limited and new road construction through undisturbed Type A or B habitat is extremely unlikely.

Dust/Erosion/Sedimentation

Dust from construction activities has the potential to spread into adjacent areas outside of NDDOT ROW; which could cause vegetation preferred by the Dakota skipper to be affected physiologically. The effects of dust on grasslands can affect photosynthesis, respiration, transpiration, and allow the penetration of phytotoxic gaseous pollutants (Farmer 1993). Large amounts of dust could also cause various effects to Dakota skipper adults, eggs, and larvae, which could cause impaired functioning (i.e. delayed growth, reduced nectaring ability). Dust may be lethal to insects either directly or indirectly. Dust may cause death or injury directly through desiccation, or indirectly through reducing insects ability to find food and may bring about starvation by forming a mechanical barrier to their food supply, by impeding their movement, or by clogging their digestive systems (Fleschner 1958).

As part of standard practice for all NDDOT projects; if the Project Engineer determines that dust from performance of the work is creating a hazard to traffic, or nuisance to the public; dust would be controlled on paved surfaces using a vacuum or pickup sweeper. On unpaved surfaces, dust would be controlled using water. In addition, erosion control measures required as part of the SWPPP plan would be implemented as necessary. Erosion control measures such as mulching, stabilizes soils and lessens the amount of fugitive dust created. Therefore, with the implementation of dust abatement and erosion control measures; no adverse effects from dust, erosion, or sedimentation to the Dakota skipper or its habitat are anticipated.

Introduction/Spread of Noxious Weeds

Earthwork leaves soil in a bare condition, therefore if appropriate measures are not taken to establish vegetation on disturbed areas, there is a potential for undesirable plants to establish within the project limits and disperse into native prairie locations outside of the ROW (including the critical habitat unit portion) after this project is constructed. This could in-turn cause a reduction in the quality of habitat for the Dakota skipper (reduced nectaring forbs, cool season grasses, noxious weeds, or other undesirable plants over-competing with native grasses). North Dakota Century Code requires the NDDOT to provide for eradication or control of noxious weeds on NDDOT land.

NDDOT maintenance staff coordinates noxious weed control with outside agencies, typically the Commissioner of Agriculture. Controlling noxious weeds is also typically coordinated with appropriate county and local officials. Applicators of pesticides and/or their direct supervisors (depending on pesticide label requirements) need to be certified by the Pesticide Control Board and must follow all applicable laws for use of pesticides. The application of pesticides as part of this project is not anticipated by the contractor. Such application would be conducted by district staff or hired pesticide applicators during routine maintenance operations. Spot spraying is typically used rather than broadcast applications.

In addition, as part of erosion control measures for SWPPP plans as well as NDDOT seeding requirements; disturbed areas that are seeded must be free of all prohibited noxious weed seed and should not contain more than 1/2 of 1% by weight of restricted noxious weed seeds as classified by the ND State Seed Department. If seeding is required before April 20 or between July 16 and August 9, a temporary cover crop (oats) is applied to disturbed areas. If this is the case, these areas are re-seeded with NDDOT approved permanent seed mixtures between April 20 and July 15, or after August 10 (must be seeded before the ground freezes). Given this information, the chance for indirect effects to Dakota skipper habitat such as noxious weeds or other undesirable species establishing in areas disturbed by this project and encroach outside the ROW onto adjacent land is highly unlikely.

Exposure to Contaminants

Depending on the size of a project and amount of fuel or other contaminants needed to be on-site, a Spill Prevention Control and Countermeasure Plan (SPCC) may be implemented and appropriate containment installed. SPCC plans are not required if materials are stored in containers less than 55 gallons and can be demonstrated that spill material will not reach navigable waters of the U.S. Although SPCC plans are not required in these situations, contractors must have materials available to clean up a spill. Due to contractor requirements to properly store contaminants as well as clean up inadvertent spills in accordance with state and federal regulations, releases of potentially hazardous materials into occupied Dakota skipper habitat is not anticipated.

Conservation Measures Specific to the Dakota Skipper

For work outside of the ROW that may directly impact high quality native prairie the following commitment should be used.

- Conduct a vegetation inventory for all areas identified as potential native prairie to be directly impacted either outside or within existing ROW by construction activities to determine the presence of Type A or Type B Dakota skipper habitat. Note- these commitments are meant for areas outside of designated critical habitat units. See Dakota skipper critical habitat section for further information on critical habitat areas.

- Note - If suitable habitat is identified, a presence/absence survey for the Dakota skipper must be conducted by qualified individuals. If Dakota skippers are not detected during surveys, the project may proceed under the PBA. If Dakota skippers are detected during surveys, separate consultation would be required, as adverse effects would be likely to occur. Qualified individuals to conduct Dakota skipper surveys are in short abundance, and the survey window for the species is small; therefore, projects may be significantly delayed should Dakota skipper surveys be required.

Effect Determination

NDDOT projects that occur adjacent to or within occupied Dakota skipper habitat (or designated critical habitat) have the potential to directly and indirectly affect the Dakota skipper through direct injury/mortality, removal/modification of habitat, large amounts of fugitive dust, and establishment/spread of invasive/noxious plants. Direct injury/mortality of Dakota skippers is not anticipated due to the avoidance of ground disturbing activities in occupied habitat that is suitable for the species. Surveys for suitable Type A or Type B habitat would occur prior for projects anticipated to disturb high quality prairie outside of previously disturbed ROW. With the implementation of SWPPP plans, NDDOT standard seeding practices, dust abatement, and vegetation inventories, direct and indirect effects to the Dakota skipper are anticipated to be insignificant or discountable, provided that occupied Dakota skipper habitat is not directly impacted. Therefore, the proposed action **may affect, but is not likely to adversely affect** the Dakota skipper.

6.10 Rufa Red Knot Stressor and Response

Rufa red knots do not nest in North Dakota; however, the species may migrate through the state during the spring and fall on their way to breeding and wintering grounds, respectively. During migration the species may use stopover sites similar to the piping plover to rest and forage. Transportation projects that occur adjacent to or within the Missouri River/Lake Sakakawea, alkali lakes within central and western North Dakota as well as sewage lagoons have the potential to have direct or indirect effects to rufa red knots. Disturbances such as noise/vibrations from various types of construction activities, increased human presence, water quality modification, habitat alteration/removal can have various effects to the rufa red knot. The section below details potential effects to the rufa red knot from NDDOT project stressors.

Disturbance (Noise/Vibrations/Human Presence)

Noise, vibrations, and human presence from construction activities can temporarily discourage rufa red knots from foraging or roosting in suitable habitat that is adjacent to a roadway construction project (i.e. habitat avoidance). Effects of highway noise to species such as the rufa red knot may include: producing significant changes in behavior (i.e. expending additional energy to find foraging or resting sites); masking signals birds use to communicate between individuals/young or to recognize biological signals; impairing detection of sounds of predators; decreasing hearing sensitivity temporarily or permanently; and increasing stress (Dooling and Popper 2007).

There have been no studies that have determined how noise specifically affects rufa red knots. However, it is reasonable to assume that rufa red knots could be affected from construction generated noise, dependent on the scope and duration of a project as well as site-specific conditions such as the projects distance to suitable stopover habitat. Conversely, rufa red knots that have selected foraging or roosting habitat near an existing roadway have been or become habituated to some level of increased background noise from the daily operation of traffic. Recent studies have indicated that a similar shorebird species, the piping plover, appears to be able to habituate to human disturbances (Jorgensen et al. 2016). In addition, rufa red knots are a highly mobile species, and are capable of making long distance flights. Migrating red knots can complete non-stop flights of 1,500 miles or more (USFWS 2016). Temporary avoidance of potential stopover habitat is not anticipated to adversely affect the species.

Water Quality Modification

Degradation of water quality from construction activities such as erosion, sedimentation, increased turbidity or release of contaminants including oil, gas, or hydraulic fluid can cause adverse effects to the rufa red knot. The rufa red knot is dependent upon varies food items such as clams, mussels, snails, and other invertebrates. Excessive erosion or sedimentation that reaches foraging habitat of the rufa red knot, may result in sub lethal and behavioral effects to small invertebrates such as increased activity, stress, and emigration rates; loss or reduction of foraging capability (reduced plankton); reduced growth and resistance to disease; and physical abrasion (Kjelland et al. 2015).

The long term effects of increased suspended sediments can cause changes in the abundance and/or type of food organisms preferred by rufa red knots. Potential effects from roadway construction to water quality in rufa red knot stopover habitat would be temporary, and any modification to water quality would be reduced through the implementation of SWPPP plans and associated best management practices. Therefore, potential effects to the rufa red knot as a result of potential water quality impacts resulting from roadway construction are expected to be insignificant or discountable.

Exposure to Contaminants

Roadway construction activities adjacent to or within suitable rufa red knot stopover habitat have the potential to inadvertently introduce contaminants into suitable habitat for the rufa red knot. Items such as fuel, oil, and hydraulic fluid may need to be stored on a project site. Exposure to contaminants may directly or indirectly affect rufa red knots, depending on the location and quantity of release. Injury to the rufa red knot from exposure to hazardous materials includes a poisoned food source, decrease in food supply, or habitat degradation. Direct exposure of contaminants to adults or juveniles, including ingestion of oil from contaminated invertebrates or oiling of plumage, would adversely affect the rufa red knot through direct injury or mortality. The primary problem caused when a bird becomes exposed to contaminants such as oil is alteration of the feather structure (UC Davis 2016). When oiled, feathers lose the ability to trap air and repel water. As a result, birds can no longer maintain body heat and become hypothermic. This can cause an increase in metabolism, causing a greater need for food. Birds also frequently preen themselves; therefore, when exposed to contaminants, birds may inadvertently ingest oil when preening (UC Davis 2016). Once contaminants such as oil are ingested, it can cause direct damage to the gastrointestinal tract, causing physical damage to organs which can lead to decreased ability to absorb nutrients and can cause birds to have anemia and lower white blood cells to fight infections (UC Davis, 2016). In extreme cases, contaminants may remain in rufa red knot habitat for long periods of time, and may be transferred up the food chain through the process of bioaccumulation (Arnold et. al. 2002). Large releases of contaminants are unlikely to occur for a roadway construction project; however potential adverse effects may occur if appropriate measures are not taken to remediate any releases.

Storm Water Pollution Prevention Plans are prepared in order to identify potential sources of sediment and other sources of pollution associated with construction activities, and to ensure practices are implemented and maintained to reduce the contribution of pollutants in storm-water discharges from the construction site to waters of the state as well as storm sewer systems. The SWPPP describes how litter, debris, chemicals and parts will be handled to minimize exposure to storm-water. The SWPPP also describes spill prevention and response procedures where potential spills can occur. Specific handling procedures, storage requirements, spill containment, cleanup procedures, and disposal must be identified. Storage structures for petroleum products and other chemicals must have adequate leak and spill protection to prevent any spilled materials from entering waters of the state or storm sewer systems.

Although not common for NDDOT projects, depending on the size of a project and amount of fuel or other contaminants needed to be on-site, a Spill Prevention Control and Countermeasure Plan (SPCC) may be implemented and appropriate containment installed. SPCC plans are not required if materials are stored in containers less than 55 gallons and can be demonstrated that spill material will not reach navigable waters of the U.S. Although SPCC plans are not required in these situations, contractors must have materials available to clean up a spill. Further details on SPCC plans are included in previous sections. With the design of a SPCC and/or SWPPP plan specific to a project that may occur in rufa red knot habitat, adverse effects to the species are not likely.

For geotechnical investigations and utility relocations, the use of bentonite is required to act as a drilling lubricant. Frac-out or inadvertent return of bentonite is a potential concern when horizontal directional drilling is used in or near sensitive habitats, waterways, and cultural resource sites. In order to minimize the potential for a frac-out, a contingency plan or frac-out plan is prepared to provide for the timely detection of frac-outs. The frac-out plan is prepared by the drilling contractor to ensure that preventative and responsive measures can be implemented. Once a frac-out is identified, all work stops and the location and extent of the frac-out is determined. If the frac-out is terrestrial, the area is isolated to contain and remove the drilling mud. If the frac-out is aquatic, it is monitored to determine if the drilling mud congeals, once the frac-out is stabilized the congealed drilling mud is removed. If a frac-out becomes excessively large, a spill response team would be hired to contain and clean up excess drilling mud in the water. Typically, frac-out plans are only prepared for large-scale horizontal directional drilling projects, and may not be required for small distance (section) adjustments or relocations.

Although frac-out plans are not required for small-scale horizontal directional drilling projects, any inadvertent release of drilling mud must be remediated.

Other contaminants such as asbestos or lead/non-lead paint (i.e. from bridge demolition activities) or application of herbicides/pesticides has the potential to reach rufa red knot habitat; however adverse effects are not anticipated. Appropriate measures are taken to test for and dispose of asbestos and lead paint, and must be done in accordance with state and federal laws. Applicators of pesticides and/or their direct supervisors (depending on pesticide label requirements) need to be certified by the Pesticide Control Board and must follow all applicable laws for use of herbicides/pesticides. The potential for these types of contaminants to adversely affect rufa red knots is insignificant or discountable.

Habitat Alteration/Fragmentation/Removal

Habitat alteration, fragmentation, or removal can occur from roadway construction activities, particularly for new bridge construction and bridge demolition, but also for roadway projects that may intersect potential habitat for the rufa red knot (i.e. alkali lakes/wetlands). Because of the transitory nature of rufa red knots and ample foraging and resting habitat, road construction or new bridge construction/bridge demolition in the Missouri River, Lake Sakakawea, or alkali lakes and wetlands; the associated potential stressors from these types of NDDOT projects is not likely to adversely affect rufa red knots. Since the rufa red knot chooses similar habitats like shorebirds such as the piping plover, conservation measures including piping plover monitoring surveys (which would also afford protection to the rufa red knot) can be implemented prior to and during construction to reduce project effects to the species to an insignificant or discountable level. Should rufa red knots be identified during monitoring surveys as part of a NDDOT project, construction activities would not be allowed to resume until it has been demonstrated that the birds have left the area, or minimization measures have been approved and installed/implemented.

Rufa red knots would likely avoid any potential habitat within 0.5-1 mile of construction activities, due to constant noise and human presence. The species may fly over or near construction activities to forage, but would likely relocate to other areas away from construction disturbances. Habitat avoidance near a construction project would not be likely to adversely affect the species, as foraging habitat is not limited for this species at this point in time, and the species is capable of long-distance flights.

Sediment and erosion caused by earthwork adjacent to the Missouri River, Lake Sakakawea, or alkali lakes and wetlands has the potential to reach suitable stopover habitat for the rufa red knot. However, with the implementation of SWPPP plans and associated BMP’s, adverse effects to the rufa red knot or their potential habitat due to erosion or sedimentation would not be anticipated. Further details on potential effects from erosion/sedimentation is discussed previously in the water quality modification section.

Lighting

Lighting used during bridge construction/demolition, or new permanent lighting installed for a new bridge may cause direct or indirect effects to the rufa red knot. Temporary lighting used during construction in the active season for rufa red knots has the potential to cause behavioral effects to the species such as habitat avoidance. Permanent lighting installed for NDDOT projects also has the potential to cause behavioral effects such as habitat avoidance to the rufa red knot after the project is completed. However, given that new bridge construction typically occurs along an existing structure, baseline conditions are not expected to change. In addition, lighting is used during low-light periods when rufa red knots are typically not actively foraging, compared to daylight hours. No adverse effects to the rufa red knot are anticipated from temporary or permanent lighting. Listed as a standard conservation measure in Section 7, downcast or shielded lighting should be used for construction projects to avoid potential effects to listed species.

Conservation Measures Specific to the Rufa Red Knot

General conservation measures to be applied to all projects to lessen the potential for effects to all listed species are described in Section 7 of this document.

No conservation measures specific to the rufa red knot have been identified. However, conservation measures specific to the interior least tern and piping plover would afford protection to the rufa red knot. In addition, any threatened or endangered species observed during project activities would require that construction cease, avoidance areas established, and USFWS notified as soon as practicable to evaluate the level of disturbance and implement minimization measures as necessary.

Effect Determination

Little information or data is available for the rufa red knot within North Dakota. Although the species may migrate through the state during the spring and fall each year, adverse effects to the rufa red knot as a result of NDDOT projects are highly unlikely. The species may fly in or near a project area, but would quickly relocate to more secluded areas. Due to the species highly migratory/mobile nature, habitat avoidance near a NDDOT project is not anticipated to place energy burdens on the species to the point where significant energy expenditure would occur. In addition, potential roosting and foraging areas are not limited for this species. With the implementation of standard conservation measures and cease of construction in the event rufa red knots are observed near a project; the proposed action ***may affect, but is not likely to adversely affect*** the rufa red knot.

6.11 Northern Long-Eared Bat Stressor and Response

Transportation projects in or near densely wooded areas in North Dakota that require tree removals; work on structures such as bridges, box culverts, and buildings; impacts to caves/mines; reduces water quality; and introduces lighting in wooded habitats has the potential to affect the northern long-eared bat (NLEB). The following section details potential direct and indirect effects to the NLEB as a result of NDDOT projects.

Disturbance (Human/Noise/Vibrations)

Disturbance from construction activities such as noise and vibrations from heavy equipment in areas of suitable habitat for the NLEB has the potential to directly and indirectly affect the species. Potential effects as a result of human disturbances in or near suitable habitat for this species includes temporary to permanent alteration s in bat behavior. At low noises (or farther distances), bats initially may be startled, but they would likely habituate to the low background noise levels (USFWS 2016b). At closer range and louder noise levels (particularly if accompanied by physical vibrations from heavy machinery and the crashing of falling trees), many bats would likely be startled to the point of fleeing from their day time roosts and in a few cases may experience increased predation risk (USFWS 2016b). For projects with noise levels greater than levels typically experienced by bats (I.e. new road construction), and that continue for a long duration (multiple days/weeks), the bats roosting within or close to these areas are likely to shift their focal roosting areas further away or may temporarily abandon roosting areas completely (USFWS 2016b).

For roadway improvement projects potential effects as a result of human disturbances are unlikely to adversely affect NLEBs if they are currently in proximity to transportation corridors; as they are expected to be tolerant of existing noise and vibration levels, or have already modified their behaviors to avoid them (FHWA, FHA, and USFWS 2015). Therefore, noise/vibrations from operations of existing transportation corridors is not anticipated to result in any additional response by bats (FHWA, FHA, and USFWS 2015).

Habitat Loss/Fragmentation

Clearing and grading operations require that trees be felled, and roots/stumps be removed. Transportation projects that remove suitable habitat for the NLEB could adversely affect this species. Transportation projects may contribute to a variety of stressors as a result of habitat loss (tree removals) including; temporary or permanent loss of roosts, loss of foraging and/or roosting habitat, loss of travel corridors, and degradation of foraging and/or roosting habitat (USFWS 2016b). Frequently, tree removals are needed to facilitate construction of a project, whether it be new road construction, roadway widening, or any other type of project that is located in wooded areas. Tree removals may be required in areas that are not located in close proximity to heavily wooded areas (i.e. single trees, single rows, urban plantings, etc.). These types of situations are not anticipated to have any potential effects to the NLEB based on lack of suitable habitat.

Few NLEB roosts are expected to be in proximity to existing transportation corridors (USFWS, 2016b). Although it is unlikely for NLEBs to roost in close proximity to an existing roadway, the species may be directly or indirectly affected as a result of tree removals. New road construction has a greater potential to directly and indirectly affect bats. Direct effects of tree removals include killing or crushing bats that may be roosting during the active summer maternity season (April 1 – September 30), abandonment/flushing of a roost location, or may cause disruption of colony networks (Silvis et al. 2015). Removal of roosting and foraging habitat can result in longer flights for NLEBs to find alternative suitable habitat. Increased flight distances could cause NLEBs to expend energy causing a reduction in lipid reserves. Non-volant pups may also be abandoned and suffer direct injury or mortality as a result of tree removals during the active season.

Indirect effects of tree removals conducted during the inactive season include habitat loss and fragmentation and removal of roosts that have been used in previous years. Increased energy burdens may be placed on the species when they return during the active season to find alternate roosting locations. Since NLEBs have summer range site fidelity (Foster and Kurta 1999, Broders et al. 2013), loss or alteration of forest habitat may put additional stress on females when returning to summer roosting or foraging areas after hibernation. Hibernation and reproduction are the most energy-demanding periods for temperate-zone bats such as the NLEB (Broders et al. 2013).

Lighting

Transportation projects may require that artificial lighting be used temporarily during construction/maintenance activities, or require installation of permanent lighting in some situations. For projects with temporary or permanent lighting that is higher than baseline conditions may affect bat behavior. Bats that forage in lit areas may make them more susceptible to predation, or may cause habitat avoidance. Bats that significantly alter their foraging patterns may increase their energy expenditure resulting in reduced reproductive rates (USFWS 2016b). This is dependent upon the context of the lighting such as duration, location, extent, and type. Some bats seem to benefit from artificial lighting taking advantage of high densities of insects attracted to light, while some appear to avoid them (USFWS 2016b). Given that transportation projects may need to use artificial lighting temporarily during construction or maintenance activities, or increase permanent lighting in some situations, there is a potential for NLEBs to be affected if the light levels are above existing baseline conditions. For projects with temporary lighting during the winter season, no effects to NLEBs are likely from this stressor. For projects during the summer maternity season that use temporary lighting where the lighting is directed away from suitable habitat, no effects to NLEBs are likely. For new permanent lighting that is not substantially different than baseline light conditions, no effects to NLEBs are likely. If lighting can be installed using downward-facing, full cut off lens lights, and is directed away from forest habitat completely, no effects to NLEBs are likely (USFWS 2016b).

Water Quality, Dust/Erosion/Sedimentation, and Exposure to Contaminants

Transportation projects may alter available drinking water sources or foraging habitat from a variety of activities (i.e. permanent loss from wetland or stream fill). Impacts to water may affect foraging habitat and composition of insect prey base used by the northern long-eared bat. Construction projects may temporarily decrease water quality through dust and sedimentation as well as application of road salts and other de-icing materials. Temporary effects to water quality could occur during construction, which could reduce local insect populations. Insects associated with aquatic habitats make up part of the diet of NLEBs; therefore short term indirect effects on NLEBs during the spring, summer and fall may occur (USFWS 2016b). Implementation of SWPPP plans and associated erosion control measures would reduce potential impacts on aquatic ecosystems. Since potential impacts from sedimentation would be localized, foraging bats would have alternative drinking and foraging locations. The surrounding area would continue to provide an abundant prey base of insects during project construction, operation, and maintenance. Therefore, any potential direct effects to NLEBs from a reduction in water quality as a result of transportation projects are likely to be insignificant (USFWS 2016b).

Bats may also be exposed to contaminants/chemicals that are inadvertently released from transportation projects. For example, bats may drink contaminated water or forage on insects that have been directly exposed to chemicals/contaminants. These potential stressors may affect bats in a physiological manner (direct injury or mortality), however the extent of these types of impacts caused by transportation projects conducted with proper best management practices are expected to result in insignificant impacts.

Conservation Measures Specific to the Northern Long-Eared Bat

General conservation measures to be applied to all projects to lessen the potential for effects to all listed species are described in Section 7 of this document.

In order to fit the scope of this PBA, the proposed action must have no effect, or insignificant or discountable effects (may affect, not likely to adversely affect – NLAA) to this species. If a no effect or NLAA determination cannot be reached, the framework under the final 4(d) rule and associated programmatic biological opinion or the FHWA/USFWS range-wide consultation must be used (see the following sections for more information). One or more of the following conservation measures must be used in order for a NLAA determination to be reached.

Lighting

- Direct temporary lighting away from suitable habitat (wooded areas) during the active season.

- Use downward-facing full cut-off lens lights, and direct lighting away from suitable habitat when installing new or replacing existing permanent lights.

Tree Removals

- The word "trees" as used in the AMMs refers to trees that are suitable habitat (defined in Section 5.1.11) for the NLEB.

- Conduct tree removal activities outside of the northern long-eared bat pup season (June 1 to July 31) and/or the active season (April 15 – September 30).

- Ensure tree removal is limited to that specified in project plans. Install bright colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits.

- Do not cut down documented NLEB roosts or trees within 0.25 miles of roosts, or documented foraging habitat during any time of year. *Note- North Dakota currently does not have documented NLEB roosts or foraging habitat at this point in time. Should these types of features be identified in the future, this measure may need to be implemented to avoid adverse effects.*

Bridges

- Perform any bridge repair, retrofit, maintenance, and/or rehabilitation work during the winter hibernation period (October 1 – March 31).

- If construction activity is planned during the active season (April 1 – September 31), perform a bridge assessment for presence of bats. See Appendix I for bridge/structure assessment guidance.

- If bridge assessment for bats suggests presence of bats, ensure activities will not disturb bats. The following types of bridge work can be conducted with the presence of bats:

    - Above deck work that does not drill down to the underside of the deck or include percussives (vibration) or noise levels above general traffic (e.g. road paving, wing-wall work, work above that does not drill down to underside of deck).

  - Below deck work that is conducted away from roosting bats and does not involve percussives or noise levels above general traffic (e.g. some abutment, beam end, scour, or pier repair).

Structures

Note- This category includes manmade structures that may provide bat roosting habitat that are not bridges. They may include, but are not limited to, rest areas, offices, sheds, outbuildings, and barns.

- Perform an inspection of the structure for signs of bat use prior to demolition/removal or repair work (see Appendix I). If no signs of bat use are observed, structure demolition/removal or modifications may occur. If signs of bat use are observed, see the following conservation measures:

- Perform maintenance or repair work during the inactive season (October 1 – March 31).
- Avoid removing structures unless there are concerns about human health/safety/property and coordinate with a nuisance wildlife control officer and the local USFWS field office.

Final 4(d) Rule Streamlined Consultation Process

The final 4 (d) rule has determined that incidental take of NLEBs is not prohibited in areas outside of the White-Nose Syndrome zone, which includes the whole state of North Dakota. A framework has been released by the USFWS in order for Federal agencies to fulfill their project-specific section 7 responsibilities. The framework is meant for actions that "May Affect" the NLEB. Projects conducted during the active season for the NLEB (April 1 – September 30) that require tree removals, building demolitions, or work on structures (bridges, cattle passes, culverts) may have adverse effects to the NLEB.

The form used to complete this process can be found at the following links.

http://www.fws.gov/midwest/endangered/mammals/nleb/s7.html

- 4(d) Rule Streamlined Consultation Form found under the Consultation Documents and Information Section

http://www.dot.nd.gov/manuals/design/designmanual/reference-forms.htm

- 4(d) Rule Streamlined Consultation Form found under the NEPA Documentation Section (NDDOT Guidance for the NLEB).

When the form has been completed, it should be sent to the ETS Biologist for review. Once the attached 4(d) Rule Streamlined Consultation Form has been reviewed it will be sent to FHWA for signature. FHWA will send the letter to the USFWS Ecological Services office for a 30-day review period. If the USFWS does not respond within the 30-day window, FHWA/NDDOT may presume its affect determination is informed by the best available information and consider its project responsibilities under section 7 with respect to the NLEB fulfilled through the programmatic biological opinion. USFWS concurrence with FHWAs determination is not required; however, the USFWS may request additional information or may advise FHWA that separate consultation may be required. This procedure will be conducted in conjunction with the project level submittal for the species and associated affect determinations covered under this PBA; however the 30 day window must be reached in order for consultation to be completed for the NLEB under the final 4(d) rule programmatic biological opinion. This process will typically take less than 30 days, depending on USFWS workloads.

FHWA and USFWS Range Wide Programmatic Consultation for the NLEB

The USFWS and FHWA have standardized their approach to assessing impacts to NLEBs from highway construction and expansion projects; then avoiding, minimizing and mitigating those impacts. As a result a range-wide consultation and conservation strategy for NLEBs was completed. The programmatic biological opinion that resulted will help expedite the consultation process related to transportation projects and provide a consistent approach to conservation for NLEBs. The strategy includes: proactive conservation measures that are most suited and needed for the conservation of the species; priority areas for mitigation measures; standardized effects analysis with avoidance and minimization measures associated with project types; an informal consultation covering all states; and a limited formal programmatic consultation. Compliance under Section 7 of the ESA for the NLEB can also be facilitated through this process if the species becomes reclassified as endangered and the 4(d) rule streamlined process is no longer valid. For further details on how to use the FHWA/USFWS process to comply with Section 7 of the ESA for the NLEB refer to the following web page.

https://www.fws.gov/midwest/endangered/section7/fhwa/index.html

Effect Determination

No Effect determinations are appropriate when the proposed action requires tree removals, building demolitions, or work on structures (bridges, cattle passes, culverts) that are not located within 1.5 miles forested or wooded areas (1.5 miles is the estimated foraging distance of the NLEB). Note - Although there may be forested/wooded habitat within 1.5 miles of a structure, there must be some habitat connectivity (i.e. tree rows, wooded draws, riparian areas, etc.) that leads up to near the structure. Research has shown that the NLEB does not cross large open areas void of wooded habitat. Henderson and Broders (2008) found that NLEBs did not travel more than 78 meters from intact forest structure.

Therefore it is reasonable to assume that if no forested/wooded habitat or other treed habitat (shelterbelts) leading up to forested/wooded areas are located within 1,000 feet (304.8 meters) of a NDDOT project; projects under the proposed action that require structure work or isolated tree removals are anticipated to have ***no effect*** to the NLEB due to lack of suitable roosting and foraging habitat. If unsure potential habitat for this species is located near a project, contact NDDOT ETS Division for assistance.

Projects that occur within 1,000 of suitable habitat and require tree removals or work on structures must use the conservation measures identified in previous sections or must use the 4(d) rule streamlined consultation form. May affect and likely to adversely affect determinations for this species must be covered under the programmatic 4(d) biological opinion. Examples of projects that would have may affect and likely to adversely affect determinations include but are not limited to:

- Tree removals (suitable habitat) during the active season (April . Urban tree plantings, isolated tree rows / shelterbelts, or small isolated clusters of natural trees generally would not be considered suitable habitat unless they are located in close proximity to wooded areas (riparian forest, wooded draws, etc.)

- Bridge alteration/removal during the active season

6.12 Piping Plover Critical Habitat

NDDOT projects occurring adjacent to or within Designated Critical Habitat for the piping plover has the potential directly or indirectly affect critical habitat for this species. See Piping Plover Stressor and Response section for direct and indirect effects to the species as a result of the proposed action. The following section details potential direct and indirect effects to the Piping Plover Designated Critical Habitat as a result of NDDOT projects.

Remove/Modify Critical Habitat

NDDOT projects that either directly or indirectly affect the primary constituent elements identified for the NGP population of piping plovers can reduce or modify habitat components essential for the biological needs of the life history of piping plovers in the breeding range including: courtship, nesting, brood rearing, foraging, roosting, intraspecific communication, and migration. The primary constituent elements provide the essential combination of prey, forage, nesting, brooding, and chick-rearing areas. The potential stressors from NDDOT projects that may affect these elements include; direct habitat modification removal (i.e. dredging, new or temporary bridge construction), erosion/sedimentation, spills, introduction or spread of noxious/invasive species, water quality modification, and exposure to contaminants.

On prairie alkali lakes and wetlands, the physical primary constituent elements that sustain the northern great plains population of piping plovers include: shallow, seasonal to permanently flooded, saline wetlands with sandy to gravelly, sparsely vegetated beaches; salt encrusted mud flats, and/or gravelly salt flats; springs and fens along edges of alkali lakes and wetlands; and adjacent uplands 200 ft. above the high-water mark of the alkali lake or wetland (67 FR 2002).

On rivers the primary constituent elements include sparsely vegetated shoreline beaches, peninsulas, islands composed of sand, gravel, or shale, as well as their interface with the water bodies. On inland lakes (such as Lake Sakakawea in North Dakota) the physical primary constituent elements include: lightly vegetated and windswept sandy to gravely islands, beaches, and peninsulas, and their proximity to the water body (67 FR 2002).

NDDOT project activities that require in-water work or ground disturbing activities within or adjacent to Designated Critical Habitat for the piping plover have the potential to affect primary constituent elements of critical habitat. New bridge construction and bridge demolition can result in the direct removal or modification of piping plover designated critical habitat, increase or introduce erosion/sedimentation, introduce or spread invasive/noxious species, modify water quality, and cause inadvertent releases of contaminants. Depending on the presence of beaches, islands/sandbars, and sandy shorelines, the activities involved with new bridge construction or bridge removal can temporarily or permanently modify designated critical habitat. Water levels at the time of construction activities plays a large role on whether or not primary constituent elements are present. During high water years, primary constituent elements associated with piping plover designated critical habitat may be sparse.

Conversely, in low water years, primary constituent elements may be in great abundance. Water levels on the Missouri River/Lake Sakakawea can fluctuate greatly from year to year.

Activities that result in the changes in the hydrology of piping plover critical habitat, including new bridge construction, may have adverse effects to the primary constituents of critical habitat. The placement of piles/piers within critical habitat for the piping plover have the potential to have impacts to processes that create and maintain the constituent elements such as changes in water speed as well as turbidity. Changes to streamflow patterns has the potential to impact water velocities and flow patterns which could affect the primary constituent elements of designated critical habitat through changes in velocity of the movement of water. Typically piers are designed to be parallel to the direction of the flow of water which minimizes the effects on water velocity. In addition, more recent bridge pier design reduces the length and width of piers compared to the design of older bridges which minimizes the footprint within water. Given that the Missouri River has a relatively wide river channel, design of piers to reduce footprint within the water; negligible impacts to water velocities, flow patterns, or channel morphology are anticipated due to new bridge construction.

NDDOT activities that have the potential to directly modify any of the primary constituent elements of designated critical habitat (i.e. direct removal of sandbars) are not covered in this PBA and separate consultation would be needed. Temporary impacts to terrestrial habitats as part of NDDOT project activities are reclaimed to match pre-existing conditions; however, if the impacts to terrestrial habitats occur within the boundaries of critical habitat and primary constituent elements would be directly impacted, separate consultation would be required.

Some areas not essential to the conservation of piping plovers were included within critical habitat boundaries, but they are not critical habitat (67 FR 2002). In defining critical habitat boundaries, the USFWS was unable to exclude developed areas such as main stem dam structures, buildings, marinas, boat ramps, bank stabilization and breakwater structures, row cropped or plowed agricultural areas, mines, roads and other lands (e.g., high bank bluffs along Missouri River reservoirs) unlikely to contain primary constituent elements essential for northern Great Plains piping plover conservation (67 FR 2002). These features will not themselves contain one or more of the primary constituent elements (67 FR 2002).

Federal actions limited to those features, therefore, would not trigger a section 7 consultation, unless they affect species and/or primary constituent elements in adjacent critical habitat (67 FR 2002).

Erosion and sedimentation and inadvertent release of contaminants that occurs as a result of transportation construction activities has the potential to directly affect designated critical habitat depending on the scope of the project and proximity to the primary constituent elements associated with piping plover designated critical habitat. In addition, earthwork near boundaries of critical habitat has the potential for invasive/noxious weeds or other undesirable vegetation to become established and spread to critical habitat areas. Reduced habitat quality could result from sedimentation and erosion and spread of undesirable species; however, with the implementation of erosion control measures before, during and after a NDDOT project as well as standard NDDOT seeding practices and noxious weed control, adverse effects are not anticipated. Also, fueling sites are typically located away from water features. Any inadvertent release of potential contaminants must be remediated according to state and federal laws. The implementation of a SWPPP and/or SPCC plan would reduce these potential effects to an insignificant or discountable level.

Conservation Measures to Designated Critical Habitat for the Piping Plover

General conservation measures to be applied to all projects to lessen the potential for effects to all listed species are described in Section 7 of this document. Conservation measures specific to the piping plover can be found in the piping plover stressor and response section of this document.

- Clearly mark limits of construction within or adjacent to boundaries of Designated Critical Habitat. *Note- this measure is intended to reduce potential effects of the proposed action on the primary constituent elements of critical habitat. Ensuring that construction activities are limited to what is included in design plans will reduce the potential for direct or indirect effects such as dust/erosion/sedimentation and introduction of invasive/noxious species.*

- Fueling or Staging areas are not to be placed directly adjacent to or within the boundaries of critical habitat.

Effect Determination

NDDOT projects that occur adjacent to or within designated critical habitat for the piping plover have the potential to directly and indirectly affect the primary constituent elements of the habitat including the removal or modification of potential nesting and foraging habitat and prey selection/abundance. With the implementation of standard conservation measures, marking of critical habitat boundaries during construction, avoidance of placement of fueling/staging areas within boundaries of critical habitat, and implementation of SWPPP and/or SPCC plans, the proposed action ***may affect, but is not likely to adversely affect*** designated critical habitat for the piping plover. If direct effects to primary constituent elements occur (i.e. removal of sandbar/shoreline) as a result of the proposed action, separate consultation would be required.

6.13 Dakota Skipper and Poweshiek Skipperling Critical Habitat Stressor and Response

NDDOT projects that either directly or indirectly affect the three primary constituent elements of critical habitat identified for the Dakota skipper and Poweshiek skipperling can reduce or modify habitat components essential for the biological needs of the life history of the species. The primary constituent elements include wet-mesic tallgrass or mixed-grass remnant untilled prairie that occurs near-shore glacial lake soil deposits or high quality dry-mesic untilled native prairie on rolling terrain; native grasses and native flowering forbs for larval and adult food and shelter; and dispersal grassland habitat that is within 1 km (0.6 mi) of high quality native remnant prairie that connects high-quality wet-mesic to dry tallgrass prairie or moist meadow habitats. The potential stressors from NDDOT projects that may affect these elements include removal and modification of habitat including; direct habitat modification removal (i.e. clearing and grading), erosion/sedimentation, spills, introduction or spread of noxious/invasive species, and exposure to contaminants.

Eleven units of critical habitat have been designated for the Dakota skipper. Four of the units are directly adjacent to or bisect NDDOT ROW on highways; six of the units are directly adjacent to or bisect county roads, and one unit is within U.S. Forest Service property. Two units of critical habitat have been designated for the Poweshiek skipperling. Both units are in Richland County. One of the units located adjacent to a county road. Neither unit contain NDDOT ROW.

Remove/Modify Critical Habitat

NDDOT projects that occur adjacent to or within designated critical habitat have the potential to directly or indirectly affect the primary constituent elements needed by the species for breeding, feeding, and sheltering. For units of designated critical habitat that are determined to be occupied by the Dakota skipper, direct and indirect effects to the species is discussed in the Dakota skipper section of this document. The Poweshiek skipperling is presumed to be extirpated in ND.

Ground disturbing activities such as clearing and grading and general earthwork has the potential to directly and indirectly affect designated critical habitat for the Dakota skipper. New road construction (i.e. new alignment) proposed through Dakota skipper critical habitat is not covered under this PBA due to the high likelihood of adverse effects. Roadway projects that occur adjacent to or within previously disturbed areas that are included within critical habitat boundaries also have the potential to directly or indirectly affect the associated primary constituent elements.

Earthwork, including clearing/grubbing, and grading, removes and destroys existing vegetation. Although high quality untilled native prairie does not exist directly adjacent to existing roadways (due to soil disturbance to build and establish roadway), roadside ditches may serve as dispersal habitat within the occupied Critical Habitat units. In addition, there may be areas of undisturbed native prairie within the existing ROW for certain highways in North Dakota. Dispersal habitat is considered a primary constituent element. Depending on grass and forb composition, roadside vegetation may include grasses and forbs preferred by the species. Depending on the scope of the project and whether or not ground disturbing activities are required; adverse effects to primary constituent elements may occur (i.e. removal/modification of dispersal corridors).

Earthwork leaves soil in a bare condition, therefore if appropriate measures are not taken to establish vegetation on disturbed areas, there is a potential for undesirable plants to establish within the project limits and disperse into native prairie locations outside of the ROW (including the critical habitat unit portion) after this project is constructed. This could in-turn cause a reduction in the quality of habitat for the Dakota skipper or Poweshiek skipperling (reduced nectaring forbs, cool season grasses over-competing with native grasses). The establishment of undesirable vegetation may also reduce the quality of dispersal habitat within highway ROWs. North Dakota Century Code requires the NDDOT to provide for eradication or control of noxious weeds on NDDOT land. NDDOT maintenance staff coordinates noxious weed control with outside agencies, typically the Commissioner of Agriculture. Controlling noxious weeds is also typically coordinated with appropriate county and local officials. Applicators of pesticides and/or their direct supervisors (depending on pesticide label requirements) need to be certified by the Pesticide Control Board and must follow all applicable laws for use of pesticides. The application of pesticides are typically not conducted for roadway projects. Such application are conducted by district staff or hired pesticide applicators during routine maintenance operations. Spot spraying is typically used in these situations, rather than broadcast applications.

In addition, as part of erosion control measures for SWPPP plans as well as NDDOT seeding requirements; disturbed areas that are seeded must be free of all prohibited noxious weed seed and should not contain more than 1/2 of 1% by weight of restricted noxious weed seeds as classified by the ND State Seed Department. If seeding is required before April 20 or between July 16 and August 9, a temporary cover crop (oats) is applied to disturbed areas. If this is the case, these areas are re-seeded with NDDOT approved permanent seed mixtures between April 20 and July 15, or after August 10 (must be seeded before the ground freezes). Given this information, the chance for noxious weeds or other undesirable species to establish in areas disturbed by construction and encroach outside the ROW onto designated critical habitat is highly unlikely.

Exposure to contaminants is also a potential stressor to critical habitat for the Dakota skipper and Poweshiek skipperling. Inadvertent releases of contaminants within critical habitat may directly affect the physiology of plants that may be used as nectaring or egg-laying sources. This could include killing plants or affecting the plants physiology (reduced growth/photosynthesis). However, adverse effects to critical habitat as a result are not anticipated. If a project occurs adjacent to or within designated critical habitat for the Dakota skipper, fueling areas would not be allowed to be stored within the boundaries of the critical habitat. Small releases from vehicles or construction equipment may occur; however these types of release are not anticipated to cause adverse effects to the primary constituent elements of the critical habitat. In addition, any spills or releases from contractors must be cleaned/contained in accordance with state and federal laws.

NDDOT ROW Containing Designated Critical Habitat for the Dakota Skipper

Eleven units have been designated in North Dakota including the following counties: McHenry (5 units), McKenzie (2 units), Ransom (2 units), Richland (1 unit), and Rolette (1 unit). Of the eleven units within the state, four of them include portions of North Dakota Department of Transportation (NDDOT) Right-of-Way (ROW).

In addition, all four units are determined to be occupied by the species, which means that the Dakota skipper has been recently detected, and is still presumed to be present at the critical habitat units. The following section breaks down each unit containing NDDOT in regards to location, site status, and other pertinent information such as information collected during field visits that were conducted in 2015 by NDDOT ETS staff.

Unit 5 – McHenry County – Highway 14

Critical Habitat Unit 5 is 1,053 acres in McHenry County and is primarily owned by the North Dakota State Land Department (557 acres). Approximately 439 acres is owned by private individuals. The remaining land is owned by the U.S. Fish and Wildlife Service (58 acres). This unit is made up of several parts located within T154N, R76W, Sections 4, 5, 8, 9, 14, 15, 16, 17, 21, 28, 29, 32, and 33; and T155, R76W, Section 32. This unit occurs approximately 7.8 miles northeast of Karlsruhe, North Dakota, on both sides of North Dakota State Highway 14 and 1 mile north of 48th Street. See Appendix F for a map of this unit. This unit is considered to be occupied. Dakota skippers were last observed in 2012 at five sites located within this unit. This unit contains the physical or biological features essential to the conservation of the Dakota skipper. The unit consists of larval and adult habitat; primarily high quality native remnant prairies containing a high diversity of native prairie grasses and flowering forbs. The prairie habitats in this unit are described as fair to excellent quality. This unit also has patches of lesser quality or unrated native prairie or dispersal grassland habitat that is within 1 km (0.6 mi) of native high quality prairie that connects patches of higher quality native prairies.

The ROW within Unit 5 contains numerous artificial wetlands and wetland vegetation is prevalent in many areas. High quality prairie is not present in the ROW, although there is scattered native grasses and forbs spread throughout. Dominant vegetation within the ROW of this unit includes: Smooth brome (*Bromis inermis*), Kentucky bluegrass (*Poa pratenis*), quack grass (*Elymus repens*), little bluestem, various wetland species such as foxtail barley (*Hordeum jubatum*), prairie cordgrass (*Spartina pectinata*), cattails (*Typha spp.*) as well as various sedges and rushes. Noxious weeds including leafy spurge (*Euphorbia esula*) and absinthe wormwood (*Artemesia absinthium*) are located throughout the ROW. Several forbs indicative of Dakota skipper habitat were observed within the ROW of this unit including; purple coneflower, wood lily, harebell, and black-eyed susan (*Rudbeckia hirta*). Woody vegetation is beginning to encroach into the ROW, as willows (*Salix spp.*) and western snowberry (*Symphiocarpos occidentalis*) are present.

Figure 13. Unit 5 vegetation within boundaries of ROW. Native and non-native grasses and forbs are scattered in this area of the critical habitat unit*.*

Figure 14. Unit 5 vegetation within boundaries of ROW. Dominated by wetland vegetation with scattered native and non-native grasses and forbs.

Since Dakota skipper Critical Habitat Unit 5 is determined to be occupied, there is a potential for Dakota skippers to use the ROW as dispersal habitat to move between patches of native prairie. Although the vegetation in the ROW is not high quality prairie, several plant species were observed that provide nectar sources for adults. Therefore, there is the potential for Dakota skippers to use NDDOT ROW during the adult flight period in this unit to disperse between patches of native prairie. However, the plants observed that are preferred by the Dakota skipper were observed on the far edge of the ROW. Minor ground disturbing projects such as sliver grading would not be anticipated to cause adverse effects to the Dakota skipper or the primary constituent elements of Designated Critical Habitat provided that any ground disturbing activities or mowing of the right-of-way is avoided until after the Dakota skipper flight period (July 15).

Unit 6 – McHenry County – Highway 14

Critical Habitat Unit 6 is 80 acres in McHenry County owned by the North Dakota State Land Department. Located in T157N, R76W, Sections 17 and 18, this unit occurs on both sides of North Dakota State Highway 14, approximately 5.5 miles west of Willow Road (9th Ave. NE), 0.3 mile north of 69th St. NE, 0.5 mile south of 70th Street, and immediately east of 3rd Ave NE. See Appendix F for a map of this unit. This unit is considered to be occupied – the Dakota skipper has been recorded in 1996, 1997, 1998, and 2012. This unit contains the physical or biological features essential to the conservation of the Dakota skipper. The unit consists of larval and adult habitat; primarily a good quality native remnant prairie containing a high diversity of native prairie grasses and flowering forbs. The prairie habitats in this unit are described varying habitat of fair to good quality.

The ROW within Unit 6 would function as quality dispersal habitat as it contains a mix of native and non-native grasses including little bluestem, prairie junegrass (*Koeleria macrantha*), needle and thread grass (*Hesperostipa comata*), Indiangrass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), smooth brome, and Kentucky bluegrass. Multiple native forbs are also present, which provide nectaring sources for adult Dakota skippers. These forbs include purple coneflower, harebell, upright prairie coneflower, black-eyed susan, and wood lily.

Figure 15. Unit 6 ROW vegetation. ROW within this unit functions as quality dispersal habitat for the Dakota skipper.

Figure 16. Unit 6 ROW vegetation. ROW within this unit functions as quality dispersal habitat for the Dakota skipper.

Since Dakota skipper Critical Habitat Unit 6 is determined to be occupied and quality dispersal habitat is located within the ROW of this unit, there is a potential for Dakota skippers to use the ROW as dispersal habitat to move between patches of native prairie. There is also the potential for Dakota skippers to lay eggs within the ROW of this unit due to the presence of little bluestem throughout the ROW (primarily found on the outer edge).

NDDOT projects that require ground disturbing activities (i.e. major rehabilitation, sliver widening, etc.) in the ROW that falls within the boundary of this unit would require separate consultation as adverse effects have the potential to occur (i.e. direct injury or mortality to Dakota skipper eggs, larvae, or adults as well as modification/removal of dispersal habitat). Projects that remain on the surface of the roadway throughout the boundary of this critical habitat would fall within the scope of this PBA, provided that staging and fueling areas are not stored within the boundaries of designated critical habitat. Mowing of the right-of-way within the boundaries of this unit shall not be conducted prior to the end of the flight period for the Dakota skipper (June 15 – July 15) to avoid any direct effects to the critical habitat.

Unit 7 – McHenry County – Highway 2

Critical Habitat Unit 7 is 280 acres in McHenry County owned by private individuals. Located in T156N, R77W, Sections 30 and 31 and T156N, R78W, Section 25, this unit occurs on both sides of U.S. Highway 2, approximately 1.3 miles west of Center Avenue N., immediately south of 62nd Street, and immediately east of 2nd Avenue N. See Appendix F for a map of this unit. This unit is considered to be occupied – the Dakota skipper was observed in 1997, 1998, and 2012. This unit contains the physical or biological features essential to the conservation of the Dakota skipper. The unit consists of larval and adult habitat; primarily native remnant prairie containing a high diversity of native prairie grasses and flowering forbs. The prairie habitats in this unit are described as fair to good quality prairie. This unit may also contain small patches of lesser quality native prairie or dispersal grassland habitat that is within 1 km (0.6 mi) of native high quality prairie that connects patches of higher quality native prairies.

The ROW within this unit is dominated by wetland vegetation (>90%) with very low abundance of native grasses and forbs. Dominant wetland vegetation consists of bulrush (*Schoenoplectus sp.*), cattail, and sedges (*Cyperacea spp.*). Non-wetland vegetation consists of smooth brome, Kentucky bluegrass, and quackgrass. The ROW within this unit would not be anticipated to function as dispersal habitat due to the lack of native grasses and forbs preferred by the species.

Figure 17. Unit 7 ROW vegetation. Dominated by wetland species and contains low quality dispersal habitat for the Dakota skipper.

Figure 18. Unit 7 ROW vegetation. Dominated by wetland species and contains low quality dispersal habitat for the Dakota skipper.

Right of Way within Unit 7 is dominated by wetland vegetation and native plants and forbs are in low abundance. Unit 7 is determined to be occupied and high quality prairie is adjacent to the ROW in this unit; however, the ROW functioning as dispersal habitat during the adult flight period to move between patches of native prairie is highly unlikely. Therefore, ground disturbing projects such as sliver grading would not be anticipated to cause adverse effects to the Dakota skipper or the primary constituent elements of Designated Critical Habitat within this unit.

Unit 9 – Rolette County – Highway 281

Critical Habitat Unit 9 is 288 acres in Rolette County primarily owned by private individuals (214 acres).The remaining 74 acres is owned by the North Dakota Land Department. Located in T161N, R72W, Sections 3 and 4; and T162N, R72, Sections 33, and 34, this unit occurs on both sides of State Highway 5 (U.S. Hwy 281) approximately 3 miles east of State Highway 3, and immediately west of 34th Avenue. The Dakota skipper was last recorded in 1996, and no further surveys were done until 2012, when it was not detected. The species was detected in the most recent survey (2014), so the USFWS considers this unit to be occupied. This unit contains the physical or biological features essential to the conservation of the Dakota skipper. The unit consists of larval and adult habitat; primarily a high quality native remnant prairie containing a high diversity of native prairie grasses and flowering forbs. The dry prairie habitats in this unit are described as fair quality prairie with a prognosis of fair to good.

The ROW within this unit is dominated by non-native grasses, including; Kentucky bluegrass, smooth brome, and quack grass. Noxious weeds, leafy spurge and Canada thistle were also observed throughout the ROW of this unit. However, all three forbs indicative of “Type A” Dakota skipper habitat were observed within the ROW (wood lily, harebell, and smooth camas).

Figure 19. Unit 9 ROW vegetation. ROW within this unit may function as dispersal habitat for the Dakota skipper.

Figure 20. Unit 9 ROW vegetation. ROW within this unit may function as dispersal habitat for the Dakota skipper.

Dakota skipper Critical Habitat Unit 9 is determined to be occupied. Although forbs indicative of Type A habitat were observed within the road ditch (limited to the extreme western portion), they were not in great abundance and cool season invasive grasses were dominant throughout the ROW of this critical habitat unit. Dispersal within the ROW of this critical habitat unit is highly unlikely due to the dominance of cool season invasive grasses as well as abundance of forbs such as yellow sweet clover. However, due to high quality prairie adjacent to the ROW, and some preferred forbs present, there is a potential for Dakota skippers to be present within the ROW during the adult flight period. The presence of eggs or larvae within the ROW is highly unlikely due to absence of native bunchgrasses such as little bluestem. Therefore, minor ground disturbing projects such as sliver grading would not be anticipated to cause adverse effects to Dakota skipper Designated Critical Habitat provided that any ground disturbing activities or mowing of the right-of-way is conducted after the Dakota skipper flight period (June 15-July 15).

