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

April 2025

United States Department of the Interior

FISH AND WILDLIFE SERVICE
North Dakota Ecological Services Field Office
3425 Miriam Avenue
Bismarck, North Dakota 58501
(701) 355-8500, ndfieldoffice@fws.gov

April 25, 2025

In reply, please refer to:
FHWA/NDDOT Programmatic

Mr. Lee Potter
North Dakota Division Administrator
Federal Highway Administration
1471 Interstate Loop
Bismarck, ND 58503

Dear Mr. Potter:

This is in response to a request from the Federal Highway Administration (FHWA) for informal consultation with regards to the 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.*) (ESA), 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 (Service) North Dakota Ecological Services Field Office received the amended Programmatic Biological Assessment (PBA) for North Dakota Department of Transportation Projects, and cosigned the document in April 2025.

On February 9, 2017, the Service concurred with determinations made for the original December 2016 PBA, but they are being re-evaluated because 1) new information revealing that action may affect listed species or critical habitat in a manner or to an extent not considered in the prior consultation; and 2) the listing status of a species has since changed. The purpose of the PBA remains unchanged with its intent to streamline the regulatory procedures for routine, low impact transportation construction activities jointly carried out by the North Dakota Department of Transportation (NDDOT) and FHWA pursuant to section 7 of the ESA. The PBA programmatically re-analyzed 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 ESA.

In accordance with section 7 of the ESA, the FHWA has requested Service concurrence with the determination, for actions that fall within the scope of the April 2025 PBA, **May Affect, but is Not Likely to Adversely Affect** the endangered whooping crane (*Grus americana*), pallid sturgeon (*Scaphirhynchus albus*), Poweshiek skipperling (*Oarisma poweshiek*), northern long-eared bat (*Myotis septentrionalis*), threatened piping plover (*Charadrius melodus*), rufa red knot (*Calidris canutus rufa*), western prairie fringed orchid (*Platanthera praeclara*), Dakota skipper (*Heperia dacotae*), and designated critical habitats for the piping plover, powesheik skipperling, and Dakota skipper.

Based upon the project description, proposed conservation measures, and analysis of potential effect included in the PBA, the Service has concluded that the effects from actions determined to be within the scope of this PBA 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 endangered gray wolf (*Canus lupus*). There are no requirements under the implementing regulations of the ESA (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 Service is aware of the Memorandum of Understanding (MOU) between the FHWA and NDDOT, designating NDDOT as the FHWA's non-federal representative in accordance with 50 CFR 402.08. This MOU establishes NDDOT as FWHA's non-federal representative for the purposes of conducting informal section 7 consultation per implementation of this PBA.

Pursuant to the implementing regulations of the ESA (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 the 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, or a change occurs to the listing status of a species or designated critical habitat 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 ESA. If you have any additional questions or concerns, please contact Hanna Edens at (701) 954-0312 or via email at hanna_edens@fws.gov, or our office at (701) 355-8500 or via email at ndfieldoffice@fws.gov.

Sincerely,

LUKE TOSO

Digitally signed by LUKE TOSO
Date: 2025.04.25 16:20:43 -05'00'

Luke Toso, Deputy Field Supervisor
For
Chris Swanson, Field Supervisor

Programmatic Biological Assessment

The North Dakota Department of Transportation (NDDOT) in cooperation with Federal Highway Administration (FHWA), and U.S. Fish and Wildlife Service (USFWS) has developed this Programmatic Biological Assessment (PBA) to analyze the effects of the NDDOT transportation program on threatened and endangered species within North Dakota. The intent of the 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, non-controversial, and low impact projects. Section 2.3 defines the types of projects to be covered by the PBA. Actions that result in “no effect” or “may affect, but not likely to adversely affect” determinations are covered by the PBA. Projects covered by the PBA may include more than one activity (action), and 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 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 ESA 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”. The FHWA, NDDOT, and USFWS 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). Since the transportation program is active throughout the state of North Dakota and listed species as well as designated critical habitat (DCH) occur or have the potential to occur throughout, the 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 the 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 DCH. 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.

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 established a general framework for cooperation and participation of the FHWA and NDDOT in the exercise of their responsibilities under the ESA.

The NDDOT agrees to:

A. Work with FHWA to comply with the ESA for all FHWA involved projects.
B. Utilize the opportunities provided by the ESA to implement the 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.
D. 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, stand-alone biological assessments, Section 7 affect determination packages, or the ESA affect determination table.
E. Submit to FHWA for review of those actions that could have an adverse effect on listed resources.
F. Maintain a spreadsheet of all informal consultations covered under the PBA or stand-alone biological assessments.
G. Implement conservation measures to reduce potential impacts to listed resources covered under the PBA.
H. On a yearly basis, the NDDOT will schedule an annual meeting with FHWA and USFWS to discuss/review projects conducted under this PBA during the previous year.

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. Comply with the ESA for all FHWA involved projects.
C. Maintain ultimate responsibility for compliance with Section 7 of the ESA.
D. Initiate formal Section 7 consultation with the USFWS for projects that have the potential to adversely affect listed species or critical habitat.
E. Re-initiate formal or informal Section 7 ESA consultation with USFWS if necessary.
F. Participate in the development and review of the PBA prepared by the NDDOT.

The NDDOT, FHWA, and USFWS agree that:

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, NDDOT, and USFWS 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. All parties support the concepts identified in this PBA and will actively implement it in accordance with applicable laws, regulations, and policies.

Execution
Execution and implementation of these terms by all parties provides evidence that all parties have reviewed this PBA and agree to the terms and conditions for its implementation. 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. This PBA is effective upon the date of the USFWS concurrence letter.

Revisions
The coverage of this PBA is based on the scope of project actions, listed species, and critical habitat at the time of concurrence. Revisions to the PBA may be initiated by NDDOT, FHWA, and USFWS should essential modifications or amendments become apparent 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 PBA; or
3. A new species is listed or critical habitat is designated that may be affected by this action.

Proposed revisions to the PBA will be sent to all parties for approval/concurrence by the respective agency program managers and approved via email. The NDDOT will maintain all revision approvals on file. Approved revisions will be incorporated into the appropriate section of the PBA document by notating the affected pages within the PBA by a revision date.

At a minimum, if no documented reviews or revisions have occurred within a 5-year period, the NDDOT, FHWA, and USFWS will review and recertify the PBA to ensure compliance. The review and recertification will be approved by the respective agency program managers via email. The NDDOT will maintain the recertification approval email on file.

Signatory Page

Matt Linneman

Ronald J. Henke, PE

for the Director

North Dakota Department of Transportation

04/22/25

Date

Lee Potter, PE

Division Administrator, North Dakota Division

Federal Highway Administration

4/24/25

Date

Luke Toso

Deputy Field Supervisor

North Dakota Ecological Services Field Office

U.S. Fish and Wildlife Service

4/25/25

Date

Approved as to Substance:

Matt Gangness

Matt Gangness, PE

ETS Division Director

North Dakota Department of Transportation

4-10-2025

Date

Table of Contents

Appendices

Appendix A – Land Cover Map
Appendix B – Deconstruction Matrix
Appendix C – Piping Plover Critical Habitat Maps and Table
Appendix D – Dakota Skipper Critical Habitat Maps
Appendix E– Hydro-acoustic Monitoring Plan

Tables

Figures

Acronyms

AMMs	Avoidance & Minimization Measures
ANS	Aquatic Nuisance Species
ANWR	Aransas National Wildlife Refuge
AWBP	Aransas Wood Buffalo Population
APLIC	Avian Power Line Interaction Committee
BA	Biological Assessment
BMPs	Best Management Practices
BMS	Bridge Management System
CIR	Cold In-Place Recycling
COA	Material Source Certificate of Approval
CWS	Canadian Wildlife Service
dB	Decibel
dBA	A-weighted Decibel
DC	Direct Current
DCH	Designated Critical Habitat
DPS	Distinct Population Segment
ECE	Electrochemical Chloride Extraction
ECMs	Erosion Control Measures
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
ESS	Environmental Sensor Station
ETS	Environmental and Transportation Services
FAST	Fixed Automated Spray Technology
FHWA	Federal Highway Administration
FHWG	Fisheries Hydroacoustic Working Group
FR	Federal Register
FTA	Federal Transit Administration
GAP	Gap Analysis Project
HBP	Hot Bituminous Pavement
HDD	Horizontal Directional Drilling
HPCS	Highway Performance Classification System
ITS	Intelligent Transportation System
MOU	Memorandum of Understanding
MSE	Mechanically Stabilized Earth
NDCC	North Dakota Century Code
NDDOT	North Dakota Department of Transportation
NDGF	North Dakota Game and Fish
NEPA	National Environmental Protection Act
NGP	Northern Great Plains
NLAA	May Affect, Not Likely to Adversely Affect
NLEB	Northern Long-Eared Bat (*Myotis septentrionalis)*
NOAA	National Oceanic and Atmospheric Administration

NRM	Northern Rocky Mountain
PBA	Programmatic Biological Assessment
PBF	Physical or Biological Features
PMS	Pavement Management System
psi	Pounds per Square Inch
PTS	Permanent Threshold Shift
RMS	Root Mean Square
ROW	Right-of-way
RPU	Remote Processing Unit
RWIS	Road Weather Information System
SEL	Sound Exposure Level
SOV	Solicitation of Views
SP	Special Provision
SPCC	Spill Prevention Countermeasure and Control Plan
STIP	Statewide Transportation Improvement Program
SWPPP	Storm Water Prevention Pollution Plan
TTS	Temporary Threshold Shift
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Service
WBNP	Wood Buffalo National Park
WGL	Western Great Lakes
WNS	White-Nose Syndrome
WSDOT	Washington Department of Transportation

1.0 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 to the individual project.

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

- ***Kick-off Meeting:*** For projects using the PBA for Section 7 ESA requirements, a kick-off meeting may be requested between the parties responsible (NDDOT Design/Bridge/Local Government/Materials and Research staff or consultant), a representative from the NDDOT Environmental and Transportation Services (ETS), and in some instances FHWA and USFWS. The objective of the kick-off meeting is to assess 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 in; identify whether the specific project fits the scope of the PBA; discuss any recommended/required fieldwork; and determine appropriate conservation measures.
- ***Project Submittal Package:*** A project submittal package must be completed to track use of 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: https://www.dot.nd.gov/construction-and-planning/construction-planning/research/design-manual/references-and-forms
- ***Internal Review:*** Once a project submittal package has been completed, it will be submitted to NDDOT ETS for review to ensure that all work activities and potential effects to listed species or critical habitat fall within the scope of the PBA, appropriate conservation measures have been selected, and evaluate any completed fieldwork. If project activities and/or potential effects to listed species or critical habitat do not fit the scope of the PBA, additional conservation measures may be necessary, or separate Section 7 consultation with USFWS 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 DCH. Typically, the types of projects where adverse 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.

2.0 Proposed Action

The proposed action consists of implementing NDDOT projects across the state of North Dakota, 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 (e.g., FHWA involvement); however, it can be used as a guide for state or local transportation projects, without any Federal involvement, to help avoid “take” of listed species and 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.

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[1] In the ESA, **take** is defined as *__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.

Other NDDOT projects may arise that are not identified in the STIP, such as emergency type activities, including grade raises, 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” (50 CFR §402.02). The action area encompasses the geographic extent of environmental changes created from an action (i.e., construction project) including 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 would be limited to the vicinity where construction activities occur for each individual project conducted under the PBA.

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) (USGS 2011). National GAP Land Cover Data provides information on the distribution of native, modified, and introduced vegetation types, 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 various land cover types into hectares and percent cover within the state. Appendix A shows a map of the various land cover types throughout North Dakota.

Table 1: Land Cover Types of North Dakota

Land Cover Name		Hectares	% Cover
Forest & Woodland	***Cool Temperate Forest***	***496,419.84***	***69.5%***
	▪ Central Oak-Hardwood & Pine Forest	62,069.31	12.5%
	▪ Eastern North American Ruderal Forest & 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 & 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%

Land Cover Name		Hectares	% Cover
	Forest & Woodland Statewide Totals	**714,237.84**	**3.9%**
Shrubland & Grassland	***Temperate Grassland, Meadow & Shrubland***	***3,575,048.76***	***83.83%***
	▪ Great Plains Mixed Grass 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 & 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 & 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 & Urban***	***707,706.54***	***3.87%***
	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).

The dominant land cover type in North Dakota is herbaceous agriculture vegetation, followed by shrubland & grassland. The land cover types identified in Table 1 provide habitat for a variety of amphibians, birds, fish, insects, and mammals. Many species dependent on grassland habitat are facing current and future challenges in North Dakota, as grassland conversion to uses such as agriculture, commercial, industrial, and rural developments have dramatically increased in the last 30 years (Samson and Knopf 1994; Lark et al. 2015; Niemuth et al. 2021).

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. To fit the scope of this PBA, the activities and sub-activities from these types of additional projects would need to be consistent with those described in the deconstruction matrix found in Appendix B of this document.

2.3.1 New Road Construction / Reconstruction

New road construction is defined as a planned strategy for new road construction. 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 where 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 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 Hot Bituminous Pavement (HBP) overlay in excess of 3 inches 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 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 (CIR):** 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 B of this document.

3.1 Preconstruction Activities

Once projects are selected for advancement, preconstruction activities are conducted to gain a better understanding of the project area and issues that may arise prior to initiation of construction activities. Preconstruction activities consist of project related surveys and studies such as biological studies, cultural resources, field reviews, geotechnical surveys, noise, and utility locates; among other activities such as coring, potholing, or painting. These types of activities help identify potential construction related issues early in the project phases. This will assist in the 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 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 the environmental concerns. 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 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 are needed 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 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 [ft] deep or digging soil pits up to 8 ft 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. Vegetation removal is limited; typically, herbaceous and woody vegetation (shrubs) are removed only 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 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. At 50 feet [ft], noise generated from typical construction equipment (non-impact) ranges from 73-101 dBA (FHWA 2006). At a distance of 1,600 ft and 3,200 ft 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 a rural area. Therefore, a half-mile (2,640 ft) would be the distance at which noise would not be likely to cause any direct or indirect effects to listed resources.

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 & Structure Inspections

Field reviews are conducted to gain a better understanding of a proposed project. Typically, field reviews consist of representatives from NDDOT Districts/Divisions, city/county officials, consultants, and staff from various agencies meeting together. 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 and structure inspections are conducted to determine the type and extent of work required on a bridge or other structure such as box culverts or pipes. Additionally, inspections are conducted to assess use of the structure by protected species (e.g., bats). NDDOT will consult with USFWS as needed regarding protected species usage of bridges and structures if more in depth surveys are needed.

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 planning and early design information gathering for a project consists of subsurface site characterizations, including subsurface utilities. Not all subsurface utilities are detectable; however, utility locating surveys will significantly reduce the uncertainty associated with a project. 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 to excavate material to locate a utility. Backhoes, shovels, and air/water vacuums may be used 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. Appropriate erosion control measures are to be 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 B (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. 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 extent 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. 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 a 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 a 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 (SPCC) plan 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 to obtain aggregate/borrow material, riprap, 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 PBA; however, 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.