Conservation Measures Specific to Dakota Skipper and Poweshiek Skipperling Habitat

General conservation measures to be applied to all projects to lessen the potential for effects to all listed species are described in Section 7 of this document.

- Clearly mark limits of construction within or adjacent to boundaries of Designated Critical Habitat. *Note- this measure is intended to reduce potential effects of the proposed action on the primary constituent elements of critical habitat. Ensuring that construction activities are limited to what is included in design plans will reduce the potential for direct or indirect effects such as dust/erosion/sedimentation.*

- Fueling or Staging areas are not to be placed directly adjacent to or within the boundaries of critical habitat.

- For projects with ground disturbing activities through Designated Critical Habitat that functions as dispersal habitat:

  To avoid effects to Dakota skipper critical habitat, any ground disturbing activities prior to June 15 – July 15 shall be avoided. Mowing of the right-of-way shall also be avoided during this time frame.

Effect Determination

NDDOT projects that occur adjacent to or within Dakota skipper critical habitat have the potential to directly and indirectly modify the primary constituent elements of the critical habitat through the removal/modification of habitat; including crushing and removing vegetation, altering dispersal habitat within NDDOT ROW, creating large amounts of fugitive dust, and establishment or spread of invasive/noxious plants. With the implementation of SWPPP plans, NDDOT standard seeding practices, dust abatement, and noxious weed control, potential direct and indirect effects to Dakota skipper or Poweshiek skipperling designated critical habitat are anticipated to be insignificant or discountable. Therefore, the proposed action ***may affect, but is not likely to adversely affect*** Designated Critical Habitat for the Dakota skipper and Poweshiek skipperling.

7.0 General Conservation Measures

The following is a list of general conservation measures that are to be used on all projects to lessen the potential effects to any threatened or endangered species. Please note that a majority of these measures are part of NDDOT standard practices and will not be listed as a separate conservation measure (environmental note) in order to reduce redundancy and confusion to the contractor(s).

- Disturb the smallest footprint possible

- Reclaim disturbed areas upon project completion.

- Utilize downcast and/or shielded lighting.

- Implement a Storm Water Pollution Prevention Plan (SWPPP). Employ and maintain erosion control measures (i.e. fiber rolls, straw wattles, erosion mats, silt fence, and/or turbidity barriers, etc.) throughout the duration of a project and until vegetation is established.

- If required, implement a Spill Prevention Control and Countermeasure Plan (SPCC)

- Employ dust control measures

- Spot-spray herbicides rather than broadcast application on invasive/noxious weeds
    - *Note- herbicide use is typically not conducted as part of roadway construction projects, but rather as part of routine maintenance operations.*

- In accordance with state and federal laws, properly contain and dispose of any contaminated materials discovered during construction activities.

- Employ mufflers on all combustion engines

- Properly contain and dispose of garbage/trash generated as a result of construction activities

- The contractor will notify the Project engineer immediately in the event any threatened or endangered species is identified within one mile of the proposed action. The Project engineer will cease all construction activities, establish at least a 0.5 mile avoidance area, and immediately coordinate with the USFWS, FHWA, and NDDOT Environmental and Transportation Services. The contractor will not resume work within the avoidance area until the Project engineer has confirmed with the agencies that work may proceed (either species have left the area or approved minimization measures have been implemented).

  Note- For all projects that use the programmatic biological assessment for Section 7 compliance, a threatened and endangered species poster will be placed on all job sites. In certain situations where observations of threatened or endangered species is highly probable (i.e. projects adjacent to or within the Missouri River), qualified biologists may need to be on-site.

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APPENDIX A
Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING
BETWEEN THE
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION AND
FEDERAL HIGHWAY ADMINISTRATION, NORTH DAKOTA DIVISION
REGARDING SECTION 7 ENDANGERED SPECIES ACT CONSULTATION

I. BACKGROUND AND PURPOSE

The parties to this agreement are the Federal Highway Administration, North Dakota Division (hereinafter referred to "FHWA") and the North Dakota Department of Transportation (hereinafter referred to "NDDOT"). The parties seek to create a process to address compliance under the Endangered Species Act (hereinafter referred to "ESA") for listed species and critical habitat in North Dakota. North Dakota's increasing transportation needs, addition of threatened and endangered species within the state, and internal initiatives are prompting NDDOT and FHWA to seek a streamlined process to comply with the ESA.

The NDDOT and the FHWA realize that project specific ESA clearance process takes a significant amount of time and resources, which may be better invested for more complex projects. The ESA of 1973 (16 U.S.C. 1536), as amended, provides a means to conserve threatened and endangered species and the ecosystems upon which they depend. Pursuant to Section 7(a)(2) of the ESA; each Federal agency must, in consultation with the United States Fish and Wildlife Service (hereinafter referred to "USFWS"), ensure that any action it funds, authorizes, or carries out will not jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Section 2(c) of the ESA declared the policy of Congress that all Federal departments and agencies shall seek to conserve threatened and endangered species and shall utilize their authorities to further the purposes of the ESA.

The FHWA and NDDOT seek to improve efficiency by combining their efforts, to foster better working relationships and promote the conservation of species listed as threatened or endangered under the ESA. In addition, the FHWA and NDDOT agree to use their authorities to help prevent species endangerment by conserving species that are trending towards Federal listing as threatened or endangered under the ESA (i.e. candidate and proposed species).

Designation of Non-Federal Representative (50 – Code of Federal Regulations – Section 402.08), allows Federal agencies to delegate informal ESA consultation and preparation of biological assessments in the Federal-aid highway program to State DOTs. To this end, the FHWA and the NDDOT have entered into a Memorandum of Understanding (hereinafter referred to "MOU"). The purpose of this MOU is to establish a general framework for cooperation and participation of the FHWA and NDDOT in the exercise of their responsibilities under the ESA.

II. NDDOT RESPONSIBILITIES

The NDDOT agrees to:

A. Work with FHWA to comply with the ESA for all FWHA involved projects.

B. Utilize the opportunities provided by the ESA to develop a programmatic biological assessment (PBA) to proactively address Section 7 consultations for NDDOT/FHWA projects throughout North Dakota.

C. Re-initiate informal Section 7 ESA consultation with USFWS if necessary.

III. FHWA RESPONSIBILITIES

The FHWA agrees to:

A. Comply with the ESA for all FHWA involved projects when acting as the lead Federal agency.

B. Maintain ultimate responsibility for compliance with Section 7 of the ESA.

C. Re-initiate formal or informal Section 7 ESA consultation with USFWS if necessary.

IV. NDDOT TASKS AND PRODUCTS

The NDDOT has:

A. Developed a species and critical habitat list with assistance from the USFWS Ecological Services office in North Dakota for all listed species and critical habitat that occur within the state.

B. Prepared a PBA in order to streamline the Section 7 ESA consultation process for FHWA involved projects across the state of North Dakota.

C. Evaluated, using best available data and expertise, potential direct and indirect effects as a result of transportation projects to all listed resources under the ESA that occur within North Dakota on a comprehensive level rather than on an individual or site basis.

D. Developed measures to avoid or minimize potential effects from FHWA involved transportation project on listed resources.

V. NDDOT AGREEMENTS

The NDDOT agrees to:

A. Determine if proposed projects with FHWA involvement could adversely affect listed resources under the ESA. Those projects that do not have adverse effects on listed resources would be covered under the PBA or stand-alone biological assessments.

B. Submit to FHWA for review of those actions that could have an adverse effect on listed resources.

C. Maintain a spreadsheet of all informal consultations covered under the PBA or stand-alone biological assessments.

D. Implement conservation measures to reduce potential impacts to listed resources covered under the PBA.

E. On a yearly basis, the NDDOT will schedule an annual meeting to discuss/review projects conducted under this PBA during the previous year.

VI. FHWA AGREEMENTS

The FHWA agrees to:

A. Delegate informal Section 7 consultation responsibilities to the NDDOT in order to comply with the ESA for projects with FHWA involvement. Informal consultation would be conducted either as part of the PBA or separate stand-alone biological assessments.

B. Initiate formal Section 7 consultation with the USFWS for projects that have the potential to adversely affect listed species or critical habitat.

C. Participate in the development and review of the PBA prepared by the NDDOT.

VII. MUTUAL AGREEMENTS

A. Resources otherwise devoted to individual project Section 7 consultation and documentation process would be better spent by streamlining the informal consultation process through a programmatic effort which will allow more time for FHWA and NDDOT staff to focus efforts on projects with greater concerns to listed resources under the ESA.

B. Section 7 compliance would be carried out through USFWS programmatic concurrence under the PBA or through separate project-specific USFWS consultations.

C. Consultation would be re-initiated under the PBA for any changes to the content of the document; including changes in listed species/critical habitat, scope of work activity descriptions, additions of work activities covered under the PBA, and any other edits to the document.

D. Both parties support the concepts identified in this MOU and will actively implement it in accordance under applicable laws, regulations, and policies.

VIII. TERM, RENEWAL, AND TERMINATION

A. This MOU shall have a term of five (5) years, effective on the date of the last signature. The NDDOT shall post and maintain an executed copy of this MOU on its website, available to the public.

B. This MOU is renewable for additional five (5) year terms if NDDOT requests renewal and FHWA determines that NDDOT has satisfactorily carried out the provisions of this MOU. In considering any renewal of this MOU, FHWA will evaluate the effectiveness of this agreement and its overall impact on the environmental review process.

C. Either party may terminate this MOU at any time only by giving at least thirty (30) days written notice to the other party.

D. Expiration or termination of this MOU shall mean that the NDDOT is not able to initiate informal consultation on FHWA's behalf.

Execution of this MOU and implementation of its terms by both parties provides evidence that both parties have reviewed this MOU and agree to the terms and conditions for its implementation. This MOU is effective upon the date of the last signature below.

Wendall L. Meyer
Division Administrator, North Dakota Division
Federal Highway Administration

2/9/17
Date

Grant Levi, P.E.
Director
North Dakota Department of Transportation

1/4/17
Date

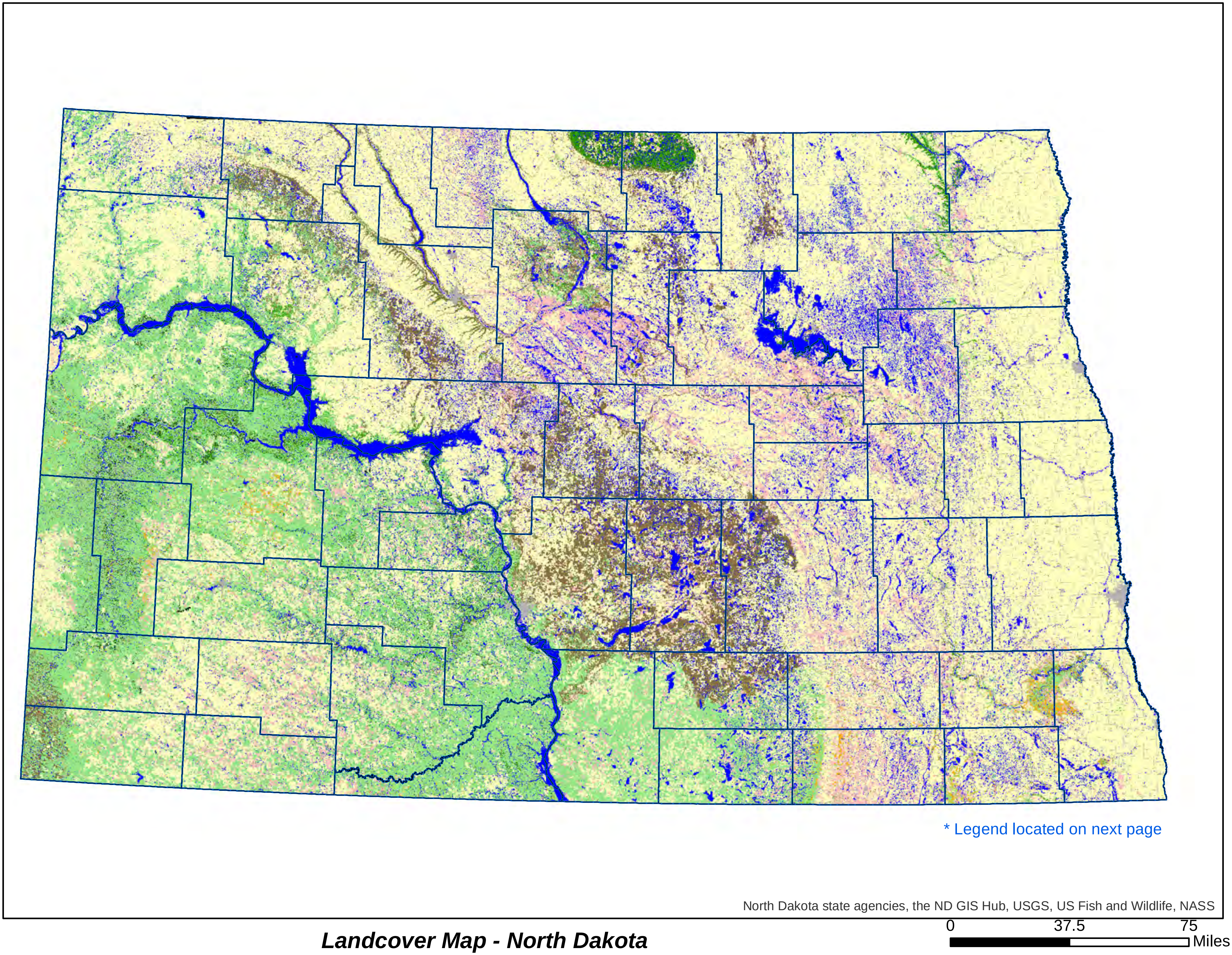
Approved as to Substance:

Mark Gaydos, P.E.
ETS Division Director
North Dakota Department of Transportation

12/8/16
Date

APPROVED as to FORM
20 day of December 16
ATTORNEY GENERAL
SPECIAL ASST ATTORNEY GENERAL

APPENDIX B
Land Cover Map



* Legend located on next page

Landcover Map - North Dakota

LEGEND

NDHUB.LANDCLASS_GAP_2010
Class_Name

- No Data
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Cultivated Cropland
- Pasture/Hay
- Open Water (Fresh)
- Cliff, canyon and talus
- Bluff and badland
- North-Central Interior Dry-Mesic Oak Forest and Woodland
- North-Central Interior Dry Oak Forest and Woodland
- North-Central Interior Maple-Basswood Forest
- Eastern Great Plains Tallgrass Aspen Parkland
- Northwestern Great Plains Aspen Forest and Parkland
- Inter-Mountain Basins Curl-leaf Mountain Mahogany Woodland and Shrubland
- Western Great Plains Wooded Draw and Ravine
- Boreal Aspen-Birch Forest
- Western Great Plains Dry Bur Oak Forest and Woodland
- Rocky Mountain Foothill Limber Pine-Juniper Woodland
- Northwestern Great Plains - Black Hills Ponderosa Pine Woodland and Savanna
- Northern Rocky Mountain Foothill Conifer Wooded Steppe
- Inter-Mountain Basins Big Sagebrush Steppe
- Inter-Mountain Basins Montane Sagebrush Steppe
- North-Central Interior Oak Savanna
- Inter-Mountain Basins Mat Saltbush Shrubland
- Inter-Mountain Basins Big Sagebrush Shrubland
- Northwestern Great Plains Shrubland
- Central Mixedgrass Prairie
- Northwestern Great Plains Mixedgrass Prairie
- Western Great Plains Sand Prairie
- Western Great Plains Tallgrass Prairie
- North-Central Interior Sand and Gravel Tallgrass Prairie
- Northern Tallgrass Prairie
- Harvested Forest - Grass/Forb Regeneration
- Managed Tree Plantation
- Recently burned shrubland
- Introduced Upland Vegetation - Perennial Grassland and Forbland
- Disturbed, Non-specific
- Freshwater herbaceous marsh, swamp, or baygall
- Bog or fen
- Wet meadow or prairie
- Depressional wetland
- Floodplain and riparian

APPENDIX C
Deconstruction Matrix

Deconstruction Matrix: Interior Least Tern

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: ***Surveys*** ***Data Gathering*** ***Bidding*** ***Project Prep***	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short ●Post Construction Permanent: N/A	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
Utility Relocations: ***Above Ground Utilities*** ***Below Ground Utilities***	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: Temporary: Short-Long* ●Post Construction: Permanent: Utility Features to Remain on Landscape	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting ●Habitat Modification/Removal	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted (Reclamation May Occur)	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Interior Least Tern

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Habitat Modification/Removal	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting ●Habitat Modification/Removal	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased energy expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting ●Habitat Modification/Removal	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting ●Habitat Modification/Removal ●Exposure to Fertilizer/Herbicides	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Interior Least Tern

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Install/Remove Guardrail	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic	Adjacent to or	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	All	●Habitat Avoidance	●Construction Activities shall be Avoided within 0.5 miles of	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Lighting	●Construction/Field: - Temporary: Short-Long* ●Post Construction: Permanent: N/A	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	N/A	NLAA
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting ●Habitat Modification/Removal	●Construction/Field: Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting ●Habitat Modification/Removal	●Construction/Field: Temporary: Long ●Post Construction: Permanent: N/A	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
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Deconstruction Matrix: Interior Least Tern

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting ●Habitat Modification/Removal	●Construction/Field: Temporary: Short ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: Temporary: Short/Long ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: Temporary: Short ●Post Construction Permanent: N/A	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA

<u>Duration</u>: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Interior Least Tern

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting/Shotblasting/Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: Temporary: Short-Long ●Post Construction Permanent: N/A	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: Temporary: Short-Long ●Post Construction Permanent: N/A	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA

<u>Duration</u>: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Whooping Crane

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: ***Surveys*** ***Data Gathering*** ***Bidding*** ***Project Prep***	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA
Utility Relocations: ***Above Ground Utilities*** ***Below Ground Utilities***	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Modify (Adjust/Relocate) Overhead Utilities/Guy Wires ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: Utility Features to Remain on Landscape	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Expend Additional Energy ●Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Line Markers (Bird Diverters) will be Placed Along the Segment(s) of Overhead Utilities to be Raised, Lowered, and/or Moved within 1 mile of Whooping Crane Stopover Habitat to Reduce the Risk of Flight Collisions.	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Stopover Habitat ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted (Reclamation May Occur)	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLTAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Whooping Crane

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Stopover Habitat ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Stopover Habitat ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Stopover Habitat ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Stopover Habitat ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLTAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Whooping Crane

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barrier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Stopover Habitat ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Lighting	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Long ●Post Construction: Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLTAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Whooping Crane

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Stopover Habitat ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Stopover Habitat ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Short/Long ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA

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Deconstruction Matrix: Whooping Crane

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting/Shotblasting/Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Rural Areas in Migration Corridor with Cropland/Wetland Matrixes	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Stopover Habitat ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides) ●Lighting	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Increased Energy Expenditure	●N/A	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLTAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Black-Footed Ferret

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures	Resulting Effects of the Action
Project Development: ***Surveys*** ***Data Gathering*** ***Bidding*** ***Project Prep***	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Removal/Modification of Suitable Habitat (i.e. Geotechnical Investigations in Active Prairie Dog Towns)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	N/A	NLAA
Utility Relocations: ***Above Ground Utilities*** ***Below Ground Utilities***	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Removal/Modification of Suitable Habitat (i.e. Utility Relocations in Active Prairie Dog Towns) ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: Utility Features to Remain on Landscape	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	N/A	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Removal/Modification of Suitable Habitat ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted (Reclamation May Occur)	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	N/A	NLAA

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Black-Footed Ferret

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Removal/Modification of Suitable Habitat ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	N/A	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Removal/Modification of Suitable Habitat ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	N/A	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Removal/Modification of Suitable Habitat ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	N/A	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Removal/Modification of Suitable Habitat ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	N/A	NLAA

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Black-Footed Ferret

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barrier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Removal/Modification of Suitable Habitat ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	N/A	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: N/A	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality (Vehicle Traffic) ●Increased Energy Expenditure	N/A	NLAA
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	All	●Habitat Avoidance ●Increased Energy Expenditure	N/A	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: Permanent: N/A	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	N/A	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Black-Footed Ferret

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Removal/Modification of Suitable Habitat ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	N/A	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short/Long ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	N/A	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	All	N/A	N/A	NE

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Black-Footed Ferret

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting, Shotblasting, Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	●N/A	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Rural Areas Containing Praire Dog Towns (80 Acres or Greater) in Western North Dakota	●Disturbance (Human/Noise/Vibrations) ●Removal/Modification of Suitable Habitat ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	All	●Habitat Avoidance ●Potential for Direct Injury/Mortality ●Increased Energy Expenditure	●N/A	NLAA

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Pallid Sturgeon

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: Surveys Data Gathering Bidding Project Prep	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	All	●Temporary Habitat Avoidance ●Potential for Direct Injury, Mortality, or Impaired Functioning	●No Work will occur within the Missouri River, Lake Sakakawea, or Direct Tributary from April 15 – June 1). (Geotechnical) ●The Contractor will notify the NDGFD at least 72 hours Prior to the Placement in or on the Waters of the State of North Dakota of any and all Vehicles, Vessels, Pumps and Equipment that will be used in the Project, to Allow the Department Sufficient Time to Inspect any and all such Equipment for ANS.	NLAA
Utility Relocations: Above Ground Utilities Below Ground Utilities	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: Utility Features to Remain on Landscape	All	●Temporary Habitat Avoidance ●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification)	●No Work will occur within the Missouri River, Lake Sakakawea, or Direct Tributary from April 15 – June 1). (Geotechnical) ●The Contractor will notify the NDGFD at least 72 hours Prior to the Placement in or on the Waters of the State of North Dakota of any and all Vehicles, Vessels, Pumps and Equipment that will be used in the Project, to Allow the Department Sufficient Time to Inspect any and all such Equipment for ANS.	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted (Reclamation May Occur)	All	●Temporary Habitat Avoidance ●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification)	N/A- Design and Implmentation of SWPPP and SPCC Plans if required, would reduce potential effects to the pallid sturgeon from site preparation activiites to an insignificant or discountable level.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Pallid Sturgeon

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	***Conservation Measures*** - *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Temporary Habitat Avoidance ●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification)	●N/A- Design and Implmentation of SWPPP and SPCC Plans if required, would reduce potential effects to the pallid sturgeon from site preparation activiites to an insignificant or discountable level.	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Temporary Habitat Avoidance ●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification)	●No Work will occur within the Missouri River, Lake Sakakawea, or Direct Tributary from April 15 – June 1). (Geotechnical) ●The Contractor will notify the NDGFD at least 72 hours Prior to the Placement in or on the Waters of the State of North Dakota of any and all Vehicles, Vessels, Pumps and Equipment that will be used in the Project, to Allow the Department Sufficient Time to Inspect any and all such Equipment for ANS.	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Temporary Habitat Avoidance ●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification)	●N/A- Design and Implmentation of SWPPP and SPCC Plans if required, would reduce potential effects to the pallid sturgeon from roadway surfacing activiites to an insignificant or discountable level.	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Temporary Habitat Avoidance ●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification)	●N/A- Design and Implmentation of SWPPP and SPCC Plans if required, would reduce potential effects to the pallid sturgeon from roadway finishing activiites to an insignificant or discountable level.	NLAA

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Deconstruction Matrix: Pallid Sturgeon

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barrier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	All	●Temporary Habitat Avoidance ●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification)	●N/A- Design and Implmentation of SWPPP and SPCC Plans if required, would reduce potential effects to the pallid sturgeon from activities associated with roadway appurtenances to an insignificant or discountable level.	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	N/A	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: N/A	All	N/A	●N/A	NE
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Habitat Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	All	●Potential for Temporary Avoidance of Habitat ●Potential for Permanent Displacement of Habitat ●Potential for Direct Injury, Mortality, or Impaired Functioning (Pile Driving, Water Quality Modification, Etc.)	●No Work will occur within the Missouri River, Lake Sakakawea, or Direct Tributary from April 15 – June 1). (Geotechnical) ●The Contractor will notify the NDGFD at least 72 hours Prior to the Placement in or on the Waters of the State of North Dakota of any and all Vehicles, Vessels, Pumps and Equipment that will be used in the Project, to Allow the Department Sufficient Time to Inspect any and all such Equipment for ANS. ●Implement Noise Monitoring during pile driving activities if conditions vary greatly from the hydroacoustic noise monitoring study conducted in 2015. Implement Noise Attenuation (Bubble Curtains, Isolation Casings, Etc) if necessary.	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Habitat Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: Permanent: N/A	All	●Potential for Temporary Avoidance of Habitat ●Potential for Permanent Displacement of Habitat ●Potential for Direct Injury, Mortality, or Impaired Functioning (Deck/Pile/Pier Removal, Water Quality Modification, Etc.)	●No Work will occur within the Missouri River, Lake Sakakawea, or Direct Tributary from April 15 – June 1). (Geotechnical) ●The Contractor will notify the NDGFD at least 72 hours Prior to the Placement in or on the Waters of the State of North Dakota of any and all Vehicles, Vessels, Pumps and Equipment that will be used in the Project, to Allow the Department Sufficient Time to Inspect any and all such Equipment for ANS.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Pallid Sturgeon

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification)	●N/A- Design and Implmentation of SWPPP and SPCC Plans if required, would reduce potential effects to the pallid sturgeon from activities associated with roadway maintenance activities to an insignificant or discountable level.	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Potential for Habitat Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short/Long ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification, Potential Habitat Modification) ●Temporary Avoidance of Habitat	●No Work will occur within the Missouri River, Lake Sakakawea, or Direct Tributary from April 15 – June 1). (Geotechnical) ●The Contractor will notify the NDGFD at least 72 hours Prior to the Placement in or on the Waters of the State of North Dakota of any and all Vehicles, Vessels, Pumps and Equipment that will be used in the Project, to Allow the Department Sufficient Time to Inspect any and all such Equipment for ANS.	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	All	●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification)	●N/A- Design and Implmentation of a SWPPP Plan (including containment and proper disposal/removal of paint) would reduce potential effects to the pallid sturgeon from bridge painting activities to an insignificant or discountable level.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Pallid Sturgeon

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting/Shotblasting/Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	All	●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification)	●No Work will occur within the Missouri River, Lake Sakakawea, or Direct Tributary from April 15 – June 1). (Geotechnical) ●The Contractor will notify the NDGFD at least 72 hours Prior to the Placement in or on the Waters of the State of North Dakota of any and all Vehicles, Vessels, Pumps and Equipment that will be used in the Project, to Allow the Department Sufficient Time to Inspect any and all such Equipment for ANS.	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Adjacent to or Within Missouri River/Lake Sakakawea	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	All	●Potential for Direct Injury, Mortality, or Impaired Functioning (Water Quality Modification)	●No Work will occur within the Missouri River, Lake Sakakawea, or Direct Tributary from April 15 – June 1). (Geotechnical) ●The Contractor will notify the NDGFD at least 72 hours Prior to the Placement in or on the Waters of the State of North Dakota of any and all Vehicles, Vessels, Pumps and Equipment that will be used in the Project, to Allow the Department Sufficient Time to Inspect any and all such Equipment for ANS.	NLAA

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Gray Wolf

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: ***Surveys*** ***Data Gathering*** ***Bidding*** ***Project Prep***	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA
Utility Relocations: ***Above Ground Utilities*** ***Below Ground Utilities***	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: Utility Features to Remain on Landscape	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Potential Disperal Habitat ●Habitat Fragmentation (New Road Construction)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted (Reclamation May Occur)	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Gray Wolf

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Potential Disperal Habitat ●Habitat Fragmentation (New Road Construction))	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Potential Disperal Habitat ●Habitat Fragmentation (New Road Construction)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Potential Disperal Habitat ●Habitat Fragmentation (New Road Construction)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Potential Disperal Habitat ●Habitat Fragmentation (New Road Construction)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Gray Wolf

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Potential Disperal Habitat ●Habitat Fragmentation (New Road Construction)	●Construction/Field: - Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: N/A	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: - Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: - Temporary: Long ●Post Construction: Permanent: N/A	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Gray Wolf

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations) ●Remove/Modify Potential Disperal Habitat	●Construction/Field: - Temporary: Short/Long ●Post Construction - Permanent: Undisturbed Areas Converted		●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A		●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
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Deconstruction Matrix: Gray Wolf

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting/Shotblasting/Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Rural Areas Statewide	●Disturbance (Human/Noise/Vibrations)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	Adult Juvenile	●Temporary Habitat Avoidance ●Potential for Direct Injury/Mortality (Heavy Machinery/Vehicle Operation) ●Increased Energy Expenditure	●N/A	NLAA

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Poweshiek Skipperling

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: Surveys Data Gathering Bidding Project Prep	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	High Qaulity Prairie in Richland County	●Light Ground/Soil/Vegetation/ Disturbance ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA
Utility Relocations: Above Ground Utilities Below Ground Utilities	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: Utility Features to Remain on Landscape	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted (Reclamation May Occur)	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Poweshiek Skipperling

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment*.	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA

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Deconstruction Matrix: Poweshiek Skipperling

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment .*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barrier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	N/A	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: N/A	All	N/A	●N/A	NE
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: Permanent: N/A	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA

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Deconstruction Matrix: Poweshiek Skipperling

Phase/Sub PhaseA193:E194A	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short/Long ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA

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Deconstruction Matrix: Poweshiek Skipperling

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Minimization Measures	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting/Shotblasting/Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	High Qaulity Prairie in Richland County	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●N/A - No Conservation Measures specific to the Poweshiek Skipperling have been Identified. However, Conservation Measures Identified for the Dakota Skipper would also afford Protection to the Poweshiek Skipperling, should Reintroductions occur in the Future as they are found in the same Counties as well as Similar Habitat.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Piping Plover

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: Surveys Data Gathering Bidding Project Prep	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short ●Post Construction Permanent: N/A	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
Utility Relocations: Above Ground Utilities Below Ground Utilities	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction: Permanent: Utility Features to Remain on Landscape	All	●Habitat Avoidance ●Flushing from Feeding/Nesting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted (Reclamation May Occur)	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
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Deconstruction Matrix: Piping Plover

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment*.	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Obtain and Apply Surfactant/Water ●Soil Stockpiling ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Fertilizer/Herbicides ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA

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Deconstruction Matrix: Piping Plover

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites	●Disturbance (Human/Noise/Vibrations) ●Lighting	●Construction/Field: - Temporary: Short-Long* ●Post Construction: Permanent: N/A	All	●Habitat Avoidance ●Increased Energy Expenditure	●N/A	NLAA
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Long ●Post Construction: Permanent: N/A	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
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Deconstruction Matrix: Piping Plover

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short/Long ●Post Construction Permanent: Undisturbed Areas Converted	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short ●Post Construction Permanent: N/A	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA

<u>Duration</u>: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Piping Plover

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting/Shotblasting/Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long ●Post Construction Permanent: N/A	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Adjacent to or Within Critical Habitat or Known Nesting Sites (Missouri River/Lake Sakakawea, Alkali Lakes or Wetlands	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long ●Post Construction Permanent: N/A	All	●Habitat Avoidance ●Flushing from Feeding/Roosting Areas ●Nest Abandonment (Temporary or Permanent) ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●Construction Activities shall be Avoided within 0.5 miles of Suitable Habitat (between Station X and Station X) for the Interior Least Tern and Piping Plover between April 15 and August 31. ●Conduct Pre-Construction Surveys for Species/Suitable Habitat. See Programmatic Biological Assessment for Further Information.	NLAA

<u>Duration</u>: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Western Prairie Fringed Orchid

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: ***Surveys*** ***Data Gathering*** ***Bidding*** ***Project Prep***	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Light Ground/Soil/Vegetation/ Disturbance ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	All	●Potential to be Crushed/Destroyed by Project Activities	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA
Utility Relocations: ***Above Ground Utilities*** ***Below Ground Utilities***	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: Utility Features to Remain on Landscape	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted (Reclamation May Occur)	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Western Prairie Fringed Orchid

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA. .	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Western Prairie Fringed Orchid

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	N/A	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: N/A	N/A	N/A	●N/A	NE
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: Permanent: N/A	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Western Prairie Fringed Orchid

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short/Long ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	All	●Potential to be Crushed/Destroyed by Project Activities ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Western Prairie Fringed Orchid

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting/Shotblasting/Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Praire in Ransom or Richland Counties - May be Found in Roadside Ditches	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	All	●Potential to be Crushed/Destroyed by Project Activities ●Outcompeted by Invasive/Noxious Weeds ●Reducced Growth/Fitness (Erosion/Sedimentation)	●A Survey for Western Fringed Prairie Orchids shall be Conducted prior to Construction for Projects occurring within Ransom and Richland Counties that require Ground Disturbing Activities. If Orchids are Discovered during Surveys, Measures shall be Taken to Avoid Direct Impacts to the Species. Note - If Avoidance is not Possible, Separate Consultation would be Required as Adverse Effects to Threatened or Endangered Species are not Covered under this PBA.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Dakota Skipper

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: ***Surveys*** ***Data Gathering*** ***Bidding*** ***Project Prep***	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Light Ground/Soil/Vegetation/ Disturbance ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA
Utility Relocations: ***Above Ground Utilities*** ***Below Ground Utilities***	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: Utility Features to Remain on Landscape	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted (Reclamation May Occur)	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA

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Deconstruction Matrix: Dakota Skipper

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NTAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Dakota Skipper

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barrier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	N/A	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: N/A	All	N/A	●N/A	NE
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: Permanent: N/A	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NTAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Dakota Skipper

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short/Long ●Post Construction - Permanent: Undisturbed Areas Converted	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NTAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Dakota Skipper

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting/Shotblasting/Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA
Drainage Improvement	Clean and Reshape Ditches ●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	High Quality Native Prairie in 19 Counties in North Dakota - See BA for Complete List	●Ground/Soil/Vegetation/ Disturbance ●Dust/Erosion/Sedimentation ●Introduction/Spread of Invasive/Noxious Species ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	All	●Arousal/Flee From Area (Habitat Displacement) ●Potential for Direct Injury/Mortality	●Conduct a Vegetation Inventory for all Areas Identified as potential Untilled Native Prairie to be Directly Impacted Outside of Existing ROW by Construction Activities to Determine the Presence of Type A or Type B Dakota skipper Habitat. Note - If Suitable Habitat is identified, a Presence/Absence Survey for the Dakota Skipper must be Conducted by Qualified Individuals. If Dakota Skippers are not Detected during Surveys, the Project may Proceed under the PBA. If Dakota Skippers are Detected during Surveys, Separate Consultation would be Required, as Adverse Effects would be likely to Occur.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NTAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Rufa Red Knot

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment .*	Resulting Effects of the Action
Project Development: Surveys Data Gathering Bidding Project Prep	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short ●Post Construction Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA
Utility Relocations: Above Ground Utilities Below Ground Utilities	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction: Permanent: Utility Features to Remain on Landscape	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted (Reclamation May Occur)	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA

<u>Duration</u>: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Rufa Red Knot

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Fertilizer/Herbicides ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Rufa Red Knot

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	See Above	●Disturbance (Human/Noise/Vibrations) ●Lighting	●Construction/Field: - Temporary: Short-Long* ●Post Construction: Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●N/A	NE
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Long ●Post Construction: Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA

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Deconstruction Matrix: Rufa Red Knot

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Habitat Modification/Removal ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short ●Post Construction Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short/Long ●Post Construction Permanent: Undisturbed Areas Converted	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short ●Post Construction Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA

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Deconstruction Matrix: Rufa Red Knot

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting/Shotblasting/Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long ●Post Construction Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Interior Least Tern and Piping Plover Habitat (Lake Sakakawea, Missouri River, Various Alkali Lakes and Wetlands)	●Disturbance (Human/Noise/Vibrations) ●Water Quality Modification ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: Temporary: Short-Long ●Post Construction Permanent: N/A	Adult Juvenile	●Habitat Avoidance ●Flushing from Feeding/Resting Areas ●Potential for Direct Injury/Mortality/Impaired Functioning ●Increased Energy Expenditure	●No Conservation Measures specific to the Rufa Red Knot have been Identified. However, Conservation Measures specific to the Interior Least Tern and Piping Plover would afford Protection to the Rufa Red Knot. See Piping Plover and Interior Least Tern Sections in Programmatic Biological Assessment for more Information.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Northern Long-Eared Bat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: ***Surveys*** ***Data Gathering*** ***Bidding*** ***Project Prep***	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Natural Wooded Areas Throughout North Dakota	●Disturbance (Human/Noise/Vibrations) ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or N/A
Utility Relocations: ***Above Ground Utilities*** ***Below Ground Utilities***	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Natural Wooded Areas Throughout North Dakota	● Disturbance (Human/Noise/Vibrations) ●Habitat Loss/Fragmentation ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: Utility Features to Remain on Landscape	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or N/A
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	● Disturbance (Human/Noise/Vibrations) ●Habitat Loss/Fragmentation ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted (Reclamation May Occur)	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or N/A

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Northern Long-Eared Bat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	● Disturbance (Human/Noise/Vibrations) ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	● Disturbance (Human/Noise/Vibrations) ●Habitat Loss/Fragmentation ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	● Disturbance (Human/Noise/Vibrations) ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	● Disturbance (Human/Noise/Vibrations) ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
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Deconstruction Matrix: Northern Long-Eared Bat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barrier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	Natural Wooded Areas Throughout North Dakota	● Disturbance (Human/Noise/Vibrations) ●Habitat Loss/Fragmentation ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptibility to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	N/A	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: N/A	N/A	N/A	●N/A	NE
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	● Disturbance (Human/Noise/Vibrations) ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptibility to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	●Disturbance (Human/Noise/Vibrations) ●Habitat Loss/Fragmentation ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: Permanent: N/A	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptibility to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
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Deconstruction Matrix: Northern Long-Eared Bat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Natural Wooded Areas Throughout North Dakota	●Disturbance (Human/Noise/Vibrations) ●Habitat Loss/Fragmentation ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	● Disturbance (Human/Noise/Vibrations) ●Habitat Loss/Fragmentation ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short/Long ●Post Construction - Permanent: Undisturbed Areas Converted	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	●Disturbance (Human/Noise/Vibrations) ●Lighting ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Northern Long-Eared Bat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Life History Form	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting/Shotblasting/Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	●Disturbance (Human/Noise/Vibrations) ●Artificial Habitat Alteration ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Natural Wooded Areas Throughout North Dakota	●Disturbance (Human/Noise/Vibrations) ●Artificial Habitat Alteration ●Lighting ●Alteration of Water Quality/Foraging Habitat/Insect Prey Base ●Dust/Erosion/Sedimentation ●Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	Adult Juvenile	●Arousal/Flushing from Roosts ●Temporary Habitat/Roost Avoidance ●Direct Injury/Mortality ●Increased Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Piping Plover Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: Surveys Data Gathering Bidding Project Prep	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Geotechnical Work, Bentonite Exposure)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
Utility Relocations: Above Ground Utilities Below Ground Utilities	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: Utility Features to Remain on Landscape	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted (Reclamation May Occur)	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Piping Plover Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Piping Plover Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barrier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	N/A	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: N/A	N/A	N/A	NE
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Piping Plover Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short/Long ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Piping Plover Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting, Shotblasting, Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Within 0.5 Mile of Designated Critical Habitat (Lake Sakakawea, Missouri River, Alkali Lakes and Wetlands)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Emergent Vegetation and/or Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Prey, Forage, Nesting, Brooding, and Chick-Rearing Areas)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	

<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
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Deconstruction Matrix: Dakota Skipper Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: Surveys Data Gathering Bidding Project Prep	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Geotechnical Work, Bentonite Exposure)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA
Utility Relocations: Above Ground Utilities Below Ground Utilities	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: Utility Features to Remain on Landscape	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted (Reclamation May Occur)	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
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Deconstruction Matrix: Dakota Skipper Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Dakota Skipper Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barrier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	N/A	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: N/A	N/A	N/A	NE
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Dakota Skipper Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short/Long ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●See above	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Dakota Skipper Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting, Shotblasting, Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Eleven Designated Critical Habitat Units in Various Counties (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic Tallgrass or Mixed Grass Remnant Untilled Prairie with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat. ●For Projects with Ground Disturbing Activities through ROW within Designated Critical Habitat that Functions as Dispersal Habitat (Units 5, 6, and 9): any Ground Disturbing Activities from June 15 – July 15 shall be Avoided. Any Ground Disturbing Activities within Unit 6 will Require Seperate Consultation.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
Resulting Effects of Action: NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Poweshiek Skipperling Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Project Development: ***Surveys*** ***Data Gathering*** ***Bidding*** ***Project Prep***	●Aerial Surveys ●Ground Surveys (Environmental, Bridge, ROW) ●Wetland Delineations/Monitoring ●Cultural Resource Surveys ●Noise Studies ●Biological Surveys ●Geotechnical Surveys ●Field Reviews/Site Visits/Bridge Inspections ●Utility Locates ●Coring ●Potholing ●Painting	●Vehicle Traffic ●Install/Remove Equipment ●Ground Disturbance ●Operation of Airplanes, Atvs, Boats, Light Machinery ●Drilling Rig Operation (Geotechnical) ●Nest Searching ●Vegetation Sampling ●Lathing/Staking ●Bentonite Use	Two Units in Richland County (See BA for Locations) (See BA for Locations) (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
Utility Relocations: ***Above Ground Utilities*** ***Below Ground Utilities***	●Removal and Installation ●Equipment Staging ●Clear/Grub Vegetation ●Tree Removal/Disposal ●Dust Control	●Vehicle Traffic ●Install/Remove Equipment ●Clear/Grub Vegetation ●Brush/Tree Removal ●Grind/Mulch Woody Vegetation ●Ground/Soil Disturbance ●Light/Heavy Equipment Operation ●Soil Stockpiling ●Install Guy Wires ●Bury/Relocate Overhead/Underground Wire ●Trenching/Directional/Horizontal Drilling ●Bentonite Use ●Obtain and Apply Surfactant/Water ●Lathing/Staking ●Airlift Operations ●Install/Remove Temporary Lighting ●Dewatering/Trenching Wetlands	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: Utility Features to Remain on Landscape	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Site Prep	●Mobilization ●Project Staging ●Material Sourcing ●Equipment Staging ●Fueling Sites ●Plant Site Preparation ●Field Laboratory and Office Set-up ●Temporary Lighting ●Vegetation Removal/Disposal ●Rock Removal/Disposal ●Debris Removal/Disposal ●Tree Removal/Disposal ●Clearing/Grubbing ●Establish Avoidance Areas ●Build/Maintain/Remove Haul Roads and Temporary Access Roads ●Temporary Erosion/Sediment Control ●Construction Staking ●Pavement & Base Removal ●Dust Control ●Building Demolition/Relocation ●Temporary Bypass Construction/Removal ●Remove/Stockpile Topsoil	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Store/Supply Fuel, Oil, Hydraulic Fluid ●Excavation ●Mine/Crush/Grind Aggregate ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Obtain and Apply Surfactant/Water ●Install/Remove Erosion Control BMP's ●Hazardous Materials Removal/Disposal (Lead Paint, Asbestos, Erionite, Contaminated Soils) ●Coal/Shale Removal/Disposal ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted (Reclamation May Occur)	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA

Duration: Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
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Deconstruction Matrix: Poweshiek Skipperling Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment*.	Resulting Effects of the Action
New Road Construction or Reconstruction: Earthwork/Grading	●Equipment Staging ●Excavation ●Place/Compact Fill Material ●Temporary Erosion & Sediment Control ●Cutting/Filling/Grading ●Finish Grading/Roadbed Preparation ●Dust Control ●Remove Unsuitable Fill ●Install Geotechnical Fabric ●Install Retaining Wall/Slope Stability Features ●Sliver Widening	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Fill Material/Soil Compaction ●Temporary Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Place/Remove Erosion Control BMP's ●Temporary Seeding ●Drive/Remove Sheet Pile ●Lathing/Staking ●Ditch/Channel Construction ●Embankment Construction ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Installation of Drainage Features (excluding bridges and box culverts)	●Equipment Staging ●Work Area Isolation (Dewater, Drainage/Stream Diversion) ●Place/Compact Fill Material ●Channel/Stream Diversions ●Excavation (Pipe Trench / Ditch Creation) ●Culvert Jacking or Drilling ●Lay Pipe and Place/Compact Fill ●Regrade Drainage/Stream ●Place Bed Material/Habitat Features ●Install Armoring (Riprap, Concrete Blanket) ●Install Storm Drain System (Conduit, Manholes, Inlets) ●Install Channel Lining ●Install Temporary Berm ●Install Temporary Slope Drain	●Vehicle Traffic ●Install\Remove Equipment ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary/Permanent Structure Placement/Removal ●Obtain and Apply Surfactant/Water ●Placement/Removal of Permanent/Temporary Erosion Control BMP's ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Area ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Roadway Surfacing	●Laydown of Aggregate Base ●Equipment Staging ●Hot Mix Asphalt Paving ●Portland Cement Concrete Paving ●Surface Grinding/Milling and Rumble Strips ●Curb & Gutter, Pedestrian Paths, Trails, Sidewalks, Driveways ●Construct Stormwater Facilities ●Construct Retaining Wall ●Road Median Construction - Barrier Wall ●Striping, Pavement Markers and Signage ●Guardrail Installation ●Noise Wall Construction	●Vehicle Traffic ●Install\Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Obtain and Apply Surfactant/Water ●Waste Slurry Disposal/Removal ●Place/Remove Erosion Control BMPs ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Roadway Finishing	●Place/Shape Topsoil ●Establish Vegetation ●Permanent Erosion/Sediment Control ●Landscaping / Tree Plantings	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance, Soil Stockpiling ●Fertilizer/Herbicide Application ●Hydromulch Application ●Fiber Roll/Fabric Installation ●Discing/Seeding, Permanent/Temporary ●Erosion Control BMPs ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA

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Deconstruction Matrix: Poweshiek Skipperling Desginated Critical Habitat

Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
New Road Construction or Reconstruction: Roadway Appurtenances	●Permanent/Temporary Lighting ●Install/Remove Guardrail ●Signs/Signals/Intelligent Transportation Systems (ITS)/Automatic Traffic Recorders (ATR)/Weight In Motion Systems (WIM)/Environmental Sensor Stations (ESS) ●Rumble Strips ●Painting and Striping ●Railroad Crossings ●Median Barrier Wall ●Noise Barier Wall ●Construct/Maintain Turnouts, Overlooks, Historic Markers, Viewpoints ●Fencing ●Construct/Maintain Rest Area or Weigh Station ●Install/Remove High Mast Lighting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Prune/Trim Trees ●Tree Felling ●Grind/Mulch Woody Vegetation ●Paint Application ●Burying/Trenching Wires ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent Lighting ●Burying/Trenching Wires	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long* ●Post Construction Permanent: Undisturbed Areas Converted, Features to Remain in Place (Barriers, Walls, Overlooks, Fencing, Etc).	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Workzone Traffic Control	●Control/Maintain Traffic	●Installalation/Removal of Signage ●Vehicle Operation/Staging ●Detour Traffic ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	N/A	●Construction/Field: - Temporary: Short-Long* ●Post Construction: - Permanent: N/A	N/A	N/A	NE
New Road Construction or Reconstruction: New Bridge Construction	●Equipment Staging ●Work Area Isolation (Dewater, Stream Diversions) ●Excavation (Channel Widening, Foundations) ●Clearing and Grading ●Install and Remove Causeway/Work Platform ●Install Coffer Dam/Sheet Piling ●Substructure Construction (Piers, Footings, Foundations, Abutments, Pier Cap) ●Superstructure Construction (Girders/Deck/Approach Slabs) ●Install/Remove Temporary Detour Bridge ●Fueling sites ●Noise Attenuation/Monitoring ●Install Direct Bearing Footings (rock, spread, seal concrete) ●Pile Driving ●Temporary Bypass Construction/Removal ●Utility Adjustments/Relocations ●Install/Remove Lighting ●Temporary Shoring ●Causeway Construction	●Vehicle Traffic ●Install/Remove Equipment ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Stream Diversions ●Dewatering ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement/Removal of Erosion Control BMP's ●Drive/Remove of Sheet Pile ●Storing and Supplying Fuel/Oil/Hydraulic Fluid ●Impact (Diesel) Hammer ●Vibratory Hammer Pile ●Installation/Removal Bubble Curtain ● Installation/Removal of Isolation Casings ●Dredging ●Airlift Operation (Excavation) ●Placement/Removal of Fill Material ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: - Permanent: Completed Bridge/Structure	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
New Road Construction or Reconstruction: Bridge Demolition	●Work Area Isolation (Dewater, Stream Diversions) ●Pile, Footing, Pier, Bridge Deck Removal ●Excavation ●Equipment Staging ●Fueling Sites ●Utility Adjustments/Relocations ●Blasting	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Stream Diversions ●Dewatering ●Light/Heavy Equipment Operation ●Barge Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Temporary Structure Placement/Removal ●Placement and Removal of Erosion Control BMP's ●Explosive Use ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Long ●Post Construction: Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA

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Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Road / Right of Way Maintenance	●Chemical Vegetation Control ●Mechanical Vegetation Control ●Cattle Pass Maintenance ●Removal of Roadway Traffic Hazards ●Guardrail Maintenance ●Snow/Ice Control ●Crack Sealing/Pouring ●Joint Sealing ●Bituminous Seal Coats (sand, chip or slurry) ●Tree control/removal ●Litter collection/removal ●Pavement Rehab (Concrete Pavement Repair, Dowl Bar Retrofit) ●Overlay (HBP) ●Aggregate application ●Resurfacing ●Install / Repair ROW Fence ●Microsurfacing and Patching ●Signs/Signals/Intelligent Transportation Systems ●Pavement Marking ●Utility Installation/Removal (Post construction) ●Potholing ●Mine and Blend/Full Depth Reclamation ●Sawing/Milling/Grinding ●Improve/Restore Drainage ●Lighting System Maintenance	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Fertilizer/Herbicide Application ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Lathing/Staking ●Install/Remove Erosion Control BMPs ●Install/Remove Temporary or Permanent ●Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
Slide Abatement, Bank Stabilization, Flood/Scour and Sinkhole Repair, Landslide Correction	●Cutting, Filling, Grading ●Construct Temporary Access Road ●Conduct Geotechnical Investigations ●Debris Removal ●Vegetation clearing/Tree Removals ●Construct Buttresses, Berms, Shear Keys ●Retaining Wall Construction ●Ground Improvements (stone columns, high pressure grouting) ●Blasting ●Install Anchored Wire Mesh Netting/Fences ●Rip-Rap Installation/Removal ●Willow Staking ●Instream Structure Installation (weirs, barbs, logjams) ●French/Trench Drain Installation ●Landscaping/Site Stabilization	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Soil Stockpiling ●Install/Remove Erosion Control BMPs ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short/Long ●Post Construction - Permanent: Undisturbed Areas Converted	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
Bridge Painting	●Construct Scaffolding ●Install full containment ●Pressure wash Bridge ●Sandblast Bridge ●Prime/Paint Bridge ●Remove Containment and Scaffolding	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Paint Application ●Sandblasting/Shotblasting ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA

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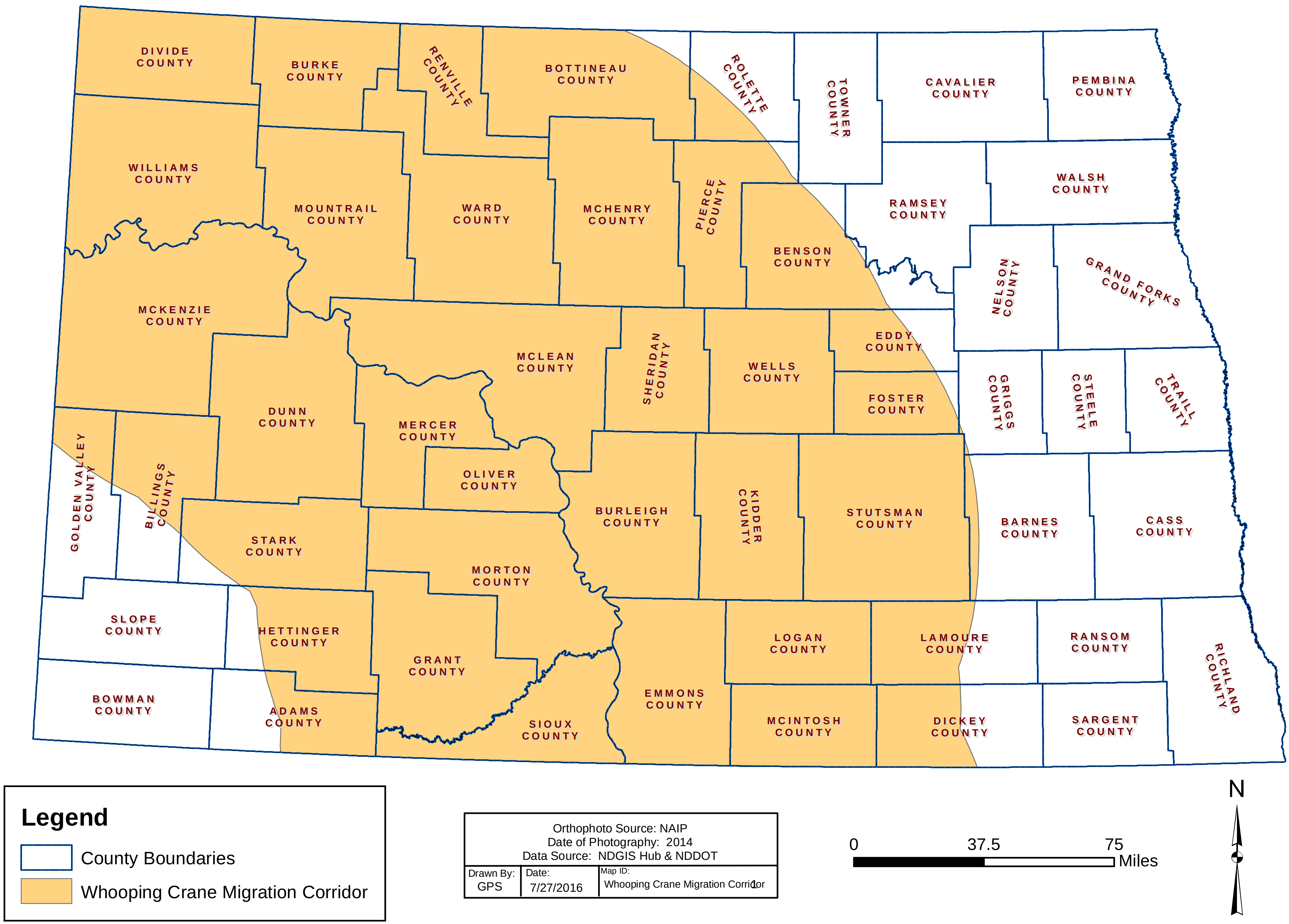
Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	Resulting Effects of the Action
Bridge Preservation/Rehab	●Install/Remove Scaffolding and Containment ●Replace Rivets, Degraded Steel, Bridge Railing, Joint Seals, Bearing Work, structural support elements ●Seal Cracks ●Repair Concrete Spalling ●Repair Bridge Approaches/Embankments ●Repair/Replace Electrical Systems ●Replace Rivets and Bolts, ●Install Concrete Catcher Blocks ●Install Pier Sleeves ●Install Longitudinal Restrainers ●Transverse Girder or Deck Restrainers ●Bridge Deck Replacement ●Repair/Replace Finger Joints ●Pour New Deck ●Sampling of Bridge Materials (Coring and Drilling) ●Abutment Repair/Replacement ●Remove Debris ●Install Full Containment ●Clean/Repair Deck Drains ●Clean Expansion Joints ●Clean/Wash Bridge Deck ●Mechanical Sweeping ●Scour and Erosion Repair ●Slope Protection Repair ●Surface Treatment (Silane / Linseed Oil) ●FAST (Fixed Automated Spray Technology) ●Chloride Extraction ●Deck Overlay ●Hydro-Demolition ●Heat Straightening (Beams) ●Shotcrete Application	●Vehicle Traffic ●Install/Remove Equipment ●Equipment Staging ●Light/Heavy Equipment Operation ●Excavation/Ground/Soil Disturbance ●Hydroblasting ●Sandblasting, Shotblasting, Jackhammering ●Milling/Sawing/Grinding/Welding, ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	NLAA
Drainage Improvement	●Clean and Reshape Ditches ●Culvert Repair/Replacement ●Clean Catch Basins/Inlets ●Debris/Sediment Removal ●Vegetation clearing/Tree Removals ●Install Culvert Liner ●Patch Repair ●Headwall / Wingwall Repair ●Repair Joints ●Line With Shotcrete or Gunnite ●Bank Stabalization ●Work Area Isolation ●Extend Culvert ●French/Trench Drains	●Vehicle Traffic ●Equipment Staging ●Light/Heavy Equipment Operation ●Ground/Soil Disturbance ●Vegetation/Debris Removal and Disposal ●Dewatering ●Drainage/Stream Diversion ●Placement/Removal of Erosion Control BMP's ●Tree Felling ●Clear/Remove Stumps and Organic Debris ●Prune/Trim Trees ●Grind/Mulch Woody Vegetation ●Widen Drainage/Stream Channel ●Improve/Restore Flow ●Repair/Reinforce Eroded Areas ●Install/Remove Temporary Lighting	Two Units in Richland County (See BA for Locations)	●Remove/Modify Critical Habitat (Habitat Removal, Erosion/Sedimentation, Spills, Introduction or Spread of Noxious or Invasive Species, Water Quality Modification, Exposure to Contaminants such as Gas, Oil, Lead or Non-Lead Paint , Asbestos, Bentonite, Herbicides, Pesticides)	●Construction/Field: - Temporary: Short-Long ●Post Construction - Permanent: N/A	●Primary Constituent Elements of Critical Habitat Potentially Altered (Wet Mesic to Dry Tallgrass or Remnant Moist Meadows and Prairie Fen Habitats with Native Grasses and Forbs necessary for Larval Food and Shelter and Nectar Sources for Adults, Dispersal Grassland Habitat)	●Clearly Mark Limits of Construction Within or Adjacent to Boundaries of Designated Critical Habitat. ●Fueling or Staging Areas are not to be Placed Directly Adjacent to or within the Boundaries of Critical Habitat.	

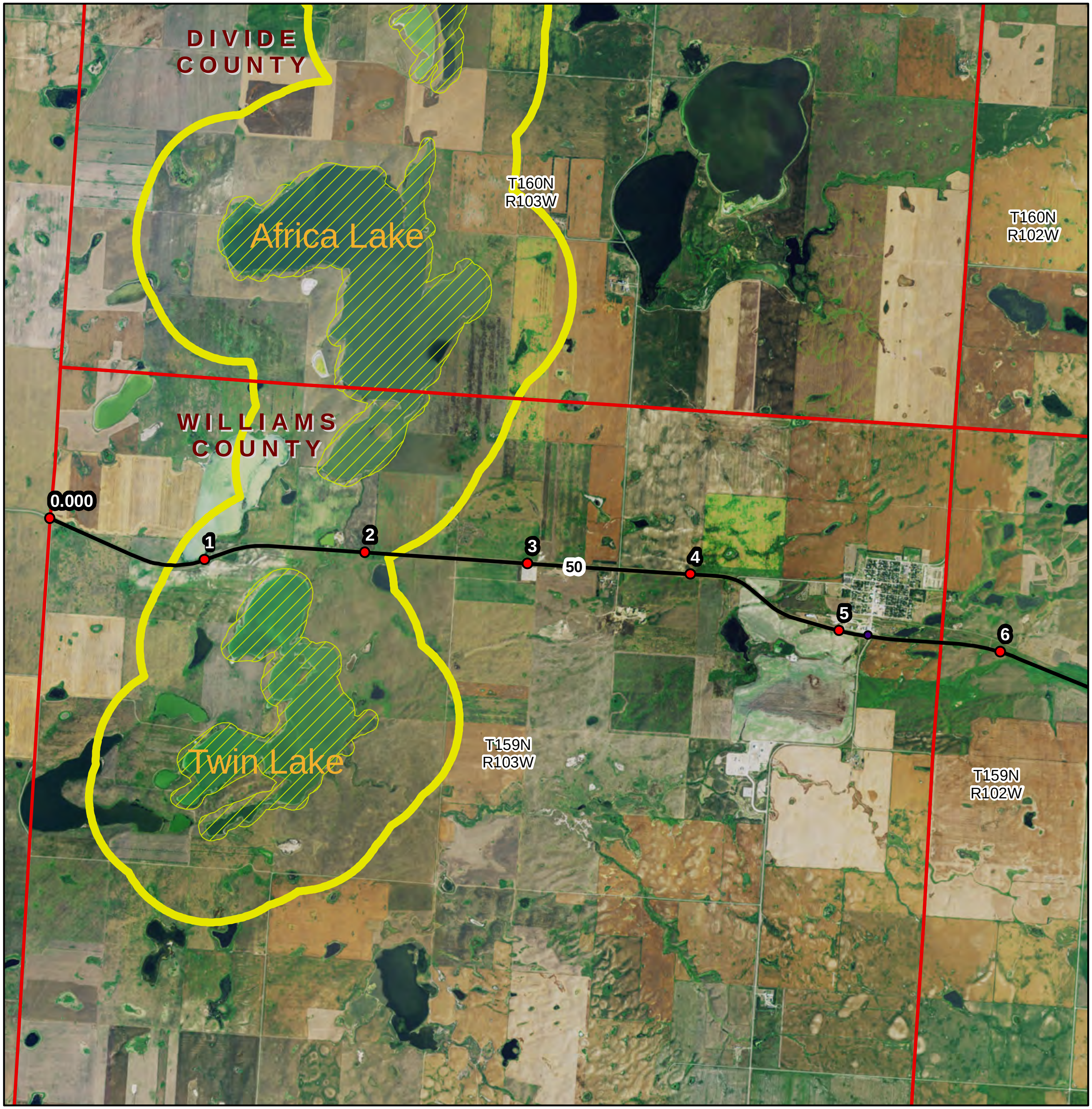
<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

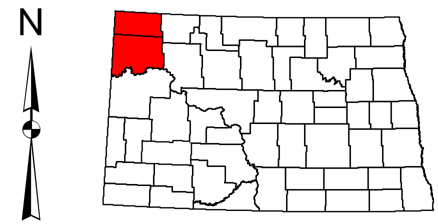
APPENDIX D
Whooping Crane Migration Corridor Map

Whooping Crane Migration Corridor in North Dakota



APPENDIX E
Piping Plover Critical Habitat Maps and Table





Divide and Williams Counties, North Dakota

Legend

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

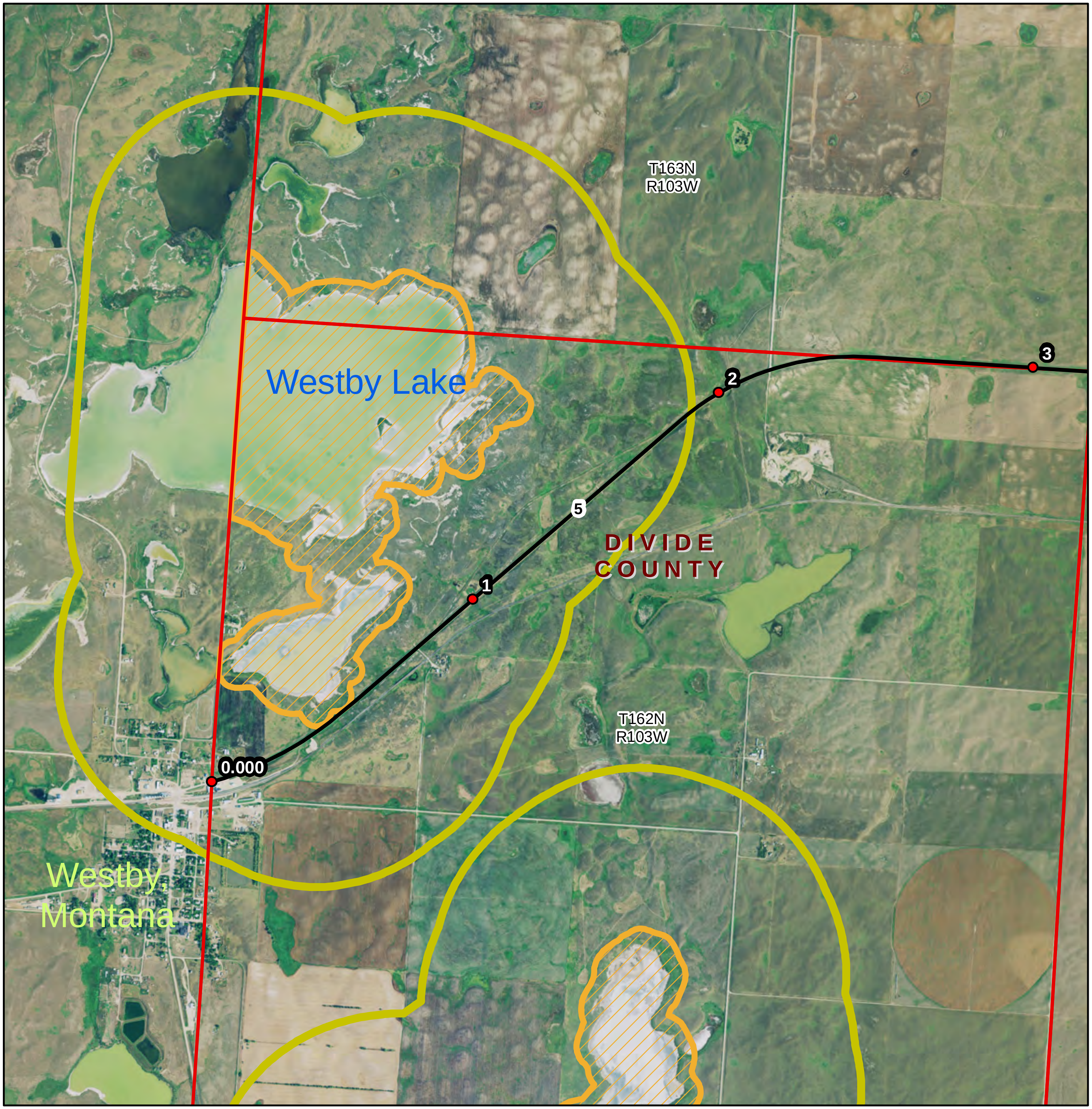
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

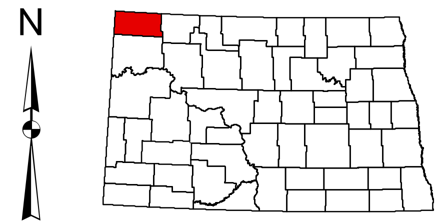
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota
Department of Transportation

0 0.75 1.5 Miles

Unit 1 - Divide and Williams Counties





Divide County,
North Dakota

Legend

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

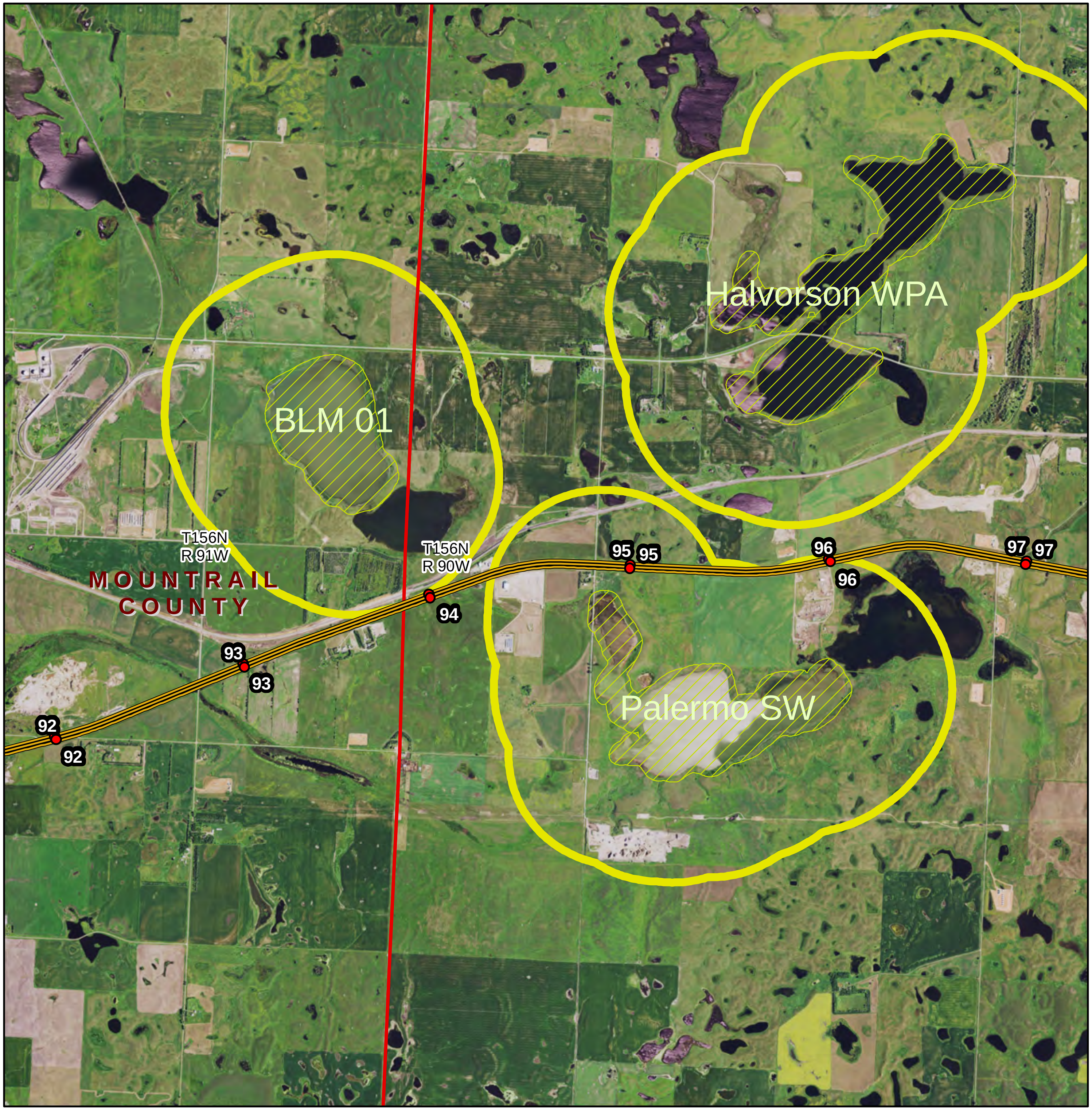
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat	Sheet: 1

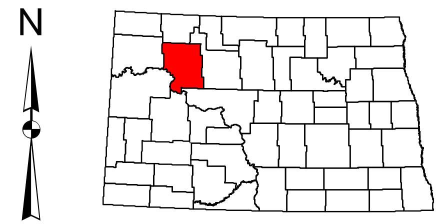
NDDOT
North Dakota
Department of Transportation

0 0.475 0.95
Miles

Unit 1 - Divide County



Unit 2 - Mountrail County



Mountrail County, North Dakota

Legend

State Highways

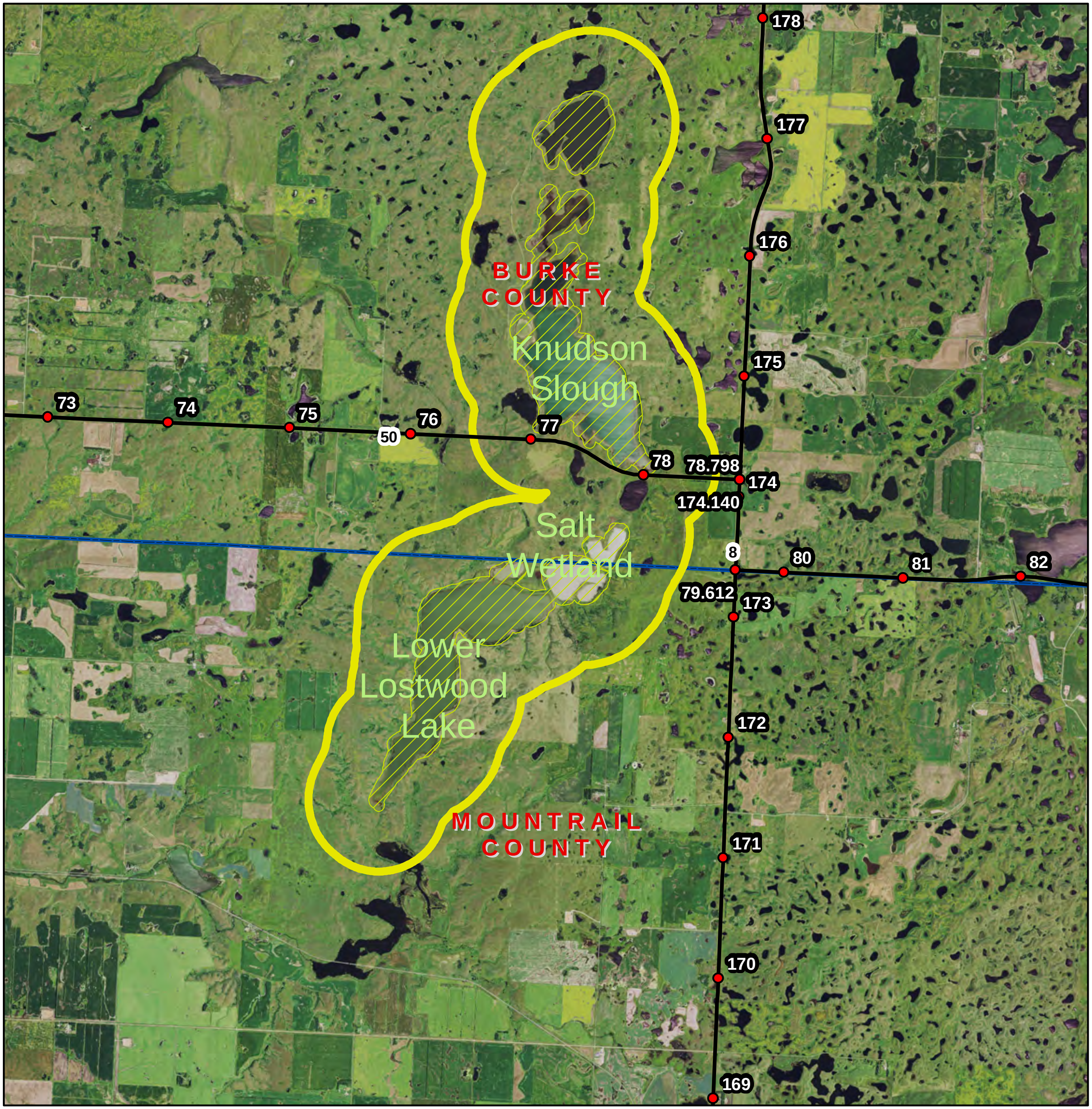
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

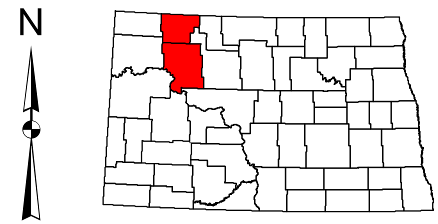
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota Department of Transportation

0 0.75 1.5 Miles



Unit 2 - Burke and Mountrail Counties



Burke and Mountrail Counties, North Dakota

Legend

State Highways

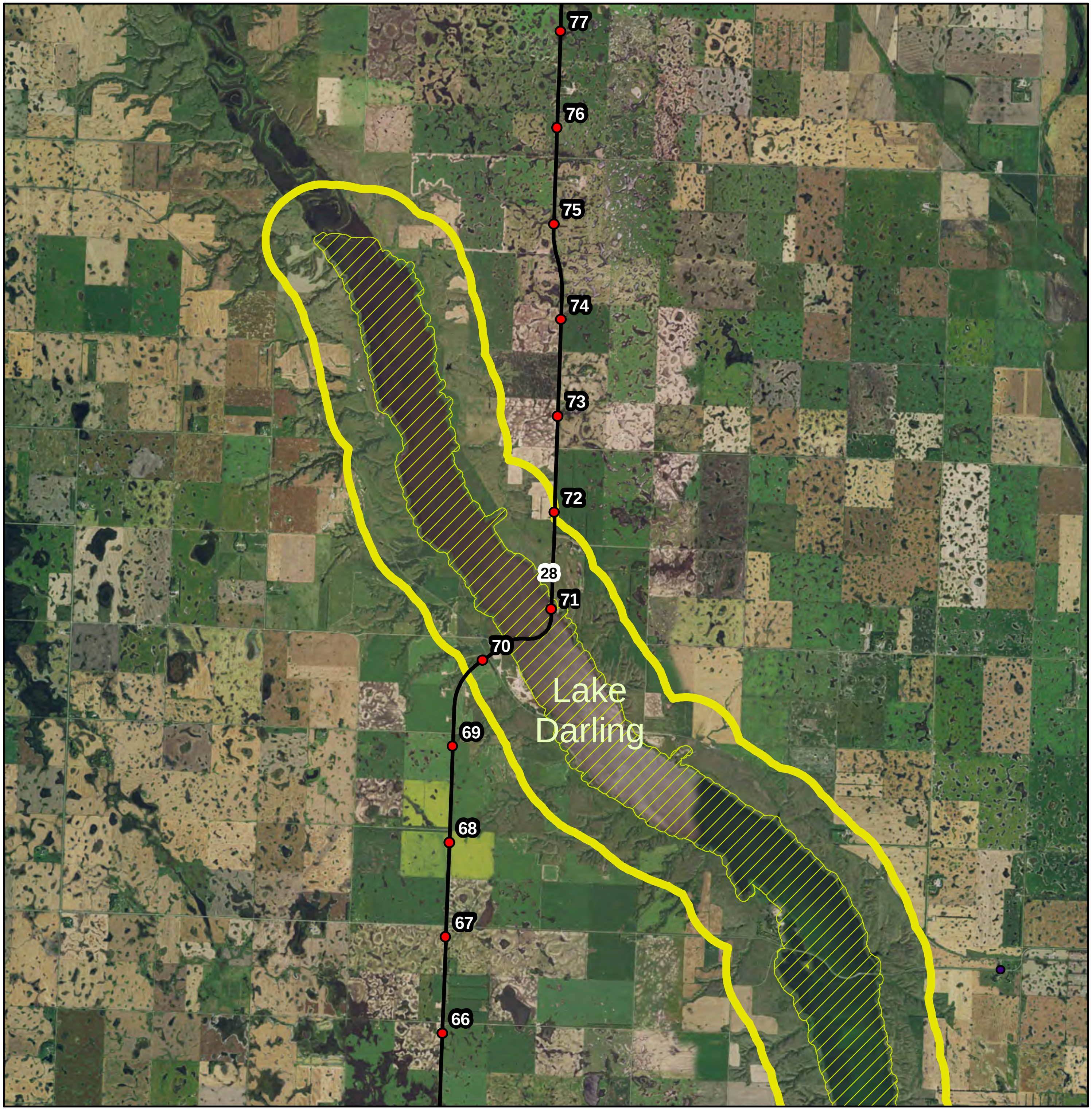
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota
Department of Transportation

0 1.25 2.5 Miles



Unit 2 - Renville County

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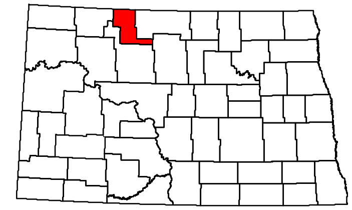


Renville County, North Dakota

Legend

State Highways

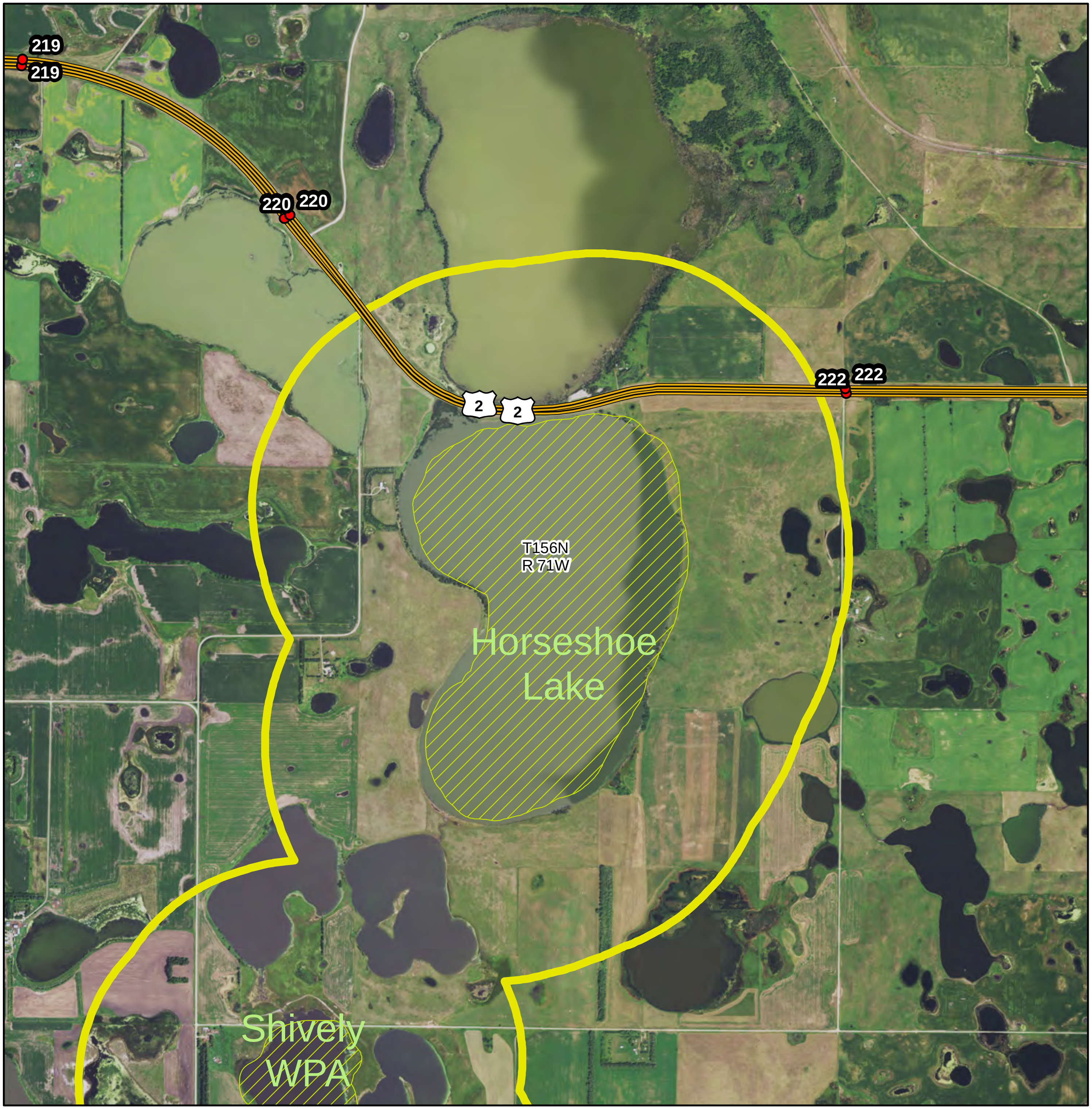
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

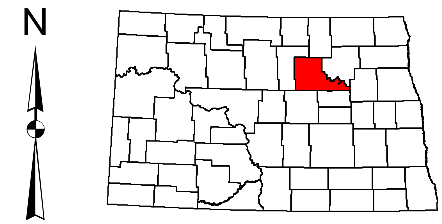
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota Department of Transportation

0 1.5 3 Miles



Unit 6 - Benson County



**Benson County,
North Dakota**

Legend

State Highways

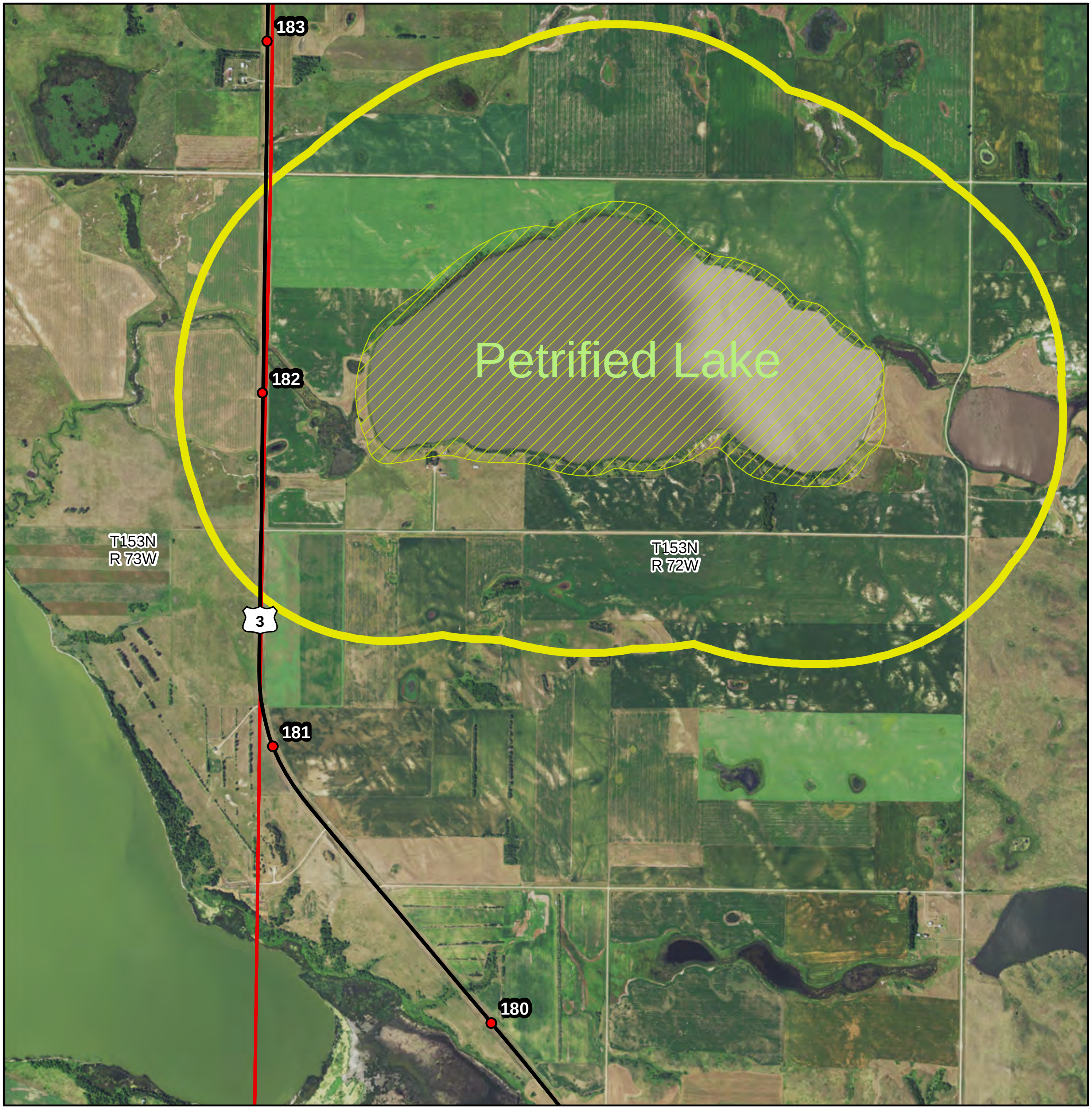
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

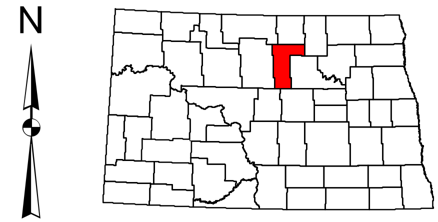
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota
Department of Transportation

0 0.475 0.95 Miles



Unit 6 - Pierce County



Pierce County, North Dakota

Legend

State Highways

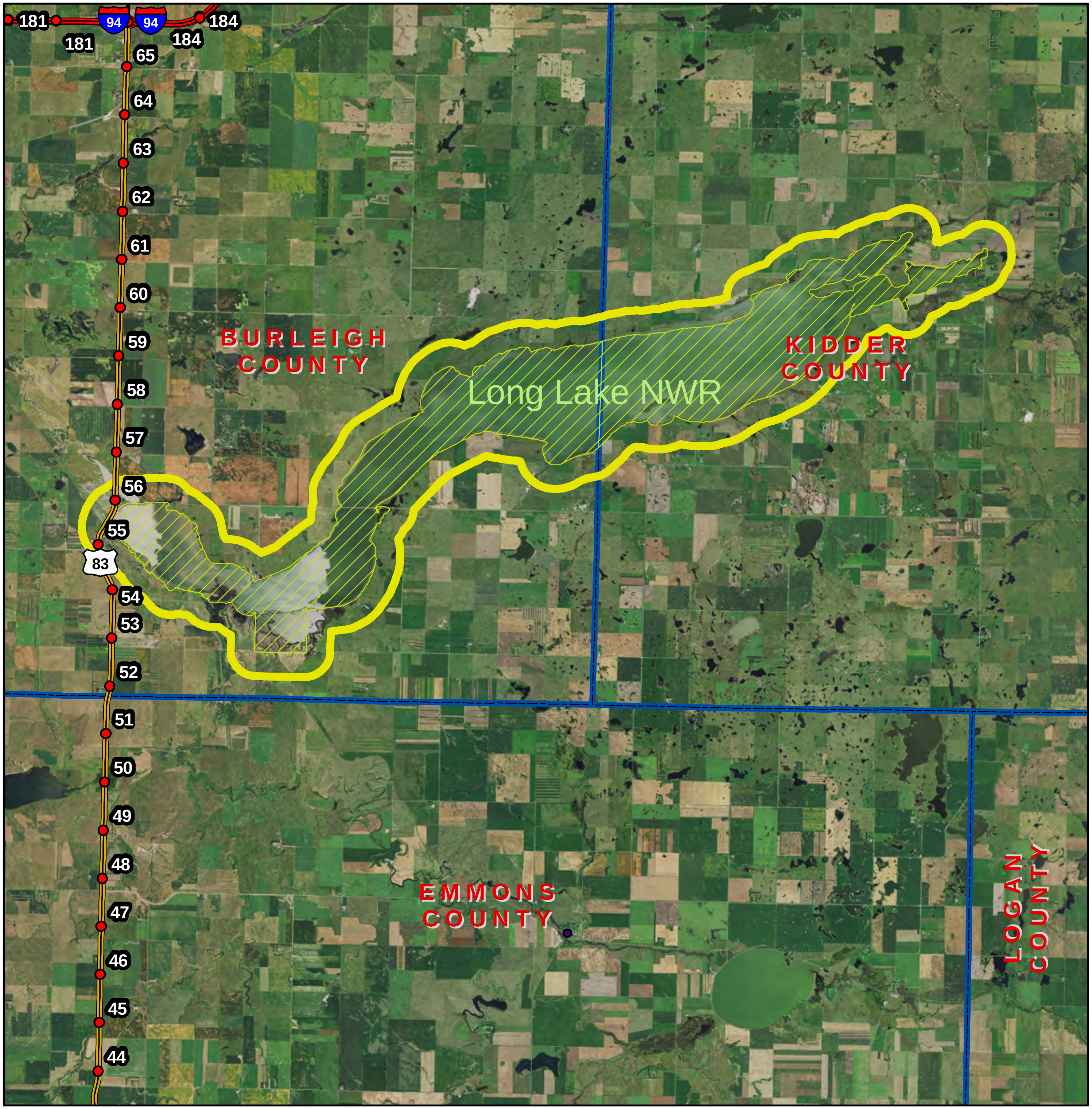
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- PLSS Townships

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

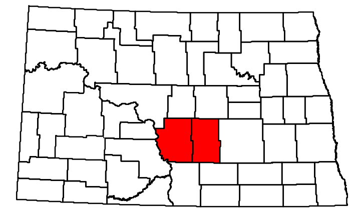
NDDOT
North Dakota Department of Transportation

0 0.425 0.85 Miles



Unit 7 - Burleigh and Kidder Counties

N



Burleigh and Kidder Counties, North Dakota

Legend

State Highways

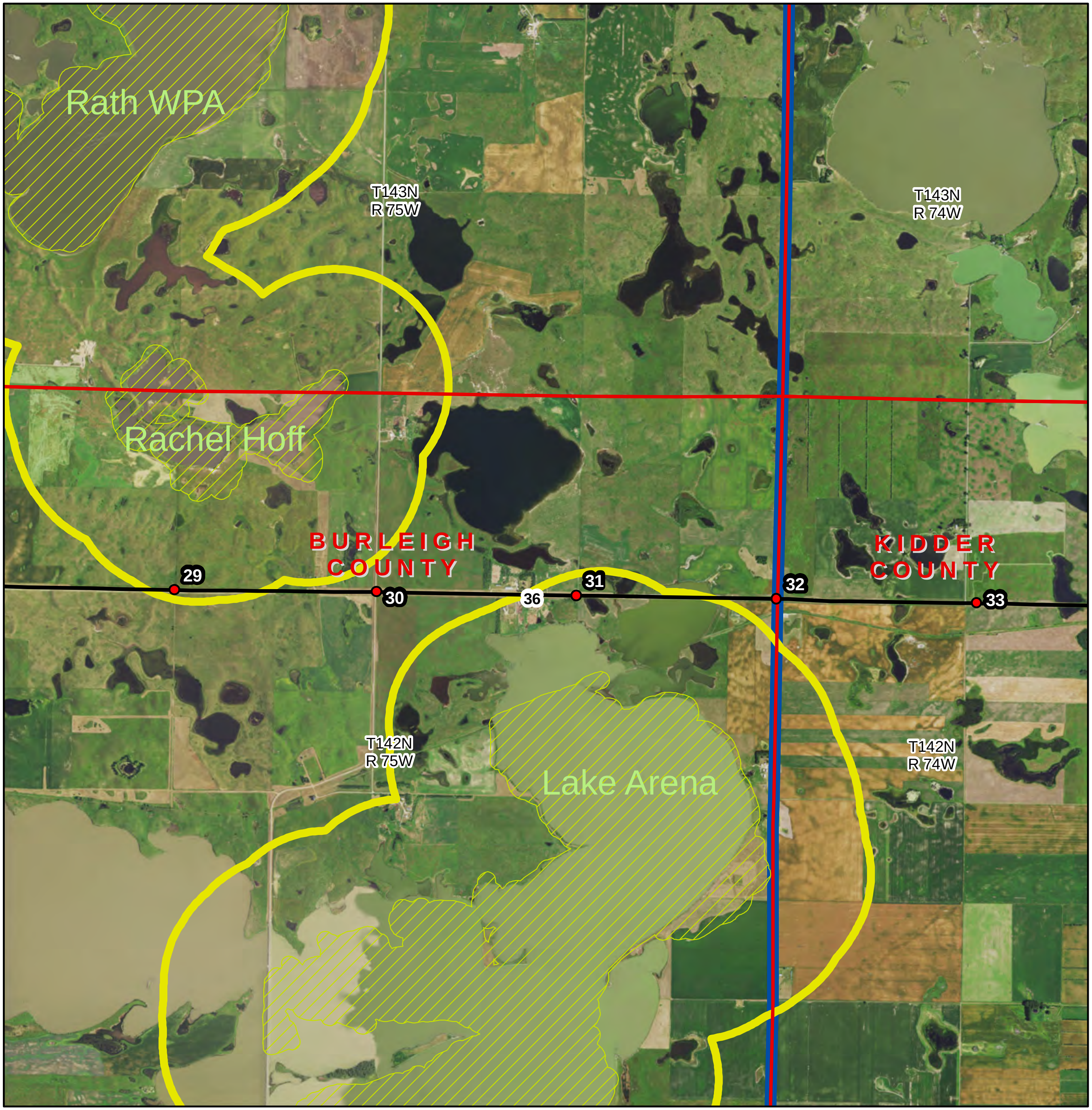
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

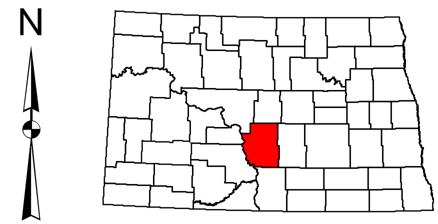
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota
Department of Transportation

0 3 6
Miles



Unit 7 - Burleigh County



Burleigh County,
North Dakota

Legend

State Highways

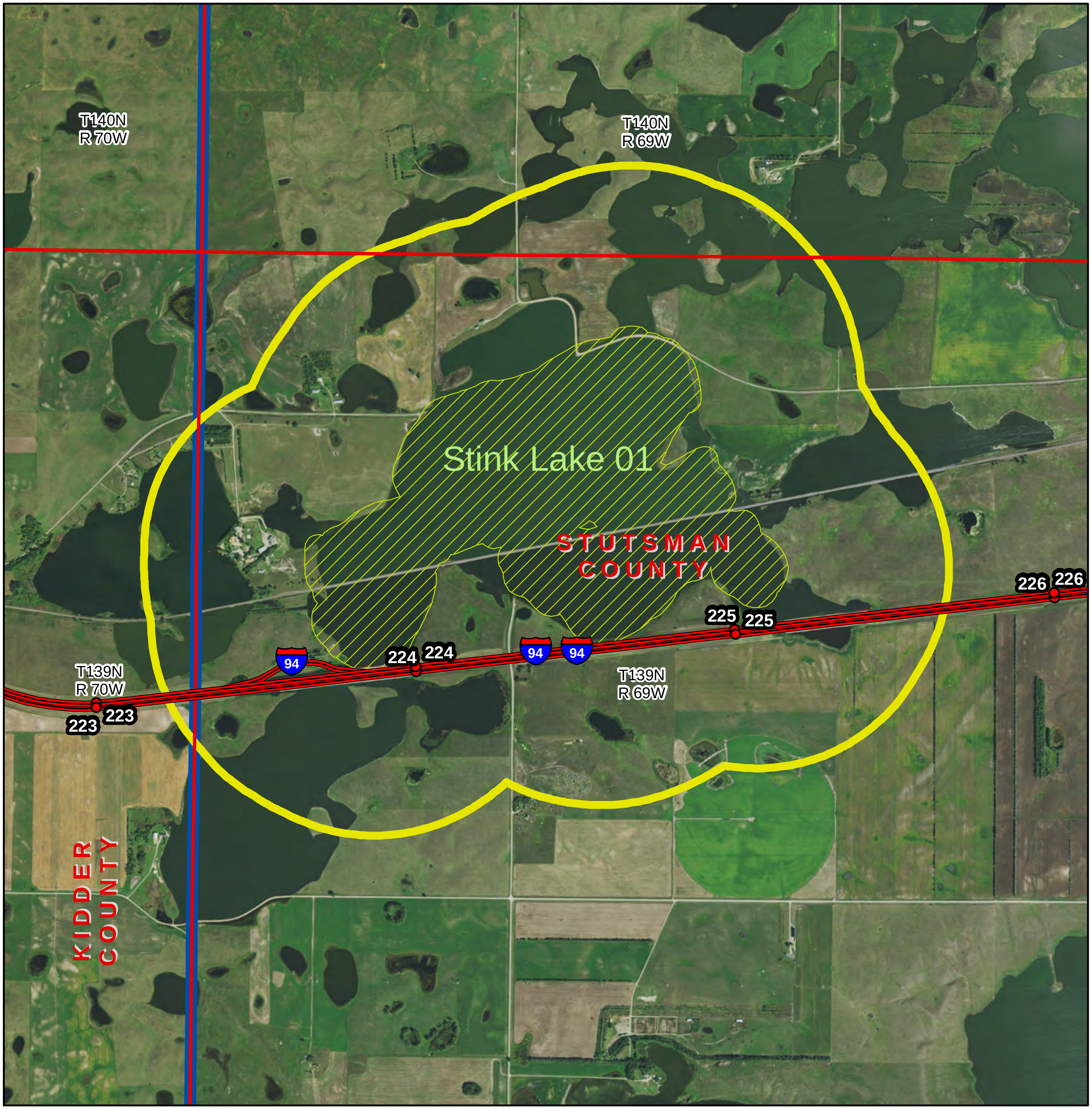
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

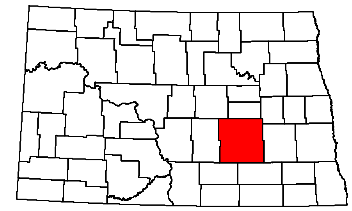
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota
Department of Transportation

0 0.75 1.5
Miles



Unit 8 - Stutsman County



Stutsman County, North Dakota

Legend

State Highways

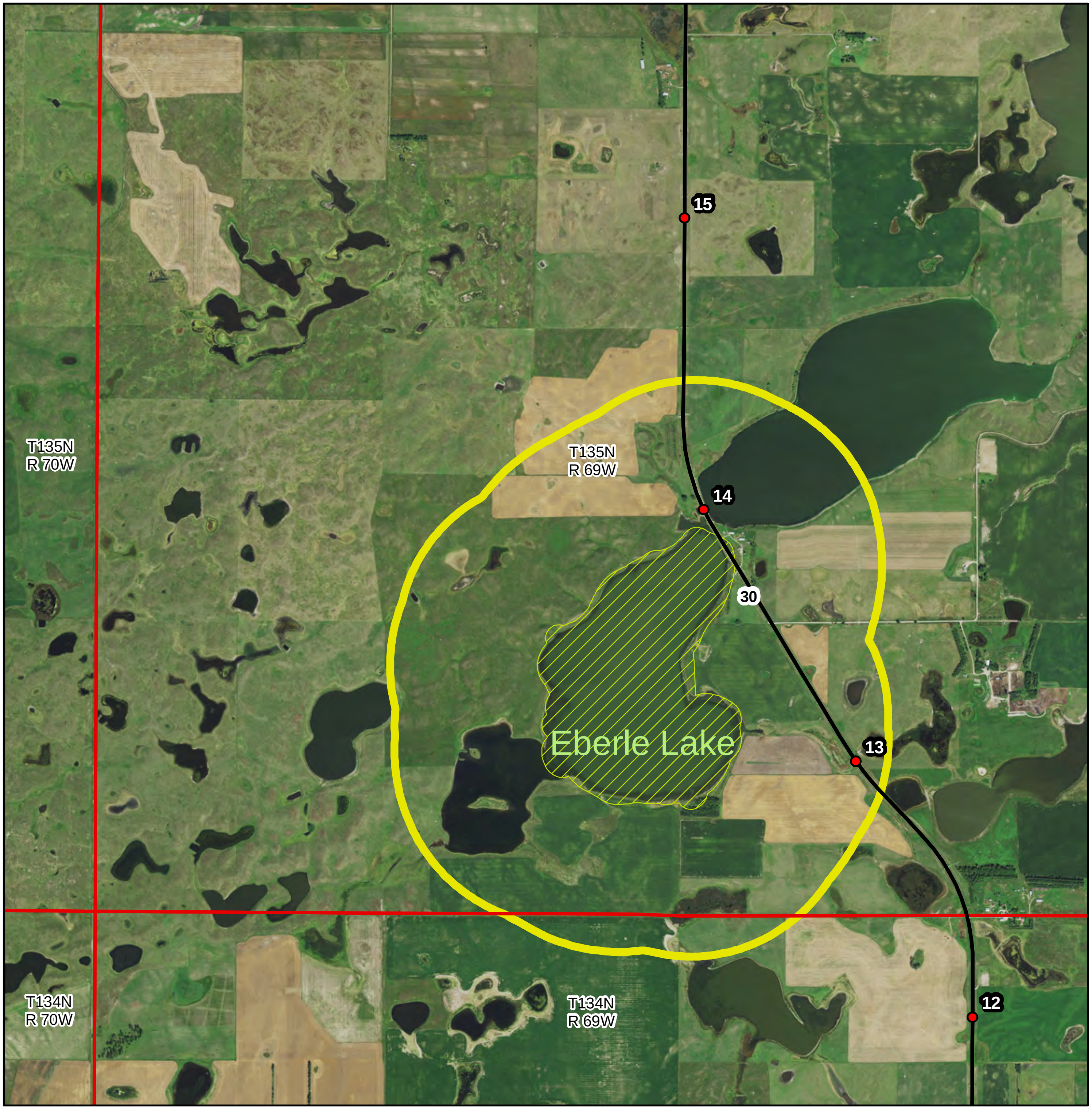
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