To control movement of sediment off-site, stabilize areas, and minimize environmental impacts to water features, temporary construction best management practices (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.

The NDDOT Standard Specification Manual states that if the Engineer determines dust from work activities are creating a hazard to traffic or a nuisance to the public, dust will be controlled on paved surfaces using a vacuum or pickup sweeper and on unpaved surfaces using water. If the Engineer determines the vacuum or pickup sweeper is not adequate, water is used in conjunction with the sweeper to control the dust.

Although NDDOT utilizes standard dust control procedures on all projects, a more rigorous dust abatement plan is sometimes used in situations where erionite is a concern or there are other concerns for fugitive dust. In these instances, a Special Provision (SP) pertaining to dust control is applied to the project. Personnel on the project will be required to more regularly apply water to aggregate, crushed/milled asphalt, and any exposed courses and embankments to prevent fugitive dust. The SP will also require enhanced dust control for the temporary aggregate/gravel driving surface during construction with either prime coat or chloride treatments. If surfactants are used, they must be properly contained. If a spill occurs, measures are taken to properly contain and remediate the release.

Discussions with NDDOT District Staff indicate that when prime coat or chloride treatments are utilized on temporary gravel traffic surfaces, dust is controlled exceptionally well. The application of the prime coat or chloride significantly reduces potential for fugitive dust until the new asphalt is applied for the final roadway design.

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 tends 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 to compact to its maximum density. To complete earthwork, contractors will place gravel in layers on the roadbed and will moisten and compact each layer. Layers are added and compacted until the roadbed 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 using 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 (i.e., 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 adjusting 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 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 using 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 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, 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 a drainage feature at the time of installation or replacement. 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 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 roadbed 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 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 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 constructed/reconstructed during roadway surfacing include the following: curb and gutter, pedestrian paths, trails, sidewalks, and driveways. Retaining walls may be built for certain situations with slope/stability issues. Additionally, 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 prior to being 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 markers, and viewpoints 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 extent of roadway appurtenances are dependent on the scope and length of a project.

3.9 Work Zone Traffic Control

A critical part of highway construction projects is ensuring effective provisions for proper control of traffic within the construction work zone has been provided. Highway construction generally results in heavy equipment working near 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 to reduce the number 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 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 15 – June 1. The Red River in-water restriction lasts from April 15 - July 15.

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 the impact of 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 found directly on rock or firm soil or may require pile foundations. In the latter case, these generally extend well below the cofferdam. Inside excavation of the cofferdam is done using clam shell buckets. To dewater the cofferdam, 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 to seal off the water, resist its pressure, and 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 as follows:

1. Drive temporary support piles.
2. Erect bracing frame on the support piles.
3. Set steel sheet piles, starting at all four corners and meeting at the center of each side.
4. Drive sheet piles to grade.
5. Block between bracing frame and sheets and provide ties for sheet piles at the top as necessary.
6. Excavate inside the grade or slightly below grade, while leaving the cofferdam full of water.
7. Drive bearing piles (impact or vibratory hammer)
8. Place rock fill as leveling and support course.
9. Place concrete seal.
10. Check blocking between bracing and sheets.
11. Dewater.
12. Construct new structure (footing block, block between footing and sheet piles, pier pedestal, pier shaft).
13. Flood cofferdam.
14. Remove sheet piles.
15. Remove bracing.
16. Backfill.
17. Repeat as necessary (number of piers dependent on specific situation)

3.10.3 Bridge Beams or Girders

The words *beams* and *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/girders 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, transfer the loads from the superstructure into the ground, and support the bearing devices and 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. The type and quantity to be installed is dependent upon the project and length of the 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 necessary protection systems 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 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/riverbanks. 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.

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 bridge. 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 the 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 (mechanical), or through insertion of an expansive slurry into a predetermined pattern of boreholes (chemical). Concrete, once split in a controlled manner, 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 (e.g., 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 various BMPs, and selection is dependent upon the bridge to be removed. For larger structures, a SPCC plan may be required 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 ECMs may be implemented such as silt fence and turbidity barriers, sediment traps and ponds, fiber rolls, mulching, matting, and netting.

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

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 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 ROW Maintenance

North Dakota is divided into eight districts and major responsibilities of each of the districts include maintenance operations, highway construction activities, and road/ROW 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.

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, 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 ROW maintenance including, but not limited to dump trucks, backhoes, rollers, snowplows, 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 DCH 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 ROW 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 (NDCC) 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 ROW. There are also several programs that allow for volunteer groups to collect the litter in the ROW. Litter taken from the ROW is disposed 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 microsurfacing 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 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 ROW of state highways. The District Engineer(s) may elect to restrict or delay mowing of a specific segment of ROW based on construction schedules, maintenance repairs, or environmental concerns. For harvesting hay from the ROW 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 remove 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 the road and are either placed in the ROW as far from the 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. 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 ROW 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 ROW.

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.

BMPs 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 ECMs 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 riprap is then placed in the toe trench and used to armor the fill. Granular material is often used as fill behind the riprap. This method is typically used to replace or repair existing embankments that have been previously armored.

Mechanically stabilized earth (MSE) embankment walls 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, riprap, 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. 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, riprap 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. 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 several coats of paint. Paint is applied when temperatures are above freezing and it's 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 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; materials collected in the filter fabric are 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 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 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 to remove accumulation of salt and debris from winter snow and ice control activities. Cleaning and washing of the bridge deck require 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 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 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 ECE is 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 negatively charged.

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. ECE requires several site utilities and services. The most notable of these are a power supply, a water (electrolyte) supply, and physical access to the site.

ECE can be used to remove chloride ions from chloride contaminated concrete. Several 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. ECE 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 bridge. 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 wastewater 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 (FAST)

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) 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, proper control of the heating temperature and rate of heating and cooling, and providing 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, handheld 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).

3.15.8 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, 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 used terms is Gunnite, 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% 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.

3.15.9 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). 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), and 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 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 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 riprap, 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 compacted to avoid settlement in the future. 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 Equipment for Roadway Construction and Maintenance

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	Forklift/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 Jack	Semi-Tractor Trailers
Bulldozers	Impact Pile Drivers	Slurry Trenching Machine
Chain Saws	Jackhammers	Soil Mix Drill Rig
Chip Spreaders	Loaders	Snowplows
Cold Planers	Man Lift	Sweepers
Compactors	Rollers	Tractors
Compressor (air)	Mounted Impact Hammer	Trenchers
Concrete Mixer Trucks	Oil Distributers	Vacuum Excavator
Concrete Pump Trucks	Pavement Scarifier	Vacuum Street Sweeper
Concrete Saws	Pavers	Ventilation Fans
Curb Machines	Pickup Trucks	Vibrating Hoppers
Cranes	Pneumatic Tools	Vibratory Concrete Mixers
Drill Rig Trucks	Pumps	Vibratory Pile Drivers
Drum Mixers	Rivet Busters	Water Trucks
Dump Trucks		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 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 that are often impact type noises. Noise levels at 50 feet [ft] 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 ft 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 ft of vegetation, up to a maximum reduction of 10 dB over 200 ft (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 (L_{max}). 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 & Endangered Species and Designated Critical Habitat in North Dakota

Common Name	Scientific Name	Status	Presence in North Dakota
Whooping Crane	Grus americana	Endangered	Spring: March 15 – May 15* Fall: September 10 – November 15*
Counties – Adams, Benson, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, LaMoure, Logan, McHenry, McIntosh, McKenzie, McLean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stutsman, Stark, Ward, Wells, and Williams			
Rufa Red Knot	Calidris canutus	Threatened	Spring: April 15-May 31* Fall: August 1 – September 15*
Counties – Benson, Burke, Burleigh, Divide, Dunn, Eddy, Emmons, Foster, Kidder, McHenry, McIntosh, McKenzie, McLean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Sheridan, Sioux, Stutsman, Ward, Wells, and Williams			
Piping Plover	Charadrius melodus	Threatened	April 15 – August 15*
Counties – Benson (DCH), Burke (DCH), Burleigh (DCH), Divide (DCH), Dunn (DCH), Eddy (DCH), Emmons (DCH), Foster (DCH), Kidder (DCH), Logan (DCH), McHenry (DCH), McIntosh (DCH), McKenzie (DCH), McLean (DCH), Mercer (DCH), Morton (DCH), Mountrail (DCH), Oliver (DCH), Pierce (DCH), Renville (DCH), Sheridan (DCH), Sioux (DCH), Stutsman (DCH), Ward (DCH), Wells, and Williams (DCH).			
Pallid Sturgeon	Scaphirhynchus albus	Endangered	Year Round
Counties – Dunn, McKenzie, McLean, Mercer, Mountrail, and Williams			
Gray Wolf	Canis lupus	Endangered	Year Round
Statewide			
Northern Long-Eared Bat	Myotis septentrionalis	Endangered	Year Round
Statewide, more commonly found in central and western North Dakota			
Poweshiek Skipperling	Oarisma poweshiek	Endangered	Year Round Presumed Extirpated in ND
Counties – Richland (DCH) and Sargent			
Dakota Skipper	Hesperia dacotae	Threatened	Year Round
Counties - Barnes, Benson, Billings, Bottineau, Burke, Burleigh, Cass, Dickey, Divide, Dunn, Eddy, Emmons, Foster, Griggs, Kidder, McHenry (DCH), McKenzie (DCH), McLean, Mercer, Morton, Mountrail, Nelson, Oliver, Pierce, Ramsey, Ransom (DCH), Renville, Richland (DCH), Rolette (DCH), Sargent, Sheridan, Stark, Steele, Stutsman, Traill, Ward, Wells, and Williams			
Western Prairie Fringed Orchid	Platanthera praeclara	Threatened	Year Round
Counties – Ransom and Richland			
Monarch Butterfly**	Danaus plexippus	Candidate	May – September
Statewide, more commonly found in eastern and central North Dakota.			

*Species may be found in the state outside of these ranges, depending on the year.

**On December 15, 2020, the monarch butterfly was listed as a candidate species under the ESA. Section 7 consultations are not required for candidate species. NDDOT is a partner to the North Dakota Monarch Butterfly and Native Pollinator Strategy and continues to implement pollinator conservation efforts across the state. Programmatic or project-specific conference/consultation for this species will not be undertaken at this time.

5.1 Threatened & Endangered Species and Designated Critical Habitat in North Dakota

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

North Dakota contains DCH 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.

5.1.1 Whooping Crane (*Grus americana*)

Figure 1: Whooping Crane adults [A - C] and chicks [B]

Species Description and Life History

The whooping crane (*Grus americana*) is the tallest bird in North America, approaching 5 feet [ft] when standing upright, and has a wingspan of up to 7 ft. 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. Their historic 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.

Whooping cranes are monogamous and form life-long pair bonds around 2 or 3 years of age and will re-bond following the death of a mate. Reaching their breeding grounds within Wood Buffalo National Park (WBNP), roughly around April every year, whooping cranes will work to construct nests made of bulrush in the same general area. Whooping cranes generally do not produce fertile eggs until age four and typically 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 Aransas National Wildlife Refuge (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 to make the journey back to WBNP (USFWS 2014).

Whooping cranes are omnivorous and probe the surface of soil with their bills, taking food 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, including shallow, seasonally and semi-permanently flooded palustrine (marshy) wetlands for roosting, and various cropland and emergent wetlands for feeding (CWS and USFWS 2007). In addition, whooping cranes are often recorded in riverine habitats, such as 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 (approximately 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).

Current Status

The whooping crane was listed as threatened with extinction in 1967 and elevated to endangered in 1970, and both listings were grandfathered into the ESA once enacted in 1973. Critical habitat was designated in 1978; however, no critical habitat is within North Dakota. Currently, whooping cranes are still listed as endangered under the ESA wherever found, except where nonessential experimental populations exist.

Currently, there are four geographically distinct populations of whooping cranes that occur in the wild. Three of the four are reintroduced experimental populations, one of which does migrate but only between Wisconsin and Florida. The fourth, known as the Aransas Wood Buffalo Population (AWBP), is the only natural, self-sustaining population of whooping cranes in existence and migrates more than

2,400 miles twice annually between summer nesting grounds and winter habitat (Figure 2).

The current nesting range of the AWBP is restricted to WBNP in Saskatchewan, Canada; and the current wintering grounds are restricted to the Texas Gulf Coast at ANWR and vicinity (USFWS 2023; USFWS/Taylor 2021; USWFS 2014). In January 2023, the population that arrived at ANWR was estimated at 536 individuals, including 88 juveniles (USFWS 2023). Annual documentation of migrating adult and juvenile whooping cranes using roosting and feeding habitat (primarily agriculture and wetland associations) is recorded in North Dakota along a band running from the south central to the northwestern part of the state (Figure 3), although sightings of this species has occurred all over North Dakota. The migration corridor for the AWBP follows a relatively straight-line path, roughly along the Missouri River corridor, through the Midwestern United States (Figure 2). The primary migration corridor can be over 200 miles wide, as cranes can be pushed east or west depending on winds during migration periods. 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 r site.

Figure 2: Aransas Wood Buffalo Population (AWBP) winter grounds, summer breeding/nesting grounds, and migration corridor (USFWS/Taylor 2021).

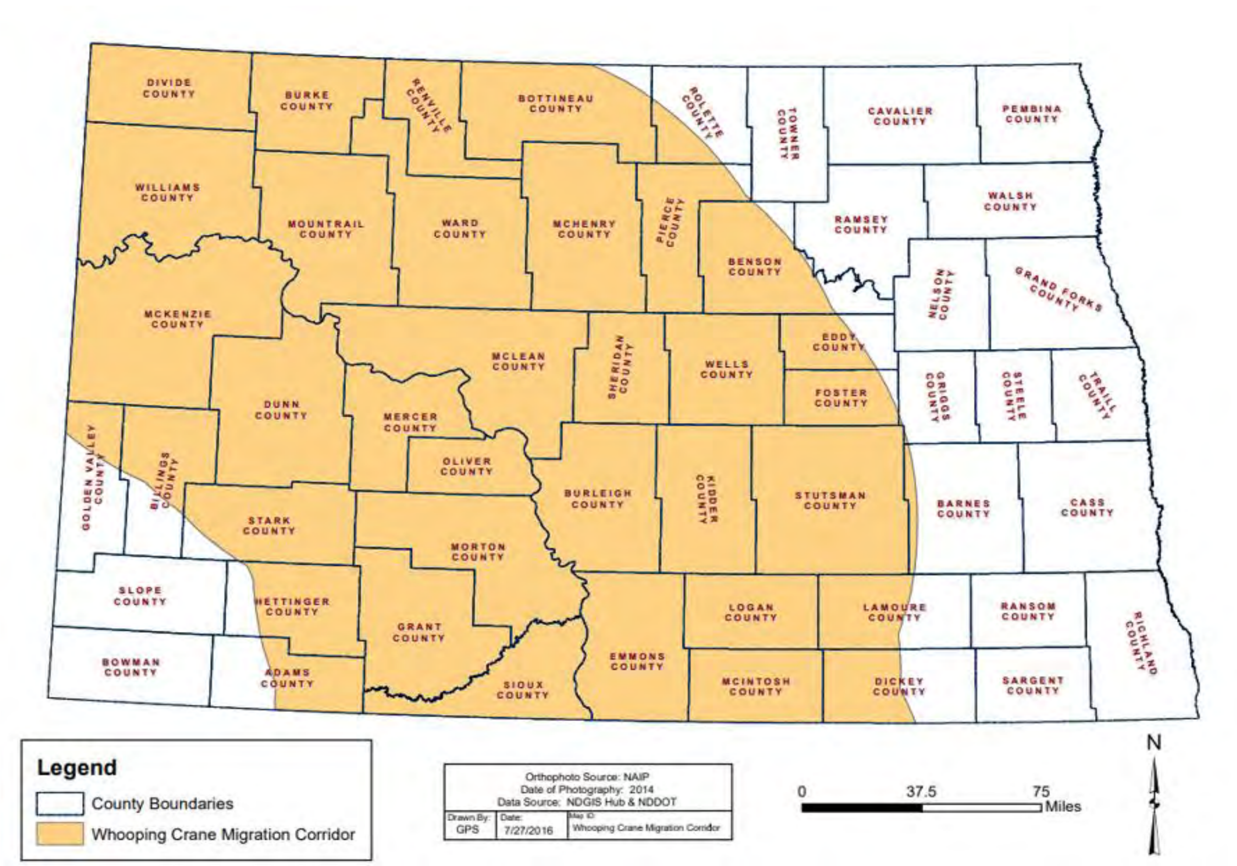

Figure 3: Map of whooping crane migration corridor in North Dakota included herein only for illustrative purposes.

Threats

The whooping crane was listed as federally endangered due to 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 wetland 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.

A substantial cause of whooping crane mortality today is the result of collisions with power lines during migration, even more so for recently fledged individuals (CWS and USFWS 2007; Stehn 2008). The U.S. electrical grid consists of hundreds of thousands of miles of high-voltage transmission lines and millions of miles of low-voltage distribution lines (EIA 2022). Continual power line construction throughout the AWBP migration corridor (Figure 2) increases the potential for collision mortalities. This led to the establishment of the Avian Power Line Interaction Committee (APLIC) in 1989 to address the issue of whooping crane collisions with power lines (Lewis 1997). The APLIC developed voluntary guidelines for the utility industry to use and implement with the intent to reduce avian interactions with power lines (APLIC 2006; APLIC 2012). Techniques for reducing whooping crane interactions include marking lines in areas frequented by cranes and avoidance of new line corridors around wetlands or other crane use areas. Tests of line marking devices, using sandhill cranes as a research species, have identified techniques effective in reducing collisions by up to 61% in some instances (APLIC 2012; CWS and USFWS 2007).

In more recent decades, the increase of renewable energy development, specifically wind development, has increased the structural hazards this species faces on its bi-annual migration cycle (USFWS 2009b). However, specifics regarding impacts to whooping crane population viability from wind development is still not fully understood. Mortality from collision with turbines, similar to what is seen with utility lines, remains as a primary concern but there currently appears to be no recorded reports of whooping crane mortality from collision with wind turbines. A study from 2010-2013 at five wind facilities, three of which are in North Dakota, reported no collision fatalities of whooping cranes with wind turbines (Derby et al. 2018). More recent research indicates migrating whooping cranes may be avoiding wind infrastructure and any suitable stopover habitat within <5 km of the development (Pearse et al. 2021). This indicates the impact to whooping cranes from wind development could likely be the loss of suitable stopover habitat, which amounts to a number greater than what is being directly converted into another land use.

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).

5.1.2 Rufa Red Knot (*Calidris canutus rufa*)

Figure 4: Rufa red knot adults

Species Description and Life History

The rufa red knot (*Calidris canutus rufa*) is a medium-sized, bulky shorebird about 9 to 11 inches in length, with a short straight black bill. This species 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-colored feathers mixed in (USFWS 2014c). The feathers of the lower belly and under the tail are whitish with dark flecks. The dorsal (back) side is dark brown with white and rufous feather edges; outer primary feathers are dark brown to black (Harrington 2001; Davis 1983).

The rufa red knot migrates annually between its breeding grounds in the Canadian Arctic and multiple wintering regions, including the southeast United States, the northwest Gulf of America, northern Brazil, and Tierra del Fuego at the southern tip of South America (USFWS 2014c). This species 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).

Although the rufa red knot primarily uses marine habitats, a small number can be found during the migration periods in every inland state over which the red knot flies between its wintering and breeding grounds. The rufa red knot typically migrates through North Dakota around mid-May and mid-September. It has been observed utilizing the Missouri River system, sewage lagoons, alkaline wetlands, and lakes (NDGF 2024). Observations of migrating rufa red knots in North Dakota are scattered throughout the state and no consistently used stopover sites have been identified.

Breeding of the rufa red knot occurs in central Canadian Artic from the northern Hudson Bay west to Victoria Island (Niles et al. 2008; Morrison and Harrington 1992). Rufa 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 wetlands. While at the breeding grounds, the rufa red knot's diet will consist of insects, arthropods, and other invertebrates (Niles et al. 2008; Harrington 2001).

Current Status

The rufa red knot was listed as a threatened species under the ESA on December 11, 2014. The estimated total population of this subspecies of rufa red knot is about 63,600 individuals (USFWS 2020). The rufa red knot is 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 like those selected by other shorebirds in North Dakota, such as the piping plover.

Threats

During the 1800's, legal and illegal hunting of the red knot greatly reduced the population (Karpanty et al. 2006; Cohen et al. 2009; Harrington 2001). Current threats to the rufa red knot include loss of breeding and nonbreeding habitats, reduced food availability at stopover areas, climate change, shoreline stabilization, coastal development, various disturbance from vehicles, people, dogs, aircraft, etc., among other things (USFWS 2020).

5.1.3 Piping Plover (*Charadrius melodus*)

Figure 5: Piping plover (*Charadrius melodus*)

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; Elliott-smith and Haig 2004; USFWS 2020b). Currently, the species' range remains similar to their described 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.

Of the three Distinct Population Segments (DPS), only the NGP DPS of piping plovers is found in North Dakota; critical habitat has also been designated for the species in North Dakota. 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; USFWS 2020b).

Plovers arrive on the breeding grounds during mid-March through mid-May and remain for three to four months per year. In North Dakota they are typically present between April 15 and August 15. 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 during the second or third week in May, although the species may re-nest depending on local conditions. They lay three to four 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 (hatching within 30 days) and feeding the young (until about 30 days after hatching). Plovers depart for the wintering grounds from mid-July through late October. Piping plovers forage on exposed wet sandy beaches/shorelines; intertidal ocean beach; wrack lines; wash-over 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. The home range of a piping plover during the breeding season is usually limited to the wetland, lakeshore, or section of beach on which the nest is located.

Current Status

On December 11, 1985, the piping plover was listed as threatened in all areas where populations exist except for those located within the Great Lakes, where the piping plover is listed as endangered (50 FR 50726). The 2011 international piping plover breeding census estimated a total of 5,719 adults across the U.S. and Canada (Elliott-Smith et al. 2015). The NGP population of piping plovers is the largest of the three breeding populations with numbers that have fluctuated between 2,000 and 4,500 individuals (USFWS 2020b). In North Dakota, piping plovers can be found breeding across 25 counties; specifically, those throughout central and western North Dakota that include the Missouri River and alkali wetlands within them (USFWS 1988; USFWS 2020b). 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. See *Piping Plover DCH* section below for more information.

Threats

The piping plover is a species with variable annual reproductive success. Habitats used by plovers are often ephemeral, which renders them 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; USFWS 2020b). 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 locations, or not at all (USFWS 1988; USFWS 2020b). Encroachment of vegetation has also reduced the amount of suitable habitat.

Human disturbance (e.g., recreational use of beaches) is a main threat nesting piping plovers face. Because nests are exposed on open sandy beaches they 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. Additionally, unleashed pets, such as cats and dogs, may harass or kill piping plovers and/or their chicks. Studies indicate shorebirds are more likely to have a greater stress response (e.g., flush sooner) to the presence of a dog compared to a human (USFWS 2020b). Furthermore, normal predation has become a problem for piping plovers, as unnaturally high populations of gulls and mammalian predators are located throughout the species range. Other impacts, such as agriculture runoff into wetlands, pesticide drift, botulism, and environmental contaminants, are continuing to be monitored but are not considered to be major threats at this time (USFWS 2020b).

5.1.4 Piping Plover Designated Critical Habitat

Critical habitat for the piping plover (*Charadrius melodus*) has been designated in North Dakota, as published in the Federal Register on September 11, 2002 (67 FR 57638). The Upper Great Plains region, comprising of Minnesota, Montana, Nebraska, North Dakota, and South Dakota, DCH 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 57638). Within North Dakota, piping plover DCH (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 C, Piping Plover Critical Habitat Unit Maps. Several State and U.S. Highways are located directly adjacent or within proximity to piping plover DCH units. Appendix C also breaks down the piping plover DCH units with associated counties and names of lakes/rivers that have been designated as well as highway name (if within 0.5 miles of DCH).

Physical or Biological Features essential to the conservation of the species

Physical or Biological Features essential to the conservation of the species (often abbreviated to *Physical or Biological Features (PBF)*), previously referred to as *Primary Constituent Elements*[2], are habitat components essential for supporting the biological needs of a species such as water, soil, foraging resources, etc. (see regulatory definition at 50 CFR 424.02). Specific to the northern Great Plains population of piping plovers, PBFs are the habitat components essential for courtship, nesting, brood rearing, foraging, roosting, intraspecific communication, and migration. The PBF 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 57638).

On prairie alkali lakes and wetlands, PBFs that sustain 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. On rivers, PBFs include sparsely vegetated shoreline beaches, peninsulas, islands composed of sand, gravel, or shale, and their interface with the water bodies. On inland lakes, such as Lake Sakakawea in North Dakota, PBFs include

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[2]The 2016 and 2019 revisions to the 424 regulations removed the phrase *Primary Constituent Elements* and added a regulatory definition for the phrase *Physical or Biological Features essential to the conservation of the species* (defined in the regulations at 50 CFR 424.02). As such the phrase *Primary Constituent Elements* is no longer used in the designation of Critical Habitat. Critical habitat designations for listed species discussed herein occurred prior to the 424 regulation revision; therefore *Primary Constituent Elements* is utilized throughout the original publication, which we now refer to as *Physical or Biological Features essential to the conservation of the species.*

lightly vegetated and windswept sandy to gravelly islands, beaches, and peninsulas, and their location to the water body (67 FR 57638).

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 affect or destroy or adversely modify piping plover critical habitat.

- Activities that result in changing the hydrology of the critical habitat unit, including those 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 critical habitat unit including those 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 alter 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 disturbing piping plovers from activities such as foraging, brooding, and nesting.

5.1.5 Pallid Sturgeon (*Scaphirhynchus albus*)

Figure 6: Pallid sturgeon (*Scaphirhynchus albus*)

Species Description and Life History

The pallid sturgeon (*Scaphirhynchus albus*) is a prehistoric species of fish that is 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 of a spiracle (small openings found on each side of the head) (USFWS 2014b). Like other species of sturgeon, their mouths are toothless, protrusible (capable of being extended and withdrawn from its natural position), and ventrally positioned under the head (USFWS 2014b). The 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 (*Scaphirhynchus platorynchus*). Pallid sturgeon can weigh up to 80 pounds and reach lengths of 6 ft, whereas the shovelnose sturgeon rarely surpasses eight 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 have also been 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 basin 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, South Dakota downstream to within Lake Sharpe, South Dakota; between Fort Randall, South Dakota and Gavins Point Dam, straddling the South Dakota and Nebraska boarder; 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; USFWS 2021). Additionally, pallid sturgeon observations have increased with sampling efforts in the Mississippi River basin; the downstream extent ending near New Orleans, Louisiana.

In North Dakota, pallid sturgeon reside generally within the Missouri River downstream from the confluence of the Missouri and Yellowstone Rivers during the fall and winter months. As discharge increases in the spring, adult pallid sturgeon will migrate upstream. Typically, pallid sturgeon will migrate into the unregulated Yellowstone River to spawn. Spawning success has been documented recently in the Missouri River downstream from Fort Peck Dam, Montana; 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 in these areas (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 is approximately 15-20 years, compared to approximately 5 years 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 around 6-9 years. 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 (USGS 2007; DeLonay et al. 2009).

Incubation rates are dependent upon water temperature. In a hatchery environment, fertilized eggs will hatch in approximately five to seven 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 kilometers downstream from spawn and hatch locations (USFWS 2014b).

Since much of the pallid sturgeon historic range has been altered from natural settings, the 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). Floodplains, backwaters, chutes, sloughs, islands, sandbars and main channel waters form the ecosystem that provides the macro-habitat requirements for all life stages of pallid sturgeon (USFWS 1993). 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 > 20 m (1.9->65 ft). 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 is 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).

Current Status

The pallid sturgeon was listed as federally endangered under the ESA on September 6, 1990 (55 FR 36641). Since its initial listing, the overall status of the pallid sturgeon has improved, and the population is currently considered 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 within several reaches throughout this river system.

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 because 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. These 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). Since the species listing in 1990, however, no new dams or reservoirs have been constructed and once blocked areas are seeing on going efforts to aid and enhance passage to allow pallid sturgeon to access suitable habitats further upstream (USFWS 2021).

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).

5.1.6 Gray Wolf (*Canis lupus*)

Figure 7: Gray Wolf (*Canis lupus)*

Species Description and Life History

The gray wolf (*Canis lupus*) 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 found to occur within the interior United States that may occasionally be present in North Dakota. The western United States population of gray wolves has a range that occurs across California, Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming (USFWS 2023b). Within this range, the Northern Rocky Mountain (NRM) DPS of gray wolves is found (USFWS 2012c; USFWS 2023b). The Western Great Lakes (WGL) DPS of the gray wolf has a range that occurs within Michigan, Minnesota, and Wisconsin, but may be occasionally observed in surrounding states such as North Dakota (USFWS 2012c).

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 DPS (east of the Missouri River and US Highway 83) 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 four years (USFWS 2011d).

Current Status

In 1973, there were fewer than 1,000 wild, gray wolves in the U.S., all found in northern Minnesota. The species was subsequently listed in 1978 as federally endangered in the lower 48 states, except in Minnesota, where it was federally listed as threatened. Under this protection, the species was able to spread from Minnesota to Wisconsin and Michigan. Wolves from Canada moved south into Montana, and a reintroduction into Yellowstone National Park and central Idaho took place in the early 1990s allowing gray wolves to begin further dispersing.

In the early 2000s, the Service identified DPS for the gray wolf in three separate areas: 1) Northern Rocky Mountains, 2) Great Lakes, and 3) Southwest (now a separate listing as the Mexican gray wolf (*Canis lupus baileyi*)). Between 2003 and 2015, attempts were made by USFWS to delist the different DPSs of gray wolves, but the courts vacated these decisions. Then in 2017, a reverse of a decision pertaining to the NRM DPS was made, reinstating the delisting of gray wolves in Wyoming (Defenders of Wildlife v. Zinke, 849 F.3d 1077 (DC Cir 2017)). As a result, the entire NRM DPS is currently delisted (Figure 8).