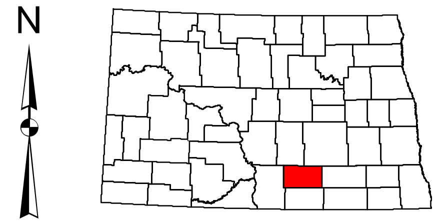
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota Department of Transportation

0 0.475 0.95 Miles





Logan County, North Dakota

Legend

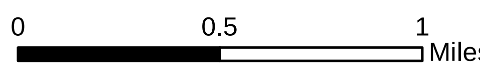
State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- PLSS Townships

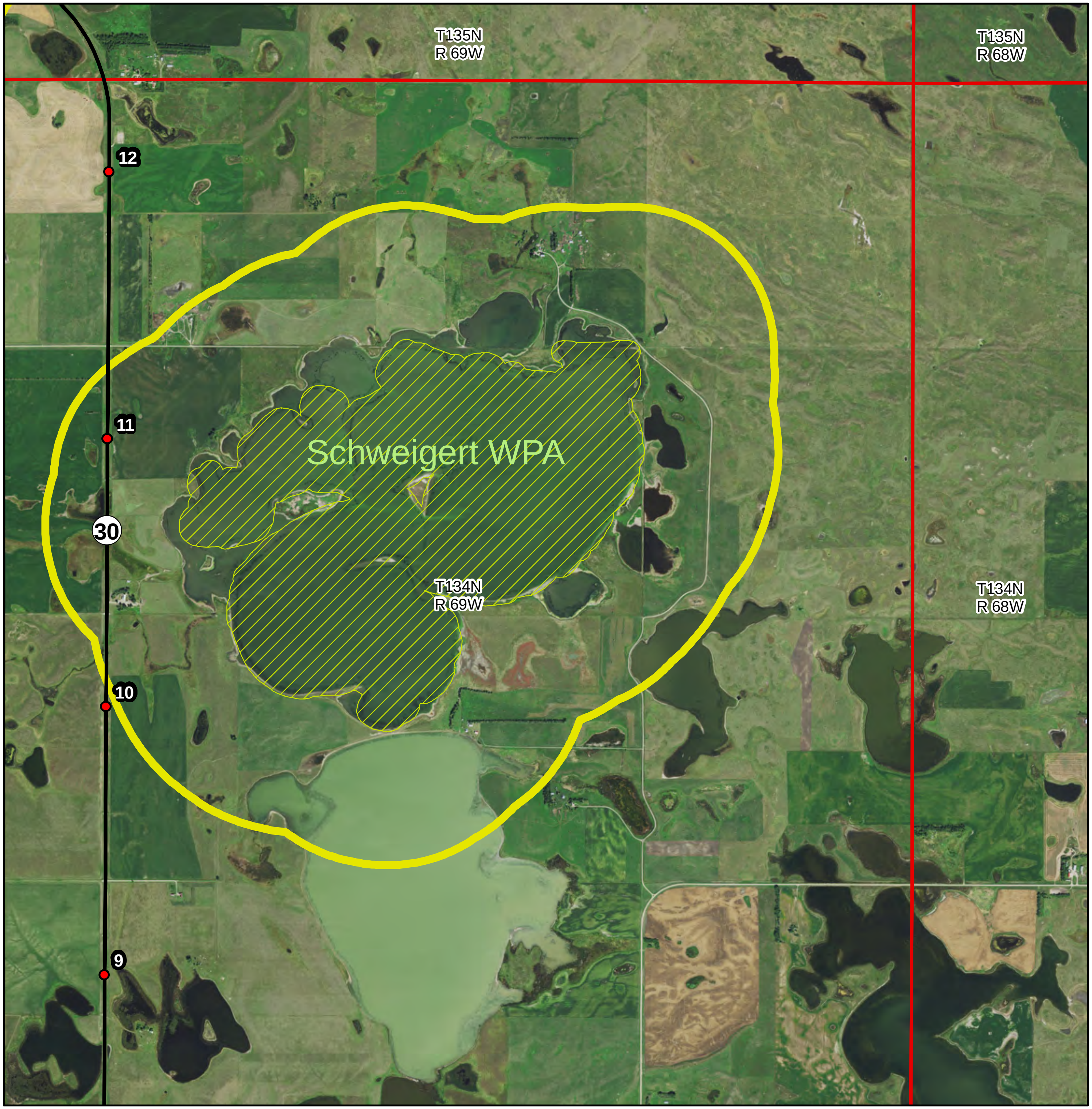
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota Department of Transportation

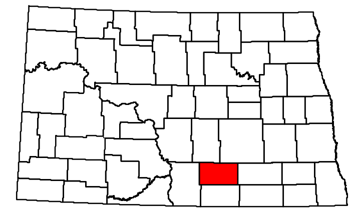


Unit 9 - Logan County



Unit 9 - Logan County

N



Logan County, North Dakota

Legend

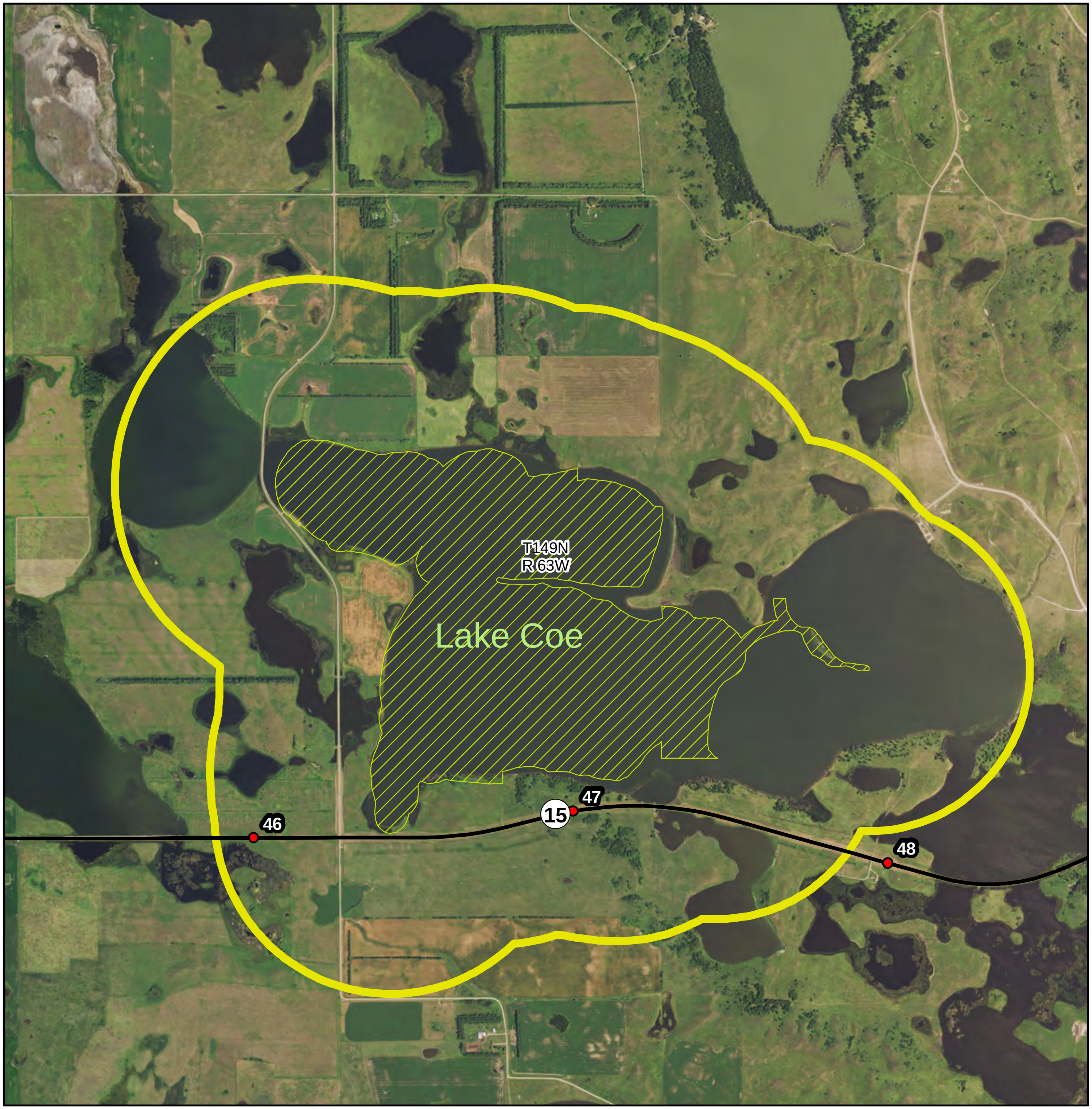
State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat

Orthophoto Source: NAIP Date of Photography: 2014 Data Source: NDGIS Hub & NDDOT			
Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat	Sheet: 1

NDDOT
North Dakota
Department of Transportation

0 0.5 1 Miles



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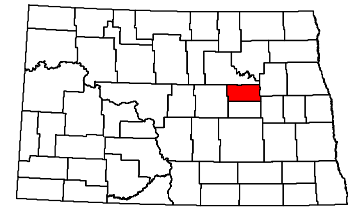


**Eddy County,
North Dakota**

Legend

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat

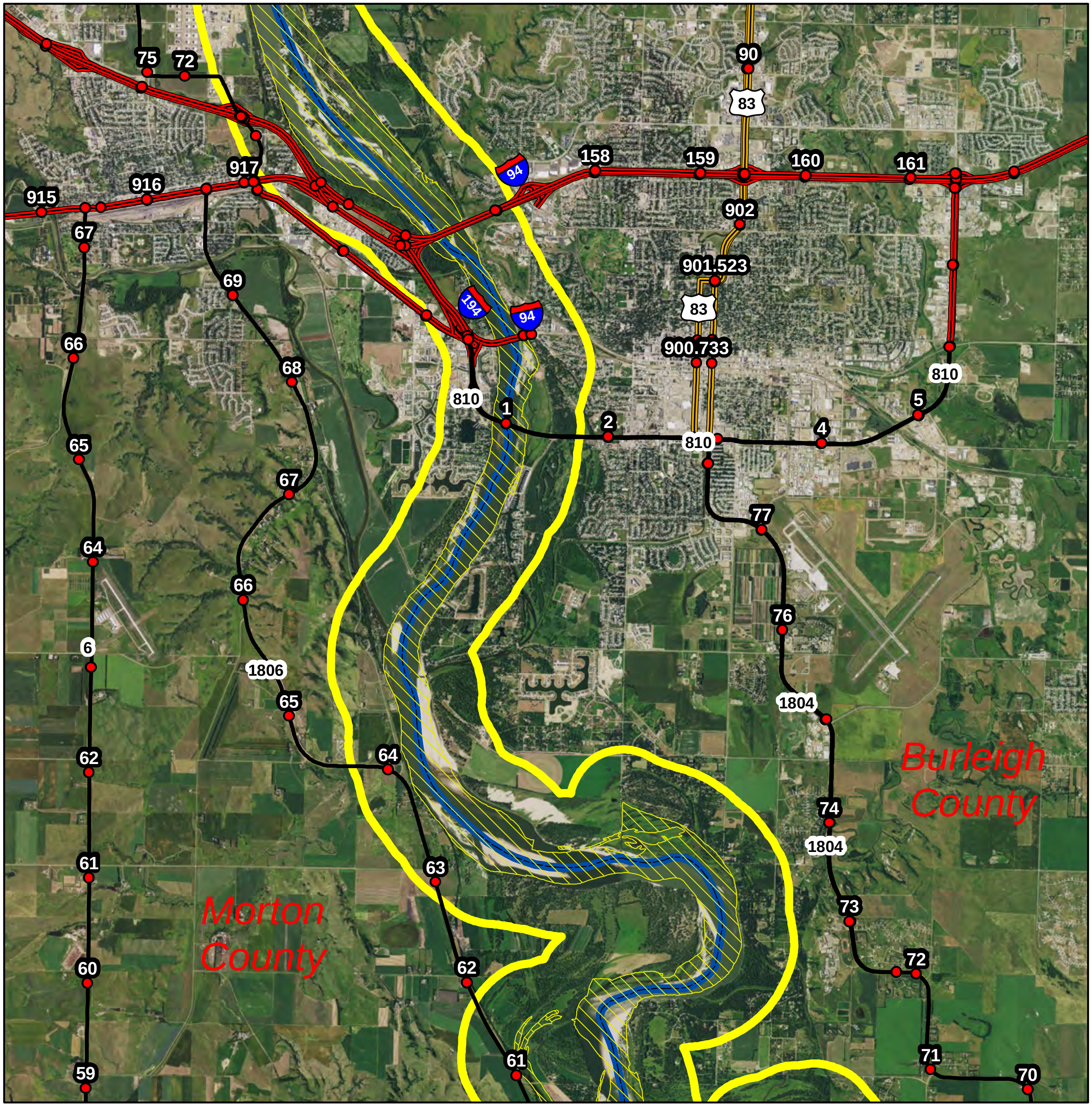
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

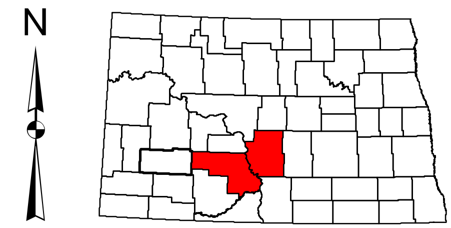
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota
Department of Transportation

0 0.45 0.9
Miles

Unit 10 - Eddy County





Burleigh and Morton Counties, North Dakota

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass

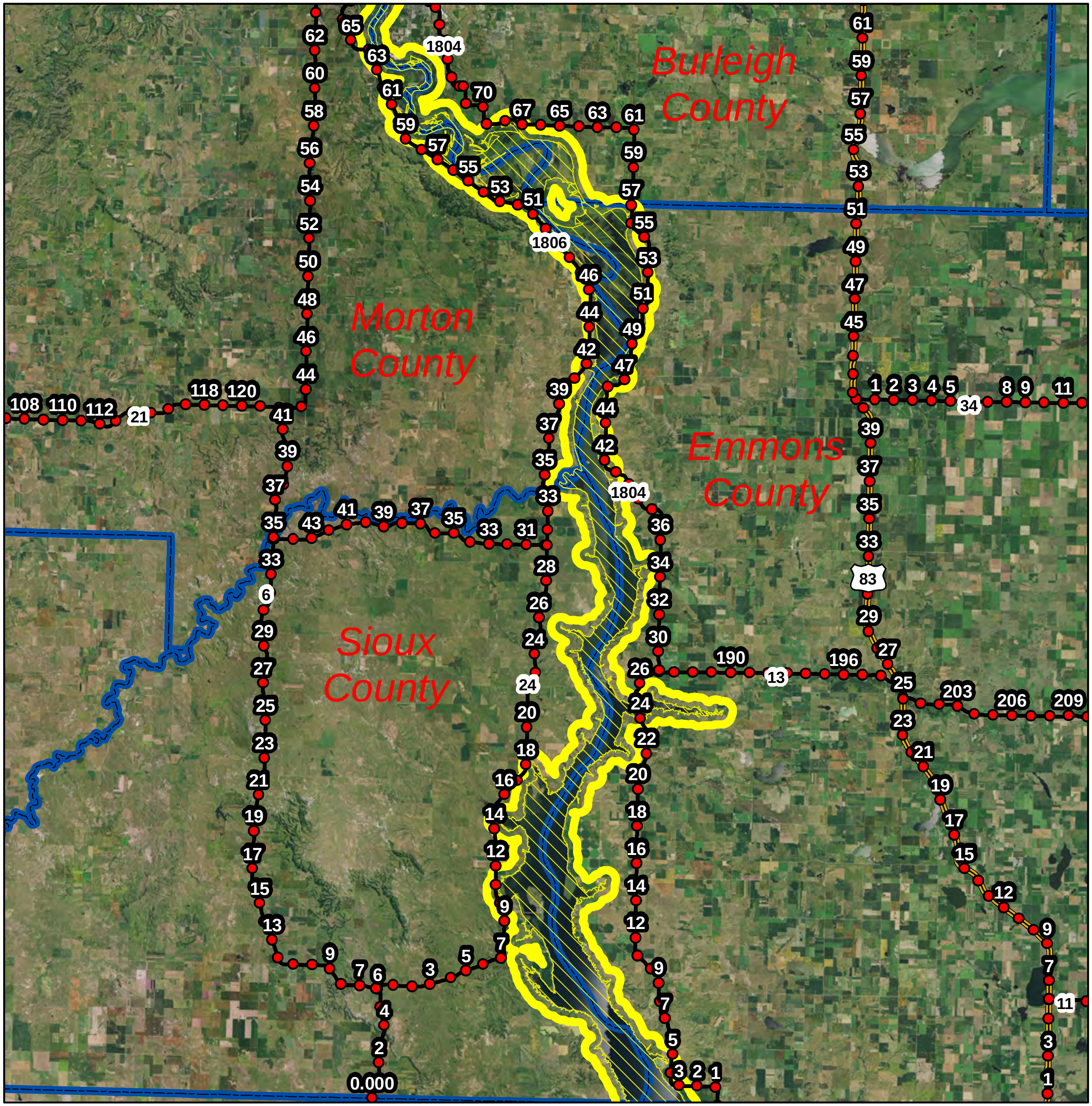
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat

NDDOT
North Dakota Department of Transportation

0 1.25 2.5 Miles

Unit 11 - Missouri River System



Unit 11 - Missouri River System

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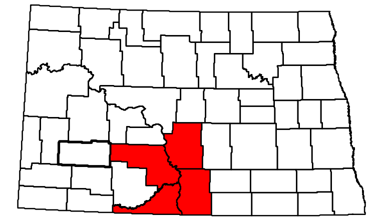


Burleigh, Emmons, Morton, and Sioux Counties, North Dakota

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

State Highways

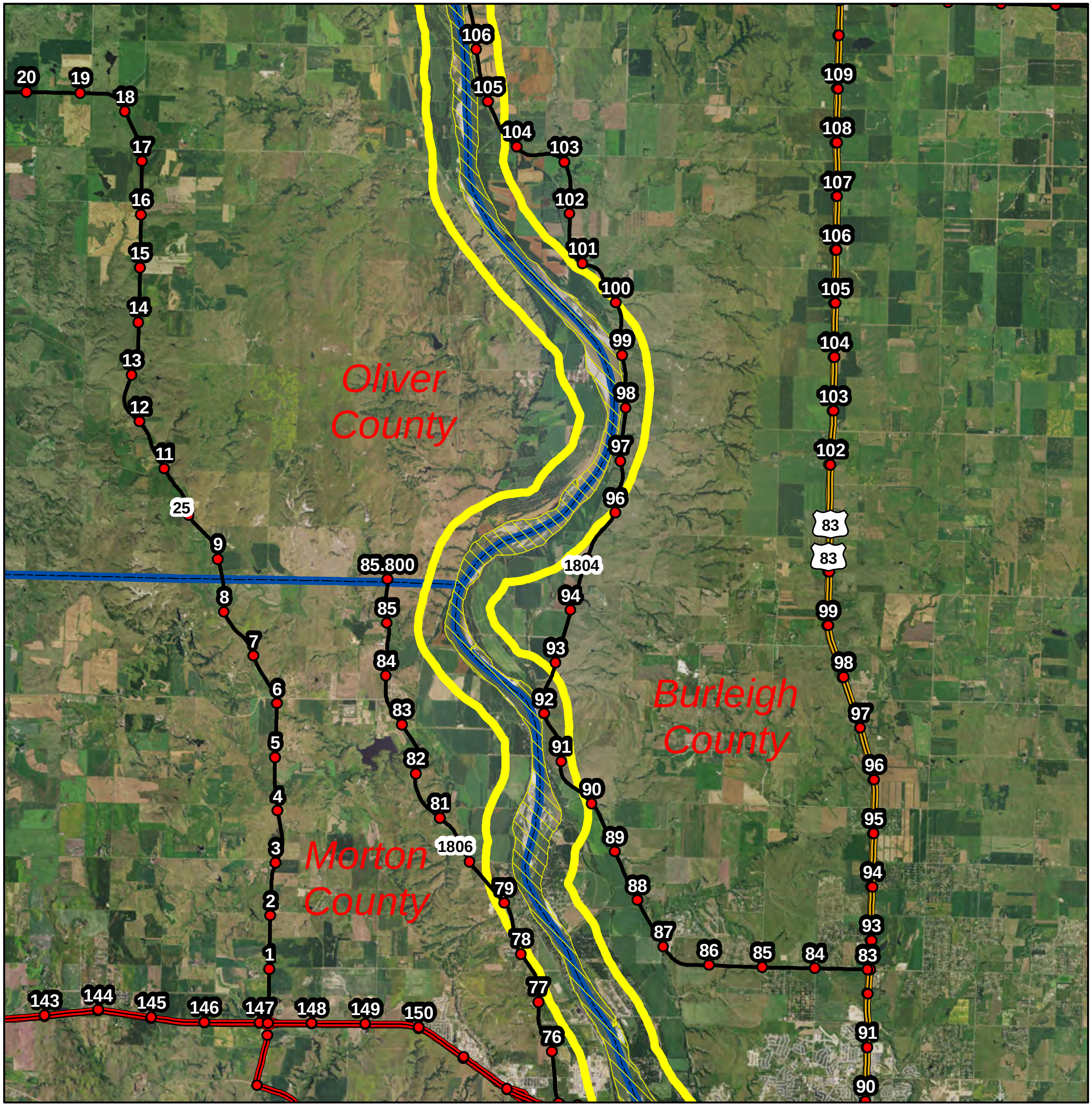
- Interstate Highway
- State Highway
- US Highway
- Bypass

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

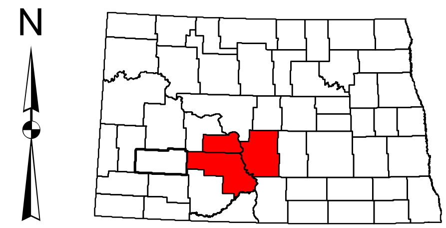
Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

NDDOT
North Dakota Department of Transportation

0 5 10
Miles



Unit 11 - Missouri River System



Burleigh,Morton, and Oliver Counties, North Dakota

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

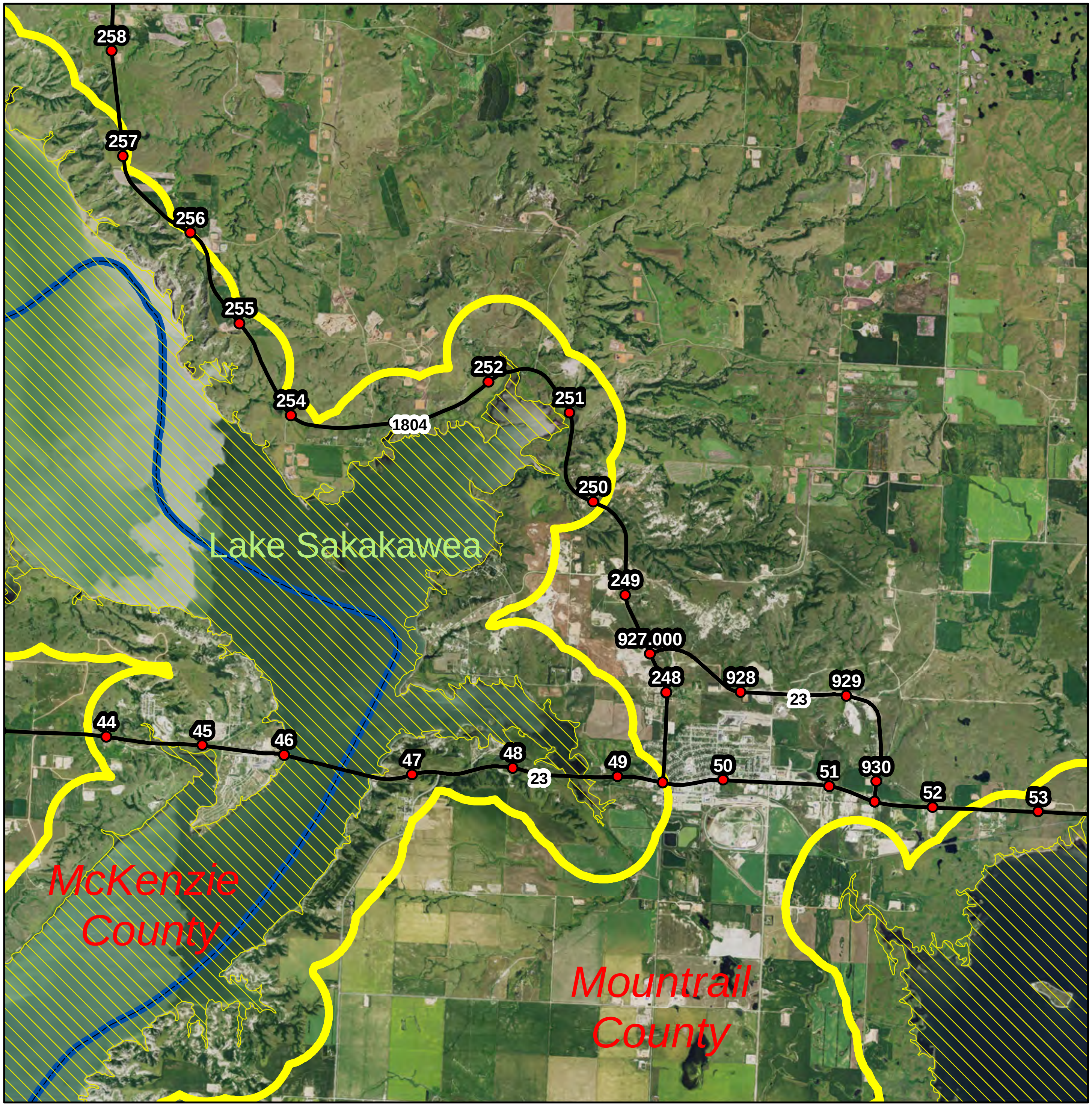
State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass

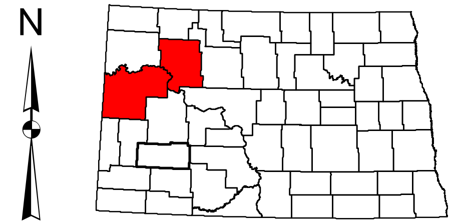
Orthophoto Source: NAIP Date of Photography: 2014 Data Source: NDGIS Hub & NDDOT		
Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat

NDDOT North Dakota Department of Transportation

0 2.75 5.5 Miles



Unit 11 - Missouri River System



McKenzie and Mountrail Counties, North Dakota

Legend

State Highways

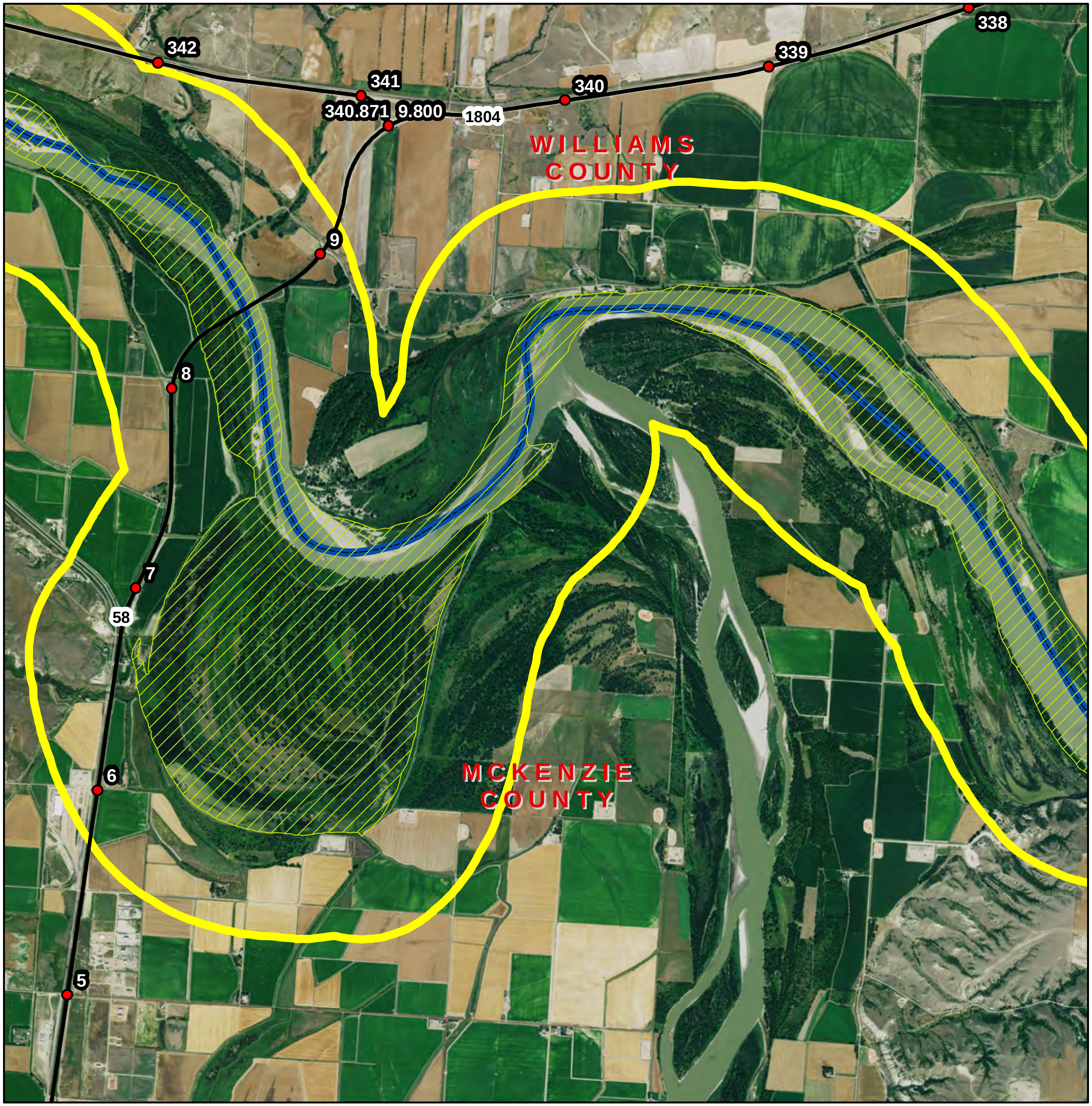
- Interstate Highway
- State Highway
- US Highway
- Bypass
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

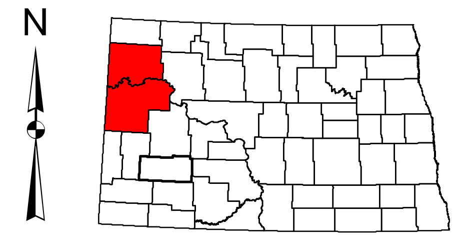
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

NDDOT North Dakota Department of Transportation

0 1.25 2.5 Miles





McKenzie and Williams Counties, North Dakota

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass

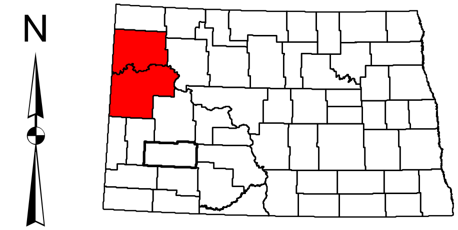
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

NDDOT
North Dakota
Department of Transportation

0 0.75 1.5 Miles

Unit 11 - Missouri River System



McKenzie and Williams Counties, North Dakota

Legend

- County Boundaries
- Piping Plover Critical Habitat
- 0.5 Mile Buffer

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass

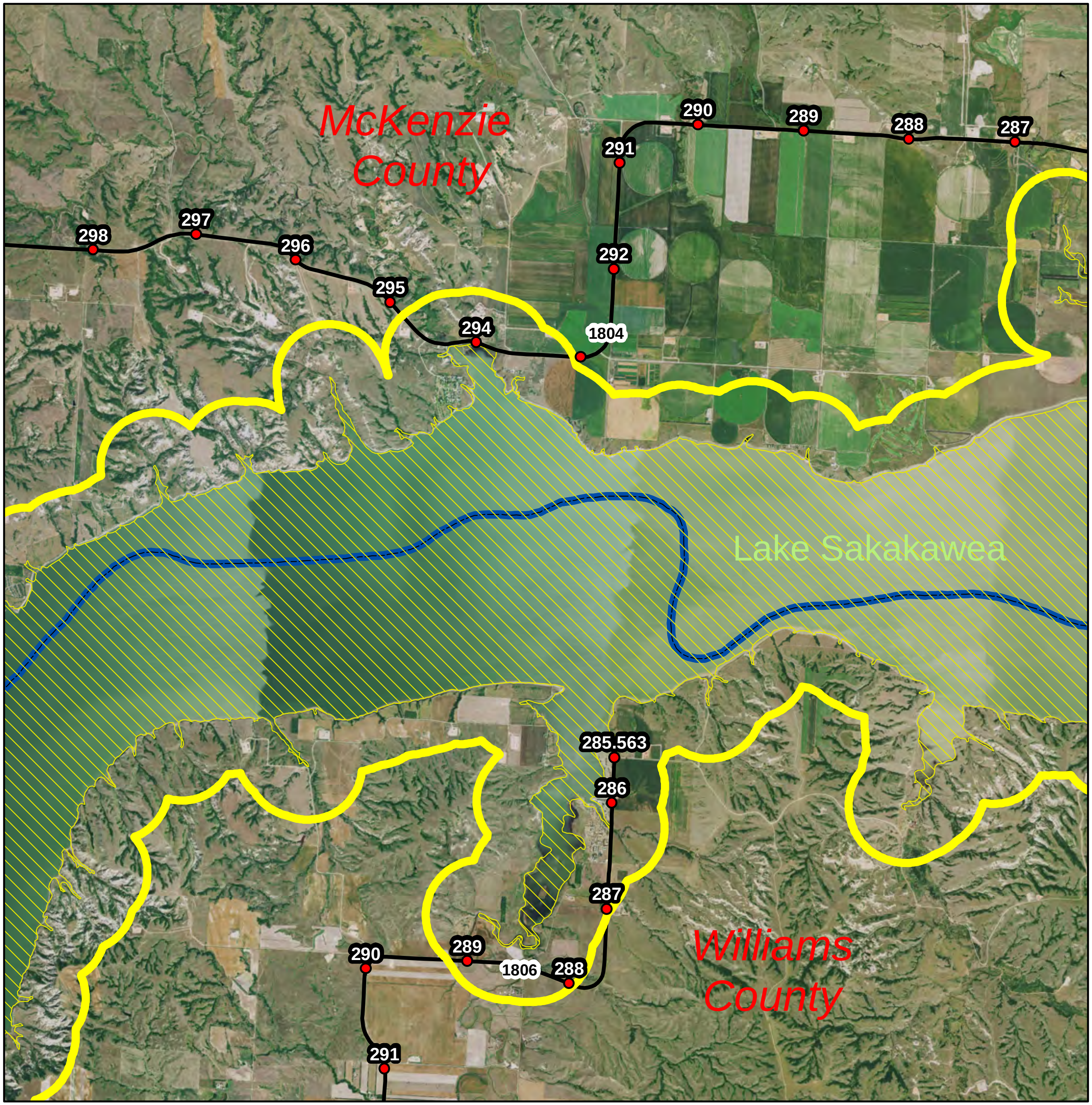
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat

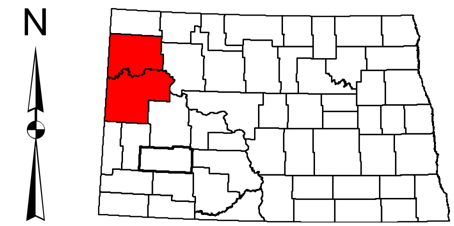
NDDOT
North Dakota Department of Transportation

Unit 11 - Missouri River System

0 1 2 Miles



Unit 11 - Missouri River System



McKenzie and Williams Counties, North Dakota

Legend

- County Boundaries
- Piping Plover Critical Habitat
- 0.5 Mile Buffer

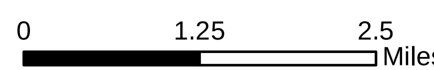
State Highways

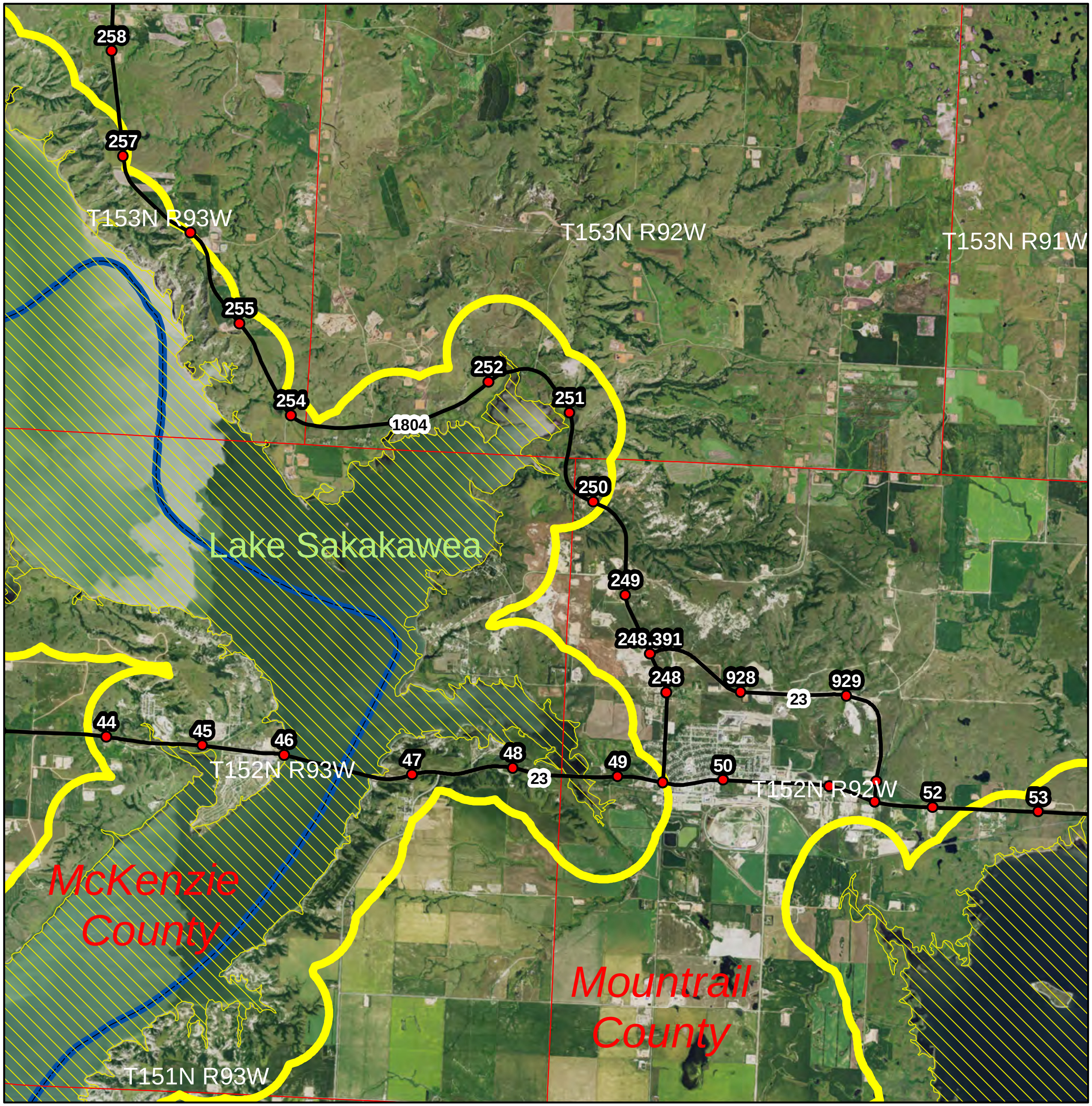
- Interstate Highway
- State Highway
- US Highway
- Bypass

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

NDDOT North Dakota Department of Transportation





Unit 11 - Missouri River System

McKenzie and Mountrail Counties, North Dakota

Legend

- PLSS Townships
- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

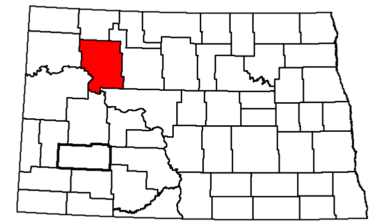
Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

NDDOT North Dakota Department of Transportation

0 1.25 2.5 Miles

Unit 11 - Missouri River System

N



Mountrail Couny, North Dakota

Legend

Piping Plover Critical Habitat

0.5 Mile Buffer

State Highways

Interstate Highway

State Highway

US Highway

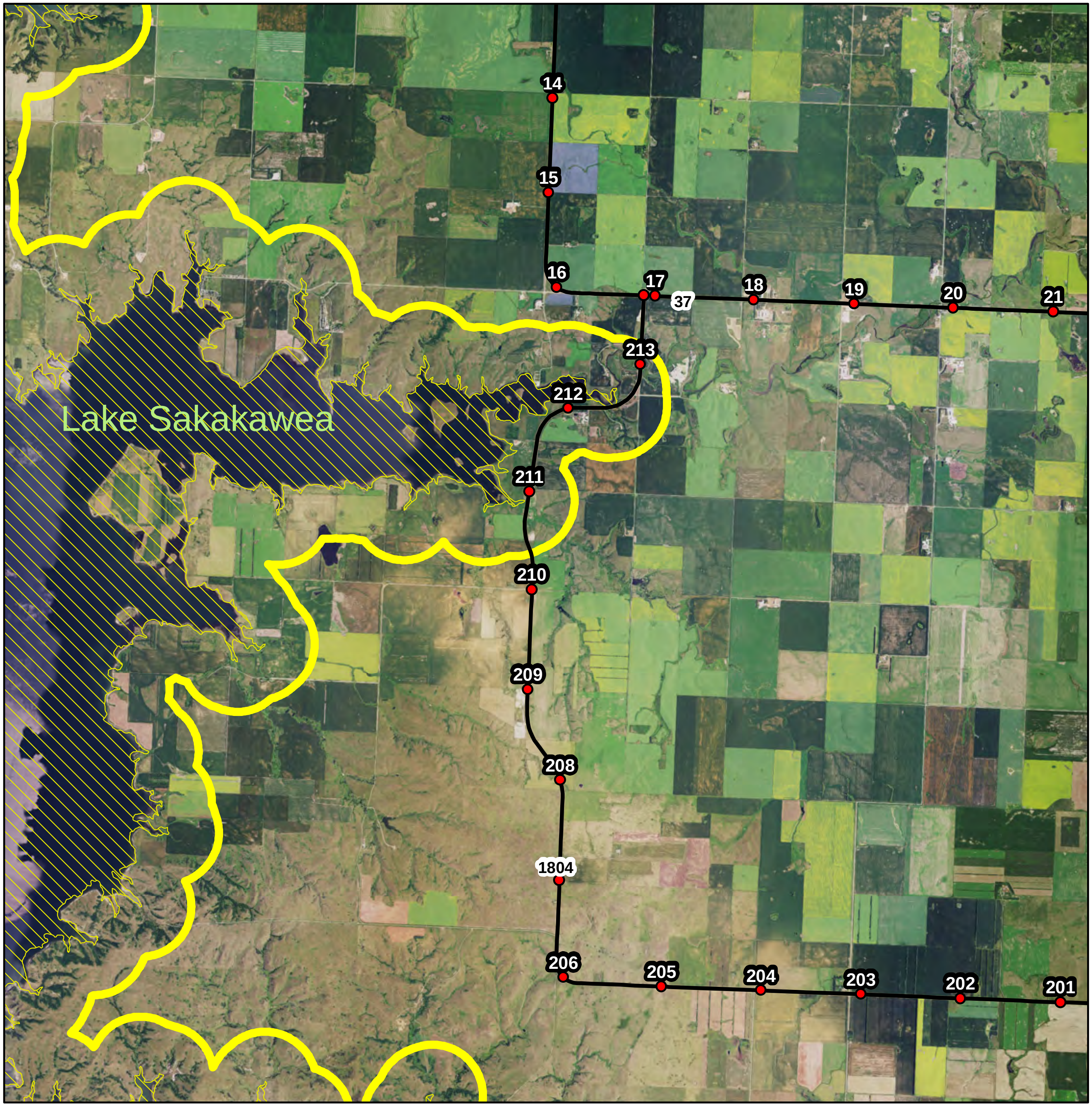
Bypass

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

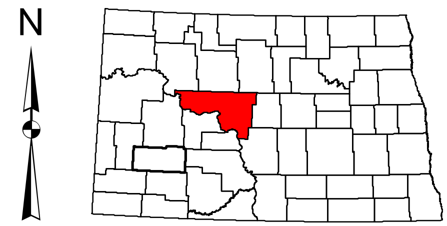
Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat

NDDOT
North Dakota Department of Transportation

0 1.5 3 Miles



Unit 11 - Missouri River System



McLean Couny, North Dakota

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass

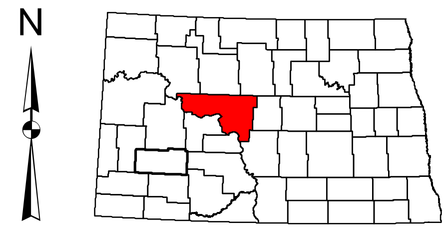
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

NDDOT
North Dakota Department of Transportation

0 1.5 3 Miles

Unit 11 - Missouri River System



McLean Couny, North Dakota

Legend

- PLSS Townships
- Piping Plover Critical Habitat
- 0.5 Mile Buffer

State Highways

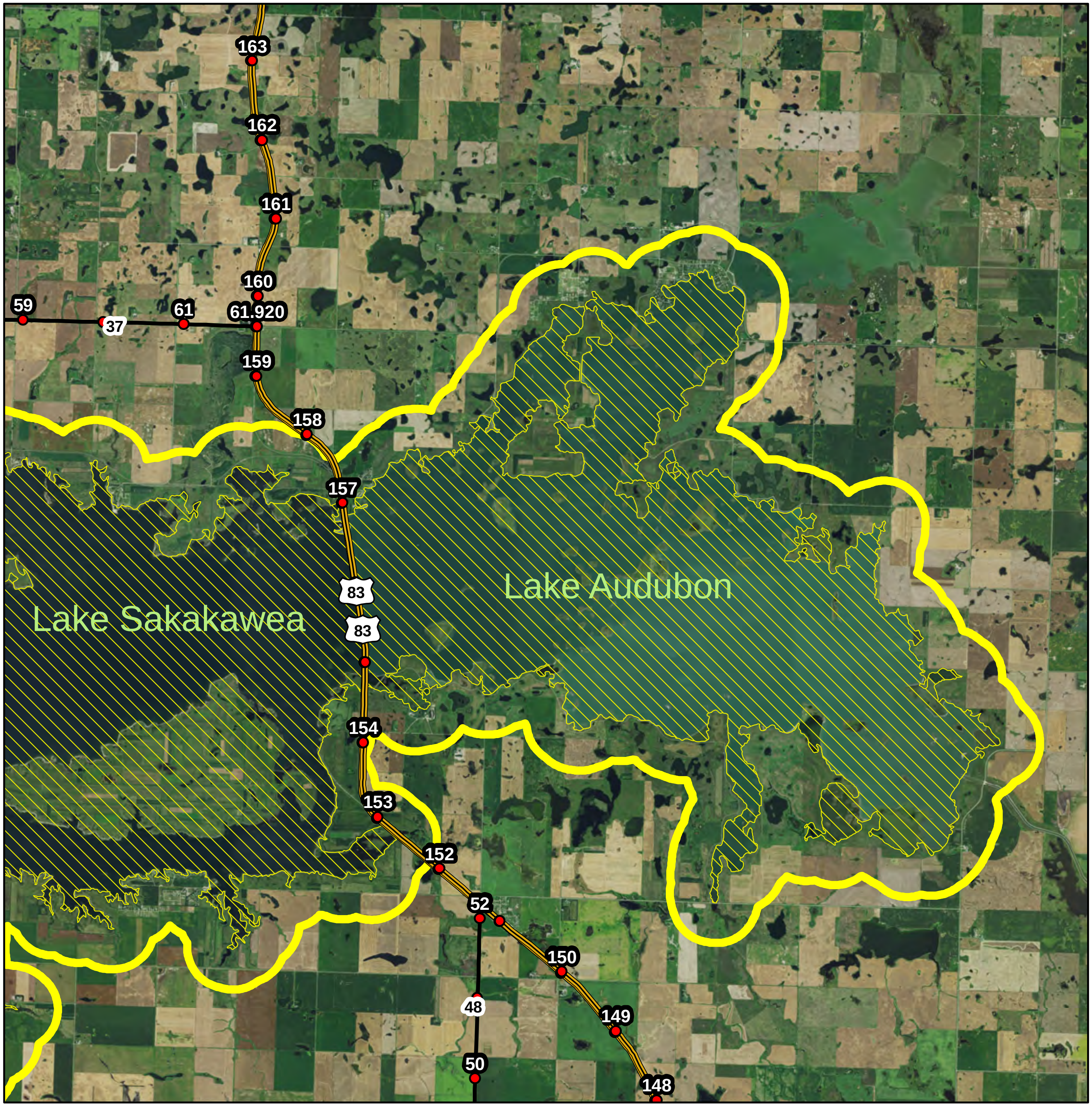
- Interstate Highway
- State Highway
- US Highway
- Bypass

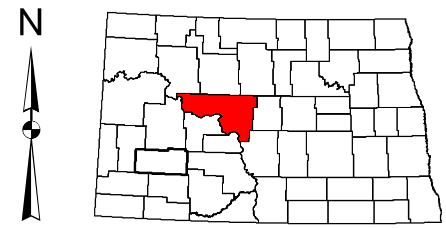
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

NDDOT
North Dakota Department of Transportation

0 1.75 3.5 Miles





McLean Couny, North Dakota

Legend

Piping Plover Critical Habitat

0.5 Mile Buffer

State Highways

Interstate Highway

State Highway

US Highway

Bypass

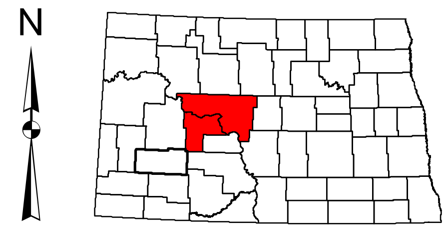
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat

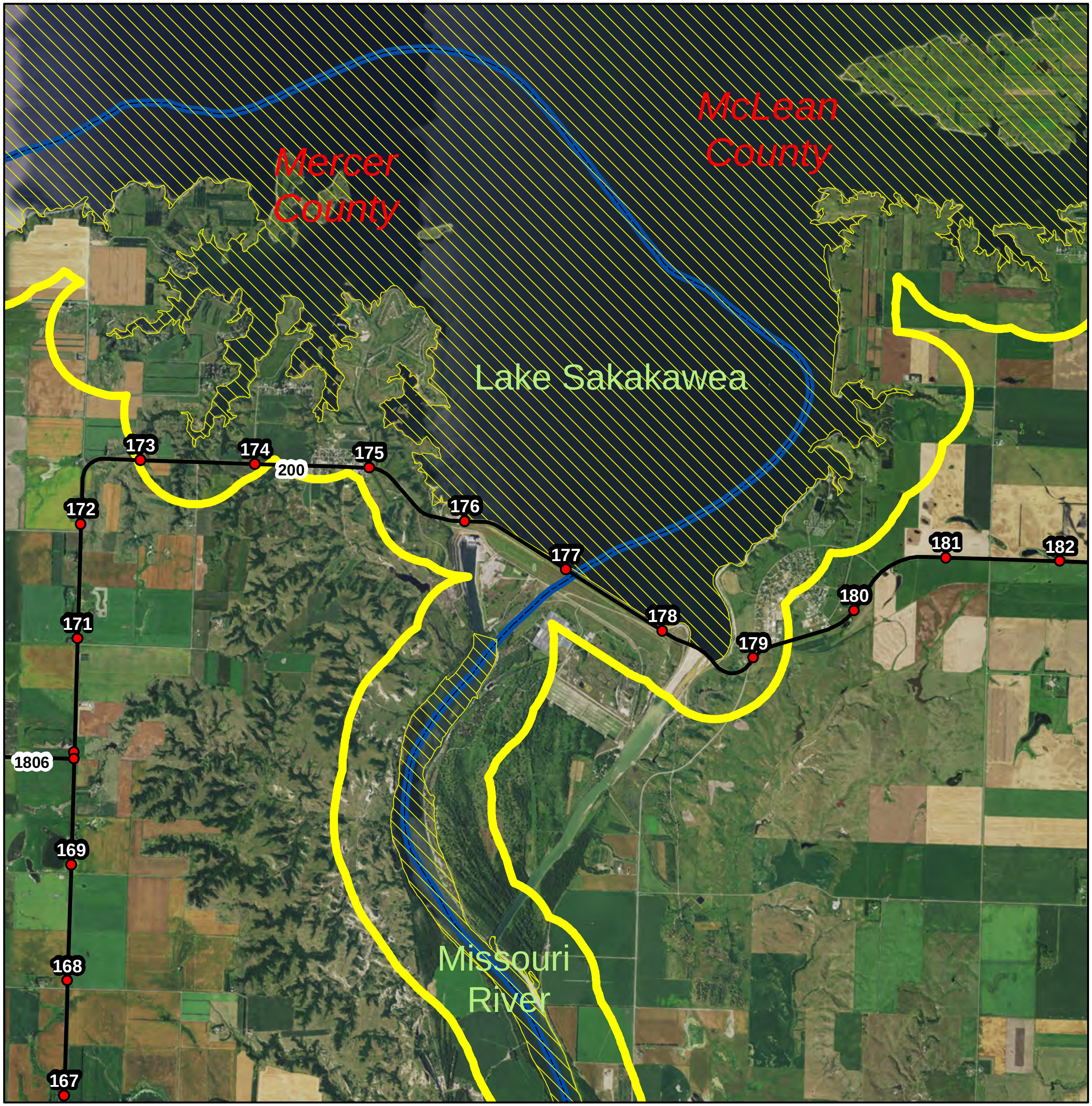
NDDOT
North Dakota Department of Transportation

Unit 11 - Missouri River System

0 1.75 3.5 Miles



McLean and Mercer Counties, North Dakota



Unit 11 - Missouri River System

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass

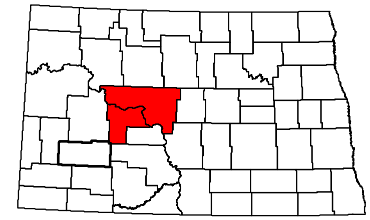
Orthophoto Source: NAIP Date of Photography: 2014 Data Source: NDGIS Hub & NDDOT		
Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat

NDDOT
North Dakota Department of Transportation

0 1.25 2.5 Miles

Unit 11 - Missouri River System

N



McLean and Mercer Counties, North Dakota

Legend

Piping Plover Critical Habitat
0.5 Mile Buffer
County Boundaries

State Highways

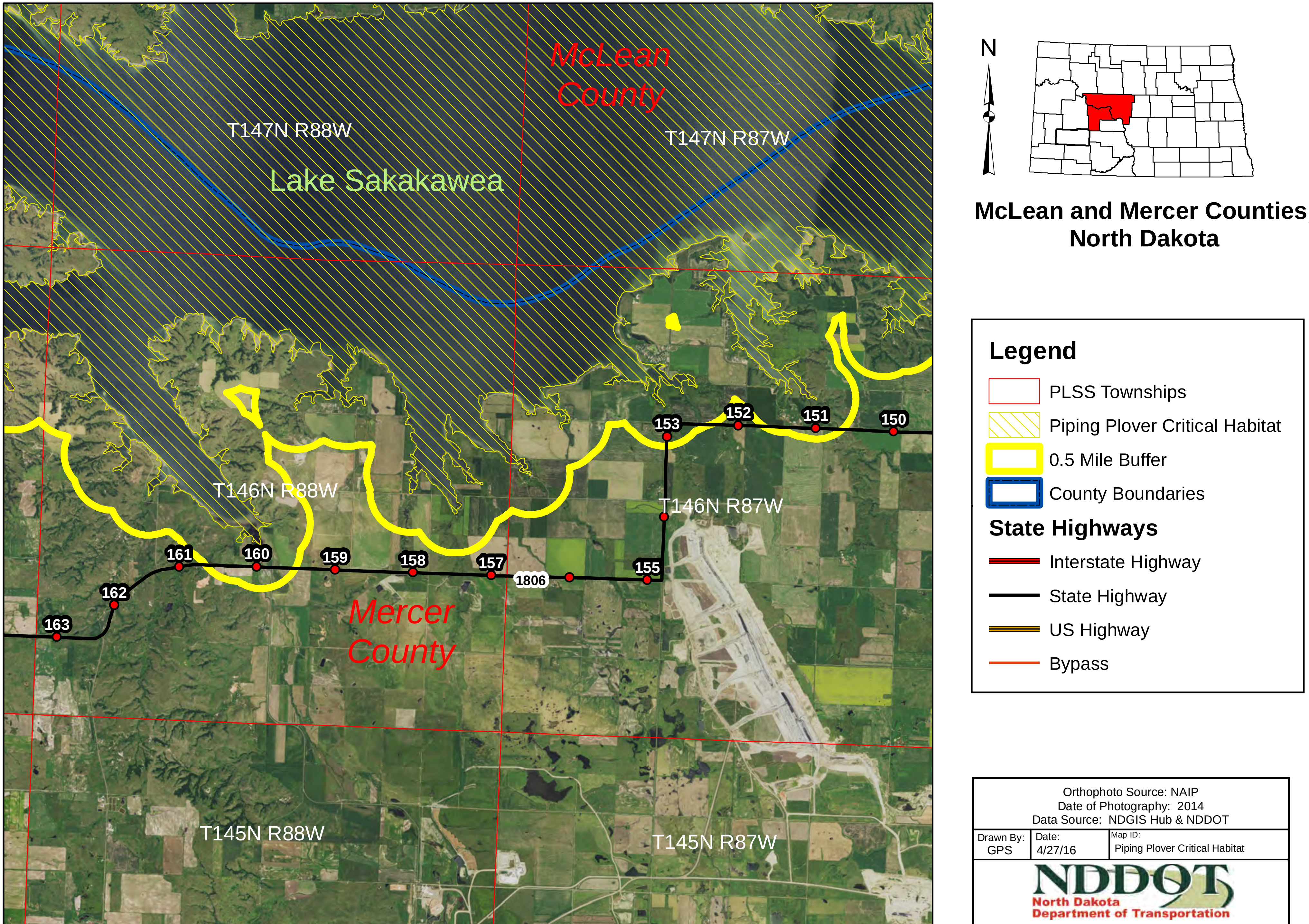
Interstate Highway
State Highway
US Highway
Bypass

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

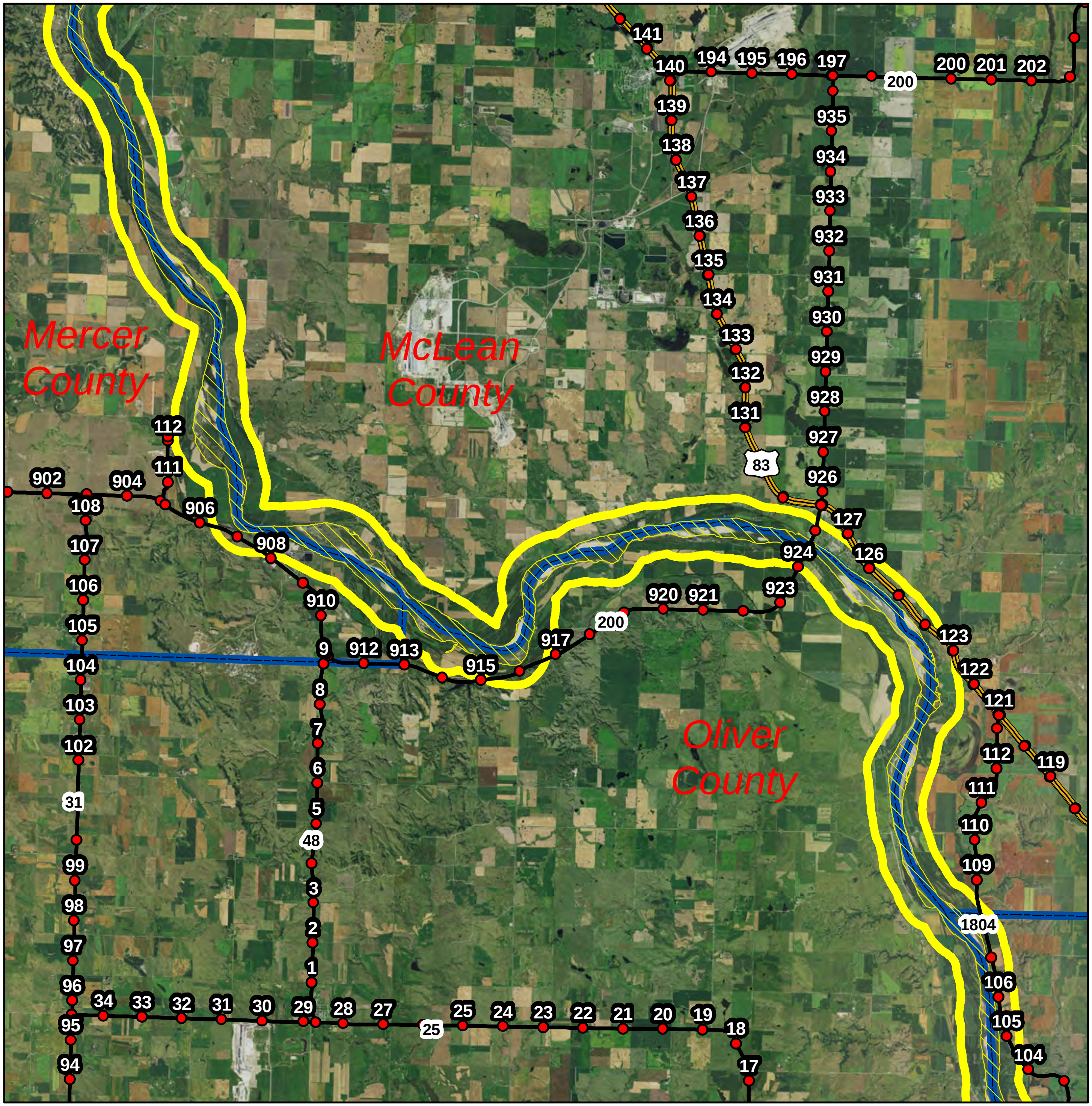
NDDOT
North Dakota Department of Transportation

0 1.5 3
Miles



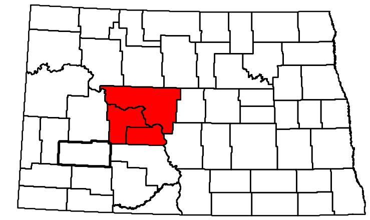
Unit 11 - Missouri River System

0 1.5 3 Miles



Unit 11 - Missouri River System

N



McLean, Mercer, and Oliver Counties, North Dakota

Legend

Piping Plover Critical Habitat

0.5 Mile Buffer

County Boundaries

State Highways

Interstate Highway

State Highway

US Highway

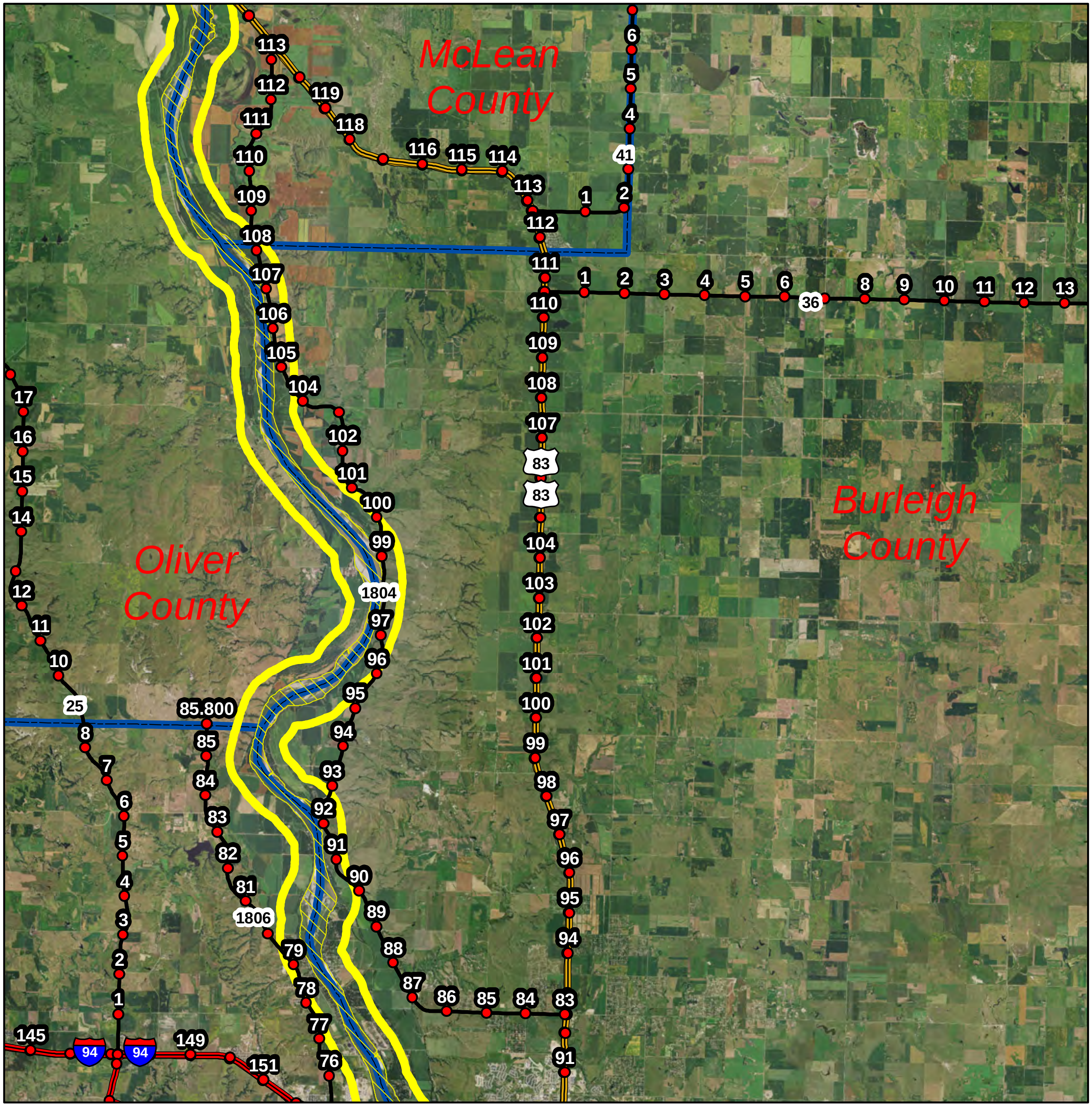
Bypass

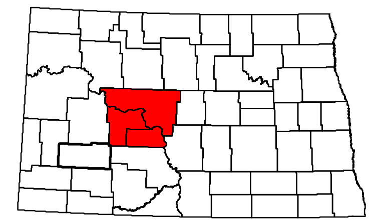
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat

NDDOT
North Dakota Department of Transportation

0 3.75 7.5 Miles





N

McLean, Mercer, and Oliver Counties, North Dakota

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass

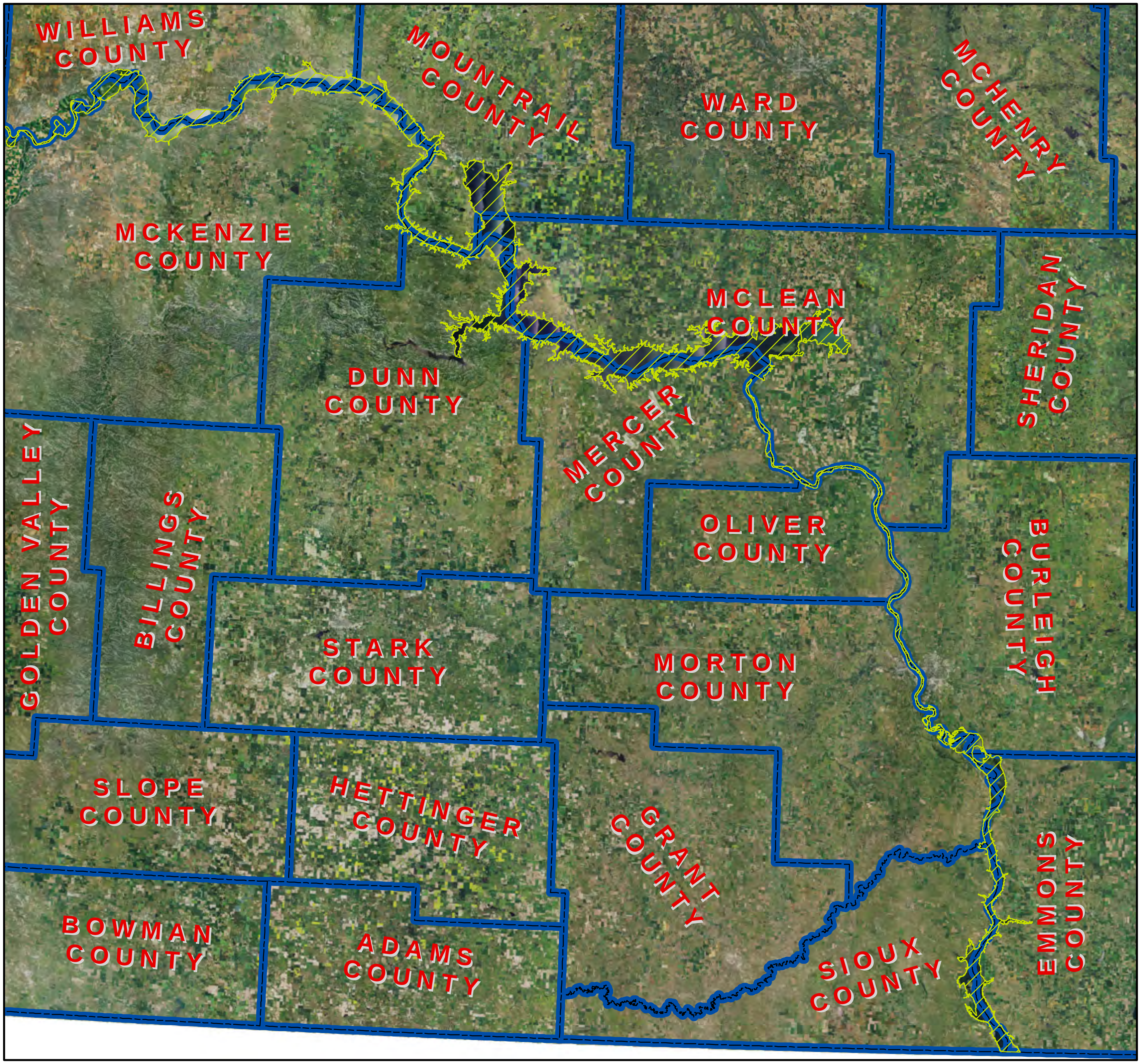
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

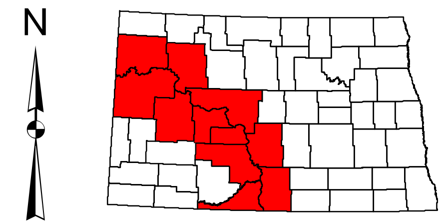
Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

NDDOT
North Dakota Department of Transportation

Unit 11 - Missouri River System

0 3.75 7.5 Miles





Burleigh, Emmons, Dunn, McLean, McKenzie,Mercer, Morton, Mountrail, Oliver, Sioux, and Williams Counties, North Dakota

Legend

- Piping Plover Critical Habitat
- County Boundaries

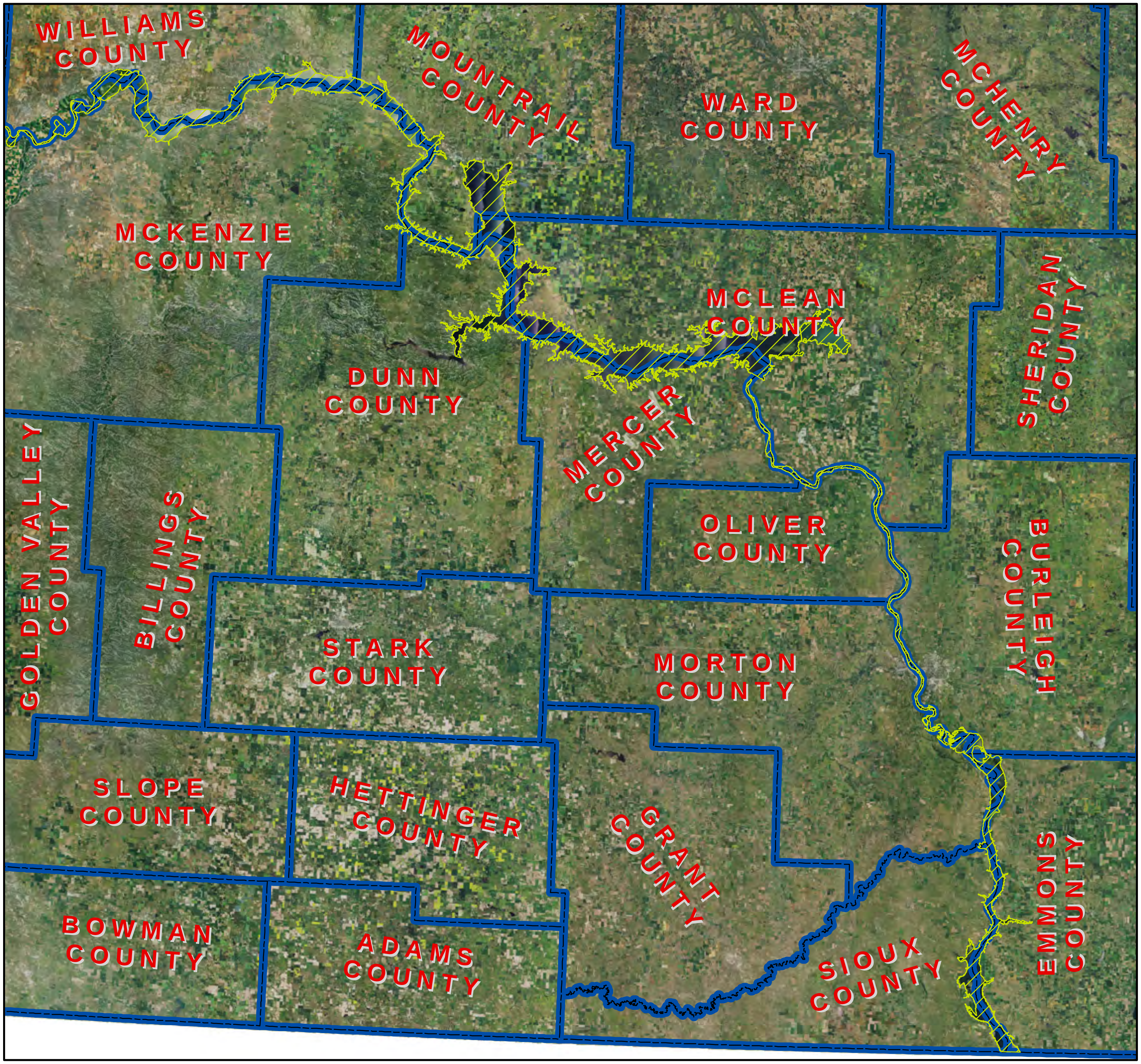
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

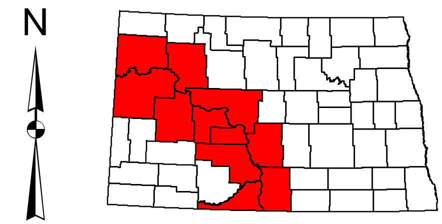
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/28/17	Piping Plover Critical Habitat	1

NDDOT
North Dakota Department of Transportation

0 25 50 Miles

Unit 11 - Missouri River System





Burleigh, Emmons, Dunn, McLean, McKenzie,Mercer, Morton, Mountrail, Oliver, Sioux, and Williams Counties, North Dakota

Legend

- Piping Plover Critical Habitat
- County Boundaries

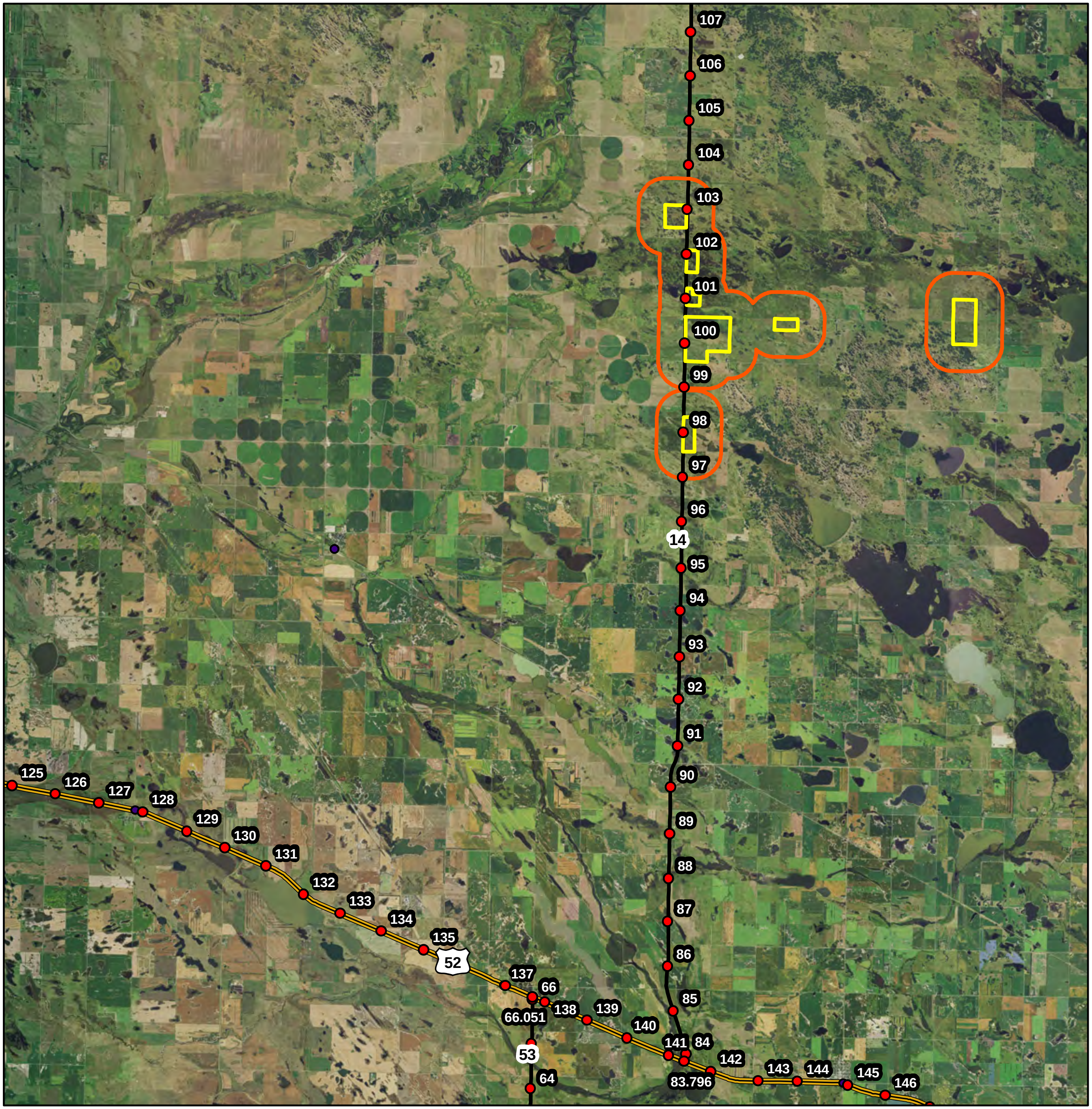
Orthophoto Source: NAIP Date of Photography: 2014 Data Source: NDGIS Hub & NDDOT			
Drawn By: GPS	Date: 4/28/17	Map ID: Piping Plover Critical Habitat	Sheet: 1

NDDOT
North Dakota
Department of Transportation

Unit 11 - Missouri River System

0 25 50 Miles

APPENDIX F
Dakota Skipper Critical Habitat Maps



Unit 5 - N.D. Highway 14 - McHenry County

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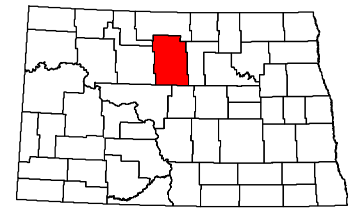


McHenry County, North Dakota

Legend

- 0.6 Mile Dispersal Buffer
- Dakota Skipper Critical Habitat
- Reference Pts

State Highways

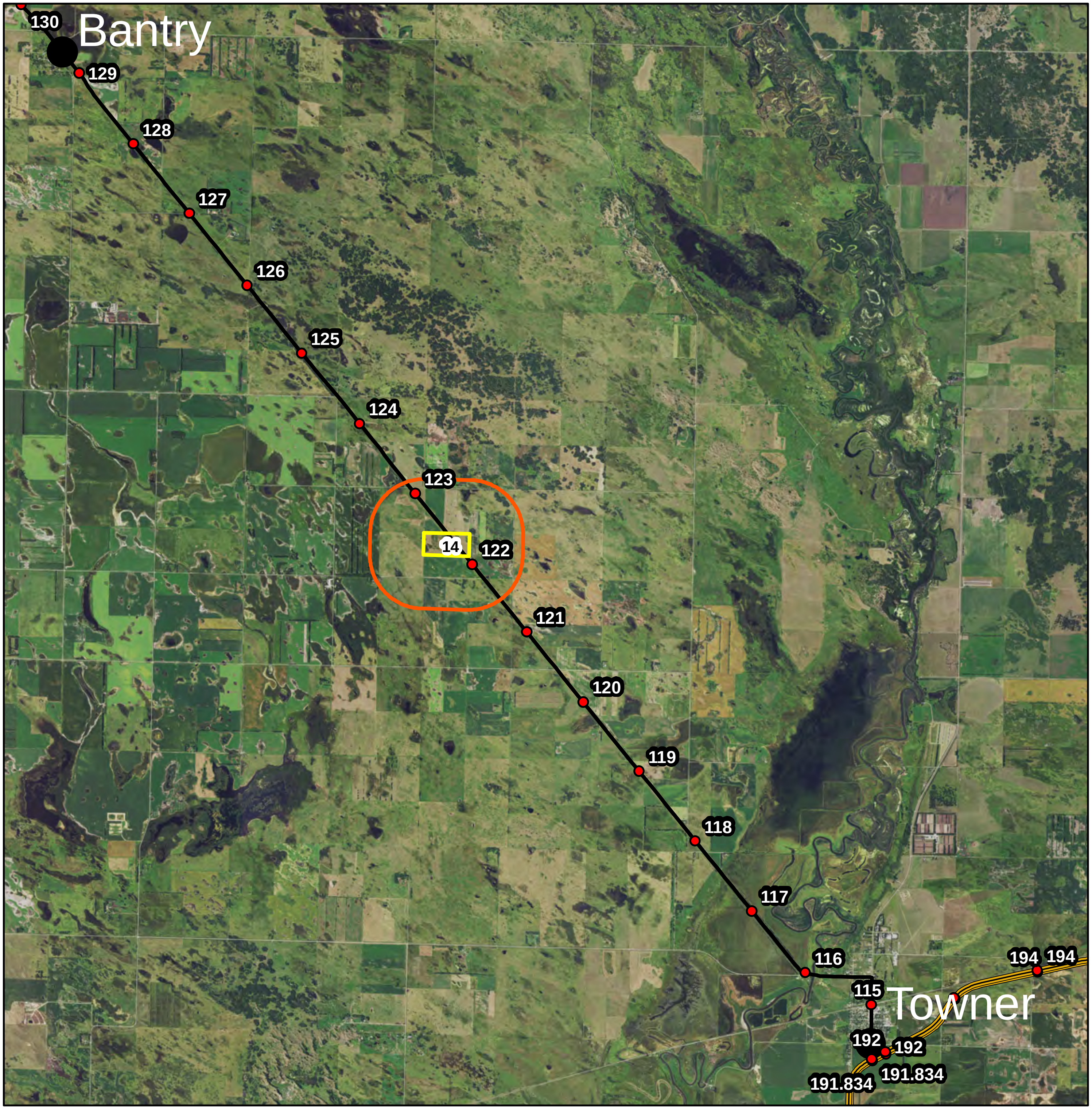
- State Highway
- US Highway

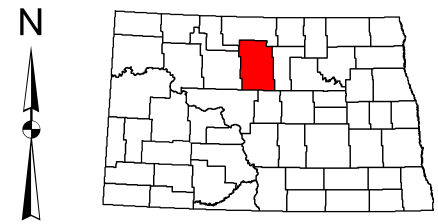
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:	Sheet:
GPS	2/11/16	Dakota Skipper Critical Habitat	1

NDDOT
North Dakota Department of Transportation

0 3.25 6.5 Miles





McHenry County, North Dakota

Legend

- 0.6 Mile Dispersal Buffer
- Dakota Skipper Critical Habitat
- Reference Pts

State Highways

- State Highway
- US Highway

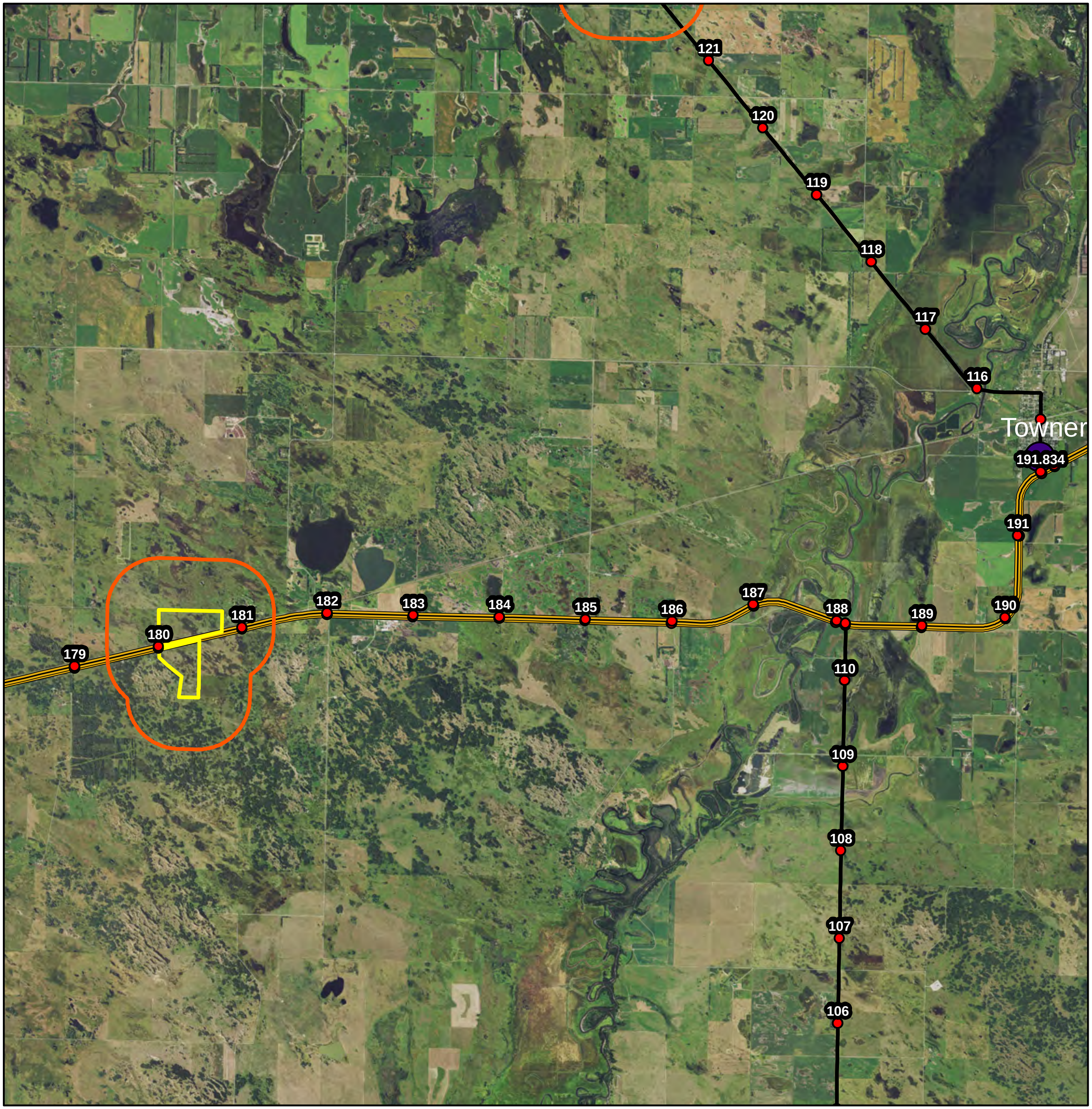
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:	Sheet:
GPS	2/11/16	Dakota Skipper Critical Habitat	2

NDDOT
North Dakota Department of Transportation

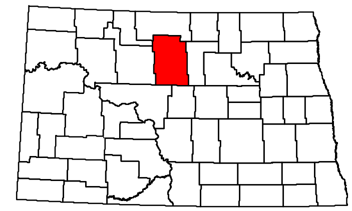
0 1.5 3 Miles

Unit 6 - N.D. Highway 14 - McHenry County



Unit 7 - U.S. Highway 2 - McHenry County

N



McHenry County, North Dakota

Legend

- 0.6 Mile Dispersal Buffer
- Dakota Skipper Critical Habitat
- Reference Pts

State Highways

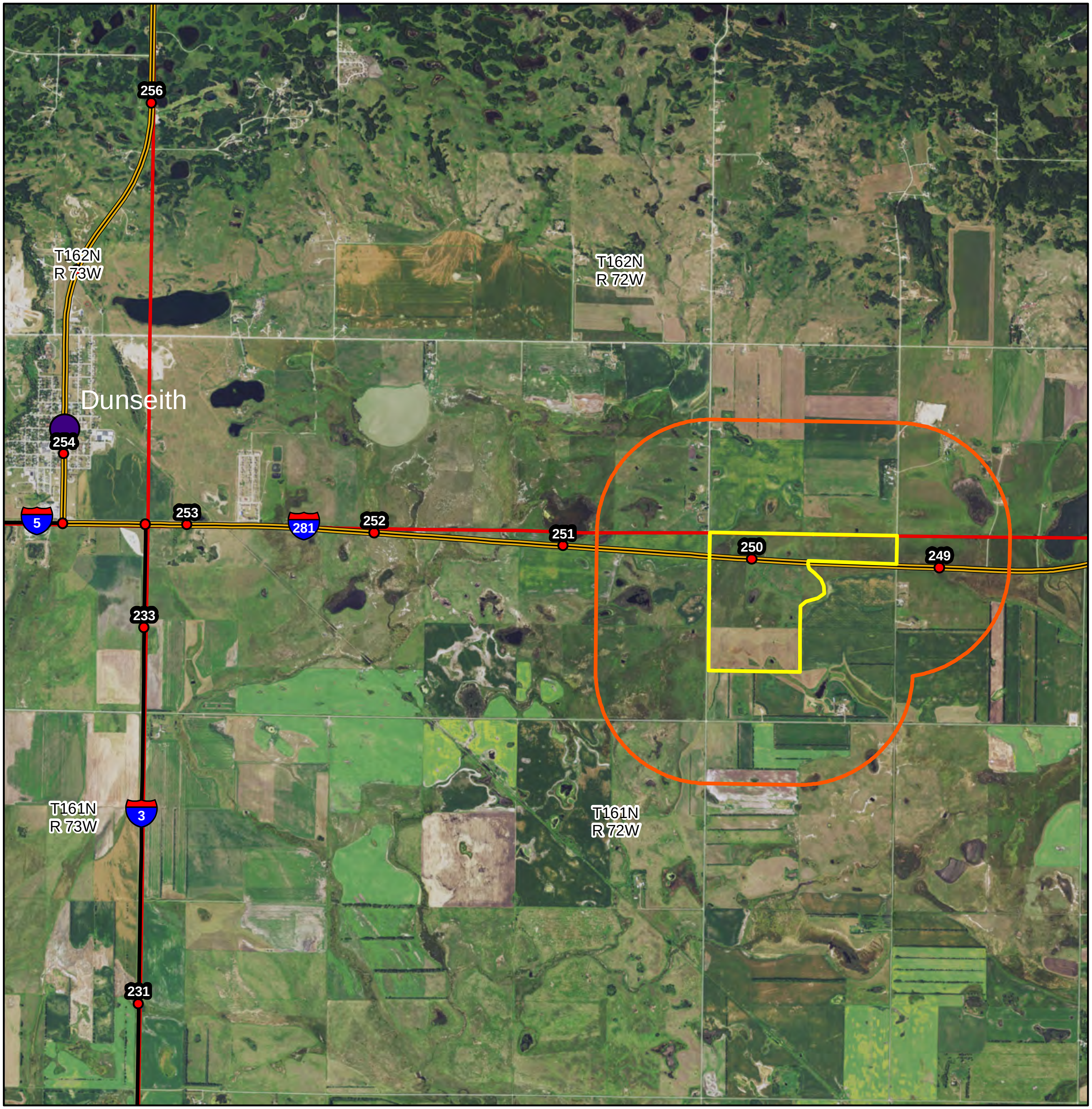
- State Highway
- US Highway

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:	Sheet:
GPS	2/11/16	Dakota Skipper Critical Habitat	3

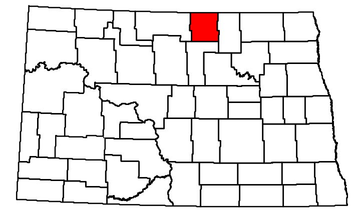
NDDOT
North Dakota
Department of Transportation

0 1.75 3.5
Miles



Unit 9 - N.D. Highway 281 - Rolette County

N



Rolette County, North Dakota

Legend

- 0.6 Mile Dispersal Buffer
- Dakota Skipper Critical Habitat
- Reference Pts

State Highways

- State Highway
- US Highway

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

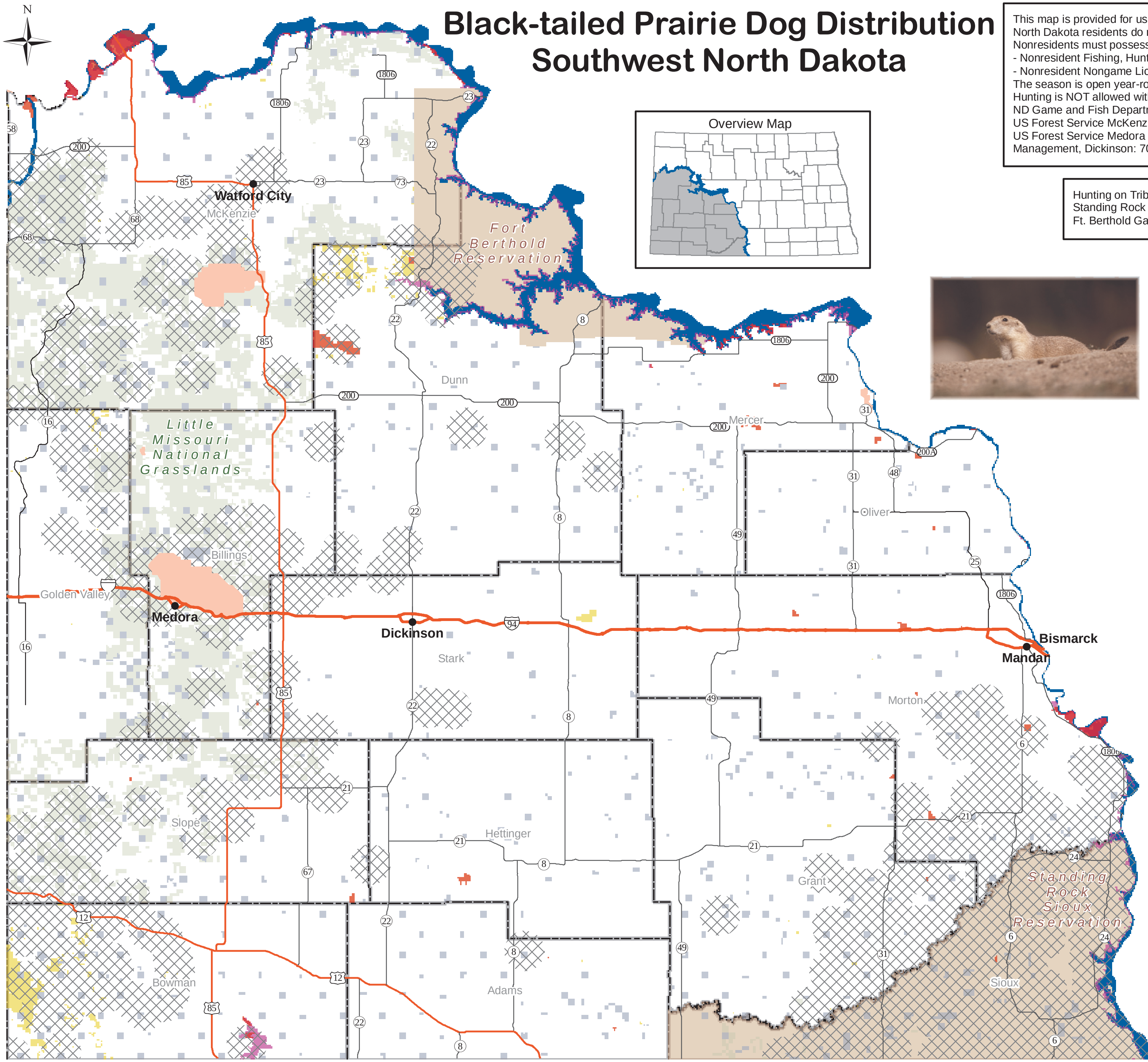
Drawn By:	Date:	Map ID:	Sheet:
GPS	2/11/16	Dakota Skipper Critical Habitat	4

NDDOT
North Dakota Department of Transportation

0 0.75 1.5 Miles

APPENDIX G
Prairie Dog Range Map

Black-tailed Prairie Dog Distribution
Southwest North Dakota



This map is provided for use in locating black-tailed prairie dog towns.
North Dakota residents do not need a license to hunt prairie dogs.
Nonresidents must possess the following licenses:
- Nonresident Fishing, Hunting, and Furbearer Certificate - $2
- Nonresident Nongame License - $15

The season is open year-round.
Hunting is NOT allowed within the US National Parks.
ND Game and Fish Department, Bismarck: 701-328-6300
US Forest Service McKenzie Ranger District, Watford City: 701-842-2393
US Forest Service Medora Ranger District and Bureau of Land Management, Dickinson: 701-227-7700

Overview Map

Hunting on Tribal Land may require an additional license:
Standing Rock Game, Fish & Parks, Ft. Yates: 701-854-7236
Ft. Berthold Game & Fish, New Town: 701-627-4760

Map Features

- Active Prairie Dog Areas
- US National Park Service
- US Forest Service
- US Bureau of Land Management
- US Army Corps of Engineers
- ND Game and Fish Department
- ND Land Department
- Tribal Land
- Missouri River System

0 5 10 20 Miles

DO NOT SHOOT

The burrowing owl is a small ground-dwelling bird standing less then one foot tall. It is brown with pale spots. They are often seen standing at the mouth of an abandoned prairie dog burrow, in which they nest and raise an average of 7-9 young. Please be aware of their presence and DO NOT SHOOT them. The burrowing owl population is declining in North Dakota and killing them or any other raptor can result in significant fines.

NDGF GIS
S. Johnson
February 2008

APPENDIX H
Hydro-acoustic Monitoring Plan

Hydroacoustic Monitoring Report

Underwater Acoustic Monitoring of Pile Installation Associated with Construction of the Lewis and Clark Bridge

Final Report

April 2016

Prepared By:
KLJ
4585 Coleman Street
Bismarck, ND 58503

Prepared For:
North Dakota Department of Transportation
608 East Boulevard Avenue
Bismarck, ND 58505-0700

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Appendices

1. Introduction

1.1. Project Overview

KLJ was contracted by the North Dakota Department of Transportation (NDDOT) to complete a hydroacoustic noise study to measure underwater sound from pile driving operations associated with construction of the Lewis and Clark Bridge. The Lewis and Clark Bridge is located along US Highway 85 in northwestern North Dakota and spans the Missouri River. Please refer to *Figure 1, Project Overview Map*. The purpose of this study is to assess the potential for project-related impacts on fish, specifically the pallid sturgeon, which is listed as an endangered species under the federal Endangered Species Act (ESA).

Prior to the initiation of pile driving operations, a Hydroacoustic Monitoring Plan was developed by KLJ in cooperation with the NDDOT, Federal Highway Administration (FHWA), US Fish and Wildlife Service (USFWS) and US Army Corps of Engineers (USACE). The purpose of this plan was to outline the process and procedures for implementing hydroacoustic monitoring and establish decibel (dB) thresholds for peak (i.e., 206 dB) and accumulated (i.e., 187 dB) sound levels. A copy of the Hydroacoustic Monitoring Plan is provided in *Appendix A*. In the event that established thresholds were exceeded, the Hydroacoustic Monitoring Plan also outlined potential sound attenuation measures to be implemented by the contractor.

Construction of the Lewis and Clark Bridge includes installation of five bridge piers in the Missouri River. Each pier requires 54 to 60 14-inch wide (35.6-centimeter) H-piles to be driven into the river bed. Hydroacoustic measurements for this study were recorded during pile driving operations associated with Piers 2 and 3. Pile driving operations associated with Pier 2 began on July 29, 2015 and ended on September 21, 2015. A total of 60 piles were driven over the course of 55 days. Pile driving operations associated with Pier 3 began on October 6, 2015 and ended on October 22, 2015. A total of 60 piles were driven over the course of 17 days.

Figure 1, Project Overview Map

1.2. River Description

The Missouri River in the area of the project, is approximately 1,200 feet (365 meters) wide, flowing generally west to east. A cross-section of the river profile along the project corridor can be seen in *Figure 2, River Profile*. The thalweg of the river is located along the southern bank, near the location of Pier 2. During the course of monitoring, water depths at Pier 2 ranged from 23 to 24 feet (7.0 to 7.5 meters) (due to fluctuating river levels), and the water depth at Pier 3 was approximately 6 feet (1.9 meters). Flow velocities recorded during the course of this study never exceeded 1.5 meters per second.[1]

Geotechnical borings completed adjacent to the project corridor reveal the structural composition of the underlying subsurface geology. The upper 45 feet (13.7 meters) are composed primarily of medium dense to dense sands transitioning to a dense sand gravel mix. The lower 40 feet (12.2 meters) are composed of tightly laminated, hard to very hard impervious clays. The full geotechnical boring longs are provided in *Appendix B*.