In 2019, the USFWS proposed to delist the species across the entire lower 48 (except for the Mexican gray wolf which is now a separate listing) and finalized this rule in 2020 (85 FR 69778). In February 2022, a district judge vacated the 2020 rule (85 FR 69778), which effectively reinstated the prior legal protections (Figure 8) – federally threatened in Minnesota, federally endangered in 44 states (including North Dakota), and under state jurisdiction in Idaho, Montana, Wyoming, and portions of eastern Oregon and Washington (i.e., where the NRM DPS is found). As it stands now, the gray wolf is still listed as endangered within North Dakota (Figure 8). No critical habitat for the gray wolf has been designated in North Dakota.

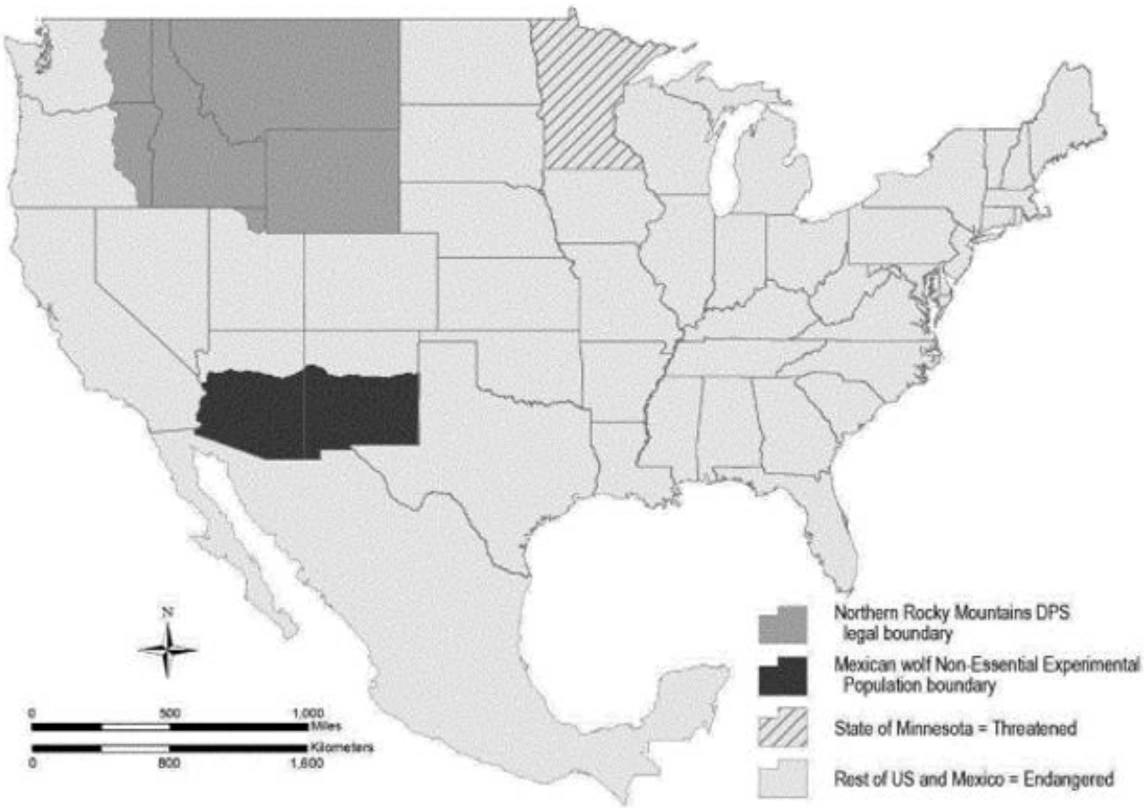

Figure 8: The current legal status of the gray wolf (Canis lupus) (85 FR 69778)

Threats

The primary threat gray wolves have faced and still face is extermination by man, which has removed most of the species throughout its historical range. Shooting, trapping, and poisoning of wolves were often subsidized by the government. Another threat is 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.

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

Figure 9: Northern long-eared bat (*Myotis septentrionalis*)

Species Description and Life History

The northern long-eared bat (*Myotis septentrionalis*; NLEB) is a medium sized bat with a body length of 77 to 95 millimeters [mm] (3.0 to 3.7 inches [in]) and a forearm length between 34 and 38 mm (1.3 to 1.5 in). Fur color ranges from medium to dark brown on the back and tawny to pale brown on the underside. This species is distinguished from other bats within its genus by its long ears, averaging 17mm (0.7 in) (USFWS 2015f; USFWS 2022). The NLEB is found along the Atlantic Coast in the United States from Maine to North Carolina, westward to eastern Oklahoma, north through the Dakotas, into eastern Montana and Wyoming. Its range also includes southern states from Georgia to Louisiana. In total, the species range encompasses 37 of the lower 48 states and several Canadian provinces. Historically, NLEBs have been found in greater abundance in the northeast and portions of the Midwest and southeast with it more rarely encountered along the western edge of the range (USFWS 2014d).

The active season for this species gets shorter the further north it's found within the range; specifically, the active season for NLEBs in North Dakota is approximated to occur April through October. The active season encompasses three important phenological/reproductive timeframes: 1) spring staging/migration, 2) maternity/pup season, and 3) fall migration/swarming. Breeding occurs in late summer or early fall when males begin to swarm near hibernating locations (hibernacula). After mating, females store sperm during the inactive season (i.e., winter hibernation) until spring staging/migration begins. When spring arrives, NLEBs emerge from hibernacula, ovulate, and then use stored sperm to fertilize 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; USFWS 2022). Females within a maternity colony typically give birth at the same time, starting to occur around late-May or early June and, with some colonies, into late-July. Young bats begin to fly approximately 18-21 days after birth. Lifespan of NLEBs is estimated to be up to 18.5 years. The NLEB is not considered a long-distance migratory bat species. Research has shown that migratory movements between seasonal habitats have been documented to be between 56-89 kilometers [35-55 miles] (Nagorsen and Brigham 1993; Caire et. Al. 1979; USFWS 2022).

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; USFWS 2022). 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 and spring staging/fall swarming habitat consists of a wide variety of forested/wooded areas where they forage, roost, and travel; as well as some adjacent and interspersed non-forested areas 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 exhibit any of the following characteristics: exfoliating bark, crevices, cavities, or cracks. Individual or isolated trees may be considered a potential roosting site when they exhibit characteristics indicative of a suitable roost tree and are located within 1,000 ft of other forested/wooded habitat. Trees found in highly developed areas (e.g., 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. A 2008 study on the movement of NLEBs found that this species has a strong preference for foraging and commuting within forested landscapes (Henderson and Broders 2008). This same study also noted that if NLEBs were 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.

Current Status

The NLEB was listed as threatened under the ESA on April 2, 2015 (80 FR 17973) and issued a species-specific 4(d) rule on January 14, 2016 (81 FR 1900). In 2022, the NLEB was reclassified as federally endangered under the ESA which took effect January 2023 and removes the species-specific 4(d) rule (87 FR 73488).

Critical habitat has not been designated for this species. Currently, population estimates throughout the species range are not fully understood. 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 are likely present within the state.

Threats

The primary threat NLEBs face is white-nose syndrome (WNS), a disease caused by the fungus *Pseudogymnoascus destructans* (Pd), which has been the most severe and immediate reason of decline for the NLEB throughout a significant portion of the species range (USFWS 2014d; USFWS 2022). Discovery of WNS, within the United States, occurred in 2006 in New York and has since rapidly spread from the Northeast to the Midwest and Southeast, covering much of the species' range. Positive identification of bats with WNS in North Dakota occurred in 2019 in Billings County and has been positively identified in three other counties since, Mercer, McKenzie, and Williams County (WNS Response Team 2023). Since 2006, the NLEB has declined substantially in portions of its range, up to 99% in the Northeast. Due to the uncertain rate of spread, WNS is expected to continue to move 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 NLEB (USFWS 2015f; USFWS 2022).

5.1.8 Poweshiek Skipperling (*Oarisma poweshiek*)

Figure 10: Poweshiek skipperling (*Oarisma poweshiek*)

Species Description and Life History

Poweshiek skipperlings (*Oarisma poweshiek*) are a small butterfly with an approximate wingspan of one 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 may have been extirpated from the Dakotas, Minnesota, and Iowa in the last twenty years. Currently, the only states known to have areas containing Poweshiek skipperlings include Wisconsin, Michigan, and Manitoba (USFWS 2015b; USFWS 2021b).

Poweshiek skipperlings live in high quality tallgrass prairie in both low, moist areas and upland, dry areas. Prior research in North Dakota has described the species' habitat as high dry prairie, low, moist, undisturbed native tallgrass prairie stretches, old fields, and meadows (McCabe and Post 1977; Royer and Marrone 1992). Poweshiek skipperlings have been historically documented in seven North Dakota counties: Cass, Dickey, LaMoure, Ransom, Richland, and Sargent County in the southeastern corner of the state and Grand Forks County in the northeast (Selby 2010).

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, 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*), black-eyed susan (*Rudbeckia hirta*) and palespike lobella (*Lobelia spicata*). Since 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).

Current Status

The Poweshiek skipperling was listed as a federally endangered species under the ESA on October 24, 2014 (79 FR 63672). At time of listing, 12 of the 298 historically documented sites across the United States and Canada had Poweshiek skipperlings present (USFWS 2021b). As of 2021, there are seven sites where the species is considered present (five in Michigan, one in Wisconsin, and one in Manitoba, Canada) (USFWS 2021b). The last confirmed observation of the species in North Dakota was in 2001. There are no sites in North Dakota where the Poweshiek skipperling is considered to be present (USFWS 2021b). There is DCH for the Poweshiek skipperling in North Dakota, specifically within Richland County (80 FR 59248). See *Dakota Skipper and Poweshiek Skipperling DCH* section herein for more information.

Threats

Although there is limited information on Poweshiek skipperlings, habitat loss and fragmentation are the main contributors to decline of this species (USFWS 2021b). Approximately 4% of the original tallgrass native prairie remains in the United States and much of what is left consists of small, isolated sites typically too far apart to allow movement of the species from site to site. Therefore, if Poweshiek skipperlings are lost at a site, there are likely 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 (i.e., nonnative or woody plant encroachment) (USFWS 2021b). Historically, wildfire helped maintain the treeless nature of the prairies. 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.

5.1.9 Dakota skipper (*Hesperia dacotae*)

Figure 11: Dakota skipper (*Hesperia dacotae*)

Species Description and Life History

The Dakota skipper (*Hesperia dacotae*) 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, with a prominent mark on the forewing, and the ventral (abdominal) portion is a 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 a 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 throughout Minnesota, the Dakotas, and Southern Canada (USFWS 2015e; USFWS 2018).

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. The flight period in a local population lasts for up to four weeks and is when mating occurs (McCabe 1979; Dana 1991).

Female Dakota skippers lay approximately 180 to 250 eggs on broadleaf plants and grasses. 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 that is fastened together with plant tissue (Dana 1991). 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. As larvae grow, they construct two to three larger shelters from which they emerge out of at night 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). As adults, nectar from various plants provide food and water, which is crucial for the survival of both sexes during the short adult flight period (USFWS 2015e; USFWS 2018).

Because plant composition providing needed nectar and water sources vary across the range suitable habitat for Dakota skippers has been split into two prairie types: Type A and Type B. Type A habitat consists of low wet-mesic prairie typically dominated by bluestem grasses 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; USFWS 2018). Type B habitat 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; USFWS 2018). Both 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.

Current Status

The Dakota skipper was listed as federally threatened under the ESA on October 24, 2014 (79 FR 63672). As of 2018, 76 metapopulations consisting of 150 distinct subpopulations are estimated to persist across three states (Minnesota, North Dakota, and South Dakota) and two Canadian provinces (USFWS 2019). The Dakota skipper is believed to be extirpated from its historical extent in Illinois, Iowa, and eastern Minnesota.

Since its listing, several new subpopulations have been discovered in areas not previously surveyed, especially within the western extent of the species range (USFWS 2019). The Dakota skipper is currently considered present in 13 North Dakota counties (USFWS 2024, Unpubl. Geodatabase). Critical habitat has been designated for this species in North Dakota, specifically within McHenry, McKenzie, Ransom, Richland, and Rolette County (80 FR 59248). See *Dakota Skipper and Poweshiek Skipperling DCH* section herein for more information.

Threats

Historical populations of Dakota skippers declined 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% 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 one km between patches of prairie habitat separated by structurally similar habitats (crop fields or pasture) (USFWS 2018). Many populations of Dakota skippers that remain are isolated and, if a local extinction occurs, too far away from each other to be re-colonized (USFWS 2015e; USFWS 2018). Other factors of decline include over-grazing, inappropriate fire management, herbicide/pesticide use, woody plant invasion, road construction, gravel mining, and invasive plant encroachment.

5.1.10 Dakota Skipper and Poweshiek Skipperling Designated Critical Habitat

Critical habitat is designated within North Dakota for the Dakota skipper (*Hesperia dacotae*) and Poweshiek skipperling (*Oarisma poweshiek*) (80 FR 59248).

Approximately 19,900 acres of critical habitat for the Dakota skipper was designated in 38 units spread between Minnesota, North Dakota, and South Dakota. Eleven of the 38 units designated are in North Dakota and found within the following counties: McHenry (five units), McKenzie (two units), Ransom (two units), Richland (one unit), and Rolette (one unit) (80 FR 59248).

Approximately 25,888 acres of critical habitat for the Poweshiek skipperling has been designated across Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin. Two units have been designated in Richland County, North Dakota, in which one of the units (Unit 1) is also DCH for the Dakota skipper (80 FR 59248). See Appendix D – Dakota skipper and Poweshiek skipperling Critical Habitat Unit Maps for a breakdown of units, counties, occupancy, acreage, and land ownership.

Physical or Biological Features essential to the conservation of the species – Dakota Skipper

Physical or Biological Features (PBF), previously referred to as *Primary Constituent Elements*, are habitat components essential for supporting the biological needs of a species such as water, soil, foraging resources, etc. (see regulatory definition at 50 CFR 424.02). Based on current knowledge of the habitat characteristics required to sustain the life-history processes of the Dakota skipper, PBFs include the following:

<u>PBF 1</u>: Untilled, wet-mesic tallgrass or mixed-grass remnant prairie that occurs on near-shore glacial lake soil deposits, or untilled, high-quality dry-mesic remnant prairie on rolling terrain consisting of gravelly glacial moraine soil deposits that contain: a predominance of native grasses and native flowering forbs; glacial soils that provide the soil surface or near surface (between soil surface and two 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% in dry prairies and less than 25% in wet-mesic prairies; and if present, nonnative invasive plant species occurring in less than 5% of the area (80 FR 59248).

<u>PBF 2</u>: Native grasses and native flowering forbs for larval and adult food and shelter. Specifically, availability of 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 59248).

<u>PBF 3:</u> Dispersal grassland habitat that is within one 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% of the area and no row crops such as corn, beans, potatoes, or sunflowers (80 FR 59248).