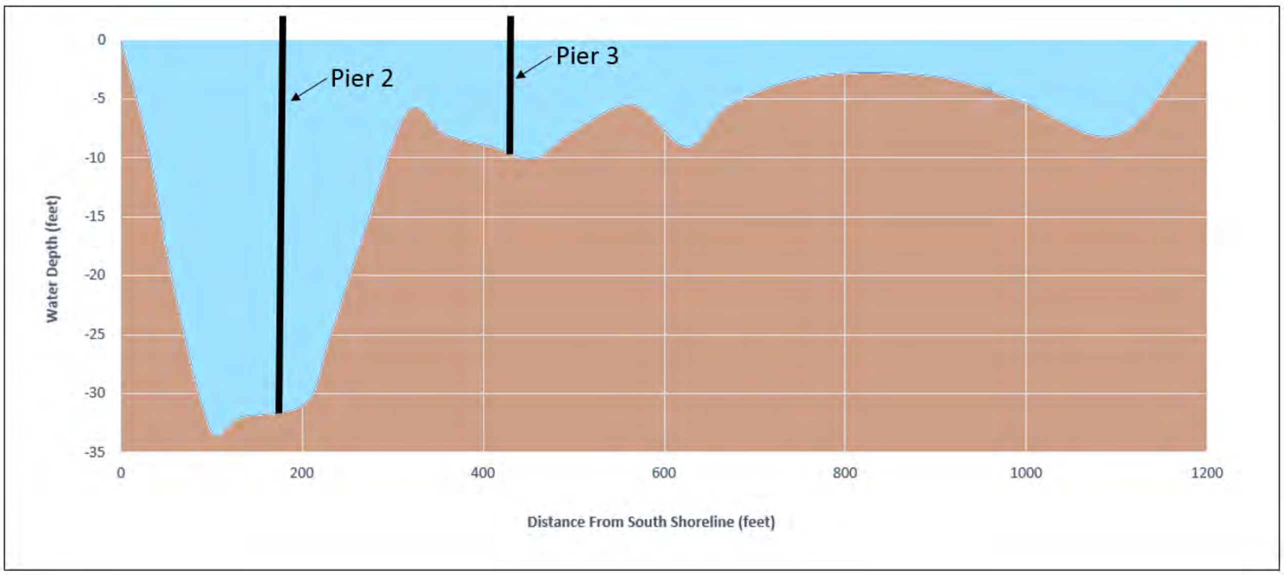

Figure 2, River Profile

1.3. Impact Potential

As stated previously, the purpose of this study is to assess the potential for project-related impacts on fish, specifically the pallid sturgeon. Potential impacts on the pallid sturgeon as a result of pile driving operations could include temporary habitat avoidance, behavioral effects (e.g., interruption of reproduction and feeding), direct injury, or mortality. The Fisheries Hydroacoustic Working Group's (FHWG) *Agreement in Principal for Interim Criteria for Injury to Fish from Pile Driving Activities* has specified an onset of injury threshold for peak sound pressure levels (SPL_{peak})[2] of 206 dB and an

[1] When collecting sound measurements in flowing environments, flow velocities of 1.5 meters per second or greater are expected to generate significant flow-induced noise, which can interfere with the detection and analysis of low-level sounds such as the sounds from a distant pile driver or background sounds. In situations where flow velocities exceed 1.5 meters per second, it is recommended that a flow shield be installed around the hydrophone to provide a barrier between the irregular, turbulent flow and the hydrophone.

[2] SPL is defined an expression of the sound pressure using the dB scale and the standard reference (re) pressures of 1 micro-Pascal (μPa) for water and 20 μPa for air. Sound pressure is the sound force per unit area, usually expressed in micro-Pascals (or micro-Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The SPL is expressed in dB as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure. SPL is the quantity that is directly measured by a sound level meter in air or a hydrophone in water.

accumulated sound exposure level ($SEL_{accumulated}$)[3] of 187 dB for fish greater than 2 grams in mass, which would include juvenile and adult pallid sturgeon.

For behavioral effects, a 150 dB root mean square (RMS) pressure[4] level has been suggested as a threshold where behavioral effects may begin to occur (Caltrans, 2009); however, this number is not backed by scientific data (Hastings, 2008). In addition, this level does not take into account differences in fish hearing capabilities (i.e., some fish may not hear sounds at this level), the levels of sounds above the threshold that would result in change in behavior, or the effects of normal ambient sounds on hearing. Fish behavior is highly variable and the criteria does not differentiate between minor non-sustained behaviors such as a transient startle response, and substantial behavioral change that would involve a fish moving away from a feeding or breeding site permanently.

The mean ambient, linear equivalent sound pressure level (SPL)[5] (i.e., background noise) within a flowing, temperate, freshwater habitat throughout the year has been recorded ranging from 111 to 133 dB, with lower mean linear equivalent SPL recorded within stagnant waters (i.e., 92 to 112 dB) (Amoser and Ladich, 2010)[6]. These levels are not considered very loud since the levels of sound, as measured in water, are generally about 60 dB higher than their equivalent sounds in air (DOSITS, 2013). Thus, a signal of 100 dB in water is about the same perceived level as a signal of 40 dB in air, a sound equivalent to a whisper. A sound of 150 dB in water is reasonably equivalent to a sound of 90 dB in air, or the sound level from a power lawn mower.

For a sound to be audible to an animal (e.g., human, fish), it must be above the ambient noise level; otherwise, the ambient sound "masks" the signal of interest. In other words, the ambient sound prevents detection of the other sound[7] (Slabbekoorn et al., 2010). In addition, the background masking sounds raises the hearing threshold of an animal. Therefore, if the normal threshold for a fish is 120 dB, a 10 dB increase in background noise would raise the hearing threshold of the fish to 130 dB (Popper et al., 2003).

The acoustic environment of a waterbody is dictated by physical factors including water depth, marine versus freshwater and bottom substrate composition. These factors are all integral to understanding the sound levels produced at the pile and how this sound decreases (i.e., attenuates) as it moves (i.e., propagates) away from the source. Sound propagates great distances with little attenuation in very deep water (e.g., ocean depths), whereas propagation is much poorer in shallower waters such as lakes and rivers (Rogers and Cox, 1988). Salinity also influences sound propagation, as sound propagates at a faster rate in denser environments (i.e., saline water has a higher density than freshwater). Finally, the bottom substrate into which a pile is being driven has a significant influence on the overall sound pressure produced. Soft substrates, such as sand and clay, result in lower dB levels compared to harder materials

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[3] SEL is the time integral of frequency-weighted squared instantaneous sound pressures. Proportionally equivalent to the time integral of the pressure squared and can be described in terms of $\mu Pa^2 \cdot sec$ over the duration of the impulse. Measured in dB re 1 $\mu Pa^2 \cdot sec$. SEL is the constant sound level in one second, which has the same amount of acoustic energy as the original time-varying sound (i.e., the total energy of an event). SEL is calculated by summing the cumulative pressure squared over the time of the event.

[4] RMS sound pressure level is a dB measure of the square root of mean square (RMS) pressure. For impulses, the average of the squared pressures over the time that comprise that portion of the waveform containing 90 percent of the sound energy of the impulse.

[5] Linear equivalent can be considered the average sound level measured over a specific time period, such as 1 min. This approach gives a better approximation of the general sound level in an environment than would an instantaneous measure which may actually record transient activities that are not really part of the soundscape.

[6] Ambient SPL depends on many factors and would not be exactly the same within the Missouri River. In addition, ambient SPL would vary depending on the time of year and flow rates.

[7] This is equivalent to the well-known "cocktail party effect" whereas background noise gets louder it becomes harder to hear a person one is talking to. In order to be heard, the speaker has to raise their voice since the background sound (the other noise sources in the room) mask detection of the voice by the listener.

such as bedrock. All of these factors, in combination with the pile size and hammer size, dictate the sound levels produced from each hammer strike.

2. Overview of Pile Driving Operation

Pile driving operations at Piers 2 and 3 were completed using a combination of three separate hammers including one vibratory hammer and two impact hammers. The vibratory hammer was used to initially set each pile and drive it to within approximately 20 feet (6 meters) of final elevation. One of the two impact hammers were then used to finish each pile and obtain bearing capacity. The two impact hammers used during this study included an International Construction Equipment, LLC (ICE) Model 80S and ICE Model I-46^{v2}. The ICE Model 80S, the smaller of the two hammers, was used to drive the initial piles associated with Pier 2. This hammer was later replaced with the larger ICE Model I-46^{v2} for driving the remaining piles at Pier 2 and all of the piles at Pier 3. Specifications for the three hammers are summarized in *Table 1, Pile Driving Hammer Specifications*.

Table 1, Pile Driving Hammer Specifications

VIBRATORY				
Hammer Model	Weight (lbs)	Eccentric Moment (in-lbs)	Driving Force (tons)	Centrifugal Force (tons)
ICE Model 66C	15,250	6,600	262	255
IMPACT				
Hammer Model	Ram Weight (lbs)	Energy at Max Stroke (ft-lbs)	Max Geometric Stroke (ft)	Operating Weight (lbs)
ICE Model 80S	8,000	99,300	10.6	17,500
ICE Model I-46^{V2}	10,141	132,550	13.1	27,179

Figure 3, Vibratory and Impact Hammers

Pile driving operations at both pier locations occurred within flooded cofferdams. These cofferdams were installed prior to the onset of pile driving operations and remained in place for the entire duration. These cofferdams were not dewatered until after pile driving operations were complete. Prior to pile driving operations, approximately 25 feet (7.6 meters) of river bottom substrate was excavated from within each cofferdam to accommodate for the seal slab and footer.

As previously mentioned, a total of 60, 14-inch wide (35.6-centimeter) H-piles, weighing 102 pounds per linear foot (152 kilograms per linear-meter) were driven at both Piers 2 and 3. The average depth each pile was driven below the excavated bottom elevation of the cofferdam was approximately 82.4 feet (25.1 meters) at Pier 2 and 85.2 feet (26.0 meters) at Pier 3.

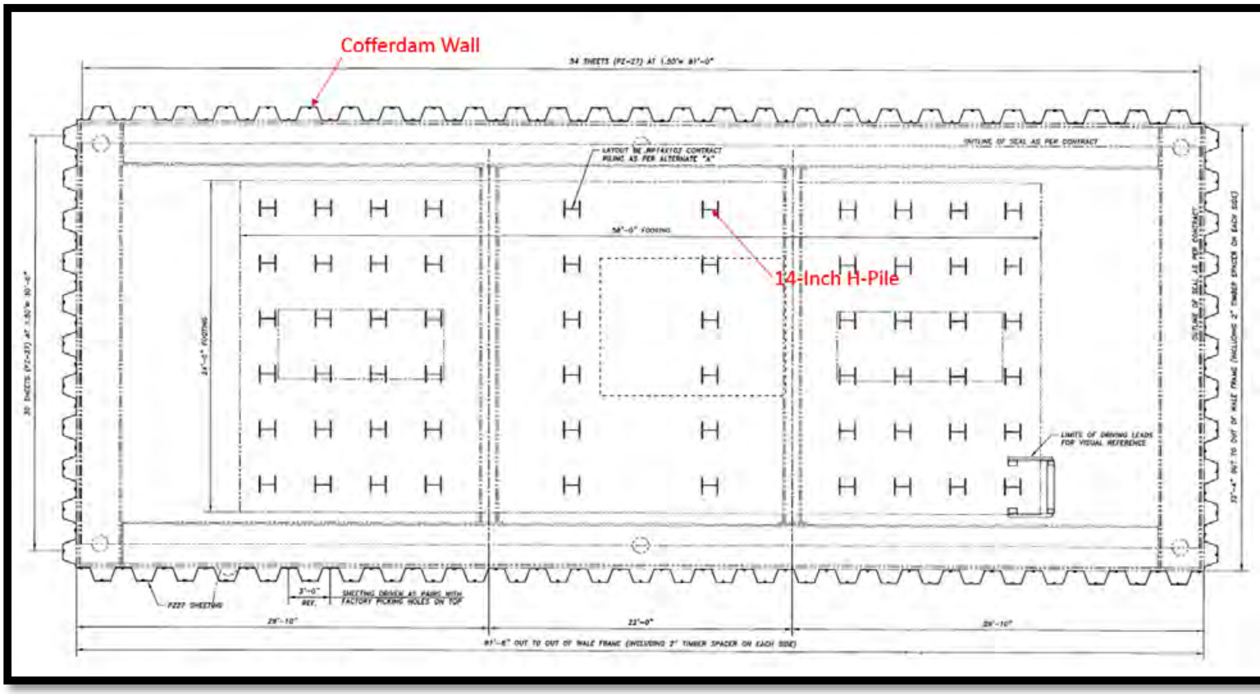

Figure 4, Cofferdam Layout (Top View)

3. Methodology

3.1. Measurement Equipment

The hydrophone used during this study was a Reson TC4013 high-sensitivity, low-frequency, miniature hydrophone. The signal from the hydrophone was fed into a Larson-Davis 831 Class 1 sound level meter (SLM)/Analyzer.

3.2. System Calibration

The overall measurement system was calibrated prior to each monitoring event using a G.R.A.S model 42AA pistonphone and hydrophone coupler, set for 114 dB at 250 hertz (Hz). System calibration was completed away from the project site at a location not subject to construction-related noise, and again at the project site prior to pile driving activities. The pistonphone functions by producing an SPL of 114 dB at 250 Hz to which the SLM is calibrated. The calibration tolerance for this study was 0.5 dB. The system was found to be within tolerance for all monitoring events completed in conjunction with this study. Prior to study initiation, the pistonphone output was certified at an independent facility.

3.3. Monitoring Setup

At both Piers 2 and 3, the hydrophone was placed at a distance of 10 meters downstream of each respective cofferdam and submerged to midwater depth with a clear acoustic line-of-sight between the cofferdam wall and the hydrophone. Midwater depth was approximately 12 feet (3.7 meters) at Pier 2 and 3 feet (0.9 meters) at Pier 3; these measurements are approximate due to fluctuating river levels. The hydrophone was attached to a steel chain to eliminate the potential for strumming of the line. The chain was attached to an anchor at the bottom and a stationary boat at the top. Pipe wrap insulation was placed around the chain at the boat to reduce the potential for incidental noise. Please refer to *Figure 5, Boat Location Relative to Cofferdam* and *Figure 6, Hydrophone Setup Diagram* for a visual overview of the monitoring setup.

Figure 5, Boat Location Relative to Cofferdam

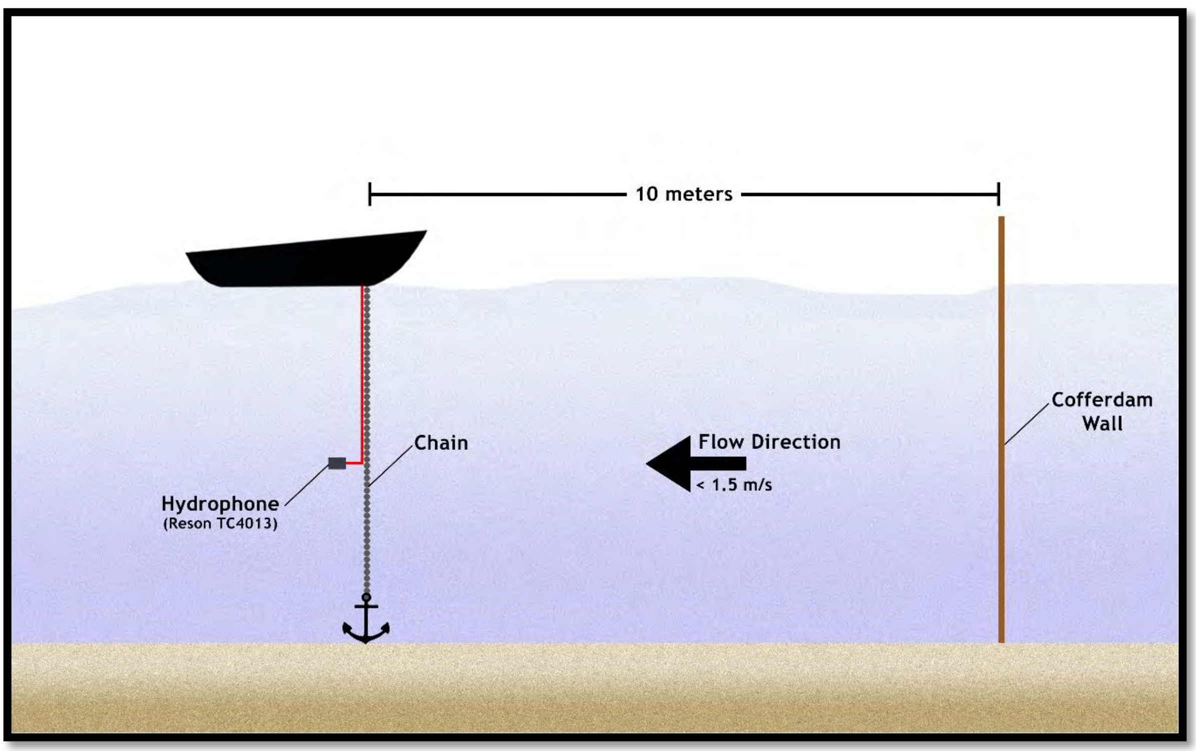

Figure 6, Hydrophone Setup Diagram

One monitoring event was also completed with the hydrophone placed inside of the cofferdam. This monitoring event was completed at Pier 3 and followed the same protocol as the monitoring events completed downstream of the cofferdam. The purpose of this monitoring event was to determine if the flooded cofferdam had any significant sound attenuation properties. The hydrophone was placed approximately 3 feet (0.9 meter) from the cofferdam wall at a depth of approximately 10 feet (3.0 meters) below the water surface. A total of 12 piles were driven during the monitoring session, with the distance from pile to hydrophone ranging from 55 to 63 feet (16.8 to 19.2 meters).

A minimum frequency range of 20 Hz to 20 kilohertz (kHz) and a minimum sampling rate of 48,000 Hz was used during monitoring. Underwater sound levels were continuously monitored during the entire duration of each pile being driven with a minimum one-third octave band frequency resolution. The SPL_{PEAK} values of each strike, and $SEL_{ACCUMULATED}$ were monitored in real-time during construction to ensure that the project did not exceed the pre-agreed upon threshold values.

4. Results

4.1. Background Readings

Underwater sound measurements were collected within the project area during periods when no pile driving activities were occurring to assess background noise. These measurements were collected at Piers 2 and 3 at a distance of 10 meters downstream of each respective cofferdam. Anthropogenic noise inputs influencing these readings included work occurring on the temporary bridge structure, traffic on the existing Lewis and Clark Bridge, and boat traffic on the river. Background noise levels collected from the two locations averaged approximately 127 dB with no significant difference between the two locations. Additional readings were obtained within the project area at locations not directly in-line with the cofferdams in order to determine if the altered flow created by the cofferdam resulted in increased background noise. No significant differences were identified.

Based on these data, a threshold limit of 130 dB was used for calculating $SEL_{ACCUMULATED}$, meaning all readings below 130 dB were considered background noise and did not contribute cumulatively to the final accumulated SEL for each monitoring session.

4.2. Vibratory Hammer

Two monitoring sessions were completed to assess noise levels associated with the vibratory hammer. These monitoring session occurred at Pier 2, 10 meters downstream of the cofferdam. As seen in *Figure 7, Vibratory Hammer Recording Session (8/18/2015)*, the vibratory hammer resulted in an approximate 15-dB increase over ambient conditions, with an SPL_{PEAK} of 145.5 dB and an $SEL_{ACCUMULATED}$ of 152.4 dB over a 15-hour recording session. These levels did not exceed any of the established thresholds.

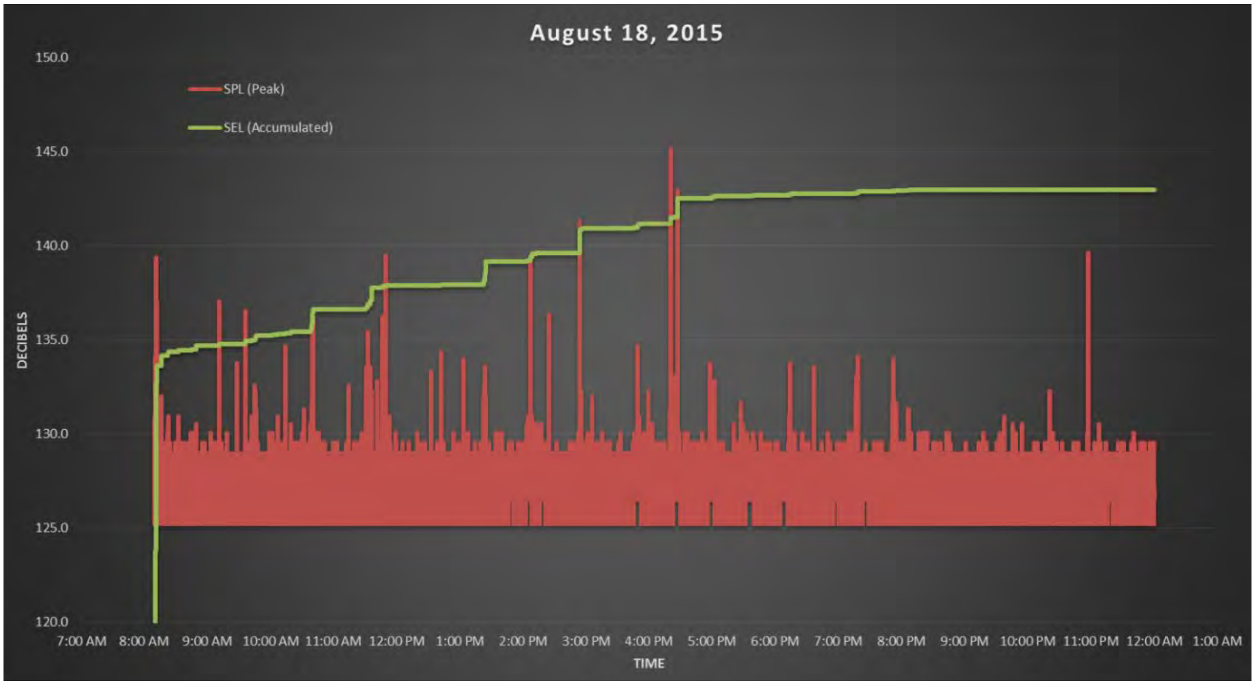

Figure 7, Vibratory Hammer Recording Session (8/18/2015)

4.3. Impact Hammer

Underwater sound levels for pile driving operations involving the use of impact hammers at Piers 2 and 3 were recorded over a total of 24 monitoring sessions. A detailed summary of each monitoring event is provided in *Appendix C*.

None of the monitoring events resulted in noise levels exceeding established thresholds. Maximum dB levels recorded outside of the cofferdam were 169.7 dB SPL_{PEAK} and 171.7 dB $SEL_{ACCUMULATED}$ at Pier 2 and 166.6 dB SPL_{PEAK} and 171.3 dB $SEL_{ACCUMULATED}$ at Pier 3. A summary of recorded sound levels for each monitoring session is provided in *Table 2, Summery of Hydroacoustic Monitoring Sessions*.

The final monitoring session completed for this study (i.e., session 24) involved placing the hydrophone inside of the cofferdam at Pier 3 to assess the attenuation properties of the cofferdam. As indicated in *Table 2*, this session resulted in the highest SPL_{PEAK} and $SEL_{ACCUMULATED}$ values for Pier 3 as well as the highest $SEL_{ACCUMULATED}$ value for the study as a whole. However, these levels remained below established thresholds.

Table 2, Summery of Hydroacoustic Monitoring Sessions

Monitoring Session	Date	Hammer Model	Blow Count	SPL_{PEAK} (dB)	$SEL_{ACCUMULATED}$ (dB)	RMS (dB)
PIER 2						
1	7/29/2015	ICE 80S	1,293	162.6	162.6	147.7
2	7/29/2015	ICE 80S	1,518	165.3	166.0	153.2
3	8/20/2015	ICE 80S	1,697	159.6	161.8	147.1
4	8/23/2015	ICE 80S	3,375	161.2	165.7	157.4
5	8/24/2015	ICE 80S	5,303	160.9	165.9	151.4
6	8/25/2015	ICE 80S	4,558	159.7	167.5	147.9
7	8/25/2015	ICE 80S	1,075	157.8	157.9	150.3
8	8/27/2015	ICE 80S	5,842	160.4	166.8	147.6
9	8/28/2015	ICE 80S	8,846	162.6	171.1	152.5

Monitoring Session	Date	Hammer Model	Blow Count	SPL_{PEAK} (dB)	$SEL_{ACCUMULATED}$ (dB)	RMS (dB)
10	8/29/2015	ICE 80S	4,686	163.9	168.1	151.1
11	9/3/2015	ICE 80S	7,968	165.4	171.7(a)	147.7
12	9/4/2015	ICE 80S	8,071	165.3	170.9	158.9
13	9/8/2015	ICE 80S	3,900	169.7(a)	169.0	160.7(a)
14	9/14/2015	ICE I-46^{V2}	1,368	153.2	155.8	141.2
15	9/15/2015	ICE I-46^{V2}	12,554	156.8	164.7	145.7
16	9/16/2015	ICE I-46^{V2}	8,717	155.0	164.7	143.0
17	9/17/2015	ICE I-46^{V2}	11,882	155.7	165.1	142.9
18	9/19/2015	ICE I-46^{V2}	723	159.2	155.1	144.0
19	9/21/2015	ICE I-46^{V2}	100	159.0	148.5	142.9
PIER 3						
20	10/6/2015	ICE I-46^{V2}	1,613	159.8	160.7	145.1
21	10/13/2015	ICE I-46^{V2}	17,693	156.4	167.3	145.2
22	10/14/2015	ICE I-46^{V2}	13,071	166.6(a)	171.3(a)	157.4(a)
23	1015/2015	ICE I-46^{V2}	3,260	159.3	163.3	144.6
24(b)	10/22/2015	ICE I-46^{V2}	7,365	168.0	172.5	153.7

*Highest recorded value at each pier location.

**Hydrophone for monitoring session 24 was placed inside of cofferdam.

Without taking into account monitoring session 24, recorded data indicates that the smaller hammer (i.e., ICE Model 80S) resulted in higher dB levels, having the highest SPL_{PEAK}, $SEL_{ACCUMULATED}$, and RMS values for the study as a whole despite only being use to drive 32 of the 120 piles. The smaller hammer was less effective overall relative to the larger hammer (i.e., ICE Model I-46V2) requiring an average of approximately 1,900 strikes per pile to reach bearing, as compared to the larger hammer that averaged approximately 900 strikes per pile to reach bearing.

5. Conclusions

Hydroacoustic monitoring revealed that pile driving noise levels were below established thresholds for both hammer models. The smaller hammer (i.e., ICE Model 80S) resulted in higher SPL_{PEAK} and $SEL_{ACCUMULATED}$ levels than the larger hammer (i.e., ICE Model I-46^{v2}); however, these highest recorded readings were still 36.3 dB and 15.3 dB below the peak and accumulated thresholds respectively. In addition, piles associated with Pier 2 were driven in the deepest part of the river and should represent the highest absolute peak strike.

SPL_{PEAK} levels represent instantaneous sound pressure at a specific location and do not accumulate over time. Therefore, it can be reasonably assumed that SPL_{PEAK} levels recorded during pile driving activities at Pier 2 represent the maximum or near maximum SPL_{PEAK} levels that could be produced by each hammer.

$SEL_{ACCUMULATED}$ levels however, do accumulate incrementally over time. During pile driving operations associated with Pier 2, the highest recorded $SEL_{ACCUMULATED}$ was 171.7 dB which occurred on September 3, 2015. Pile driving operations on this day spanned a duration of approximately 12 hours, resulting in a total of 7,968 hammer blows; this monitoring event did not represent the longest duration or highest blow count for the study. Please refer to *Figure 8, Recorded Sounds Levels (September 3, 2015)*. As shown in Figure 8, $SEL_{ACCUMULATED}$ (green line) increases logarithmically throughout the day, with a sharp initial rise in dB level that tapers off, but continues to increase throughout the day. Therefore, the potential exists for experiencing higher $SEL_{ACCUMULATED}$ values than those recorded at Piers 2 and 3, particularly if pile driving operations last for longer durations and total daily blow counts increase. It is unlikely however, that $SEL_{ACCUMULATED}$ levels would exceed the 187 dB threshold based on the trend lines of graphical data recorded to date.

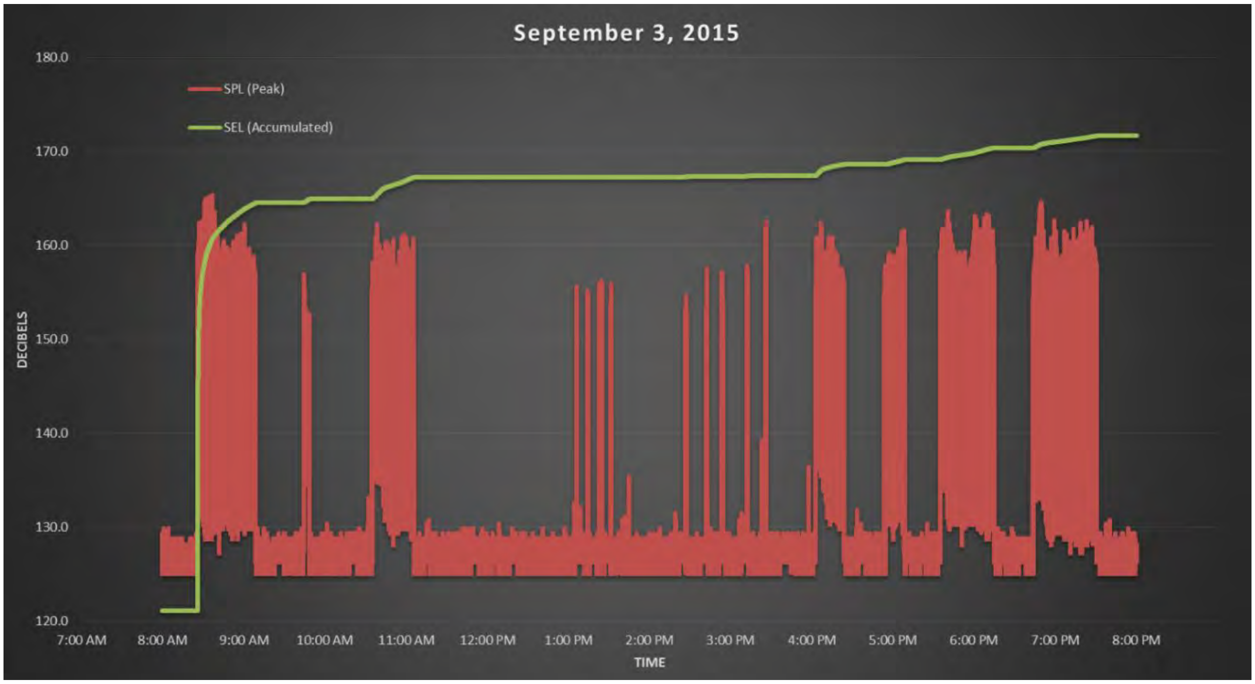

Figure 8, Recorded Sounds Levels (September 3, 2015)

As previously mentioned, it has been suggested that RMS levels in excess of 150 dB may be a threshold where behavioral effects to fish begin to occur, although this suggestion is not backed by scientific evidence. Maximum RMS levels recorded during this study exceeded 150 dB in 10 of the 24 monitoring sessions. While the full implications of these RMS levels are not known, it is possible that fish may temporarily avoid the project area during times when pile driving operations occur.

The hydrophone was placed inside of the Pier 3 cofferdam for the final monitoring session of the study. As previously noted, this session resulted in the highest SPL_{PEAK} and $SEL_{ACCUMULATED}$ values for Pier 3 as well as the highest $SEL_{ACCUMULATED}$ value for the study as a whole, suggesting the flooded cofferdam may have associated noise attenuation properties. This conclusion cannot be stated with certainty however, as no data was collected outside of the cofferdam to be used for comparison purposes. In addition, the shorter distance between hydrophone and pile may account for some or all of the higher dB levels recorded during the monitoring session.

A summary of this study's findings/conclusions are as follows:

- The 206 dB SPL_{PEAK} threshold was not exceeded.
- The 187 dB $SEL_{ACCUMULATED}$ threshold was not exceeded.
- Of the two impact hammers used during this study, the smaller hammer (i.e., ICE Model 80S) resulted in higher SPL_{PEAK} and $SEL_{ACCUMULATED}$ levels than the larger hammer (i.e., ICE I-46^{V2}) and required approximately twice as many blows per pile to reach bearing.
- Maximum RMS levels exceeded 150 dB in 10 of the 24 monitoring sessions. The actual impact/implications associated with exceeding this level are unknown.
- Based on the measurements collected during this study, it can be reasonable predicted that future pile driving operations associated with this project will not exceed established thresholds. This prediction is based on the assumption that future pile driving operations will be completed in a similar manner, using similarly sized equipment.

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APPENDIX A:

HYDROACOUSTIC MONITORING PLAN

HYDROACOUSTIC MONITORING PLAN FOR LEWIS AND CLARK BRIDGE

US Highway 85

McKenzie County Road 16 to Junction of US Highway 2

Project No. SOIA-7-085(088)180; PCN 20171

INTRODUCTION

The purpose of this plan is to outline a course of action to assess the potential for hydroacoustic noise impacts associated with pile driving operations within the Missouri River for the construction of the new Lewis & Clark Bridge (US Highway 85—McKenzie County Road 16 to junction of US Highway 2 project) and outline potential mitigation measures to be implemented in the event that noise impacts exceed established threshold limits for peak sound pressures levels (SPL_{PEAK}) of 206 decibels (dB) and/or 187 dB accumulated sound exposure level ($SEL_{ACCUMULATED}$).

HYDROACOUSTIC MONITORING

Monitoring Setup

Hydroacoustic monitoring will be conducted during pile driving operations associated with construction of the Lewis and Clark Bridge. The duration of monitoring will be dependent upon recorded noise levels, but at a minimum would be conducted for all piles driven at Pier 2. In the event that recorded noise levels are well below identified impact thresholds, hydroacoustic monitoring may be terminated. The decision to terminate would be made by the North Dakota Department of Transportation (NDDOT).

The piles associated with Pier 2 will be driven in the deepest part of the river and should represent the highest absolute peak strike. The hydrophones are anticipated to be located a distance of 10 meters downstream of each cofferdam with a clear acoustic line-of-sight between the cofferdam wall and the hydrophone; however, this distance may vary due to site constraints. The hydrophone will be placed at mid-water depth. A minimum frequency range of 20 Hz to 20 kHz and a minimum sampling rate of 48,000 Hz will be used when monitoring.

A weighted tape measure or sonar will be used to determine the depth of the water (estimated to be approximately 25 feet at cofferdam #2). The hydrophone will be attached to either a nylon cord, steel chain, or other proven anti-strum features if the current is swift enough to cause strumming of the line. The nylon cord or chain will be attached to an anchor that will keep the line the appropriate distance from the edge of the cofferdam. The nylon cord or chain will be attached to a float or tied to a static line at the surface. The distance from the hydrophone to the actively driven pile will be measured by a tape measure, where possible, or a range-finder. The acoustic path (line of sight) between the pile and the hydrophone(s) should be unobstructed in all cases (with the exception of the cofferdam wall).

Piles utilized during the driving operations will consist of 14-inch wide H-piles weighing 102 pounds per liner foot and will be approximately 80-feet in length.

Methodology

At the minimum, two test runs will be completed prior to the collection of the sound measurements at the Lewis & Clark Bridge construction site.

When collecting sound measurements in an area with currents, current speeds of 1.5 meters/second or greater are expected to generate significant flow-induced noise, which may interfere with the detection and analysis of low-level sounds such as the sounds from a distant pile driver or background sounds. If it becomes necessary to reduce the flow-induced noise at the hydrophone, a flow shield will be installed around the hydrophone to provide a barrier between the irregular, turbulent flow and the hydrophone. If no flow shield is used in these situations, the current velocity will be measured and a correlation between the levels of the relevant sounds (background or pile driving) and current speed will be made to determine whether the data is valid and can be included in the analysis.

The hydrophone will be calibrated daily prior to completing any monitoring activities. Calibration of the hydrophone will occur away from the project site at a location not subject to construction related noise, and again at the project site prior to pile driving activities. Prior to the initiation of pile driving, the hydrophone will be placed at the appropriate distance and depth as described above.

The contractor will inform the acoustics specialist when pile driving is about to start to ensure that the monitoring equipment is operational. Underwater sound levels will be continuously monitored during the entire duration of each pile being driven with a minimum one-third octave band frequency resolution. The wideband instantaneous absolute peak pressure and Sound Exposure Level (SEL) values of each strike, and daily cumulative SEL should be monitored in real time during construction to ensure that the project does not exceed its authorized take level. Peak and root mean squared (rms) pressures will be reported in dB. SEL will be reported in dB.

Every effort will be made to produce results at the conclusion of the first pile being driven. If an immediate, real time measurement cannot be made then every effort will be made to gather the results as soon as possible. Additionally, a caveat must be included in this methodology that the testing may require more than one pile to be driven and methodologies may need to be adjusted in the field due to a variety of circumstances. Efforts will be made to communicate any changes to the North Dakota Department of Transportation (NDDOT).

A logbook of monitoring activities will be maintained onsite. This logbook will include the following: equipment calibration process, instrument settings, date, start and stop time of each pile driving event, water depth, hydrophone depth, water conditions, distance to pile, pile type/size, soil/substrate composition, pile driver type/size, observed peak and RMS impulse levels, and any unusual circumstances that develop during the course of monitoring activities.

The contractor will need to provide the following information to the acoustics specialist conducting the hydroacoustic monitoring for inclusion in the final monitoring report: a description of the substrate composition, approximate depth of significant substrate layers, hammer model and size, pile cap or cushion type, hammer energy settings and any changes to those settings during the piles being monitored, depth pile driven, blows per foot for the piles monitored, and total number of strikes to drive each pile that is monitored.

Reporting

Preliminary results for the monitoring activities at Pier 2 will be submitted/reported daily to the NDDOT and any other resource agencies as directed by the NDDOT. For all other piers, summary memos will be provided to NDDOT within 10 days following the conclusion of pile driving activities unless threshold sound levels are detected, in which case the NDDOT will be immediately notified.

In addition, a final report including data collected and summarized from all monitoring locations will be submitted to the NDDOT (and any other resource agencies as directed by the NDDOT) within 90 days of the completion of hydroacoustic monitoring. The results will be summarized in graphical form and include summary statistics and time histories of impact sound values for each pile.

NOISE ATTENUATION MEASURES

The following are noise attenuation measures that may be implemented in the event hydroacoustic monitoring reveals noise levels in excess of established injury criteria (206 dB_{PEAK} and/or 187 dB-$SEL_{ACCUMULATED}$).

Bubble Curtain

Bubble curtains function by creating a deliberate arrangement of bubbles within the water column to disrupt the propagation of sound (pressure) waves through water. If bubble curtains are identified as a feasible noise attenuation alternative, all equipment necessary for deployment of the bubble curtain system would be onsite prior to beginning any pile driving operations. If noise levels exceeding injury criteria are recorded, pile driving operations would immediately cease, and would not resume until the bubble curtain system had been implemented. In such event, hydroacoustic monitoring would continue in order to determine the effectiveness of the bubble curtain system.

Final design of the bubble curtain system would be up to the discretion of the contractor, but could include either a full cofferdam or an individual pile bubble curtain setup.

Dewatered casing

A dewatered casing could be used as a means of separating the work area from the water column. The steel casing pipe would be installed vertically and embedded into the channel bottom to isolate the work area from the water column. Pile driving would then occur within this casing following dewatering. If use of a dewatered casing is identified as a feasible noise attenuation alternative, all equipment necessary for deployment of the dewatered casing system would be onsite prior to beginning any pile driving operations. If noise levels exceeding injury criteria are recorded, pile driving operations would immediately cease, and would not resume until the dewatered casing system had been implemented. In such event, hydroacoustic monitoring would continue in order to determine the effectiveness of the dewatered casing system. Dewatering activities would discharge in to the river.

Vibrate to Depth

As a means of reducing the overall number of hammer strikes required per pile, a vibratory hammer could be used to drive the piles to depth. The impact hammer would then only be used for testing the bearing capacity of each pile. This could reduce the total number of hammer strikes per pile from an estimated 900 strikes to approximately 20 strikes. This methodology would not reduce the peak decibel level caused by the pile driving operation, but would reduce the accumulated level. In addition, the two rows of batter piles associated with each pier would need to be installed using the impact hammer exclusively.

ATTACHMENT 1

BUBBLE CURTAIN COST ESTIMATE

Costs provided below are based on assumed equipment requirements, quoted equipment rental rates and assumed effects on the contractor's stated pile driving schedule. Costs may vary depending on equipment availability and other impacts to the assumed production rate.

<u>Full cofferdam bubble curtain cost per cofferdam</u>

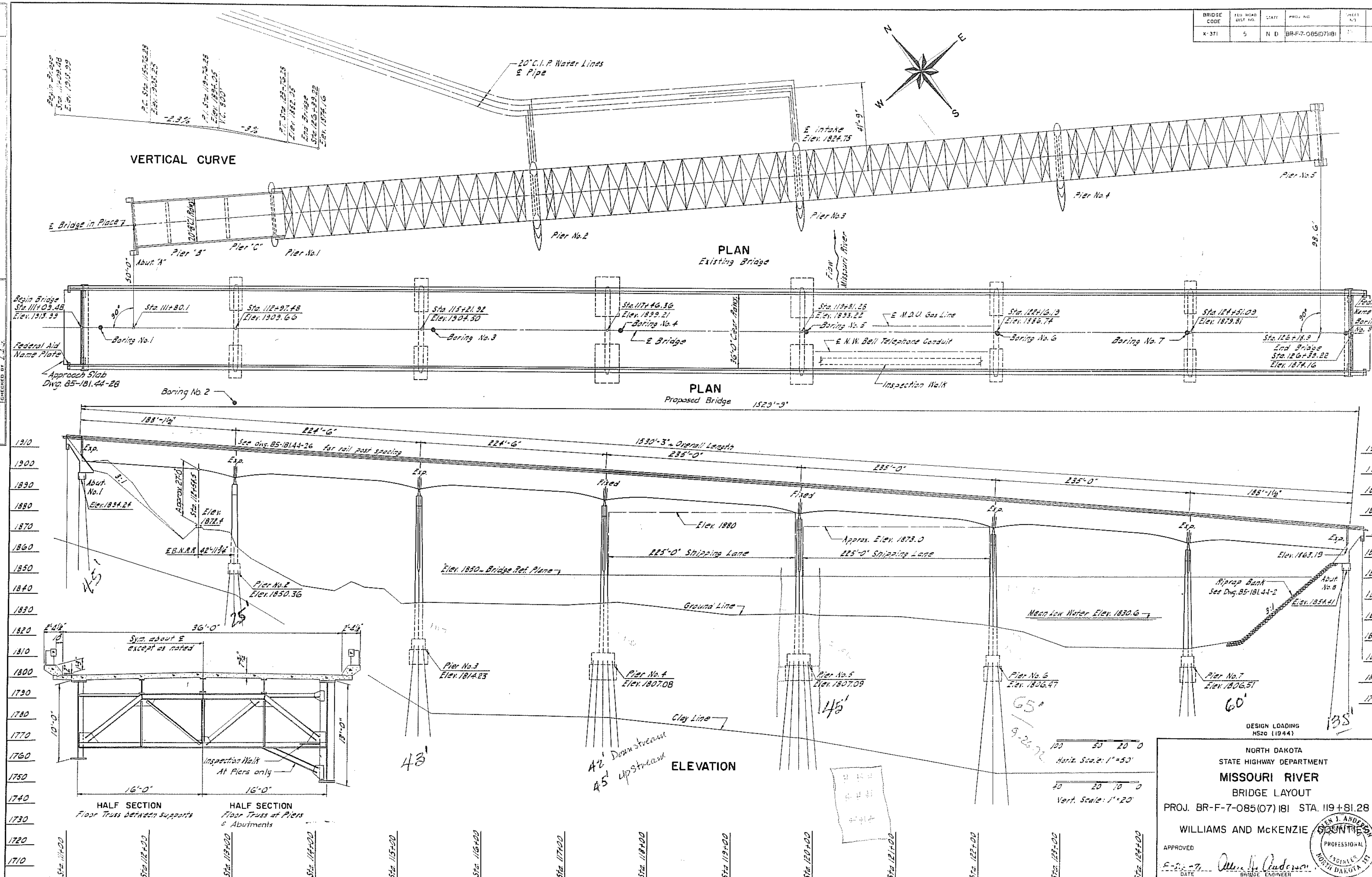
Compressor (7 compressors required) and air hose rental:	$126,000
Fabrication and maintenance of bubble curtain:	$10,000
Reduced production rate associated with bubble curtain deployment: (Approximately 5% of bid cost for HP14x102)	$20,000
Total:	**$156,000/cofferdam**

<u>Individual pile bubble curtain cost per cofferdam</u>

Compressor and air hose rental:	$15,000
Fabrication and maintenance of bubble curtain:	$5,000
Reduced production rate associated with bubble curtain deployment: (Approximately 15% of bid cost for HP14x102)	$60,000
Total:	**$80,000/cofferdam**

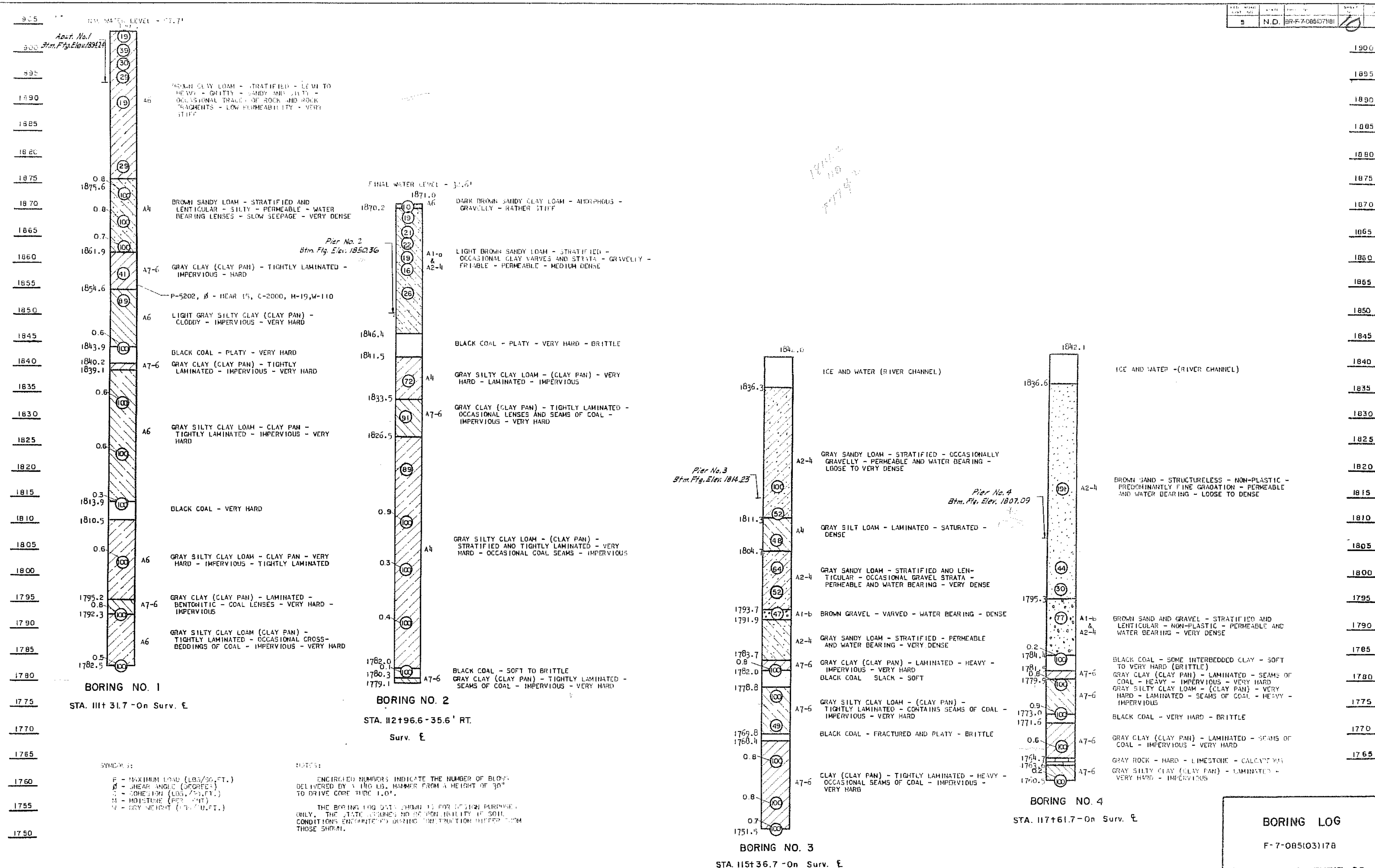
APPENDIX B:

GEOTECHNICAL BORING LOGS



BRIDGE CODE X-371
FED. ROAD DIST. NO. 5
STATE N D
PROJ. NO. BR-F-7-085(07)181
VERTICAL CURVE
Begin Bridge Sta. 111+09.48 Elev. 1913.99
P.C. Sta. 115+73.25
P.I. Sta. 119+73.25
V.C. 800'
P.T. Sta. 123+73.25 Elev. 1882.75
End Bridge Sta. 126+39.22 Elev. 1874.16
-2.3%
-3%
20" C.I.P. Water Lines
℄ Pipe
℄ Intake Elev. 1824.75
41'-9"
℄ Bridge in Place
Abut. "A"
Pier "B"
Pier "C"
Pier No. 1
Pier No. 2
Pier No. 3
Pier No. 4
Pier No. 5
PLAN
Existing Bridge
Flow
Missouri River
50'-0"
99.6'
Begin Bridge Sta. 111+09.48 Elev. 1913.99
Federal Aid Name Plate
Approach Slab Dwg. 85-181.44-28
Sta. 111+80.1
Boring No. 1
Sta. 112+97.48 Elev. 1909.66
Sta. 115+21.92 Elev. 1904.50
Boring No. 3
Sta. 117+46.36 Elev. 1899.21
Boring No. 4
℄ Bridge
36'-0" Clear Rdwy.
Sta. 119+81.26 Elev. 1893.22
Boring No. 5
℄ M.D.U. Gas Line
℄ N.W. Bell Telephone Conduit
Inspection Walk
Sta. 122+16.19 Elev. 1886.74
Boring No. 6
Sta. 124+51.09 Elev. 1879.81
Boring No. 7
Sta. 126+16.9
End Bridge Sta. 126+39.22 Elev. 1874.16
Fed. Aid Name Plate
Boring No. 8
Boring No. 2
PLAN
Proposed Bridge
1529'-9"
188'-1½"
224'-6"
224'-6"
235'-0"
235'-0"
235'-0"
188'-1½"
1530'-3" Overall Length
See dwg. 85-181.44-26 for rail post spacing
Exp.
Fixed
Abut. No. 1
Elev. 1894.24
Approx. 270'
Sta. 111+54.5
Elev. 1872.4
℄ B.N.R.R. 42'-11¾"
Elev. 1880
Approx. Elev. 1873.0
225'-0" Shipping Lane
225'-0" Shipping Lane
Elev. 1850 - Bridge Ref. Plane
Ground Line
Mean Low Water Elev. 1830.6
Riprap Bank See Dwg. 85-181.44-2
Abut. No. 8
Elev. 1863.19
Elev. 1854.41
Pier No. 2 Elev. 1850.36
Pier No. 3 Elev. 1814.23
Pier No. 4 Elev. 1807.08
Pier No. 5 Elev. 1807.09
Pier No. 6 Elev. 1806.47
Pier No. 7 Elev. 1806.51
Clay Line
45'
25'
43'
42' Downstream
45' upstream
45'
65'
60'
35'
9-26-72
ELEVATION
36'-0"
Sym. about ℄ except as noted
10'-0"
13'-0"
16'-0"
16'-0"
Inspection Walk At Piers only
HALF SECTION
Floor Truss between supports
HALF SECTION
Floor Truss at Piers & Abutments
Horiz. Scale: 1" = 50'
Vert. Scale: 1" = 20'
DESIGN LOADING HS20 (1944)
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
MISSOURI RIVER
BRIDGE LAYOUT
PROJ. BR-F-7-085(07)181 STA. 119+81.28
WILLIAMS AND McKENZIE COUNTIES
APPROVED
DATE
BRIDGE ENGINEER
Sta. 111+00
Sta. 112+00
Sta. 113+00
Sta. 114+00
Sta. 115+00
Sta. 116+00
Sta. 117+00
Sta. 118+00
Sta. 119+00
Sta. 120+00
Sta. 121+00
Sta. 122+00
Sta. 123+00
Sta. 124+00

85-181.44



5	N.D.	BR-F-7-085(03)181	10

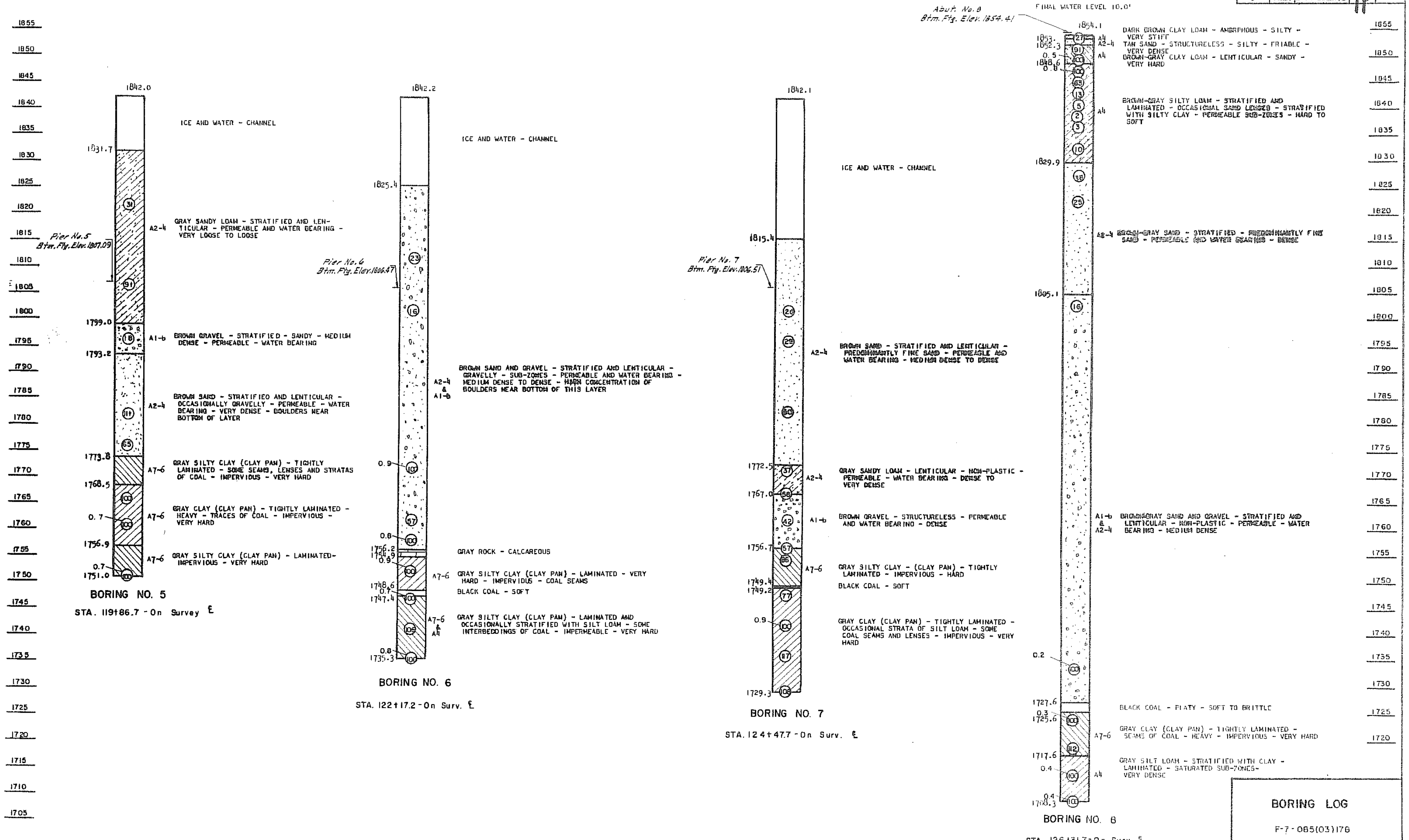
BORING LOG

F-7-085(03)178

Sheet 1 of 2

WILLIAMS & McKENZIE CO.