Physical or Biological Features essential to the conservation of the species – Poweshiek skipperling

Physical or Biological Features (PBF), previously referred to as *Primary Constituent Elements*, are habitat components essential for supporting the biological needs of a species such as water, soil, foraging resources, etc. (see regulatory definition at 50 CFR 424.02). Based on the current knowledge of the habitat characteristics required to sustain the life-history processes of the Poweshiek skipperling, PBFs include the following:

<u>PBF 1</u>: Untilled, wet-mesic to dry tallgrass remnant 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, tree or large shrub cover less than 5% in dry prairies and less than 25% in wet-mesic prairies and prairie fens; and if present, non-native invasive plant species occurring in less than 5% of area (80 FR 59248).

<u>PBF 2:</u> 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% of the unit; and if present, non-native invasive plant species occurring in less than 5% of the area (80 FR 59248).

<u>PBF 3:</u> Native grasses and native flowering forbs for larval and adult food and shelter. Specifically; availability of at least one of the following native grasses 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 richardsonis*), 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 59248).

<u>PBF 4:</u> Dispersal grassland habitat that is within one km (0.6 mi) of native high quality remnant prairie (as defined in PBF 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% of the area and no row crops such as corn, beans, potatoes, or sunflowers (80 FR 59248).

Threats to Dakota Skipper and Poweshiek Skipperling Designated Critical Habitat

- Direct and indirect impacts to DCH 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 such 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.

5.1.11 Western Prairie Fringed Orchid (*Platanthera praeclara*)

Figure 12: Western prairie fringed orchid (*Platanthera praeclara*)

Species Description and History

The western prairie fringed orchid (*Platanthera praeclara*) 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 one to four 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 ten 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. Many 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 (*Anemone 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, populations extant with the United States occurring across Iowa, Kansas, Minnesota, Missouri, Nebraska, and North Dakota (USFWS 2021c).

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).

Current Status

The western prairie fringed orchid was listed as federally threatened under the ESA in 1989 (54 FR 39857). Currently, there are 299 extant western prairie fringed orchid populations across Iowa, Kansas, Minnesota, Missouri, Nebraska, and North Dakota (USFWS 2021c). The most recent 5-year review estimates there are approximately 18,000 individual plants located within the red river valley (USFWS 2021c); and the Sheyenne National Grasslands is believed to contain one of the four largest remaining populations of the species (NatureServe 2024). As of 2020, the Sheyenne National Grassland western prairie fringe orchid populations appear to be stable (USFWS 2021c). Privately owned lands in this area of North Dakota that contain native grasslands may also support populations of the species.

Threats

The geographic range of the western prairie fringed orchid was historically correlated with tallgrass prairie. The greatest threat to the western prairie fringed orchid is habitat loss, mostly through conversion of native prairie to cropland (USFWS 2003; USFWS 2021c). Competition with non-native invasive grasses/forbs, filling of wetlands, intensive hay mowing, fire suppression, collection of plants, and overgrazing also threatens these species. The western prairie fringed orchid depends on hawkmoths for pollination. Any threat to these insects, including the use of insecticides, is a threat to the orchid.

6.0 Impacts and General Conservation Measures

The following sections (Section 6.1 – 6.2) describe 1) general roadway construction threats/stressors that could potentially impact ESA listed species and critical habitat in North Dakota and 2) general conservation measures that should be applied to all projects. The next section (Section 7.0) further details roadway construction threats/stressors specific to an ESA listed species and, if applicable, their critical habitat. Additionally, Appendix B contains a deconstruction matrix that describes all aspects of NDDOT projects. 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.

6.1 General Threats/Stressors from Roadway Construction Activities

6.1.1 Disturbance

Disturbance from construction activities (e.g., noise, vibrations, lighting, human presence) can temporarily or permanently discourage species from utilizing suitable habitat that is adjacent to a transportation construction project. Direct and indirect effects of construction activities to listed species may include: producing significant changes in behavior (e.g., habitat avoidance – expending additional energy to find foraging or roosting sites); flushing from feeding, roosting, or nesting areas; nest abandonment; habitat fragmentation; masking signals used for communication between adults/juveniles or biological signals; impairing detection of sounds of predators; decreasing hearing sensitivity temporarily or permanently; reducing the overall reproductive rate; and increasing stress, leading to the alteration of reproductive and other hormone levels (Dooling and Popper 2007; Bennet et al. 2011; Parris 2015). See Section 7.0 for further species-specific details.

6.1.2 Exposure to Contaminants

Roadway construction activities have the potential to inadvertently introduce contaminants that may reach suitable habitat for any of the ESA listed species in North Dakota. Furthermore, exposure to contaminants may directly or indirectly affect ESA listed species as items like fuel, oil, and hydraulic fluid may need to be stored on a project site. Depending on the location, quantity of release, and distance to suitable habitat, injury and/or mortality could occur from a poisoned food source, reduced food supply, habitat degradation, or direct exposure of the contaminant to adults or juveniles. Direct exposure includes ingestion of a food resource (e.g., invertebrate, grain) exposed to the contaminant, oiling of plumage or nest (avian species), and oiling of gills (fish species). In extreme cases, contaminants may remain within the area for long periods of time and have the potential to be transferred up the food chain through the process of bioaccumulation (Wilford et al. 1987; Arnold et al. 2002).

Avian species are particularly susceptible to direct exposure of oil contaminants as it can alter 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, which can lead to hypothermia. This can cause an increase in metabolism resulting in a greater need for food resources. Additionally, birds frequently preen themselves; therefore, when exposed to contaminants, birds may inadvertently ingest contaminants when preening (UC Davis 2016). Once contaminants such as oil are ingested, it can cause direct damage to the gastrointestinal tract, physical damage to organs leading to decreased ability to absorb nutrients, anemia, and lower white blood cell counts which are needed to fight infections (UC Davis 2016). Exposure of eggs to contaminants such as oil can cause mortality and developmental effects to embryos.

Bridge demolition activities have the potential to introduce contaminants such as asbestos and/or lead paint either directly or indirectly to ESA listed species and habitat. Appropriate measures are taken through material testing, and if identified, proper containment and disposal of the material is done in accordance with state and federal laws. If asbestos is detected during testing, that material 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. If lead paint is detected during testing, a containment system is set up to capture the material, keeping lead-based paint from entering the environment, which is then properly disposed of at an approved location.

Specific to 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, a trenchless method for installation of underground utilities, is used in or near sensitive habitats, waterways, and cultural resource sites. 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 and once 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.

Road and ROW maintenance has the potential to expose ESA listed species and suitable habitat to contaminants such as herbicides and pesticides. Applicators of herbicides/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.

6.1.3 Water Quality Modification

Degradation of water quality from roadway construction activities such as erosion, sedimentation, increased turbidity, or release of contaminants including oil, gas, or hydraulic fluid can cause adverse effects to ESA listed species and habitat. Furthermore, construction activities associated with new bridge construction or bridge demolition such as dredging, dewatering, concrete pouring, welding, painting and paint removal have the potential to degrade water quality and effect ESA listed species. These adverse effects could alter the available drinking water, available foraging habitat due to reduced food supply, and nesting density/reproductive success. Work within or directly adjacent to waterbodies utilized by ESA listed species could have both direct and indirect effects to either adults, juveniles, larvae, and/or eggs (e.g., work within the Missouri River/Lake Sakakawea potentially impacting the pallid sturgeon).

6.2 General Conservation Measures to be Used on All Projects

The following is a list of general conservation measures that are to be used on all projects, as applicable, to lessen 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 SWPPP plan (see Section 6.2.1).
- If required, implement a SPCC (see Section 6.2.1).
- If required, implement a frac-out plan (see Section 6.2.1).
- 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 because of construction activities.
- In-water work should not occur within the Missouri River, Lake Sakakawea, or direct tributaries between April 15 – June 1 to protect aquatic resources.
    - Some in-water activities associated with bridge construction/demolition may be conducted during this window but would need to be approved by the North Dakota Game and Fish (NDGF), USFWS, and USACE.

- Any in-water work equipment that was last used outside of North Dakota or within a Class I infested waterbody (identified on the NDGF website) requires an inspection by NDGF. Contact the NDGF ANS Coordinator for equipment inspections.
    - Notify the NDGF at least ten business days prior to pumps, watercraft, or any equipment entering a public water to allow the NDGF sufficient time to inspect any and all such equipment for ANS.
    - Supply one of the following to the engineer as proof of compliance prior to in-water work taking place: (1) the NDGF inspection report or (2) documented NDGF correspondence (email or signed letter).
- 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 ETS. 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 PBA 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.*

6.2.1 Implementation of SWPPPs, SPCCs, and Frac-out Plans

Stormwater Pollution Prevention Plans (SWPPP) are prepared to identify potential sources of sediment and pollution associated with construction activities. It ensures best practices are implemented and maintained to reduce the contribution of pollutants in stormwater discharges from the construction site to waters of the state and storm sewer systems. This includes outlining erosion control measures (EMCs), such as fiber rolls, straw wattles, erosion mats, silt fence, and turbidity barriers, that are to be deployed and maintained throughout the duration of a project and until vegetation is established. The SWPPP describes how litter, debris, chemical, and parts will be handled to minimize exposure to stormwater. 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 all be identified in the SWPPP. Storage structures for petroleum products and other chemicals must have adequate leak and spill protection to prevent any spilled material from entering waters of the state or storm sewer systems. In some instances, a separate SWPPP is prepared specifically for bridge demolition work to address dismantling activities and implement best practices to minimize the discharge of pollutants associated with these activities.

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 (SPCC) plan 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 material is stored in containers less than 55 gallons, and it can be demonstrated that spill material will not reach navigable waters. 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, an SPCC plan may be required due to the amount of equipment used and fuel needed for the project.

To minimize the potential for a frac-out during geotechnical investigations and utility relocations, 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 implements. 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 a frac-out plan may not be required for small-scale horizontal directional drilling projects, any inadvertent release of drilling mud must be remediated.

7.0 Species-Specific Effect Determination Analysis

Primary threat/stressor categories from the proposed action along with responses from each species and, if applicable, their critical habitat are described in more detail within the following sections (Section 7.1 – 7.11). Additionally, a deconstruction matrix was prepared to describe all aspects of NDDOT projects and is included as Appendix B 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. Species specific survey methods can be found on the references and forms page (https://www.dot.nd.gov/construction-and-planning/construction-planning/research/design-manual/references-and-forms).

As a part of this species-specific effect determination analysis *Effects of the Action* – a regulatory term used to define "…all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action… Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved…" (see full regulatory definition at 50 CFR 402.02) – are reviewed. Essentially, this regulatory term encompasses the direct and indirect effects[3] (i.e., consequences) a listed species or their critical habitat faces from the proposed action. Direct and indirect effects are caused by or result from the proposed action and either occur at the same time [direct] (e.g., noise, vibration, visual disturbance) or later in time [indirect] (e.g., noxious weed establishment).

[3] *Indirect effects* was a term previously defined within the 1986 definition of *Effects of the Action,* but the 2019 revisions of the 402 regulations eliminated it.

7.1 Whooping Crane Stressor and Response

Whooping cranes do not nest in North Dakota; however, this species migrates through the state during the spring and fall on their way to breeding and wintering grounds, respectively. Transportation projects that occur within rural areas with wetland/cropland associations have the potential to directly or indirectly affect whooping cranes or their habitat. Stressors such as noise/vibrations from various types of construction activities, lighting, increased human presence/disturbance, exposure to contaminants, water quality modification, habitat modification/removal, and overhead utility adjustments/installations can have various effects on whooping cranes.

An overarching concern from listed stressors is the expenditure of additional energy, depleting energy reserves, which could 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 them to spend extra time building required reserves to breed and nest or reduce their reproductive effort (lower clutch size and lower egg mass) (USGS 2012). On their return to winter grounds, adults and juveniles may become separated or displaced from preferred foraging habitats due to human disturbance, which may expend additional energy or make them more susceptible to predators.

The following sections further detail potential effects to the whooping crane from NDDOT project stressors.

7.1.1 Disturbance (Noise/Vibration/Lighting/Human Presence)

Construction generated noise/vibration and its specific affects to whooping cranes are hard to quantify, however, it is reasonable to assume that whooping cranes could be directly affected (e.g., behavioral changes) depending on the scope, duration, and site-specific conditions (e.g., distance to suitable stopover habitat) of a project.

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.

Whooping cranes generally avoid areas with ongoing human activity or disturbances. However, adverse weather conditions such as heavy fog, may cause cranes to use stopover habitat near roads. In normal weather conditions, observed whooping crane use of wetlands and croplands were more than 0.5 miles away from any human structures or developments (Austin and Richert 2011). One study found 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) (Howe 1989). This distance is likely to be greater in areas of high traffic such as interstates and rural commercial/industrial development, where disturbances are frequent, and habitat is highly fragmented. Visibility and adequate distance from human activity may be important whooping crane requirements during the spring and fall migration periods.

Indirect effects to whooping cranes, from human disturbances, 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. The 2022 Census of Agriculture reports 38,537,022 acres, roughly 85%, of the state is used for agricultural purposes (USDA 2022), thus harvested grain fields are in great abundance. Although only approximately 4% of the state is open water; small, shallow wetlands within or near agriculture fields are abundant throughout the whooping crane migration corridor in North Dakota.

Given the species preference to select habitat away from features such as roads and the abundance of suitable stopover habitat within North Dakota, no adverse effects to the whooping crane are anticipated from disturbances such as construction generated noise, temporary or permanent lighting, and increased human activity.

7.1.2 Exposure to Contaminants

Roadway construction activities adjacent to or within cropland/wetland areas have the potential to inadvertently introduce contaminants that may reach suitable habitat for the whooping crane. Exposure to contaminants may directly or indirectly affect whooping cranes, depending on the location, quantity of release, and distance to suitable habitat. Injury to the whooping crane from exposure to contaminants could occur from a poisoned food source or habitat degradation. Direct exposure of contaminants to adults or juveniles such as ingestion of contaminated food resources or the oiling of plumage, would adversely affect the whooping crane (e.g., direct injury, mortality).

Other contaminants such as asbestos or lead/non-lead paint, from bridge demolition activities, or application of herbicides/pesticides, from ROW maintenance activities, has the potential to reach whooping crane habitat; however, adverse effects are not anticipated. With proper handling, the potential for these types of contaminants to adversely affect whooping cranes is insignificant or discountable.

Large releases of contaminants in suitable whooping crane stopover habitat are unlikely to occur for a roadway construction project. In some cases, SPCC plans may be required for projects, which define measures to properly contain contaminants and address any inadvertent releases. Small releases of contaminants such as oil or gas from vehicles or construction equipment may occur; however, any release of a contaminant must be remediated according to state and federal laws. Additionally, with design of a SWPPP and SPCC plan (when required) tailored to the specific project that may occur in whooping crane habitat, adverse effects to the species from inadvertent release of contaminants are not expected. See Section 6.1.2 for more details on the potential effects exposure to contaminants could have on listed species and Section 6.2.1 for further information on SWPPPs and SPCC plans.

7.1.3 Water Quality Modification

Temporary impacts to water quality such as erosion, sedimentation, and inadvertent releases of contaminants could occur from roadway construction activities. 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 aquatic organisms used as food sources, and reduce habitat quality. The loss or reduction of aquatic organisms (e.g., frogs, crayfish, small fish, salamanders, and tadpoles) used as a food source (Armbruster 1990) may cause whooping cranes to expend additional energy foraging, relocating to new areas, or could lead to an early spring departure (Kauffeld 1981).

Potential effects from roadway construction to water quality in suitable habitat for whooping cranes would be temporary, and any modification to water quality would be reduced through the implementation of SWPPPs and associated ECMs. Therefore, potential effects to the whooping crane water quality impacts resulting from roadway construction are expected to be insignificant or discountable. See Section 6.1.3 for more details on the potential effects water quality modification could have on listed species and Section 6.2.1 for further information on SWPPPs.

7.1.4 Habitat Modification/Removal

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. See Section 7.1.1 for more detail on the disturbance avoidance habits of whooping cranes.

Wetland impacts frequently occur for NDDOT projects. Due to the whooping cranes avoidance of developed areas (including roads), wetlands directly adjacent to an existing roadway would not function as stopover habitat, particularly for high traffic highways and interstates. In addition, erosion control BMPs are utilized 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.

In addition to small shallow wetlands, foraging habitat for whooping cranes also consists of harvested grain crops. 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 (i.e., 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. The construction of a new road within the whooping crane migration corridor in North Dakota could result in habitat avoidance both during construction activities and after construction is completed. The loss or reduction of quality stopover habitat for whooping cranes in North Dakota due to new road construction would be relatively small considering the size of the migration corridor and abundance of wetland/cropland matrixes within (USFWS 2010a). Although there may be habitat avoidance from new road construction, as well as potential habitat loss, the small amount of potentially affected habitat is not anticipated to cause adverse effects to the whooping crane.

7.1.5 Overhead Utilities

Rural electrification in North America has resulted in the rapid increase of power lines within areas used by migratory birds during migration, leading to substantial mortality (Brown et al. 1987; USFWS 1994). Whooping cranes are susceptible to striking powerlines because of their large body size and wingspan, 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 becomes biologically significant when the affect changes the impacted species ability to sustain or increase its population numbers (APLIC 2012). Documentation from 1956 – 2006 reports the mortality of 45 whooping cranes directly linked to collision with power lines (Stehn and Wassenich 2008). However, the percentage of whooping crane mortality caused by collisions with power lines is difficult to quantify.

Avian collisions with distribution or transmission lines is likely due to not being able to see the lines in time to avoid them, resulting in traumatic injury from the collision itself or from the impact of falling to the ground (Brown et al. 1987; APLIC 2012). Non-conducting lines (i.e., static, shield, or ground wire), 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; APLIC 2006; APLIC 2012). Normally, ground wires are 0.9 – 1.3 cm in diameter, which is smaller than conductor wires, and sometimes appear to be invisible because of background conditions such as lighting. Therefore, birds often see and avoid conductor wires only to strike the above, less visible ground wire. Birds are also more prone to strike wires mid-span (i.e., 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. 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 that reduce visibility, 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. The amount of utility adjustments required for a specific project depends on the scope and length of the project. In some cases, the utility adjustments may be 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 and habitat characteristics also factor into potential effects to whooping cranes from utility adjustments. Utilities that need to be adjusted in rolling/steep terrain or wooded areas, would likely have no potential effects to the whooping crane because the species is highly unlikely to fly at a low altitude through these 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 (i.e., 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 on overhead utilities adjusted because 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 better avoid collision 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; APLIC 2006; APLIC 2012).

Alteration/adjustment of overhead utility lines due to transportation projects are not anticipated to cause adverse effects to the whooping crane.

7.1.6 Conservation Measures Specific to the Whooping Crane

To reduce the potential for future overhead utility strikes, the following conservation measure should be applied to all projects that require overhead utility adjustments in rural areas with wetland/cropland associations and are within the 95% whooping crane sighting corridor in North Dakota. See Figure 2 and Figure 3 for maps of the whooping crane migration corridor.

- Line marking devices (i.e., bird diverters) should be placed along the segment(s) of overhead utilities to be raised, lowered, and/or moved within one mile of whooping crane stopover habitat to reduce the risk of flight collisions.
    - The NDDOT will request affected utility companies utilize the most recent APLIC recommendations. 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.
    - *Note - There may be situations when applying line marking devices is not applicable, such as in areas of rugged terrain or high tree abundance.*

If installation of line marking devices, as part of the utility adjustments occurring from the proposed action, is not applicable (as noted) adverse effects to the whooping crane are not anticipated. The baseline condition (i.e., impact to whooping cranes) of the utilities is not likely to significantly change from the 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.

7.1.7 Effect Determination

NDDOT projects may cause whooping cranes to avoid potential stopover habitat, 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 SWPPPs and SPCC plans (if required), general (Section 6.2) and specific (Section 7.1.6) conservation measures, and cease of work activities if whooping cranes are observed near a project site; the proposed action ***may affect, but is not likely to adversely affect*** the whooping crane.

7.2 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 this species may use similar stopover sites as 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, and sewage lagoons have the potential to directly or indirectly affect rufa red knots. Disturbances such as noise/vibrations from various types of construction activities, lighting, increased human presence/disturbance, exposure to contaminants, water quality modification, and habitat modification/removal can have various effects to the rufa red knot. The following sections detail potential effects to the rufa red knot from NDDOT project stressors.

7.2.1 Disturbance (Noise/Vibration/Lighting/Human Presence)

Construction generated noise/vibration and its specific affects to the rufa red knot are hard to quantify, however, it is reasonable to assume that rufa red knots could be directly affected (e.g., behavioral changes) depending on the scope, duration, and site-specific conditions (e.g., distance to suitable stopover habitat) of a project. 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. 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 can make long distance flights. Migrating red knots can complete non-stop flights of 2,400 km (1,500 mi) or more (USFWS 2016). Temporary avoidance of potential stopover habitat is not anticipated to adversely affect the species.

Lighting used during construction, or new permanent lighting installed for a project has the potential to cause behavioral effects to the rufa red knot such as habitat avoidance during and after the completion of a project. 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. 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.

Migrating rufa red knots would likely avoid suitable habitat near construction activities, due to constant noise and human presence. This 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 in North Dakota, and the species is capable of long-distance flights.

7.2.2 Exposure to Contaminants

Roadway construction activities adjacent to or within sandy/gravelly beaches, sandbars, or alkaline wetlands have the potential to inadvertently introduce contaminants into suitable habitat for the rufa red knot. 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 contaminants could occur from a poisoned food source, decrease in food supply, or habitat degradation. Direct exposure of contaminants to adults or juveniles, including ingestion of contaminated food resources or oiling of plumage, would adversely affect the rufa red knot (e.g., direct injury, mortality).

Other contaminants such as asbestos or lead/non-lead paint, from bridge demolition activities, or application of herbicides/pesticides, from ROW maintenance activities, has the potential to reach rufa red knot habitat; however, adverse effects are not anticipated. With proper handling, the potential for these types of contaminants to adversely affect rufa red knots is insignificant or discountable.

Large releases of contaminants in suitable rufa red knot stopover habitat are unlikely to occur for a roadway construction project. In some cases, SPCC plans may be required for projects, which define measures to properly contain contaminants and address any inadvertent releases. Small releases of contaminants such as oil or gas from vehicles or construction equipment may occur; however, any release of a contaminant must be remediated according to state and federal laws. Additionally, with the design of a SWPPP and SPCC plan (when required) tailored to the specific project that may occur in rufa red knot habitat, adverse effects to the species from inadvertent release of contaminants are not expected. See Section 6.1.2 for more details on the potential effects exposure to contaminants could have on listed species and Section 6.2.1 for further information on SWPPPs and SPCC plans.

7.2.3 Water Quality Modification

Degradation of water quality from construction activities such as erosion, sedimentation, increased turbidity, or release of contaminants could adversely affect the rufa red knot. 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. Further, 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 SWPPPs and associated ECMs. Therefore, potential effects to the rufa red knot because of potential water quality impacts resulting from roadway construction are expected to be insignificant or discountable. See Section 6.1.3 for more details on the potential effects water quality modification could have on listed species and Section 6.2.1 for further information on SWPPPs.

7.2.4 Habitat Modification/Removal

Habitat modification, fragmentation, or removal can occur from roadway construction activities that may intersect potential habitat for the rufa red knot. Because of the transitory nature of rufa red knots and ample foraging/resting habitat, associated potential stressors from road construction or new bridge construction/bridge demolition in the Missouri River, Lake Sakakawea, or alkali lakes and wetlands are not likely to adversely affect rufa red knots. Further, conservation measures (e.g., monitoring surveys) 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 species has left the area, or minimization measures have been approved and installed/implemented.

7.2.5 Conservation Measures Specific to the Rufa Red Knot

No conservation measures specific to the rufa red knot have been identified. However, monitoring surveys and conservation measures specific to the piping plover (Section 7.3.5) would afford protection to the rufa red knot as well.

7.2.6 Effect Determination

Minimal information and observation 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 because of NDDOT projects are highly unlikely. 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 general conservation measures (Section 6.2) 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.

7.3 Piping Plover Stressor and Response

Piping plovers migrate to and nest annually within North Dakota. Transportation projects that occur adjacent to or within the Missouri River, Lake Sakakawea, or alkali lakes and wetlands within central and western North Dakota (particularly adjacent to or within designated piping plover critical habitat) have the potential to directly or indirectly effect piping plovers or their habitat. Stressors such as noise/vibrations from various types of construction activities, lighting, increased human presence/disturbance, exposure to contaminants, water quality modification, and habitat modification/removal can have various effects to the piping plover. The following sections detail potential effects to the piping plover from NDDOT project stressors.

7.3.1 Disturbance (Noise/Vibration/Lighting/Human Presence)

Noise/vibrations from construction activities have 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. Though it is difficult to quantify how noise from construction specifically affects piping plovers, it is reasonable to assume that piping plovers could be directly affected (e.g., behavioral changes) depending on the scope, duration, and site-specific conditions (e.g., distance to suitable habitat) of a project. 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 directly affect piping plovers (e.g., 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 help reduce the potential for noise and visual disturbances to the piping plover.

Temporary lighting used during roadway/bridge construction/demolition, or new permanent lighting installations could cause direct or indirect effects to the piping plover. As various plover species have been observed to nocturnally forage (Robert and McNeil 1989; Morrier and McNeil 1991), including the piping plover (Staine and Burger 1994), temporary use of lighting during construction has the potential to cause behavioral changes that could reduce foraging success. Permanent lighting installed for NDDOT projects also has the potential to cause behavioral changes such as habitat avoidance after the project is completed. However, given that roadway construction activities covered under this PBA typically occur within the existing roadway, baseline conditions are not expected to change. No adverse effects to the piping plover are anticipated from temporary or permanent lighting from roadway construction activities.

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 having been observed nesting within anthropogenic habitats (i.e., areas impacted by human activities); including recreation, aggregate mining, and residences (Jorgensen et al. 2016). 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. They 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 species, but that value resets every morning (Jorgensen et al. 2016).

The presence of people nearby, 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; USFWS 2020b). Eggs, newly hatched chicks, or fledged juveniles may become separated from adults or displaced from preferred foraging habitats by human activities, 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). Additionally, unleashed pets, such as cats and dogs, may harass or kill piping plovers and/or their chicks. Studies indicate shorebirds are more likely to have a greater stress response (e.g., flush sooner) to the presence of a dog compared to a human (USFWS 2020b).

Due to the duration of time required to complete roadway/bridge construction/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. Furthermore, if piping plovers have initiated nesting near a NDDOT project prior to any construction activities, the species could be adversely affected. Unless avoidance or minimization measures could be implemented (e.g., avoidance buffers, timing restrictions) that are approved by the USFWS, these projects may no longer fit the scope of this PBA and separate consultation would be required in these situations. The implementation of conservation measures, such as monitoring surveys, can be initiated 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 species has 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. Section 7.3.5 provides more information on monitoring surveys and conservation measures specific to the piping plover.

7.3.2 Exposure to Contaminants

Roadway construction activities adjacent to or within the Missouri River, Lake Sakakawea, or alkali lakes and wetlands located in central and western North Dakota have the potential to inadvertently introduce contaminants into suitable habitat for the piping plover. 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 contaminants could occur from a poisoned food source, decrease in food supply, or habitat degradation. Direct exposure of contaminants to adults, young, or eggs, including ingestion of contaminated food resources or oiling of plumage/nests, would adversely affect the piping plover (e.g., direct injury, mortality).

Other contaminants such as asbestos or lead/non-lead paint, from bridge demolition activities, or application of herbicides/pesticides, from ROW maintenance activities, has the potential to reach piping plover habitat; however, adverse effects are not anticipated. With proper handling, the potential for these types of contaminants to adversely affect piping plovers is insignificant or discountable.

Large releases of contaminants in suitable piping plover habitat are unlikely to occur for a roadway construction project. In some cases, SPCC plans may be required for projects, which define measures to properly contain contaminants and address any inadvertent releases. Small releases of contaminants such as oil or gas from vehicles or construction equipment may occur; however, any release of a contaminant must be remediated according to state and federal laws. Additionally. with design of a SWPPP and SPCC plan (when required) tailored to the specific project that may occur in piping plover habitat, adverse effects to the species from inadvertent release of contaminants are not expected. See Section 6.1.2 for more details on the potential effects exposure to contaminants could have on listed species and Section 6.2.1 for further information on SWPPPs and SPCC plans.

7.3.3 Water Quality Modification

Degradation of water quality from construction activities such as erosion, sedimentation, increased turbidity, or release of contaminants can cause direct and indirect effects to the piping plover. Sediment and erosion caused by earthwork adjacent to the Missouri River, Lake Sakakawea, or alkali lakes and wetlands has the potential to reach suitable habitat for the piping plover. Further, the piping plover is primarily dependent upon 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, reproductive success (Catlin et al. 2012), and 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 SWPPPs and associated ECMs. Therefore, potential effects to the piping plover because of potential water quality impacts resulting from roadway construction are expected to be insignificant or discountable. See Section 6.1.3 for more details on the potential effects water quality modification could have on listed species and Section 6.2.1 for further information on SWPPPs.

7.3.4 Habitat Modification/Removal

Habitat destruction, fragmentation, modification, and human development of shorelines, including roadway construction, 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). If piping plovers lose essential nesting sites and are forced to breed in areas that may be marginally suitable, the reproductive success of the species is likely to lower. In addition, roads, residences, and high use areas fragment piping plover populations and limits travel, particularly for adults with young, to other foraging areas (NYNHP 2015).

Vegetation growth may also restrict adults and chicks from reaching high quality foraging habitats and starvation in some situations has been a problem (Loegering and Fraser 1995). Natural succession and vegetative regrowth of the open sandy beaches used for nesting decreases habitat quality for piping plovers (NYNHP 2015). Habitat availability for piping plovers may become an issue if normally utilized areas become heavily vegetated without nearby expanses of sand scoured habitat for individuals 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 because of the proposed action is highly unlikely. Any temporary impacts to terrestrial areas would be reclaimed to match surrounding conditions.