FED. ROAD DIST. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS
5	N.D.	BR-F-7-065(07)181	10	



Sheet 2 of 2

BORING LOG

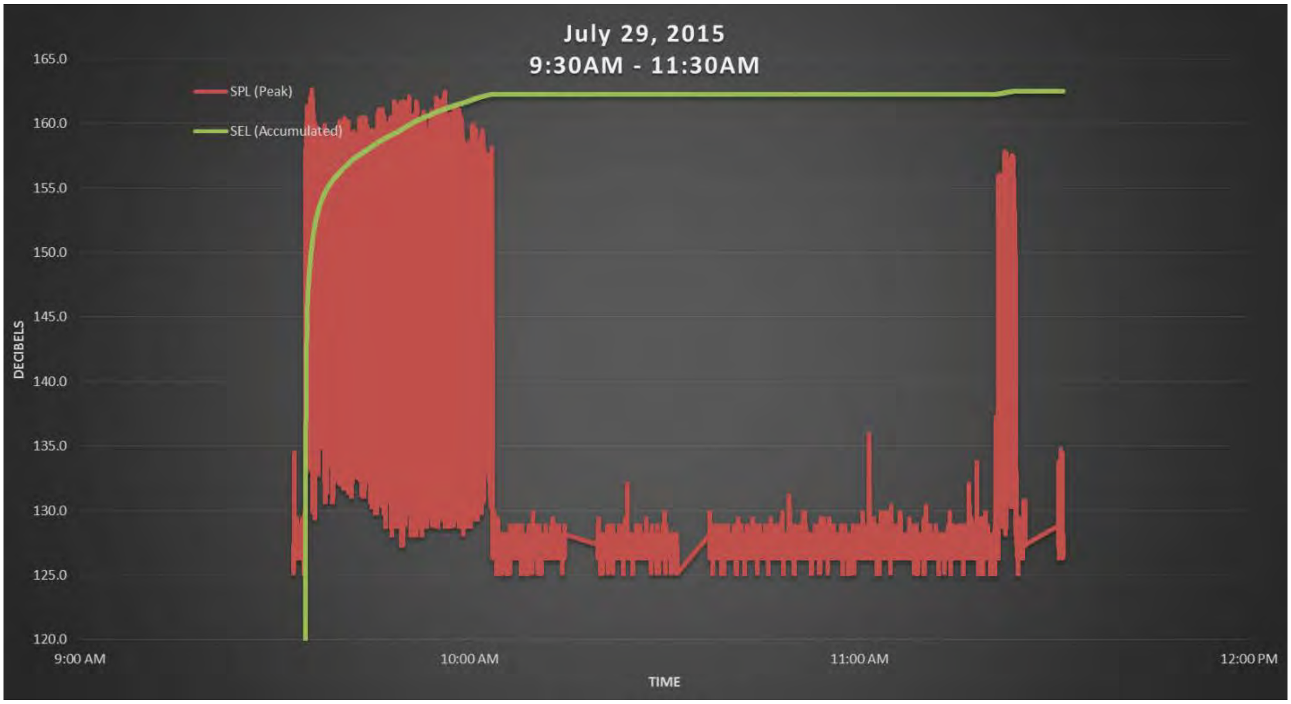
F-7-065(03)178

WILLIAMS & McKENZIE CO.

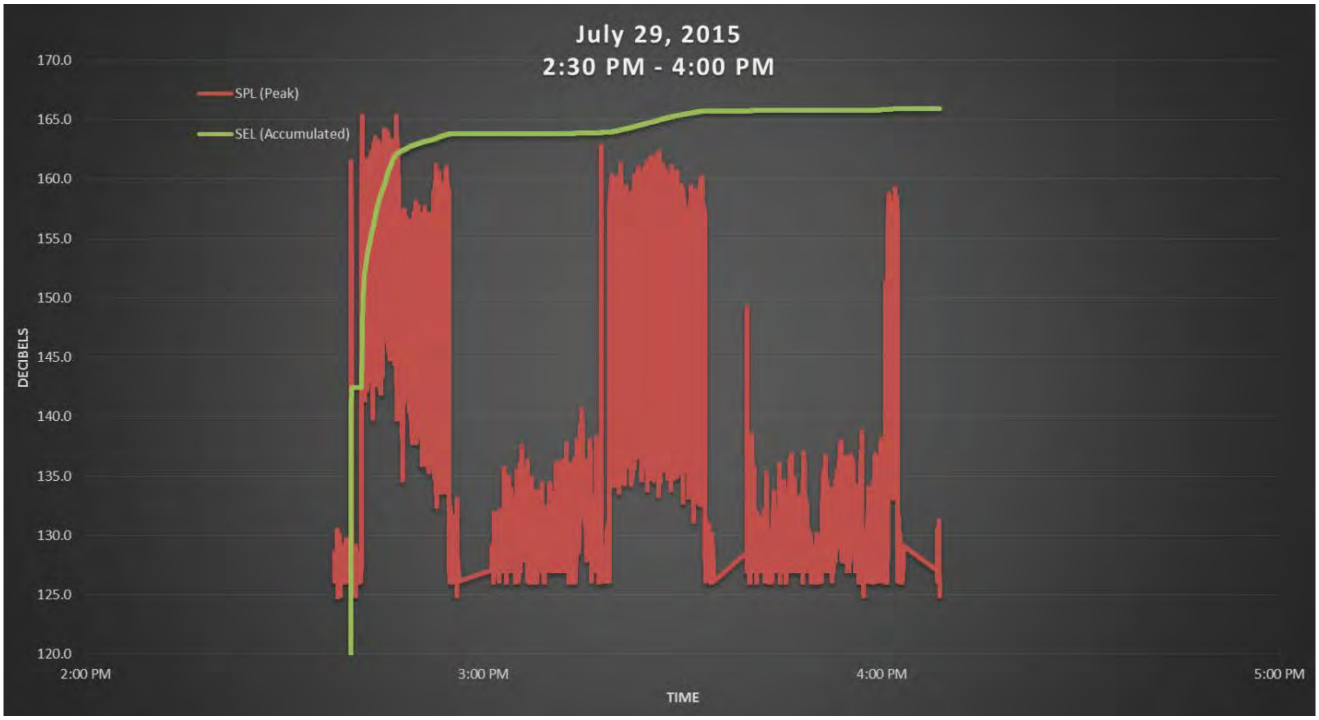
APPENDIX C:

INDIVIDUAL MONITORING SESSION SUMMARIES

Impact Hammer

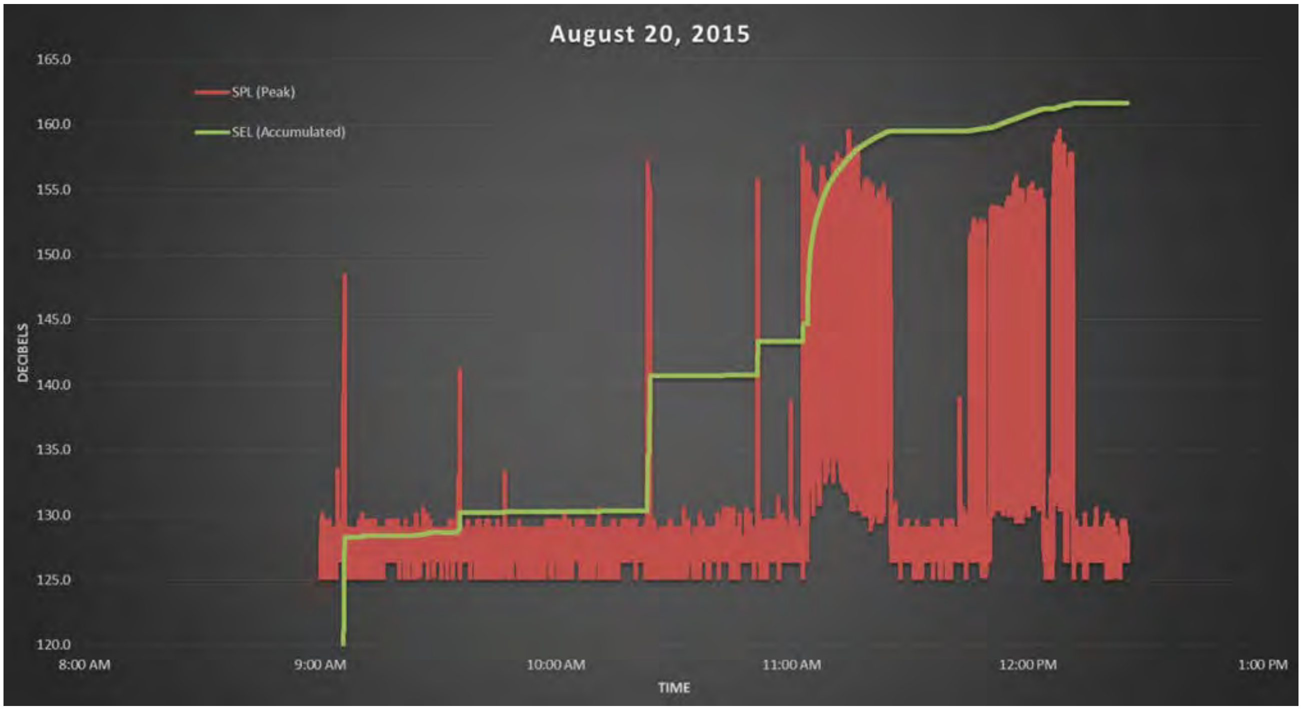


Date:	7/29/2015	Accumulated SEL:	162.6 dB
Calibration Time:	7/29/15 7:55 AM	SPL Peak (max):	162.6 dB
Start Time:	7/29/15 9:32 AM	RMS (max):	147.7 dB
End Time:	7/29/15 11:31 AM		
Duration:	1h 59m		
Hammer:	ICE 80S		
Total Blow Count:	1,293		
Total Number of Piles Driven:	Test Pile		
Pier Number:	2		
Water Depth:	7.3 m (24 ft)		
Distance from cofferdam:	10.0 m (33 ft)		
Distance from Pile:	30.7 m (101 ft)		
River Flow Velocity:	< 1.5 m/s		



Date:	7/29/2015	Accumulated SEL:	166.0 dB
Calibration Time:	7/29/15 1:17 PM	SPL Peak (max):	165.3 dB
Start Time:	7/29/15 2:37 PM	RMS (max):	153.2 dB
End Time:	7/29/15 4:08 PM		
Duration:	1h 31m		
Hammer:	ICE 80S		
Total Blow Count:	1,518		
Total Number of Piles Driven:	Test Pile		

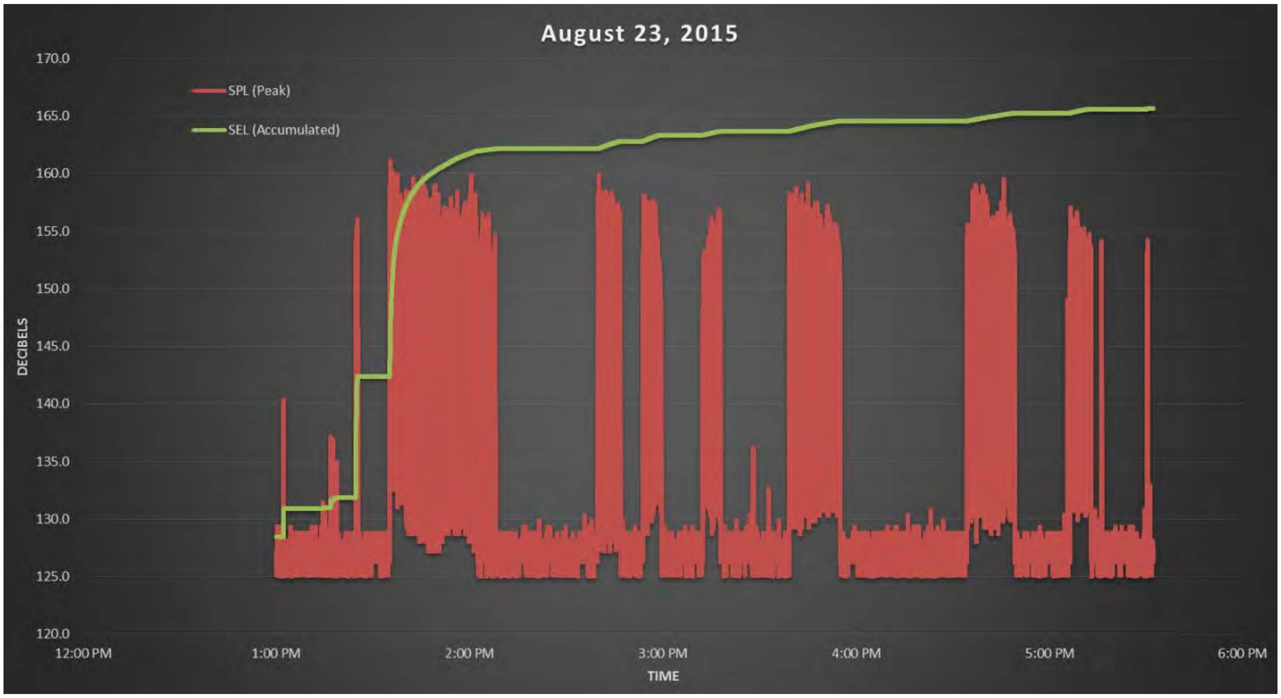
Pier Number:	2
Water Depth:	7.3 m (24 ft)
Distance from cofferdam:	10.0 m (30 ft)
Distance from Pile:	14.7 m (47 ft)
River Flow Velocity:	< 1.5 m/s



Date:	8/20/15
Calibration Time:	8/20/15 7:50 AM
Start Time:	8/20/15 9:00 AM
End Time:	8/20/15 12:25 PM
Duration:	3h 25m
Hammer:	ICE 80S
Total Blow Count:	1,697
Total Number of Piles Driven:	1

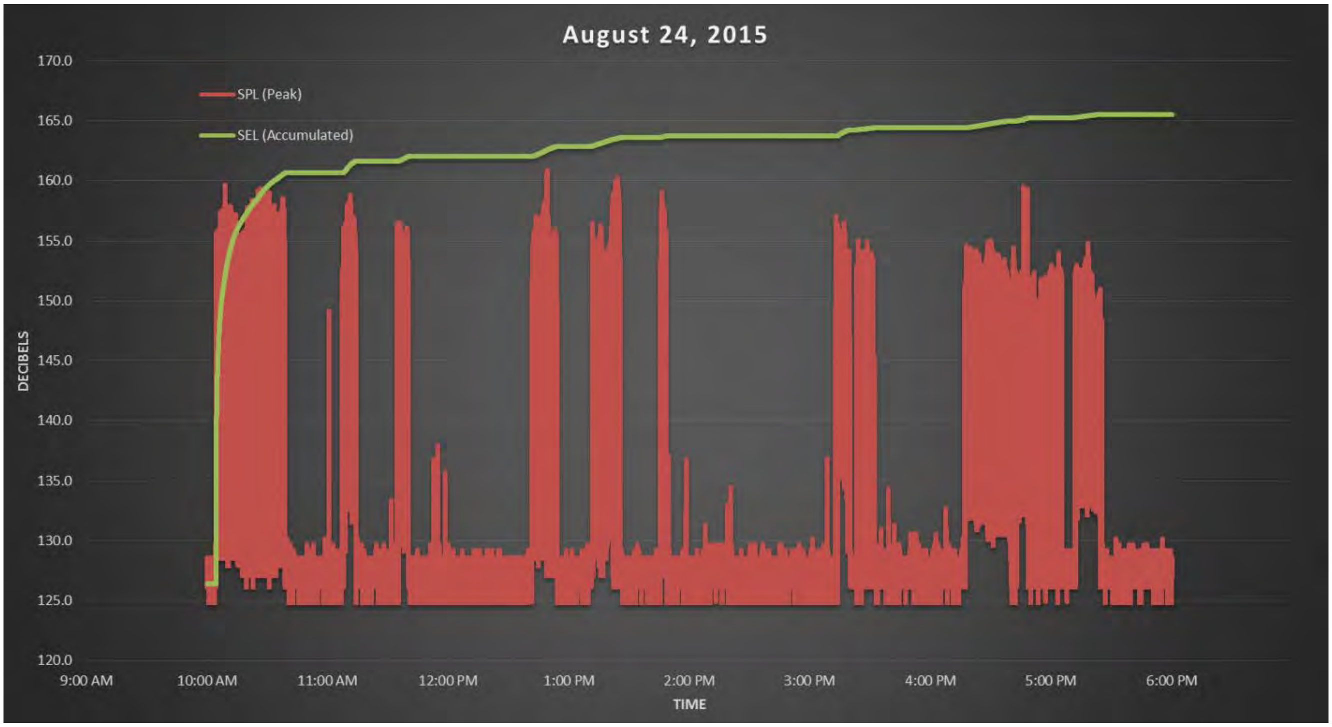
Accumulated SEL:	161.8 dB
SPL Peak (max):	159.6 dB
RMS (max):	147.1 dB

Pier Number:	2
Water Depth:	7.3 m (24 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	21.0 m (69 ft)
River Flow Velocity:	< 1.5 m/s



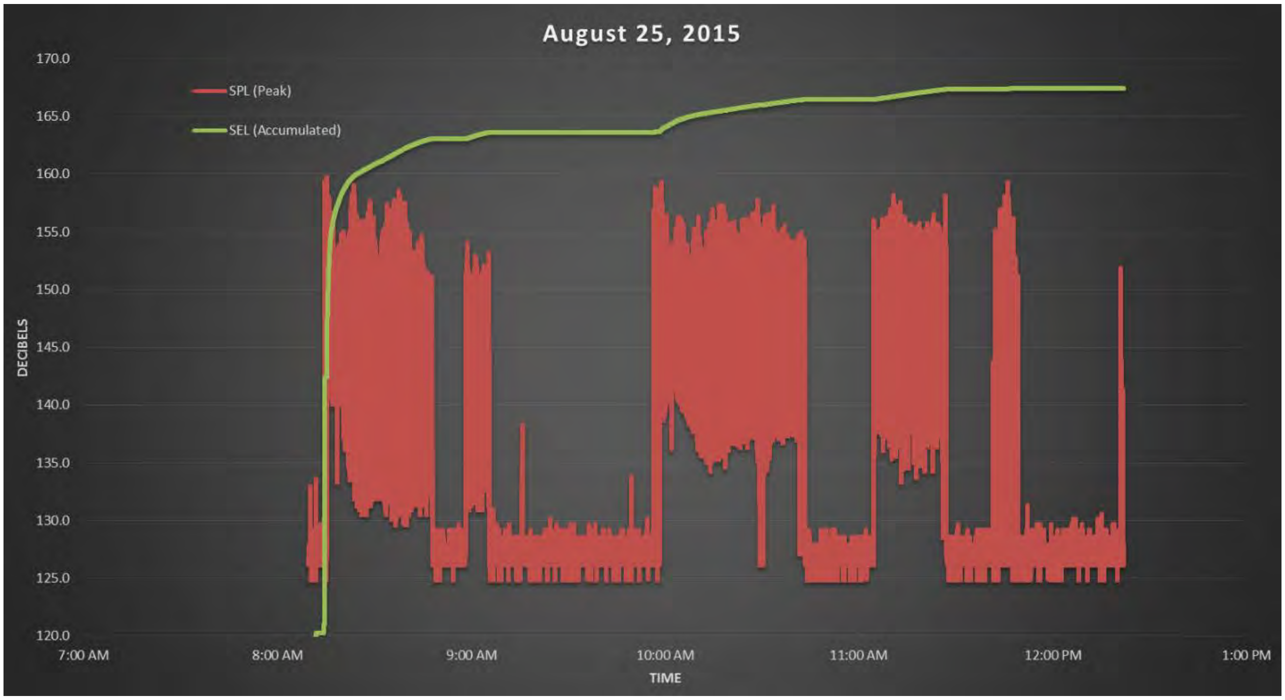
Date:	8/23/15	Accumulated SEL:	165.7 dB
Calibration Time:	8/23/15 8:03 AM	SPL Peak (max):	161.2 dB
Start Time:	8/23/15 1:00 PM	RMS (max):	157.4 dB
End Time:	8/23/15 5:32 PM		
Duration:	4h 32m		
Hammer:	ICE 80S		
Total Blow Count:	3,375		
Total Number of Piles Driven:	3		

Pier Number:	2
Water Depth:	7.3 m (24 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	21.0 m (69 ft)
River Flow Velocity:	< 1.5 m/s



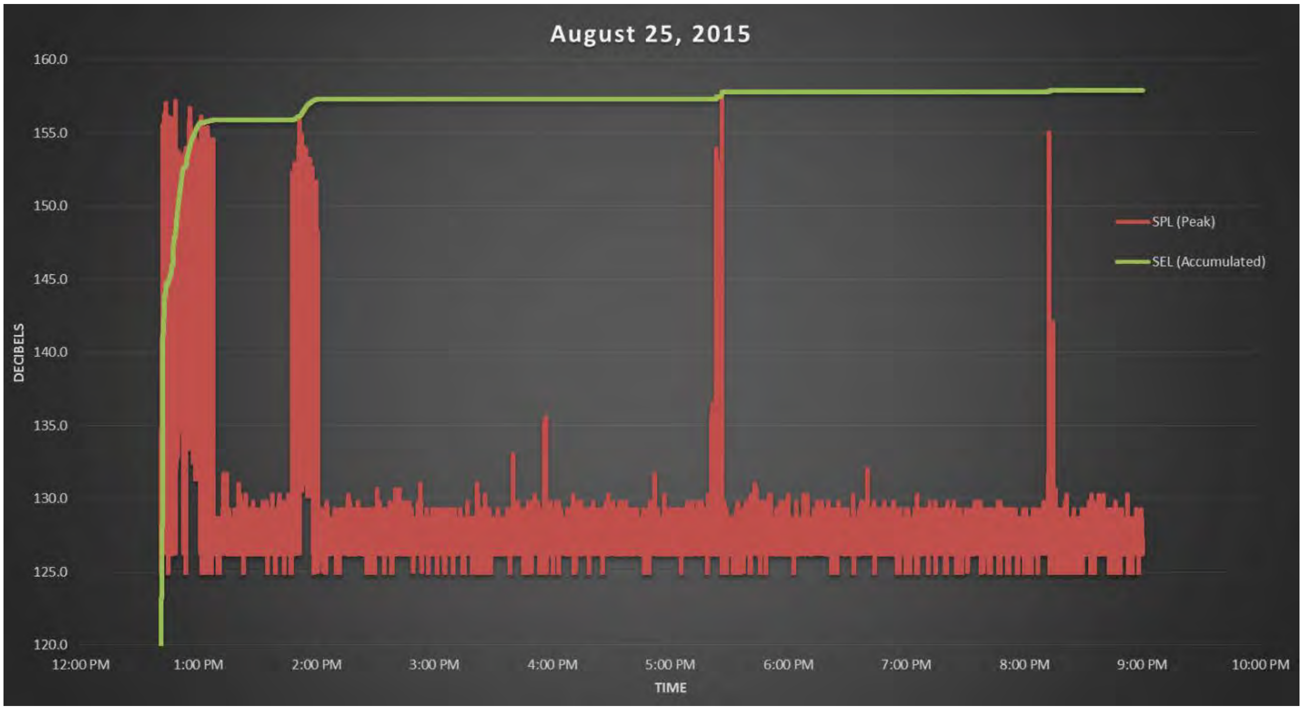
Date:	8/24/15	Accumulated SEL:	165.9 dB
Calibration Time:	8/24/15 8:00 AM	SPL Peak (max):	160.9 dB
Start Time:	8/24/15 10:00 AM	RMS (max):	151.4 dB
End Time:	8/24/15 6:00 PM		
Duration:	8h 00m		
Hammer:	ICE 80S		
Total Blow Count:	5,303		
Total Number of Piles Driven:	2		

Pier Number:	2
Water Depth:	7.3 m (24 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	24.0 m (79 ft)
River Flow Velocity:	< 1.5 m/s



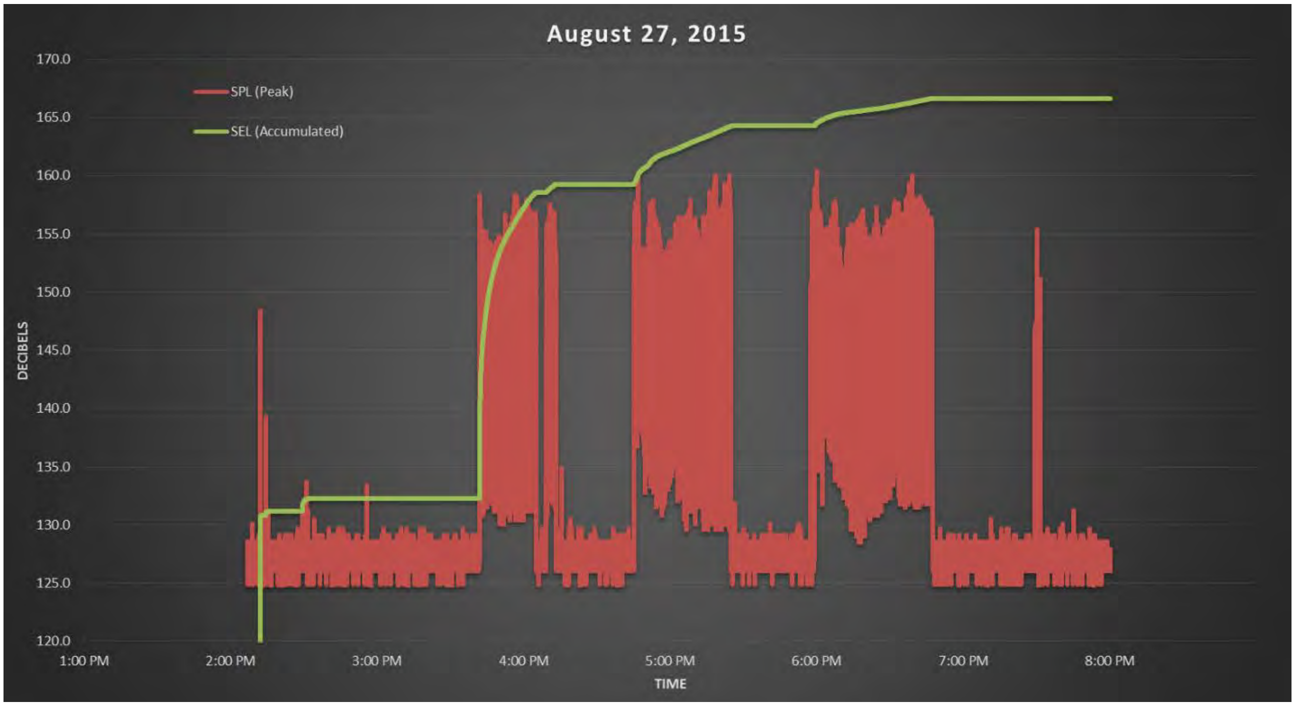
Date:	8/25/15	Accumulated SEL:	167.5 dB
Calibration Time:	8/25/15 8:05 AM	SPL Peak (max):	159.7 dB
Start Time:	8/25/15 8:10 AM	RMS (max):	147.9 dB
End Time:	8/25/15 12:20 PM		
Duration:	4h 10m		
Hammer:	ICE 80S		
Total Blow Count:	4,558		
Total Number of Piles Driven:	2		

Pier Number:	2
Water Depth:	7.3 m (24 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	17.9 m (59 ft)
River Flow Velocity:	< 1.5 m/s



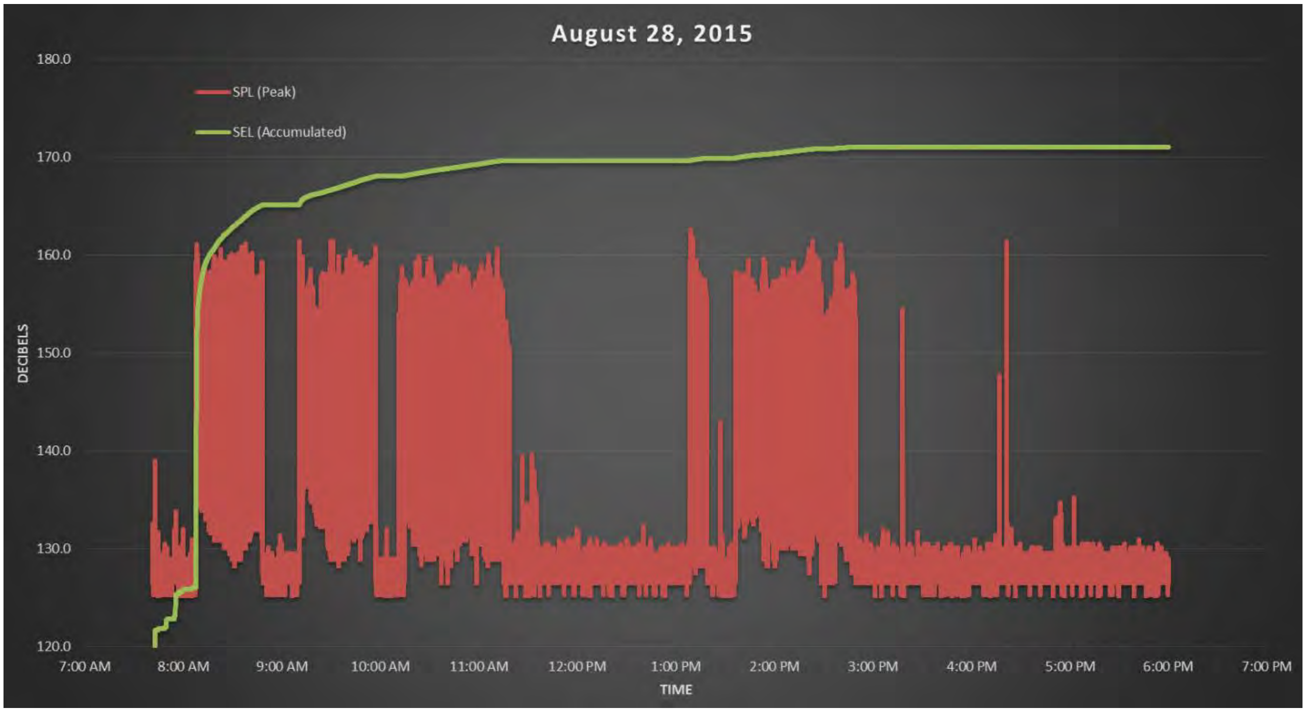
Date:	8/25/15	Accumulated SEL:	157.9 dB
Calibration Time:	8/25/15 12:34 PM	SPL Peak (max):	157.8 dB
Start Time:	8/25/15 12:40 PM	RMS (max):	150.3 dB
End Time:	8/26/15 9:00 PM		
Duration:	8h 20m		
Hammer:	ICE 80S		
Total Blow Count:	1,075		
Total Number of Piles Driven:	1		

Pier Number:	2
Water Depth:	7.3 m (24 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	17.9 m (59 ft)
River Flow Velocity:	< 1.5 m/s



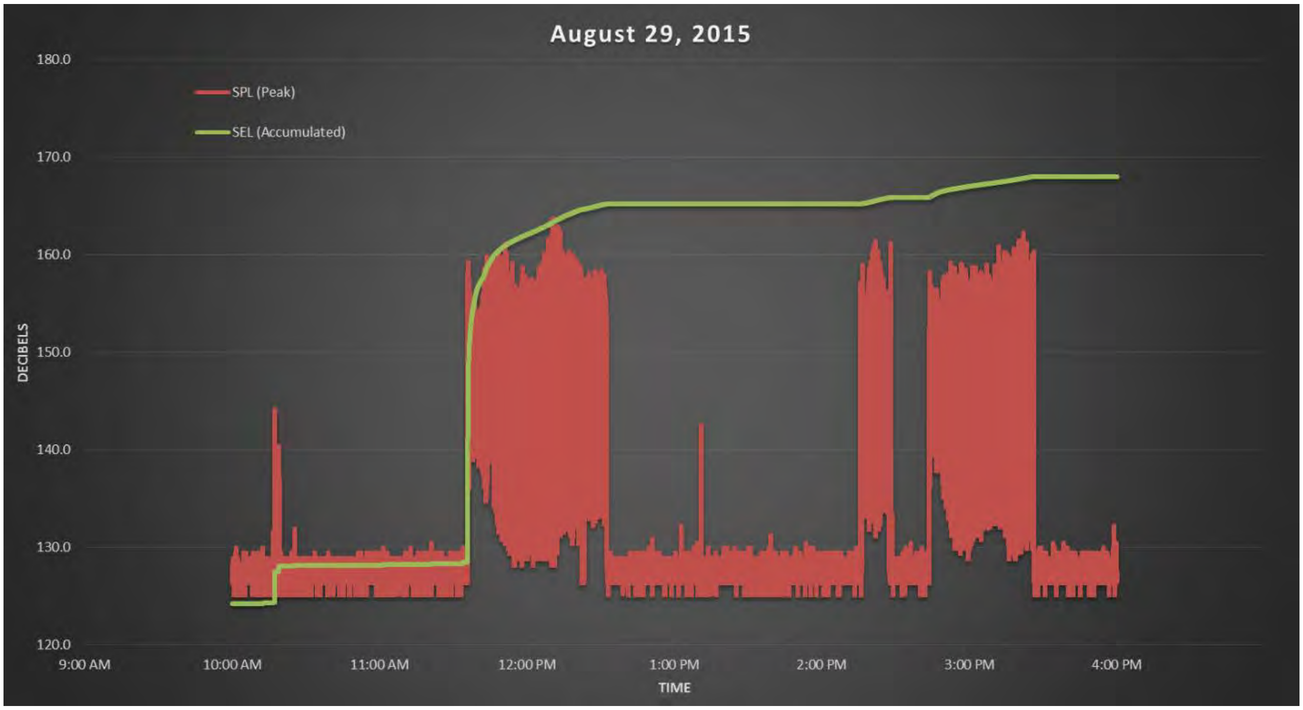
Date:	8/27/15	Accumulated SEL:	166.8 dB
Calibration Time:	8/27/15 2:02 PM	SPL Peak (max):	160.4 dB
Start Time:	8/27/15 2:06 PM	RMS (max):	147.6 dB
End Time:	8/27/15 8:00 PM		
Duration:	5h 54m		
Hammer:	ICE 80S		
Total Blow Count:	5,842		
Total Number of Piles Driven:	2		

Pier Number:	2
Water Depth:	7.0 m (23 ft.)
Distance from cofferdam:	10.0 m (33 ft.)
Distance from Pile:	17.9 m (59 ft.)
River Flow Velocity:	< 1.5 m/s



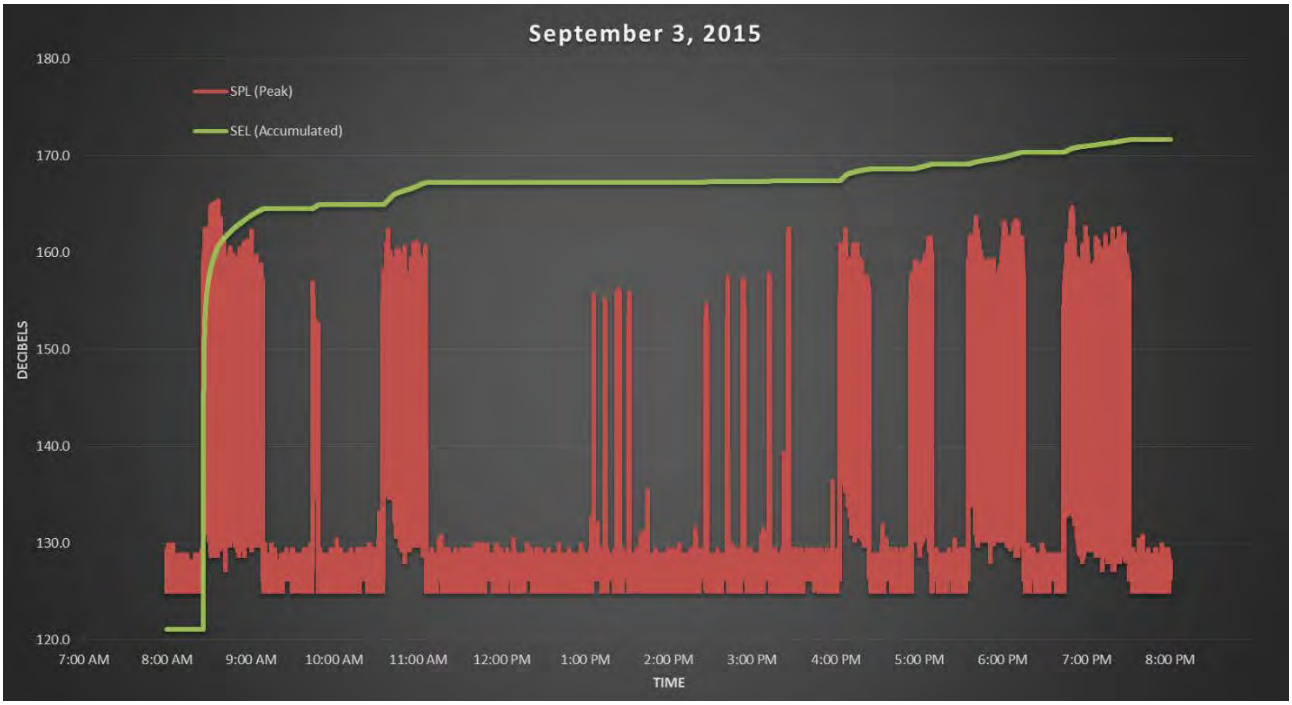
Date:	8/28/15	Accumulated SEL:	171.1 dB
Calibration Time:	8/28/15 7:37 AM	SPL Peak (max):	162.6 dB
Start Time:	8/28/15 7:40 AM	RMS (max):	152.5 dB
End Time:	8/28/15 6:00 PM		
Duration:	10h 20m		
Hammer:	ICE 80S		
Total Blow Count:	8,846		
Total Number of Piles Driven:	4		

Pier Number:	2
Water Depth:	7.0 m (23 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	16.7-17.9 m (55-59 ft)
River Flow Velocity:	< 1.5 m/s



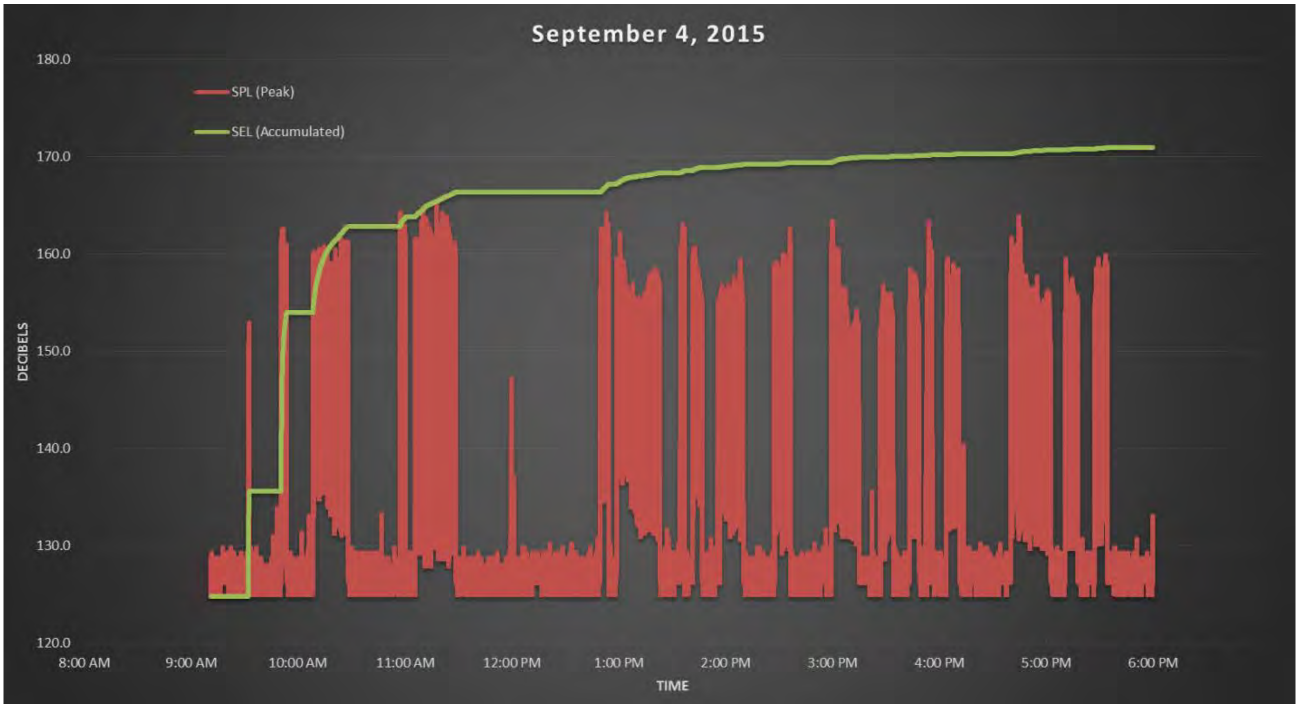
Date:	8/29/15	Accumulated SEL:	168.1 dB
Calibration Time:	8/29/15 7:47 AM	SPL Peak (max):	163.9 dB
Start Time:	8/29/15 10:00 AM	RMS (max):	151.1 dB
End Time:	8/29/15 4:00 PM		
Duration:	6h 00m		
Hammer:	ICE 80S		
Total Blow Count:	4,686		
Total Number of Piles Driven:	2		

Pier Number:	2
Water Depth:	7.0 m (23 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	16.7 m (55 ft)
River Flow Velocity:	< 1.5 m/s



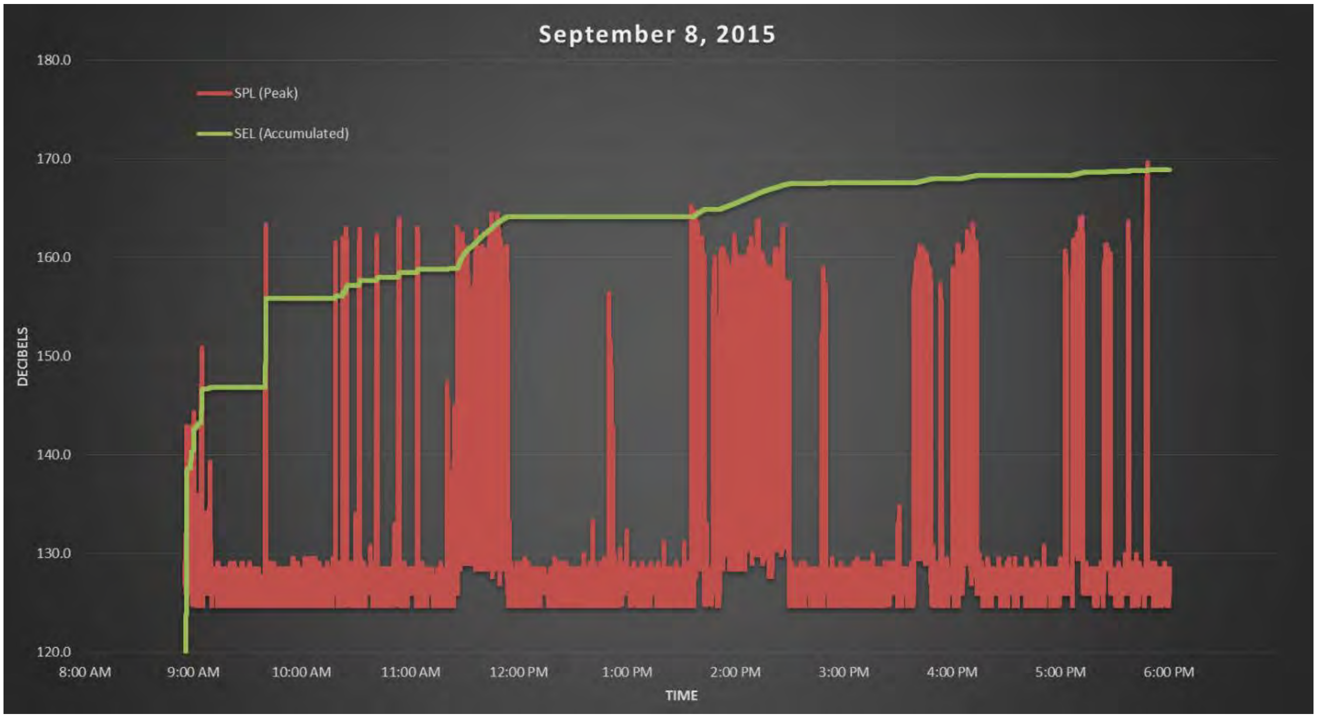
Date:	9/3/15	Accumulated SEL:	171.7 dB
Calibration Time:	9/3/15 7:45 AM	SPL Peak (max):	165.4 dB
Start Time:	9/3/15 7:47 AM	RMS (max):	147.7 dB
End Time:	9/3/15 8:00 PM		
Duration:	12h 13m		
Hammer:	ICE 80S		
Total Blow Count:	7,968		
Total Number of Piles Driven:	5		

Pier Number:	2
Water Depth:	7.0 m (23 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	15.5-16.7 m (51-55 ft)
River Flow Velocity:	< 1.5 m/s



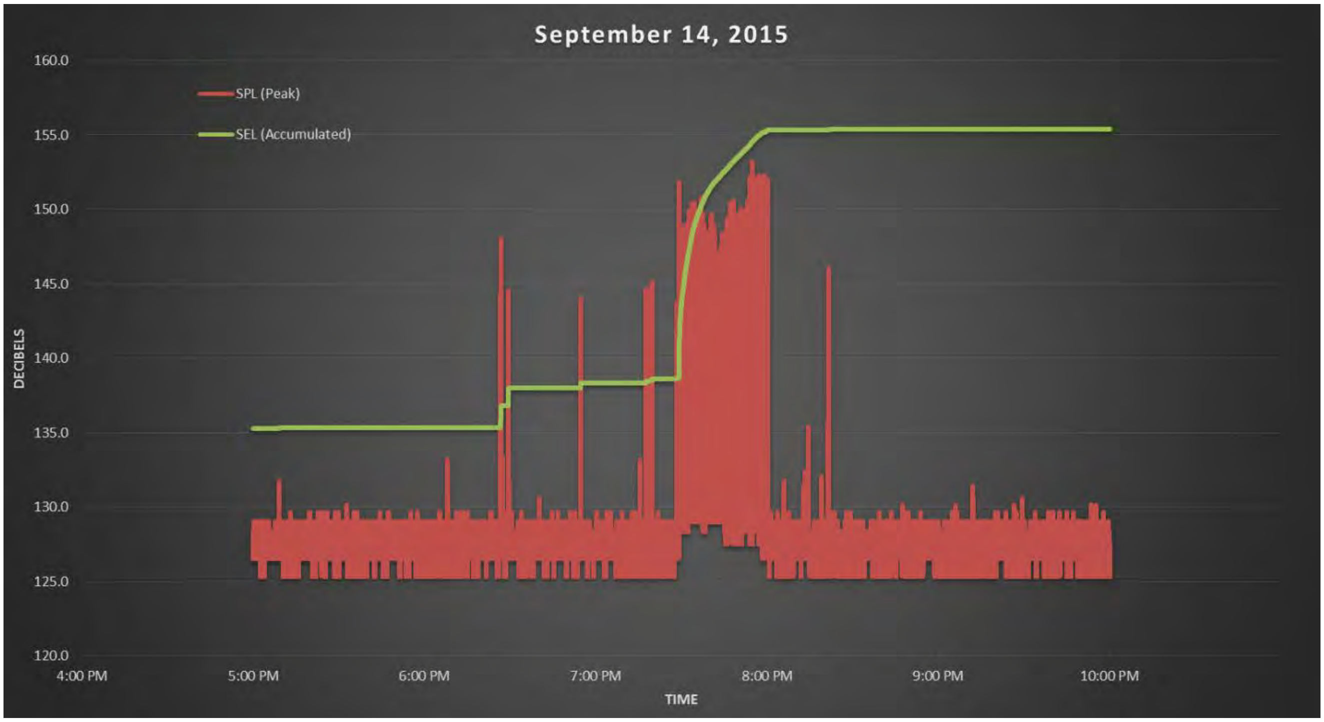
Date:	9/4/15	Accumulated SEL:	170.9 dB
Calibration Time:	9/4/15 8:59 AM	SPL Peak (max):	165.3 dB
Start Time:	9/4/15 9:03 AM	RMS (max):	158.9 dB
End Time:	9/4/15 6:02 PM		
Duration:	8h 59m		
Hammer:	ICE 80S		
Total Blow Count:	8,071		
Total Number of Piles Driven:	7		

Pier Number:	2
Water Depth:	7.0 m (23 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	14.7-15.5 m (47-51 ft)
River Flow Velocity:	< 1.5 m/s