One NDDOT project type, 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 because of both water speed and changes in turbidity. However, bridge piers are typically designed to be parallel to the direction of water flow which minimizes the effects on water velocity. In addition, more recent bridge pier design reduces the length and width of piers compared to older bridge design which minimizes the footprint within water. Given that the Missouri River has a relatively wide river channel and piers are now designed to reduce their footprint within the water, impacts to water velocities, flow patterns, or channel morphology are anticipated to be negligible. However, direct impacts to piping plover habitat (e.g., removal of sandbar habitat for bridge construction) 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 Section 7.4.

7.3.5 Conservation Measures Specific to the Piping Plover

Piping plovers may be present in North Dakota from approximately April 15 – August 15. Although the species may remain until the end of August, nest initiation is not anticipated to occur past July 15. Projects in or within 0.5 mile of suitable piping plover habitat (e.g., Missouri River, Lake Oahe, Lake Sakakawea, and other DCH) can implement construction phasing. If construction phasing is an option, the following conservation measure should be used.

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

If construction phasing is not an option, surveys may be performed by a qualified biologist[4] prior to commencement of construction activities within 0.5 mile of suitable habitat to determine if piping plovers or active nests are present.

Initial Survey: If construction outside the paved or graveled surface of the roadway occurs during the piping plover breeding season (April 15 – August 15), an initial field survey will be conducted within DCH 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 15 at the latest.

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[4] 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.

- ***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. However, each project that occurs adjacent to or within these DCH units will need a cursory review of the habitat closer to the time of project construction to verify the on-site characteristics have not substantially change since the initial survey. If water levels were to recede, many of these areas would have high quality habitat for the piping plover.

<u>Habitat Present</u>: If suitable habitat has been identified and construction activities outside the paved or graveled surface of the roadway will take place within 0.5 mile of the habitat, unless visual barriers are present between the work activities and habitat (e.g., wooded areas, rolling topography), two surveys will be conducted daily:

1. The first survey will be conducted for two hours during daylight before starting construction activities for that day.
2. The second survey will be conducted for one hour beginning after work has stopped for that day.
    a. Construction activities will stop early enough to allow for the survey to be completed no later than 30 minutes after sunset.

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.

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 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 installed, or September 1 has been reached.

<u>Survey Report:</u> A report will be submitted to the Engineer NDDOT ETS, and USFWS 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

7.3.6 Effect Determination

NDDOT projects that occur more than 0.5 mile away from suitable piping plover habitat are not anticipated to adversely affect this species. Therefore, a ***no effect*** determination for the piping plover is made for proposed actions occurring more than 0.5 mile away from suitable piping plover habitat.

NDDOT projects that occur in or within 0.5 mile of suitable habitat have the potential to affect piping plovers through disturbance from construction activities, water quality modification, exposure to contaminants, habitat modification/removal has the potential to affect the piping plover directly or indirectly. However, with the implementation of general (Section 6.2) and specific (Section 7.3.5) conservation measures, piping plover monitoring surveys, design/implementation of SWPPP and SPCC plans, 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 piping plover.

7.4 Piping Plover Designated Critical Habitat Stressors

The following sections detail potential direct and indirect effects to piping plover DCH that could result from NDDOT project stressors. See Piping Plover Stressor and Response (Section 7.3) for direct and indirect effects to the species because of the proposed action.

7.4.1 Designated Critical Habitat Modification/Removal

NDDOT projects that either directly or indirectly affect the Physical or Biological Features (PBF), previously referred to as *Primary Constituent Elements*, identified for the NGP population of piping plovers could 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 (67 FR 57638). See Section 5.1.4 for more information regarding PBFs identified for the NGP population of piping plovers and DCH located within North Dakota.

The potential stressors from NDDOT projects that may affect PBFs include direct habitat modification or removal (e.g., dredging, bridge construction/demolition), erosion/sedimentation, spills, introduction or spread of noxious/invasive species, water quality modification, exposure to contaminants, and activities that require in-water work or ground disturbance within or adjacent to DCH for the piping plover. Depending on the presence of beaches, islands/sandbars, and sandy shorelines, the activities involved with NDDOT projects could temporarily or permanently modify DCH.

Water levels at the time of construction activities play a large role in whether PBFs are present. During high water years, PBFs associated with piping plover DCH may be sparse. Conversely, in low water years, PBFs may be in great abundance. Water levels on the Missouri River and Lake Sakakawea can fluctuate greatly from year to year. Activities that result in hydrology changes, including bridge construction, may have adverse effects to the PBFs of piping plover critical habitat. The placement of piles/piers within piping plover critical habitat could impact processes that create and maintain the PBFs such as changes in streamflow patterns, water speed, and turbidity. Typically, piers are designed parallel to the directional 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 older design, minimizing the footprint within water. Given that the Missouri River has a relatively wide river channel and piers are now designed to reduce their footprint within the water, impacts to water velocities, flow patterns, or channel morphology are anticipated to be negligible.

NDDOT activities that have the potential to directly modify any of the PBFs of DCH (e.g., direct removal of sandbars) are not within the scope of 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 PBFs 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 57638). 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 PBFs essential for the NGP population of piping plovers (67 FR 57638). These features will not themselves contain one or more of the PBFs (67 FR 57638). Federal actions limited to those features, therefore, would not trigger a section 7 consultation, unless they affect species and/or PBFs in adjacent critical habitat (67 FR 57638).

Erosion/sedimentation and inadvertent release of contaminants that occurs as a result of transportation construction activities has the potential to directly affect DCH, dependent on the scope of the project and its proximity to the PBFs associated with piping plover DCH. In addition, earthwork near boundaries of DCH has the potential for invasive/noxious weeds or other undesirable vegetation to become established and spread within the DCH unit. Reduced habitat quality could also result from erosion/sedimentation; however, with the implementation of SWPPPs and associated ECMs before, during, and after a NDDOT project, SPCC plans (when required), and standard NDDOT seeding practices and noxious weed control, adverse effects would be reduced to an insignificant or discountable level. Furthermore, fueling sites are typically located away from water features and any inadvertent release of potential contaminants must be remediated according to state and federal laws.

7.4.2 Conservation Measures Specific to Designated Critical Habitat for the Piping Plover

This section provides conservation measure specific to DCH for the piping plover; conservation measures specific to the piping plover can be found in Section 7.3.5. The following conservation measures should be applied to all projects within or adjacent to piping plover DCH.

- Clearly mark limits of construction within or adjacent to boundaries of DCH.
    - This measure is intended to reduce potential effects of the proposed action on the PBFs 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/or introduction of invasive/noxious species.
- Fueling or staging areas are not to be placed directly adjacent to or within the boundaries of DCH.

7.4.3 Effect Determination

NDDOT projects that occur adjacent to or within DCH for the piping plover have the potential to directly and/or indirectly affect identified PBFs of the habitat, including the removal or modification of potential nesting and foraging habitat and prey selection/abundance. With the implementation of general (Section 6.2) and specific (Section 7.4.2) conservation measures, and implementation of SWPPPs and/or SPCC plans, the proposed actions are not anticipated to cause ***destruction or adverse modification*** of DCH for the piping plover. If direct effects to PBFs occur (e.g., removal of sandbar/shoreline) as a result of the proposed actions, those activities would fall outside the scope of this PBA and separate consultation would be required.

7.5 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 and/or indirectly affect the pallid sturgeon. Disturbances such as noise/vibrations from various types of construction activities (particularly bridge construction/demolition), exposure to contaminants, water quality modification, and habitat modification/removal can have various effects to this species. The following sections detail potential effects to the pallid sturgeon from NDDOT project stressors.

7.5.1 Disturbances (Noise/Vibration/Operation of Equipment/Installation of Pile/Geotechnical)

Noise and vibrations caused by bridge construction or demolition has the potential to cause adverse effects to pallid sturgeon adults, eggs, and larvae. A common method used to construct bridge piers, for both permanent and temporary bridges, is pile driving. 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 additional sound into the water and air (Hastings and Popper 2005). Furthermore, the pulse propagates down the length of the pile, reaches the substrate at the water bottom, and causes waves to spread outward through the bottom sediment. The sound waves that reach the substrate can be further transmitted from the bottom, back into 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 13 for the propagation of underwater sound caused by pile driving activities.

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.

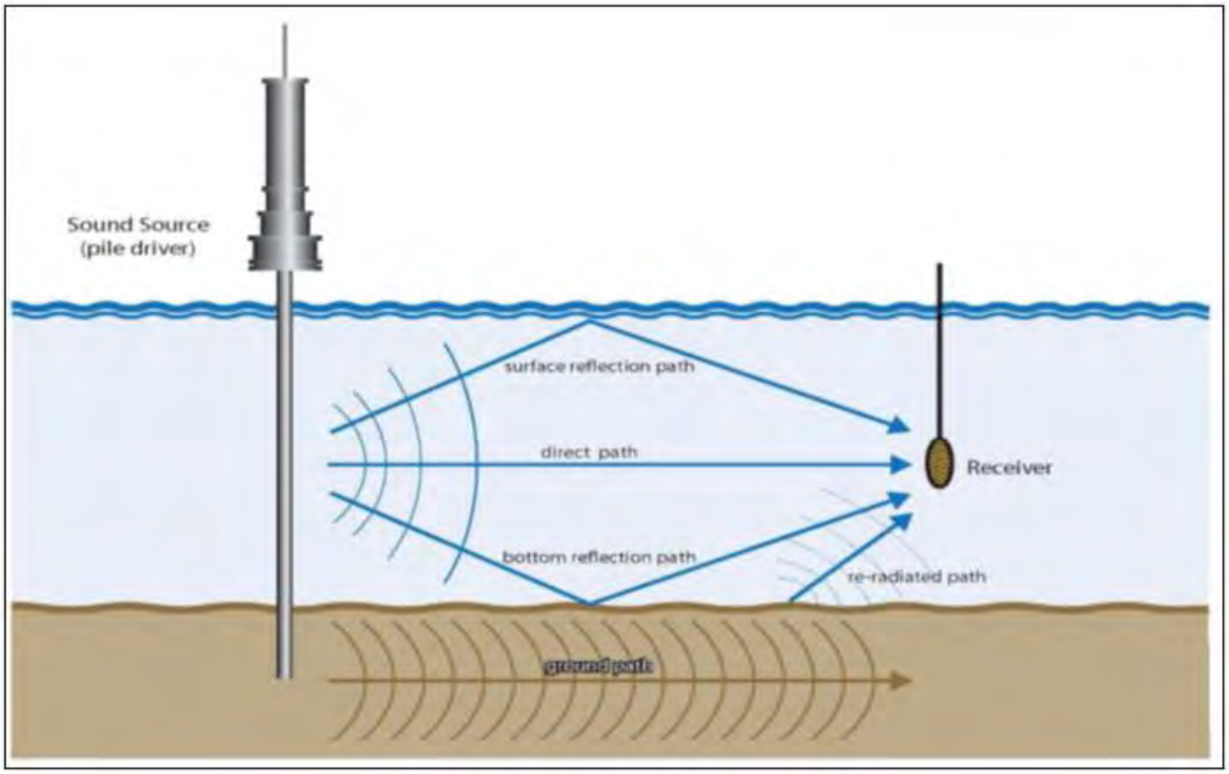

Figure 13: Propagation of underwater sound caused by pile driving activities (Caltrans 2015).

Hearing in fish is based on the detection of the mechanical motions in the medium imparted by sound. The otolith organs, hard, calcium carbonate structures located directly behind the brain of bony 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. This expansion and contraction may cause the swim bladder to rupture.

Ear sound exposure effects fall within two classes, 1) low level exposure of sound for a long period of time or 2) high-level exposure of sound for a short period of time. Both 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 rate of sound, pressure level, frequency, duration, and health of the organism can influence the duration and exposure level needed to cause 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. Another possible sound exposure 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 criterion for injury to fish because 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}[5]) and 187 dB accumulated SEL ($SEL_{ACCUMLULATED}$[6]) 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. Though there is data that suggests fish further from the source are not likely to be killed, no studies have examined the long-term effects of pile-driving sound exposure and if that leads to delayed death, or perhaps, other alterations in behavior that could affect the survival of individuals or populations of fishes. While not immediately apparent, activities that result in injury but not mortality may have significant effects on fish. This may include a temporary injury that heals, injury that leads to slow death, temporary or permanent hearing loss, and movement of fish away from feeding or spawning areas (Hastings and Popper 2005). Eggs and larvae of fish could also be exposed to sounds generated from pile driving activities but potential effects at these life stages are unclear.

The amount of pile driving activities required for new bridge construction would be dependent on the location of the project and length of the bridge needed. 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 bridge construction is previously 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.

For bridge construction/demolition projects within the Missouri River or Lake Sakakawea to fit the scope of this PBA, site-specific conditions will need to be considered and potential adverse effects to the pallid sturgeon (e.g., direct injury, mortality) must be avoided or minimized. Avoidance and minimization

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[5] 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.

[6] 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 µPa$_2$·sec over the duration of the impulse. Measured in dB re 1 µPa$_2$·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.

measures must be implemented into the design phase of the project to reduce the potential effects of exposure of fish to sound generated by pile driving activities. Other noises from bridge demolition activities include 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.

The type of pile driving equipment, type of pile, and pile size can minimize or reduce potential effects 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 the typical equipment used to drive pile. Alternative methods include the use of vibratory hammers, push or press-in pile installation, 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.

Piles used for the 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 several factors, including bearing capacity, pile length and diameter, pile function, and cost. Different types and sizes of piles produce different levels of underwater sound when they are driven. The peak sound pressure levels have been measured ten 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). To reduce underwater sound levels from individual pile strikes, alternative pile types can be used. 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. Selection for smaller piles could reduce impacts to the pallid sturgeon, other aquatic species, or sensitive habitats, if 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.

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 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 Section 7.5.2 for further information on sound attenuation measures to reduce underwater noise.

Geotechnical investigations within the Missouri River or 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).

The Washington Department of Transportation (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 to measure ambient sound levels. The hydrophone was secured 10 m from the boring machine at a water depth of 22.5 ft below the water surface. The overall water depth was 45 ft at the boring location. Peak dB levels during boring activities ranged from 152 – 181 dB. Average peak dB ranged from 151 – 178 dB. Sound exposure level (SEL) during boring operations ranged from 147 – 148 dB (WSDOT 2007). 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, and noise during drilling operations may cause pallid sturgeon to temporarily avoid habitat; however, given that the pallid sturgeon is a highly mobile fish species and the amount of habitat available, compared to the small amount of habitat to be temporarily disturbed, adverse effects to the pallid sturgeon are not anticipated.

Other sources of noise that may have potential effects to the pallid sturgeon include the operation of boats and barges within suitable 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 are not likely to be found high in the water column where propellers would be present.

Noise Monitoring Study for Bridge Construction within the Missouri River

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 full hydro acoustic monitoring report can be found in Appendix E.