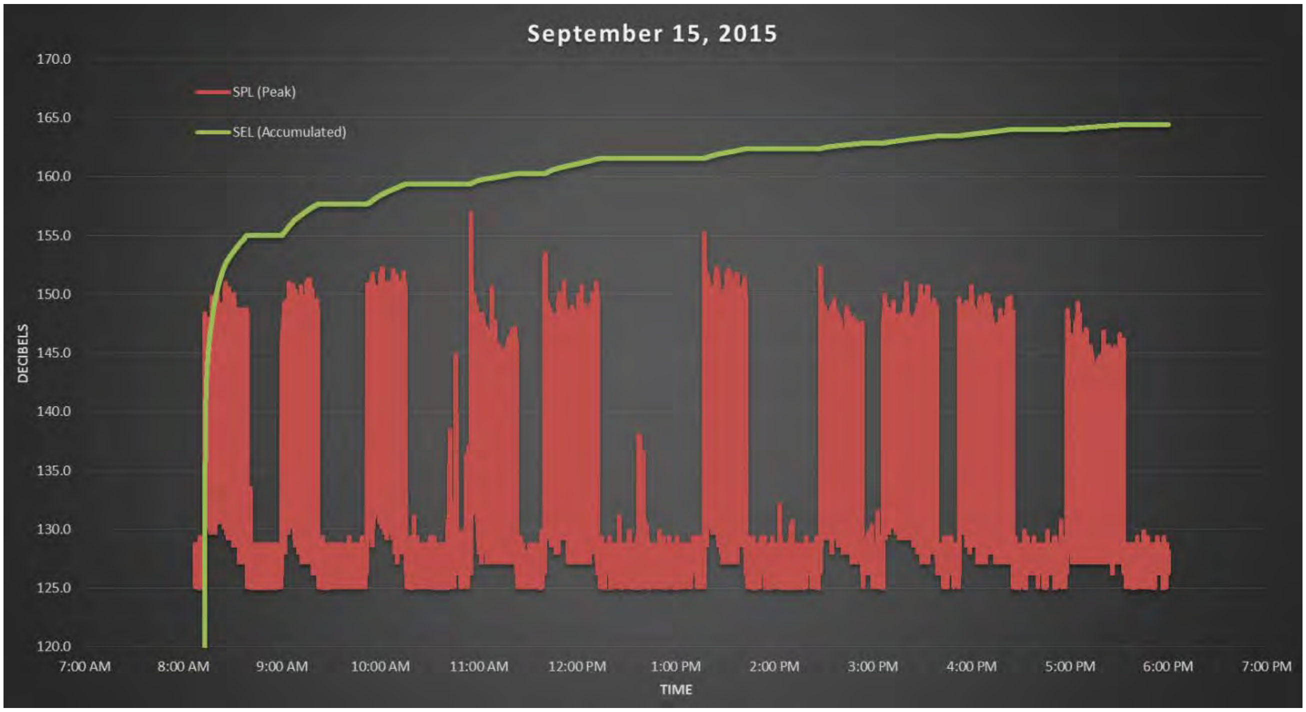
Date:	9/8/15	Accumulated SEL:	169.0 dB
Calibration Time:	9/8/15 8:46 AM	SPL Peak (max):	169.7 dB
Start Time:	9/8/15 8:55 AM	RMS (max):	160.7 dB
End Time:	9/8/15 6:00 PM		
Duration:	9h 05m		
Hammer:	ICE 80S		
Total Blow Count:	3,900		
Total Number of Piles Driven:	11 Restrikes		

Pier Number:	2
Water Depth:	7.0 m (23 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	14.3-15.5 m (47-51 ft)
River Flow Velocity:	< 1.5 m/s



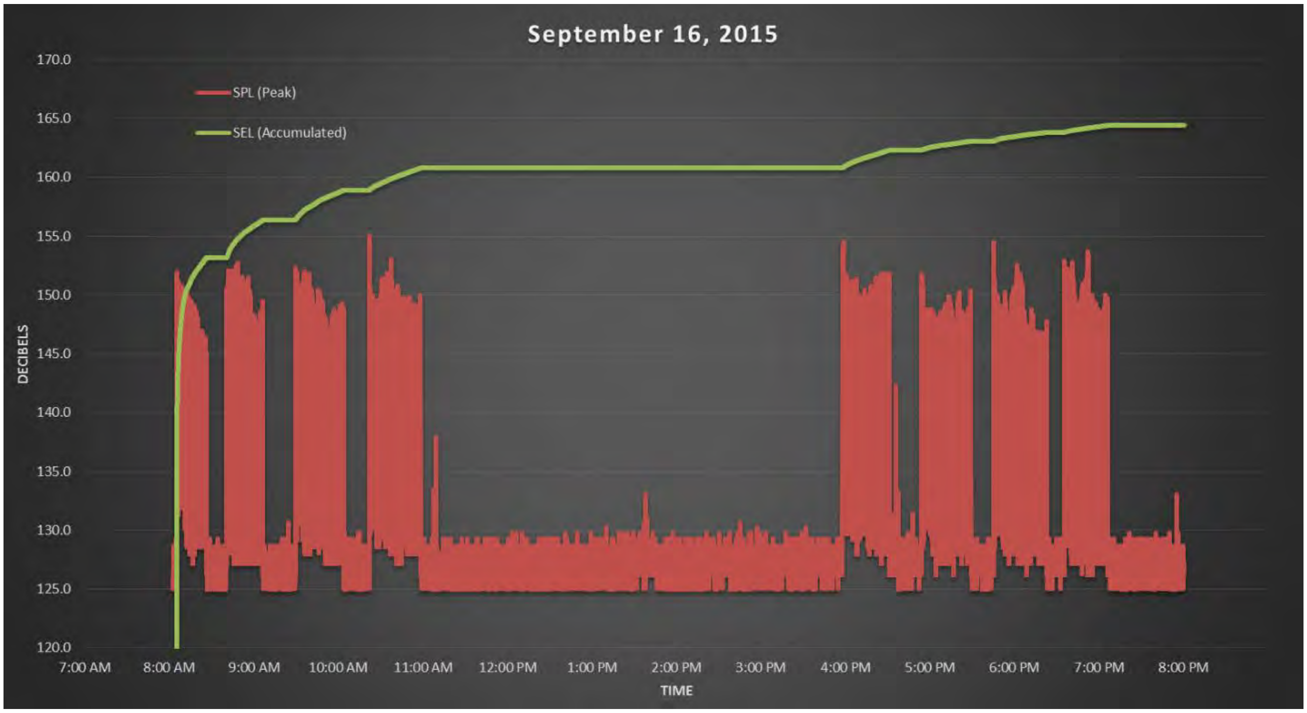
Date:	9/14/15	Accumulated SEL:	155.8 dB
Calibration Time:	9/14/15 9:02 AM	SPL Peak (max):	153.2 dB
Start Time:	9/14/15 5:00 PM	RMS (max):	141.2 dB
End Time:	9/14/15 10:00 PM		
Duration:	5h 00m		
Hammer:	ICE Model I-46 V2		
Total Blow Count:	1,368		
Total Number of Piles Driven:	1		

Pier Number:	2
Water Depth:	7.0 m (23 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	30.7 m (101 ft)
River Flow Velocity:	< 1.5 m/s



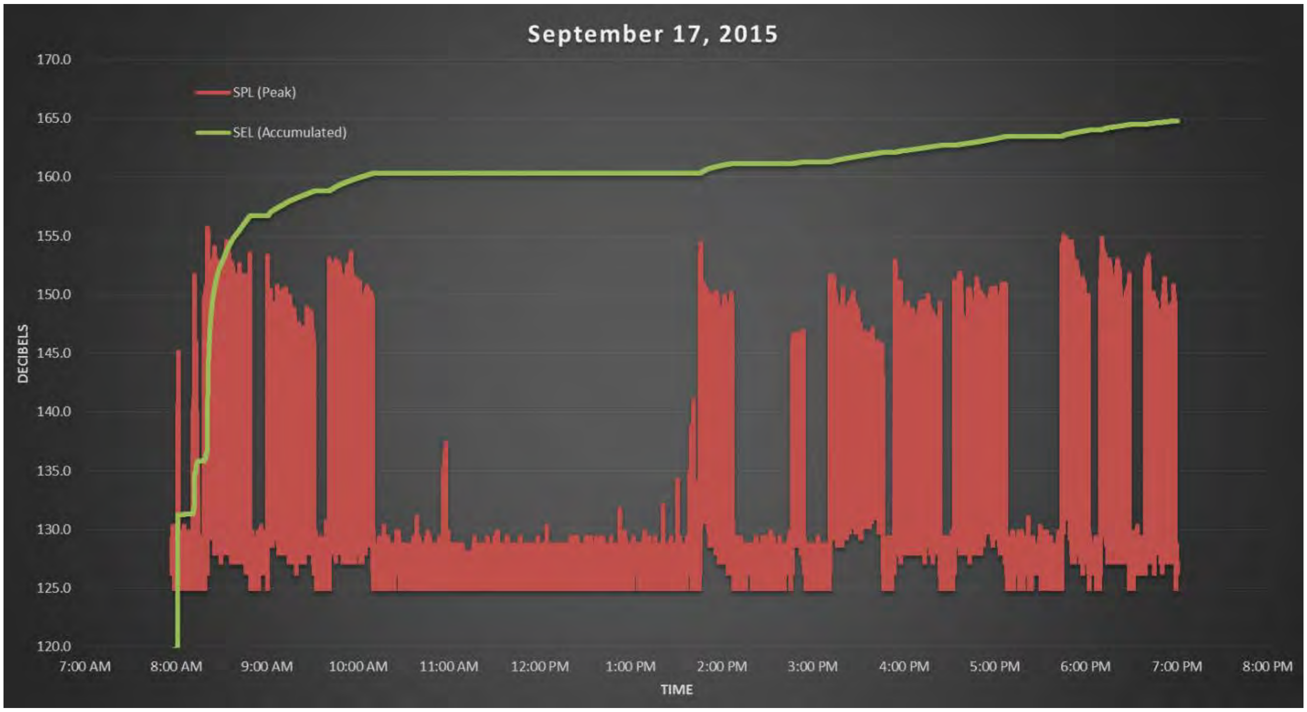
Date:	9/15/15	Accumulated SEL:	164.7 dB
Calibration Time:	9/15/15 8:04 AM	SPL Peak (max):	156.8 dB
Start Time:	9/15/15 8:07 AM	RMS (max):	145.7 dB
End Time:	9/15/15 6:00 PM		
Duration:	9h 53m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	12,554		
Total Number of Piles Driven:	10		

Pier Number:	2
Water Depth:	7.0 m (23 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	29.5-30.7 m (97-101 ft)
River Flow Velocity:	< 1.5 m/s



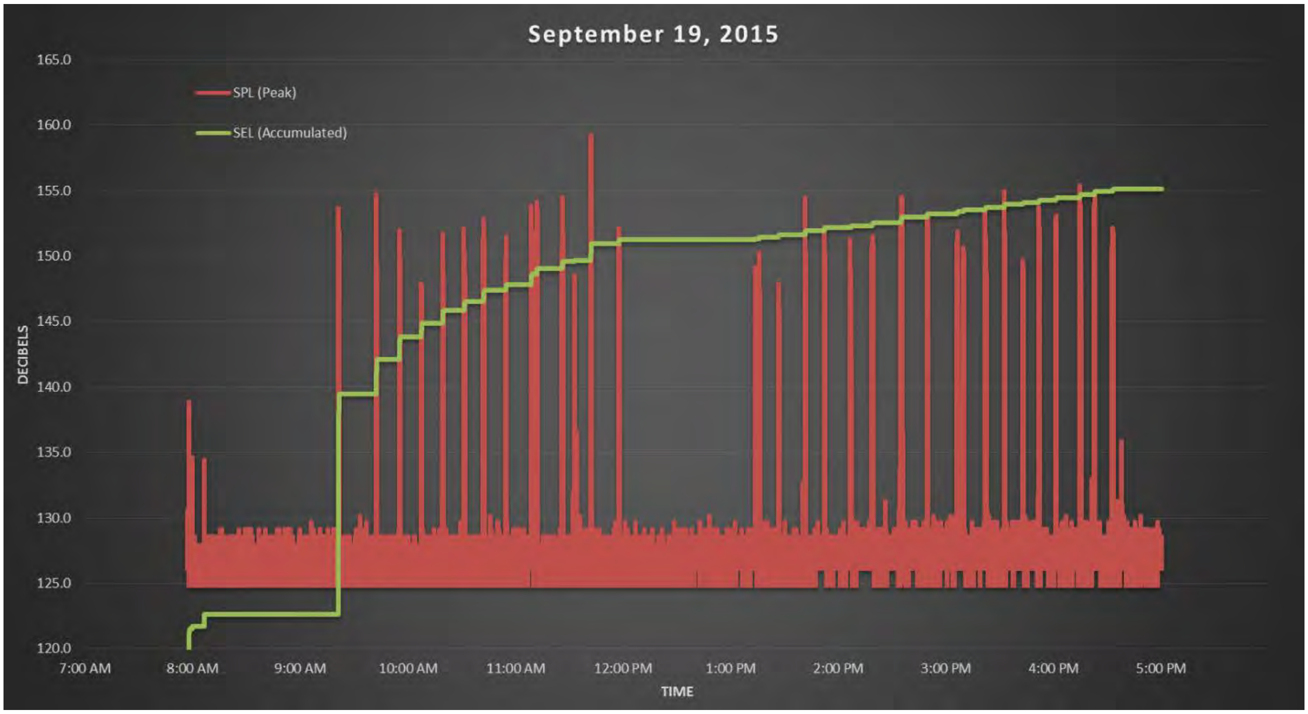
Date:	9/16/15	Accumulated SEL:	164.7 dB
Calibration Time:	9/16/15 7:58 AM	SPL Peak (max):	155.0 dB
Start Time:	9/16/15 8:02 AM	RMS (max):	143.0 dB
End Time:	9/16/15 8:00 PM		
Duration:	11h 58m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	8,717		
Total Number of Piles Driven:	8		

Pier Number:	2
Water Depth:	7.0 m (23 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	27.1-28.3 m (89-93 ft)
River Flow Velocity:	< 1.5 m/s



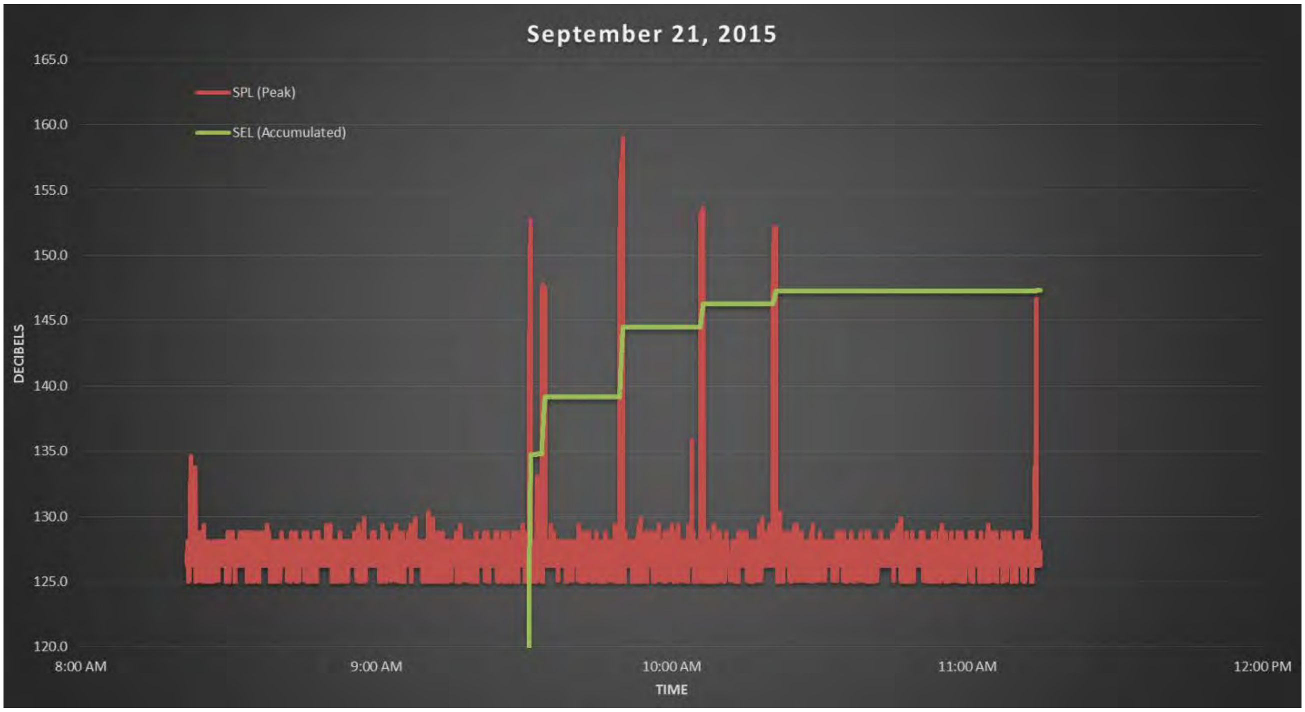
Date:	9/17/15	Accumulated SEL:	165.1 dB
Calibration Time:	9/17/15 7:54 AM	SPL Peak (max):	155.7 dB
Start Time:	9/17/15 7:57 AM	RMS (max):	142.9 dB
End Time:	9/17/15 7:00 PM		
Duration:	11h 03m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	11,882		
Total Number of Piles Driven:	10		

Pier Number:	2
Water Depth:	7.0 m (23 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	24.0-27.1 m (79-89 ft)
River Flow Velocity:	< 1.5 m/s



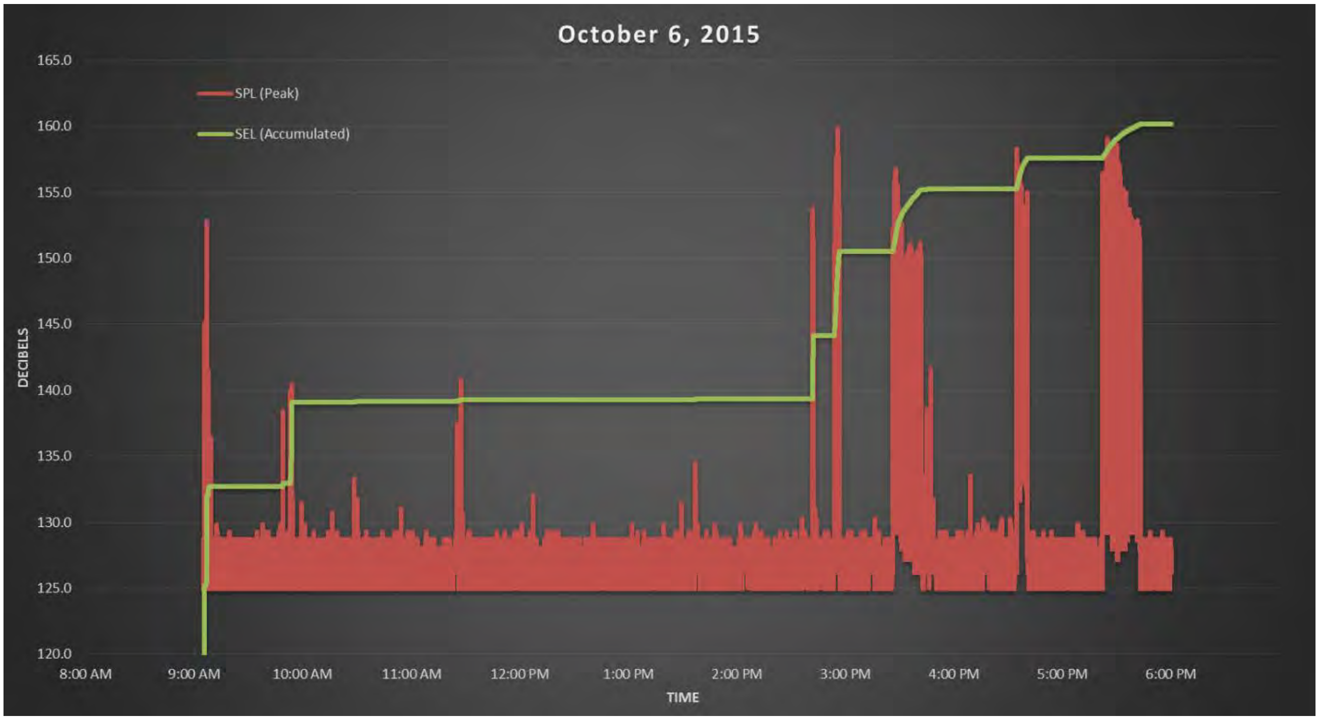
Date:	9/19/15	Accumulated SEL:	155.1 dB
Calibration Time:	9/19/15 7:52 AM	SPL Peak (max):	159.2 dB
Start Time:	9/19/15 7:57 AM	RMS (max):	144.0 dB
End Time:	9/19/15 5:00 PM		
Duration:	9h 03m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	723		
Total Number of Piles Driven:	29 Restrikes		

Pier Number:	2
Water Depth:	6.7 m (22 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	14.3-30.7 m (47-101 ft)
River Flow Velocity:	< 1.5 m/s



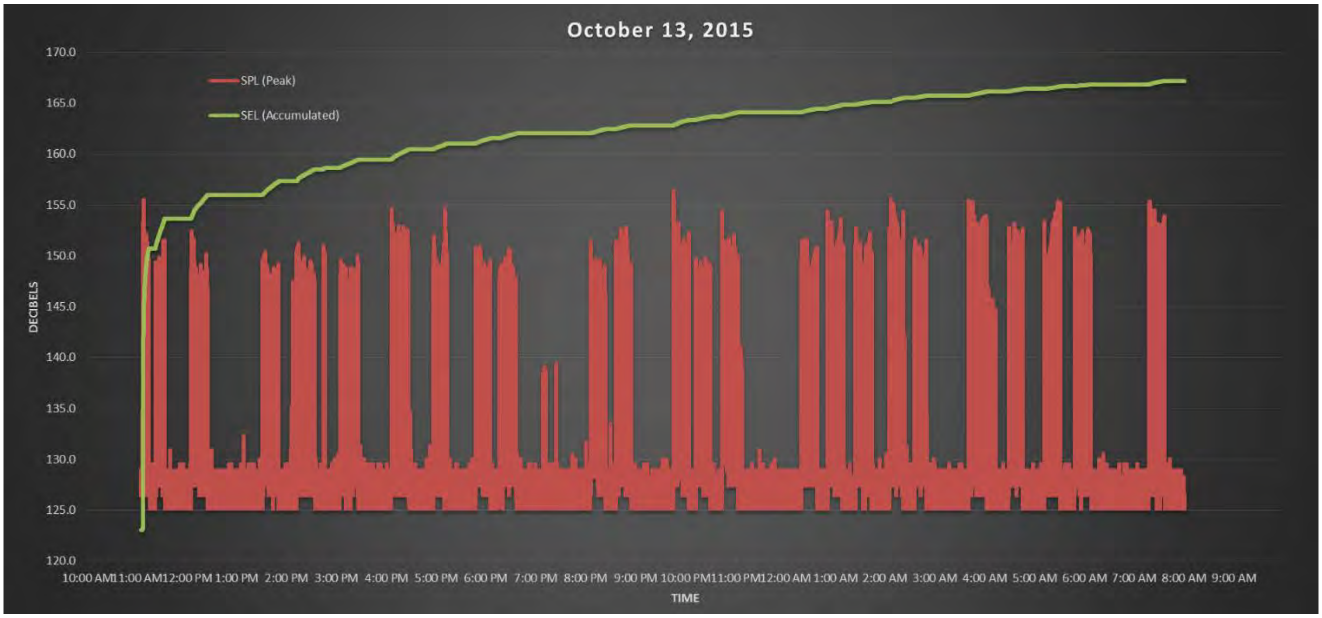
Date:	9/21/15	Accumulated SEL:	148.5 dB
Calibration Time:	9/21/15 8:19 AM	SPL Peak (max):	159.0 dB
Start Time:	9/21/15 8:21 AM	RMS (max):	142.9 dB
End Time:	9/21/15 11:14 AM		
Duration:	2h 53m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	100		
Total Number of Piles Driven:	4 Restrikes		

Pier Number:	2
Water Depth:	6.7 m (22 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	24.0-29.5 m (79-97 ft)
River Flow Velocity:	< 1.5 m/s



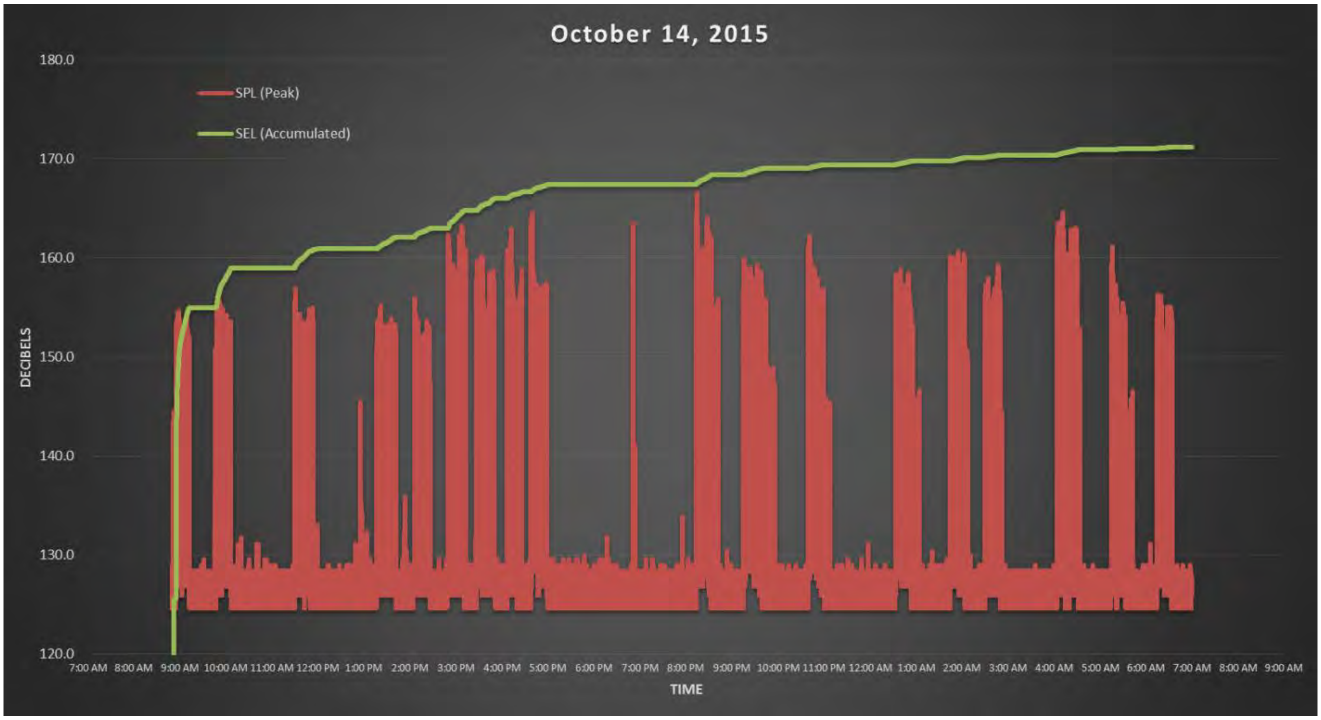
Date:	10/6/15	Accumulated SEL:	160.7 dB
Calibration Time:	10/6/15 9:02 AM	SPL Peak (max):	159.8 dB
Start Time:	10/6/15 9:04 AM	RMS (max):	145.1 dB
End Time:	10/6/15 6:00 PM		
Duration:	8h 56m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	1,613		
Total Number of Piles Driven:	2 Test Piles		

Pier Number:	3
Water Depth:	1.8 m (6 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	15.5-29.5 m (51-97 ft)
River Flow Velocity:	< 1.5 m/s



Date:	10/13/15	Accumulated SEL:	167.3 dB
Calibration Time:	10/13/15 10:14 AM	SPL Peak (max):	156.4 dB
Start Time:	10/13/15 11:05 AM	RMS (max):	145.2 dB
End Time:	10/14/15 8:05 AM		
Duration:	21h 00m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	17,693		
Total Number of Piles Driven:	24		

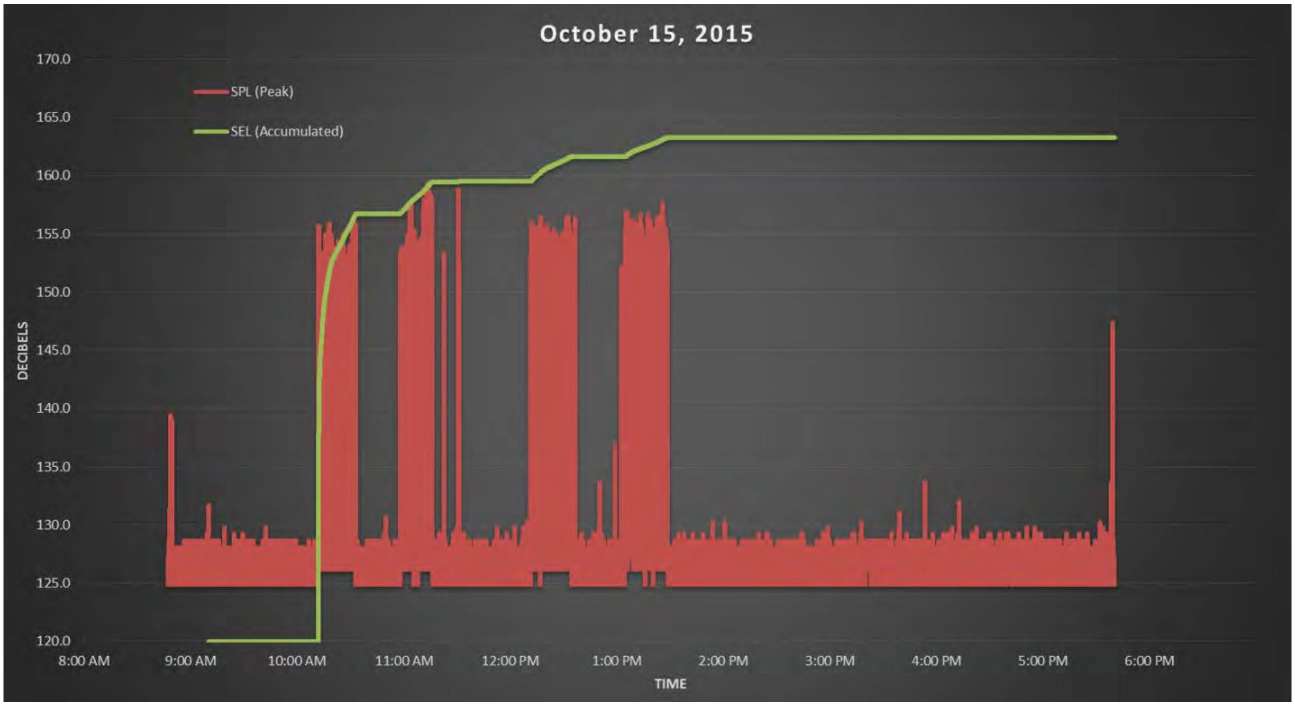
Pier Number:	3
Water Depth:	1.8 m (6 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	17.9-29.5 m (59-97 ft)
River Flow Velocity:	< 1.5 m/s



Date:	10/14/15
Calibration Time:	10/14/15 8:47 AM
Start Time:	10/14/15 8:50 AM
End Time:	10/15/15 7:00 AM
Duration:	22h 10m
Hammer:	ICE Model I-46^{V2}
Total Blow Count:	13,071
Total Number of Piles Driven:	18

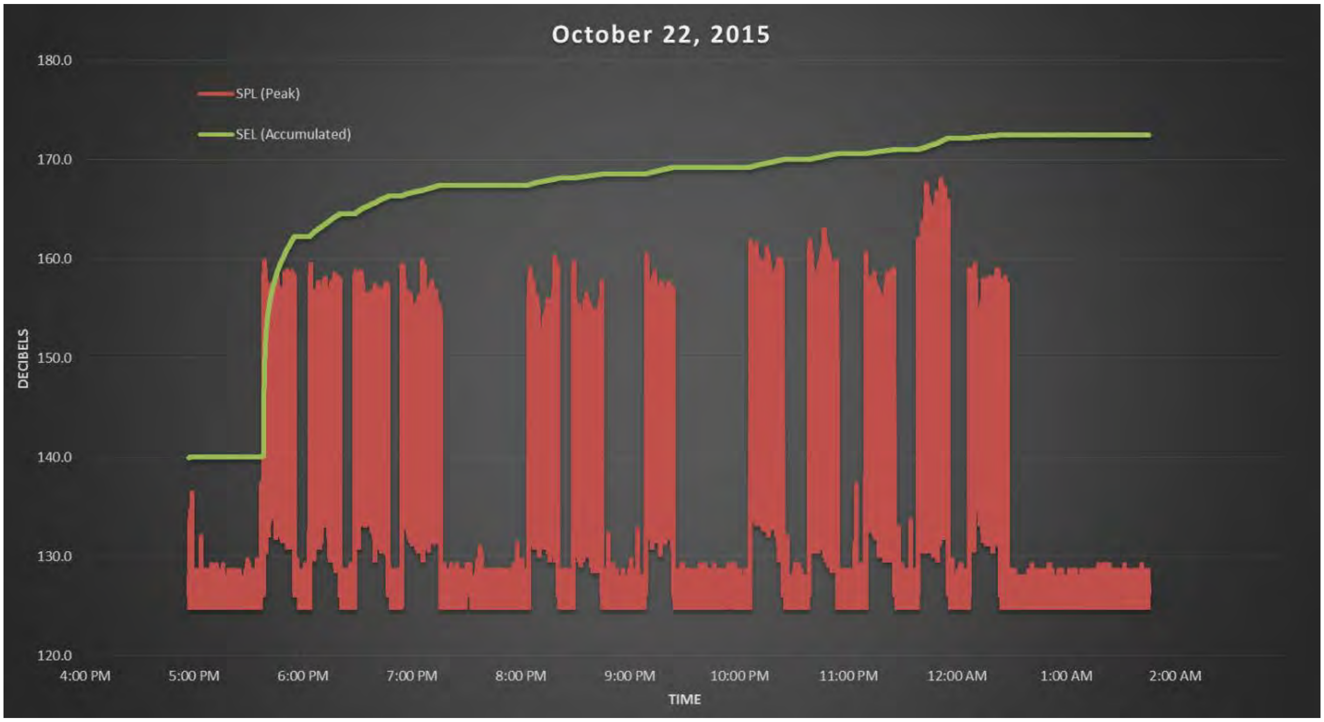
Accumulated SEL:	171.3 dB
SPL Peak (max):	166.6 dB
RMS (max):	157.4 dB

Pier Number:	3
Water Depth:	1.8 m (6 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	14.3-17.9 m (47-59 ft)
River Flow Velocity:	< 1.5 m/s



Date:	10/15/15	Accumulated SEL:	163.3 dB
Calibration Time:	10/15/15 8:45 AM	SPL Peak (max):	159.3 dB
Start Time:	10/15/15 8:47 AM	RMS (max):	144.6 dB
End Time:	10/15/15 5:39 PM		
Duration:	8h 52m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	3,260		
Total Number of Piles Driven:	4		

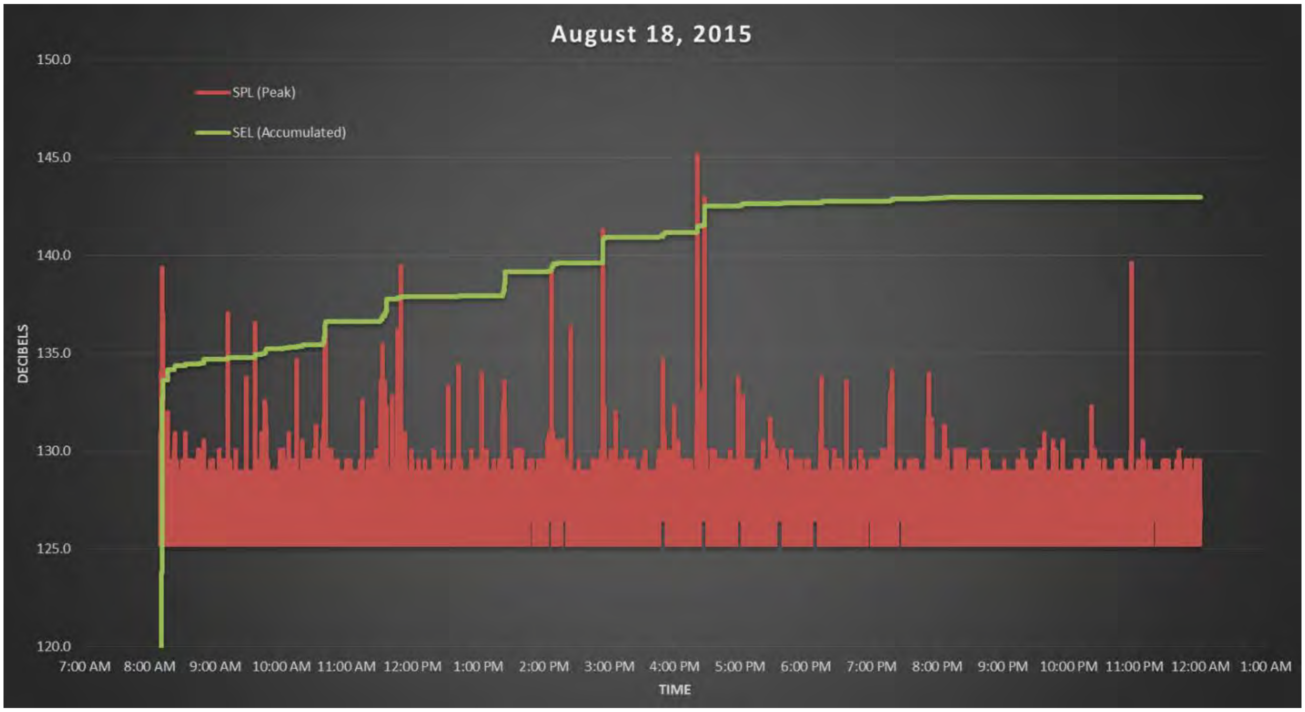
Pier Number: 3
Water Depth: 1.8 m (6 ft)
Distance from cofferdam: 10.0 m (33 ft)
Distance from Pile: 16.7 m (55 ft)
River Flow Velocity: < 1.5 m/s



Date:	10/22/15	Accumulated SEL:	172.5 dB
Calibration Time:	10/22/15 4:36 PM	SPL Peak (max):	168.0 dB
Start Time:	10/22/15 4:49 PM	RMS (max):	153.7 dB
End Time:	10/22/15 2:00 AM		
Duration:	9h 11m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	7,365		
Total Number of Piles Driven:	12		

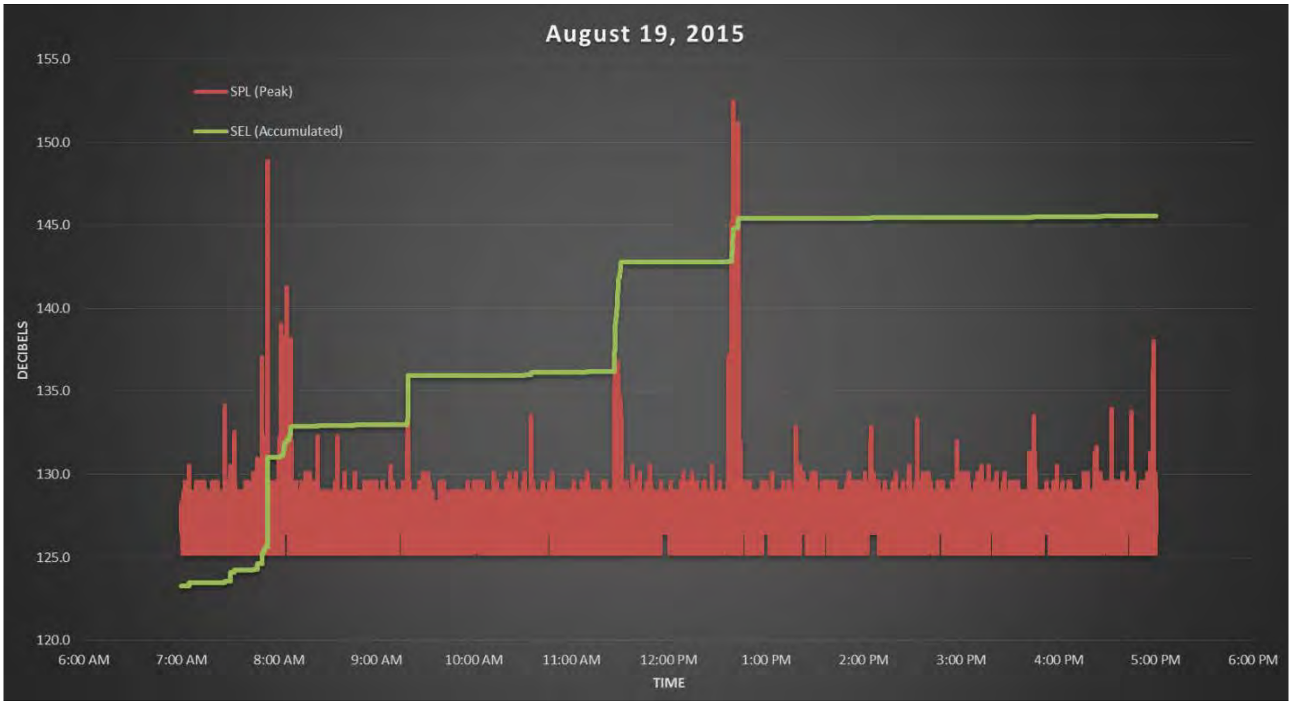
Pier Number:	3
Water Depth:	6.4 m (21 ft)
Distance from cofferdam:	Inside
Distance from Pile:	16.8-19.2 m (55-63 ft)
River Flow Velocity:	< 1.50 m/s

Vibratory Hammer



Date:	8/18/2015	Accumulated SEL:	152.4 dB
Calibration Time:	8/18/15 7:50 PM	SPL Peak (max):	145.2 dB
Start Time:	8/18/15 8:09 AM	RMS (max):	136.7 dB
End Time:	8/18/15 11:59 PM		
Duration:	15h 50m		
Hammer:	Vibratory		
Total Blow Count:	N/A		
Total Number of Piles Driven:	N/A		

Pier Number:	2
Water Depth:	7.0 m (24 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	>10.0 m
River Flow Velocity:	< 1.5 m/s



Date:	8/19/2015	Accumulated SEL:	155.2 dB
Calibration Time:	8/18/15 6:50 AM	SPL Peak (max):	152.4 dB
Start Time:	8/19/15 7:00 AM	RMS (max):	144.0 dB
End Time:	8/19/15 5:00 PM		
Duration:	10h 00m		
Hammer:	Vibratory		
Total Blow Count:	N/A		
Total Number of Piles Driven:	N/A		

Pier Number:	2
Water Depth:	7.0 m (24 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	>10.0 m
River Flow Velocity:	< 1.5 m/s

APPENDIX I
Northern Long-Eared Bat Bridge/Structure Assessment Guidelines and Form

Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and Federal Transit Administration (FTA)

Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat

Bridge/Structure Assessment Guidelines and Form

Updated May 2016

Federal Transportation Agency/State Department of Transportation (DOT) Preliminary Bat Assessment Guidelines for Bridges/Structures

DOT Environmental Division

Adapted from the Indiana Department of Transportation 2010 Bridge Inspection Manual and the Bernardin, Lochmueller and Associates 2007 document.

The guidelines in this document describe favorable characteristics of bridges/structures that may provide habitat for many bat species and preliminary indicators intended to determine if any bat species are using bridges/structures. Negative surveys are considered valid for one year.

Individuals conducting reviews for bats must use the Bridge Assessment Form and must include a copy of the completed form in their project file. Individuals assessing bridges/structures should employ appropriate safety measures in conducting these reviews and avoid touching any bats. Recommended equipment include a flashlight (preferably a headlamp), hard hat, binoculars or spotting scope, digital camera, check list and a fine- to medium-point permanent marker or pen. It is advisable that individuals also consider having a dust mask, cellular phone, and boots if access beneath structures is desired. Easily removed, protective coveralls may be advisable if access requires crawling.

Favorable Characteristics

Cracks in Concrete

Cracks in the concrete are used by bats as a foothold in roosting (Photo 1). In addition, some bats may be hidden from sight in wider cracks in the concrete and behind deteriorating concrete sections in the ceiling or walls. Look for cracking along support beams and inner walls especially below a fillet (a concrete filling between ceiling and vertical beam). During inspection, sounds may be heard coming from behind such cracks and/or expansion joints.

Expansion Joints (Bridges)

Expansion joints can provide protected cover for bats (Photos 2 and 5), but do not always provide habitat, depending upon whether they are obstructed by road debris or other blockages. If possible during the assessment, individuals should use a flashlight to look into expansion joints or cracks. Guano may be present under joints if being used by bats (Photos 7 and 8).

Cave-like Environment

While assessing bridges or structures, look for dark environments that mimic cave-like conditions such as under the deck in the case of a bridge (Photos 12 and 13) or an attic in the case of a structure. This may involve crawling under low areas so a hard hat is recommended. Such places (e.g., a concrete bunker secreted into a hillside with an open front) provide protection from wind, rain, sleet, hail and predators. Bats do not roost near the ground where predators (cats, raccoons, etc.) can reach them. Roosting is usually at least 4 ft. from the ground.

Large Rivers in Wide Floodplains (Bridges)

Many concrete bridges that span larger rivers in wide floodplains offer excellent areas for roosting. These areas tend to have an ample food supply and may also serve as historic flyways for bats during migration (i.e., March-May and September-November). These bridges may also offer opportunities for mating in late fall.

<u>Preliminary Indicators of Bat Presence</u>

The four indicators presented here document physical observations that can easily be made for individual structures. Each of these indicators should be considered on its own merits and the presence of even one of these on a bridge is enough documentation to confirm bat usage. If questions arise regarding interpretation of these indicators, individuals should contact the District Environmental Manager for clarification or assistance. (NOTE: Some of these indicators, visual and sound, will not be present during normal hibernation periods, as bats do not usually hibernate under bridges. Hibernation usually occurs between September and May, but contact your local USFWS Field Office for exact dates.)

Visual

Day: Look for bats flying or roosting (hanging) during the assessment (Photo 1, 2, & 8). A flashlight or headlamp will be needed and binoculars may be necessary when viewing higher areas. If bats are present; record numbers as best as possible and their locations. Note any dead or injured bats. A sketch map would be helpful (use bridge plan sheet as base for sketch).
Night: Thermal infrared cameras or emergence surveys can also be used to document bat use.

Use of presence/absence summer surveys (i.e., mist-netting or acoustics) may also be used if the following apply:

- A presence/absence summer survey is already necessary because there will be tree removal associated with the project. The results of the presence/absence summer survey for a nearby project is not sufficient. The survey should be specific for the project in question.
- Survey points over water/edge of water (if there is a small stream) should be incorporated in the study plan.
- Survey points should be identified based on the habitat on-site. If no point is within 0.25 miles of a bridge, an additional level-of-effort is necessary. Either add a survey point within 0.25 miles, or conduct one of the previous mentioned techniques (bridge inspection, emergence survey[1], thermal infrared cameras).
- The Service Field Office will review and approve the survey scope of work.
- If the bridge is within a known maternity colony home range, a bridge assessment is required.

Sound

[1] The range-wide Indiana bat summer survey guidelines provide details on how to conduct an emergence survey.

Listen for high pitched squeaking or chirping during the assessment and identify location(s) for later examination by DOT staff. This may be helpful in locating bats within deep cracks or open joints. A sketch map would be helpful.

Droppings (Guano)

Bat droppings are small (mouse-like in appearance but less regular) brown or black pellets (Photos 6 - 8). Older droppings may be gray in color. These droppings will accumulate on the ground, floor of a covered bridge or on structural components below where bats roost. Droppings may also adhere to support beams and walls below roosts.

Note bat droppings and their location. Check under likely roosting spots such as cracks, cave-like areas, and expansion joints. If guano is present, the inspector may wish to wear a dust mask. Also, it is advisable to wear rubber boots to minimize tracking of any guano into vehicle(s) and other places.

Staining

Stains may appear wet and are usually found in dark places. Look for four to six inch wide dark stains located on concrete support beams and walls immediately below the ceiling of the bridge, and beneath joints (Photos 8 - 11).

Literature Cited

Bernardin, Lochmueller, and Associates, Inc. 2007. Bridge Inspection Checklist for Bats. Unpublished. Evansville, Indiana.

Indiana Department of Transportation (INDOT). 2012. INDOT Bridge Inspection Manual. Indiana. Available at: http://www.in.gov/dot/div/contracts/standards/bridge/inspector_manual/index.htm.

Keeley, Brian W. and Merlin D. Tuttle. 1999. Bats in American Bridges. Bat Conservation International, Inc., Austin, TX. Resource Publication No. 4, 41 pp.

Images of Favorable Characteristics and Preliminary Indicators of Bat Presence

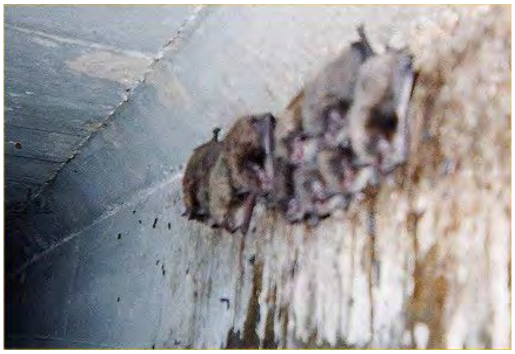


Photo 1: Bats hanging from cracks along support beams

Photo 2: Visible bats within an expansion joint

Photo 3: Example of open concrete joint used by bats

Photo 4: Guano deposits visible from bridge deck, on top of pier

Photo 5: Guano deposit on pier, obscuring structural features.

Photo 6: Bat Guano on Riprap

Photo 7: Staining along longitudinal joint. Guano deposits on the ground.

Photo 8: Staining on underside of expansion joint from bat use.

Photo 9: Staining on sides of pier caps

Photo 10: Guano staining on side of pier

Photo 11: Bats roosting & associated staining

Photo 12 and 13: Bridge design mimicking “cave-like” atmosphere

Photo 14: NLEBs roosting under a timber decked bridge

Bridge/Structure Assessment Form

This form will be completed and submitted to the District Environmental Manager by the Contractor prior to conducting any work below the deck surface either from the underside, from activities above that bore down to the underside, or that could impact expansion joints, from deck removal on bridges, or from structure demolish. Each bridge/structure to be worked on must have a current bridge inspection. Any bridge/structure suspected of providing habitat for any species of bat will be removed from work schedules until such time that the DOT has obtained clearance from the US Fish and Wildlife Service, if required. Additional studies may be undertaken by the DOT to determine what species may be utilizing structures prior to allowing any work to proceed.

DOT Project #	**Water Body**	**Date/Time of Inspection**

Route:	**County:**	**Federal Structure ID:**	**Bat Indicators** Check all that apply. Presence of one or more indicators is sufficient evidence that bats may be using the structure.				
			Visual	Sound	Droppings	Staining	**Notes: (e.g., number & species of bats, if known. Include the results of thermal, emergent, or presence/absence summer survey)**

Areas Inspected (Check all that apply)

Bridges		**Culverts/Other Structures**		**Summary Info (circle all that apply)**			
All vertical crevices sealed at the top and 0.5-1.25” wide & ≥4” deep		**Crevices, rough surfaces or imperfections in concrete**		**Human disturbance or traffic under bridge/in culvert or at the structure**	High	Low	None

All crevices >12" deep & not sealed		**Spaces between walls, ceiling joists**		**Possible corridors for netting**	None/poor	Marginal	Excellent
All guardrails				**Evidence of bats using bird nests, if present?**	Yes	No	
All expansion joints							
Spaces between concrete end walls and the bridge deck							
Vertical surfaces on concrete I-beams							

Assessment Conducted By: ______________________________ Signature(s): ____
District Environmental Use Only: Date Received by District Environmental Manager: ______________

DOT Bat Assessment Form Instructions

1. Assessments must be completed a minimum of 1 year prior to conducting any work below the deck surface on all bridges that meet the physical characteristics described in the Programmatic Consultation, regardless of whether assessments have been conducted in the past. **Due to the transitory nature of bat use, a negative result in one year does not guarantee that bats will not use that structure in subsequent years.**
2. Legible copies of this document must be provided to the District Environmental Manager within two (2) business days of completing the assessment. Failure to submit this information will result in that structure being removed from the planned work schedule.
3. Any bridge/structure suspected of providing habitat for any species of bat will be removed from work schedules until such time that the DOT has obtained clearance from the USFWS, if required. Additional studies may be undertaken by the DOT to determine what species may be utilizing each structure identified as supporting bats prior to allowing any work to proceed.
4. Estimates of numbers of bats observed should be place in the Notes column.
5. Any questions should be directed to the District Environmental Manager.