Construction of the Lewis and Clark Bridge included installation of five piers within the Missouri River; each pier requiring 54-60, 14-inch wide H-piles to be driven into the bed of the river over the course of 17 days. Three different types of hammers, one vibratory and two impact, were used to drive piles and cofferdams were setup prior to pile driving. Geotechnical boring was completed adjacent to the project corridor to reveal the structural composition of the underlying subsurface geology. Data regarding the width of the river, speed and depth of the water, and location of the thalweg was recorded. Specifications regarding equipment used, cofferdam setup, geology of the site, water level/speed monitoring, and location of the thalweg can be found in Appendix E.

Prior to the initiation of pile driving operations a hydro acoustic monitoring plan was prepared. The plan outlined the process and procedures for conducting hydro acoustic monitoring and established decibel thresholds for peak and accumulated (206 dB and 187 dB, respectively) sound levels. Hydro acoustic monitoring was conducted for the pile driving operations during the months of July-September. The type of equipment, calibration methods, and monitoring set up for the hydro acoustic monitoring can be found in Appendix E.

Background noise measurements were taken within the project area when no pile driving activities were being conducted. The measurements were taken at Pier 2 and 3, 10 m 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 sessions occurred at Pier 2, 10 m 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.

Twenty-four monitoring sessions were completed to assess noise levels associated with the use of impact hammers at Pier 2 and 3. 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. However, these levels remained below established thresholds.

RMS[7] levels more than 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 with the greatest level at 160.7 dB.

Based on 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 assumes that future pile driving operations will be completed in a similar manner, using similarly sized equipment.

Pallid Sturgeon Behavioral/Movement Responses to Pile Driving

There have been no studies specifically on the behavioral responses of pallid sturgeon to pile driving activities. To date there is no data available regarding behaviors such as swimming away from feeding or reproductive areas or changes in migration routes because of pile driving. One study on a coral reef showed little or no effect on overall behavior and movement patterns of fish and invertebrates because of deployment of seismic air guns (Wardle et al. 2001), which generates sound levels similar to pile driving. 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 air guns were deployed and repeatedly fired. Peak sound pressure levels of 210 dB at 16 m range and 195 dB at 109 m range were measured at positions where the fish were being observed. 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

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[7] 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% of the sound exposure of the impulse.

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 was some startling (reflex movements called C-start) when the explosions 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 generates similar sound levels as seismic air guns, behavioral effects to pallid sturgeon are anticipated to be like that seen in other fish species.

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 indicating that pallid sturgeon respond to environmental variables associated with seasonal changes in habitat (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.

7.5.2 Sound Attenuation Measures

Air Bubble Curtains

Air bubble curtains create 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 curtain's ability to reduce sound levels from striking piles, it is recommended that attenuation assumed 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).

7.5.3 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. 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 contaminants could occur from a poisoned food source, decrease in food supply, or habitat degradation. Direct exposure of contaminants to adults, juvenile, larvae, or eggs, including ingestion of contaminants through food or the surrounding water and/or oiling of gills, would adversely affect the pallid sturgeon (e.g., direct injury, mortality).

Other contaminants, such as asbestos or lead/non-lead paint, could enter pallid sturgeon habitat from bridge demolition activities. 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. Therefore, no adverse effects to the pallid sturgeon because of exposure to asbestos or lead/non-lead paint are anticipated.

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. In some cases, SPCC plans may be required for projects, which define measures to properly contain contaminants and address any inadvertent releases. Small releases of contaminants such as oil or gas from vehicles or construction equipment may occur; however, any release of a contaminant must be remediated according to state and federal laws. Additionally. with design of a SWPPP and SPCC plan (when required) tailored to the specific project that may occur in pallid sturgeon habitat, adverse effects to the species from inadvertent release of contaminants are not expected. See Section 6.1.2 for more details on the potential effects exposure to contaminants could have on listed species and Section 6.2.1 for further information on SWPPPs and SPCC plans.

7.5.4 Water Quality/Habitat Modification

Degradation of water quality from construction activities such as erosion, sedimentation, altered turbidity, or release of contaminants can cause direct and indirect effects to pallid sturgeon adults, juveniles, larvae, and eggs. Further, because the pallid sturgeon is an aquatic obligate, water quality modification is directly linked with habitat modification and discussed in this section concurrently.

Effects from altered turbidity levels, which disrupts and resuspends bottom sediments, to the pallid sturgeon are poorly understood. However, the pallid sturgeon appears to be highly adapted to low-visibility environments, given the developed morphological characteristics used to sense and locate other animals. 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 because of increased sedimentation/turbidity. 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 rates, reaction distance, prey selection/abundance, and ability to detect predators. The deposition of sediment can also bury aquatic invertebrates and harm small fish used as a food resource by the pallid sturgeon. 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.

Other work activities that could potentially modify water quality, habitat, or affect pallid sturgeon include dredging, dewatering, concrete pouring, welding, painting, and paint removal. These activities, primarily associated with bridge construction/demolition (including temporary bridges), could result in the short-term modification of pallid sturgeon habitat leading to temporary avoidance. Another habitat modification concern from the installation of a bridge is the potential change to streamflow patterns which could impact water velocity. Typically, bridge 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, and piers are now designed to reduce their footprint within the water, impacts to water velocities, flow patterns, or channel morphology are anticipated to be negligible.

Geotechnical drilling within the Missouri River or Lake Sakakawea may temporarily damage small amounts of benthic habitat, however drill bore sizes are small typically ten 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.

Due to adaptations to live in turbid environments, implementation of SWPPPs and associated ECMs (e.g., cofferdams, floating silt curtains), and bridge piers design to minimize their water footprint, potential effects from roadway construction activities, including bridge construction/demolition, to water quality and suitable habitat is not anticipated to adversely affect the pallid sturgeon. Furthermore, in-water work is to be avoided between April 15 and June 1 to reduce potential effects to aquatic resources during migration/spawning periods. Some in-water activities associated with bridge construction/demolition may be conducted during this window but would need to be approved by the North Dakota Game and Fish (NDGF), USFWS, and USACE.

7.5.5 Invasive and Aquatic Nuisance Species (ANS)

The introduction or spread of invasive and aquatic nuisance species (ANS) because of NDDOT projects has the potential to indirectly affect the pallid sturgeon. Potential threats to this species from 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 and species such as zebra mussels could spread or be introduced because of NDDOT projects if measures are not taken to inspect and properly clean equipment before use.

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, water-crafting, or construction shall be free of prohibited or regulated ANS, as defined in the state's ANS 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 (i.e., boat ramp) is allowed.

NDDOT uses the following environmental note (also addressed in Section 6.2) 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.

> *Note – Equipment that was last used outside of North Dakota or within a Class I infested waterbody (identified on the NDGF website) requires an inspection by NDGF. Notify the NDGF at least ten business days prior to pumps, watercraft, or any equipment entering a public water to allow the NDGF sufficient time to inspect any and all such equipment for ANS. Contact the NDGF ANS Coordinator for equipment inspections. Supply one of the following to the engineer as proof of compliance prior to in-water work taking place: (1) the NDGF inspection report or (2) documented NDGF correspondence (email or signed letter).*

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

7.5.6 Conservation Measures Specific to the Pallid Sturgeon

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.

- 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 from 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 attenuation measures discussed in Section 7.5.2 could be used to reduce exposure levels to avoid adverse effects to the pallid sturgeon. However, noise monitoring should continue if sound attenuation measures are used to determine the effectiveness of the measure and if sound levels have dropped below threshold levels.*

7.5.7 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. Other potential direct or indirect effects to this species includes exposure to contaminants, habitat modification/removal, water quality modification, and introduction or spread of ANS. However, with the implementation of noise monitoring and attenuation measures (if deemed necessary), general (Section 6.2) conservation measures, design/implementation of SWPPP and SPCC plans, timing restrictions for in-water work, and measures taken to reduce the introduction/spread of ANS, the potential effects to 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.

7.6 Gray Wolf Stressor and Response

There are no known resident populations of gray wolves in North Dakota, and the state is considered to act as dispersal habitat between the WGL DPS and the NRM DPS. Rural areas in North Dakota function as dispersal corridors for wolves. Dispersal habitat may be important for maintaining gene flow between the two 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.

7.6.1 Disturbance (Noise/Vibration/Human Presence)

North Dakota lacks key components needed for 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 habitat in North Dakota and 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 move as far as 1,092 km (678.5 mi) 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. This species is more than capable of moving several miles in a day, and it is highly unlikely that increased energy burdens would occur because of dispersal habitat avoidance. Other potential effects such as direct injury or mortality from collisions with construction machinery or other vehicles because of roadway construction projects or traffic created after a new roadway project is complete is also highly unlikely.

7.6.2 Habitat Modification/Removal

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 because 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.

7.6.3 Conservation Measures Specific to the Gray Wolf

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 this PBA will be required to report any sightings of threatened or endangered species, cease construction activities, and establish an 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.

7.6.4 Effect Determination

Disturbance from construction activities and the removal/modification of dispersal habitat may cause the gray wolf to temporarily avoid habitat near active construction. However, adverse effects to the species is not anticipated due to the lack of known populations within the state, ability of the species to cover large distances, and the ability to avoid human disturbances. 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 actions have ***no effect*** to the gray wolf.

7.7 Northern Long-Eared Bat Stressor and Response

The northern long-eared bat (NLEB) will make seasonal migratory movements, approximately 35 – 55 miles (USFWS 2022), to find suitable winter (hibernacula) and summer habitat. Suitable winter and summer habitat can be found throughout the state; currently, no hibernacula or maternity roost locations have been identified within North Dakota. Transportation projects that occur in or near wooded areas; require tree removal; require work on structures such as bridges, box culverts, and buildings; introduce light; increase exposure to contaminants; reduce water quality; or occur adjacent to caves (or associated sinkholes, fissures, or other karst features), mines, rocky outcroppings, or tunnels has the potential to affect the NLEB. The following sections detail potential direct and indirect effects to the NLEB from NDDOT project stressors.

7.7.1 Disturbance (Noise/Vibration/Lighting/Human Presence)

Disturbance from construction activities such as noise and vibrations from heavy equipment in areas of suitable habitat for the NLEB has the potential to affect the species directly and indirectly. Potential effects include temporary to permanent alterations in bat behavior and disruption of normal feeding, sheltering, and/or breeding activities. 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 louder noise levels (or closer distances), particularly if accompanied by physical vibrations from heavy machinery and the crashing of falling trees, bats would likely be startled to the point of fleeing from their daytime roosts and could experience increased predation risk (USFWS 2016b). Further, all bat species known to occur in North Dakota utilize echolocation to detect and capture prey. The reception of relevant echoes could potentially be impaired by high levels of background noise. Though evidence also suggests bats can adjust echolocation call structure to avoid acoustic interference within their local environment (Schaub et al. 2008). For projects with noise levels greater than typically experienced by bats in that localized area, and that continues for a long duration (multiple days/weeks), bats roosting within or close to these projects 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 because 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 are not anticipated to result in any additional response by bats (FHWA, FHA, and USFWS 2015).

Transportation projects may require that artificial lighting be used temporarily during construction/maintenance activities or, in some situations, the installation of permanent lighting. 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. Though there are some instances when bats seem to benefit from artificial lighting, taking advantage of high densities of insects attracted to light (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 utilizing temporary lighting during the winter season, no effects to NLEBs are likely from this stressor. For projects utilizing temporary lighting during the summer maternity season, where 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 new permanent lighting can be installed using downward-facing, full cut off lens lights, and is directed away from forest habitat completely, the lighting is not likely to adversely affect NLEBs (USFWS 2016b).

7.7.2 Exposure to Contaminants

Bats may 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 contaminants. These potential stressors may affect bats in a physiological manner (e.g., direct injury or mortality).

Large releases of contaminants in suitable NLEB habitat are unlikely to occur for a roadway construction project. In some cases, SPCC plans may be required for projects, which define measures to properly contain contaminants and address any inadvertent releases. Small releases of contaminants such as oil or gas from vehicles or construction equipment may occur; however, any release of a contaminant must be remediated according to state and federal laws. Additionally, with design of a SWPPP and SPCC plan (when required) tailored to the specific project that may occur in NLEB habitat, adverse effects to the species from inadvertent release of contaminants are not expected. See Section 6.1.2 for more details on the potential effects exposure to contaminants could have on listed species and Section 6.2.1 for further information on SWPPPs and SPCC plans.

7.7.3 Water Quality Modification

Transportation projects may temporarily decrease water quality through dust, sedimentation, application of road salts, and other de-icing materials, altering available sources of drinking water or foraging habitat – reducing or changing the composition of the 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 ECMs 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 because of transportation projects are likely to be insignificant or discountable. See Section 6.1.3 for more details on the potential effects water quality modification could have on listed species and Section 6.2.1 for further information on SWPPPs.

7.7.4 Habitat Modification/Removal

Habitat modification, fragmentation, or removal, including temporary or permanent loss of roosts, foraging and/or roosting habitat, and travel corridors, that occurs from roadway construction activities could adversely affect the NLEB. Frequently, tree removals are needed to facilitate construction of a roadway project, whether it be new road construction, roadway widening, or another project type such as clearing and grading operations which require trees be felled and roots/stumps be removed. Direct effects of tree removals include killing or crushing bats that may be roosting during the active season (April 15 – October 31 in North Dakota), abandonment/flushing of a roost location, or may cause disruption of colony networks (Silvis et al. 2015).

Indirect effects of tree removals conducted during the inactive season (November 1 – April 14 in North Dakota) include habitat loss, 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). Furthermore, individuals hibernating in white-nose syndrome (WNS) affected areas will face additional challenges (e.g., wing damage, fewer fat reserves) when emerging from hibernacula to forage and migrate to summer roosting habitat (Reichard and Kunz 2009; Reeder et al. 2012). 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.

The level of impact tree clearing can have on NLEBs is dependent on the habitat quality, amount, location, and time of year the tree clearing will happen. For example, tree removals may be required for a project in an area that is not located near other suitable habitat (e.g., a single tree located greater than 1,000 ft from another forested/wooded area) and will be removed during the NLEB inactive season. In this example the tree clearing is not anticipated to adversely affect the NLEB based on lack of suitable habitat nearby and time of year the tree removal will happen.

Projects that require tree removal in close proximity to the existing roadway (i.e., within 100ft [30.5 m]) are unlikely to create new habitat fragmentation for NLEBs. Furthermore, few NLEB roosts are expected to be in proximity to existing transportation corridors and foraging efforts are not expected within the existing roadways (USFWS 2016b). Therefore, tree removal outside documented habitat[8] during the inactive season occurring within 100 ft of the existing roadway are not anticipated to adversely affect NLEBs.

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[8] Documented habitat – USFWS known/documented NLEB locations and any suitable habitat within 0.25 mile (0.4 km) of an NLEB capture or acoustic detection, identified roost tree, area/roost tree predicted based on radio telemetry biangulation/triangulation, or that serves to connect documented habitat.

Projects that require tree removal beyond 100 ft of the existing roadway or within documented habitat any distance off the existing roadway during the inactive season could adversely affect the NLEB through fragmentation or reduction of available suitable habitat for returning individuals. Therefore, roadway projects in North Dakota with tree removals that are more than 100ft outside the existing roadway and/or that occur in documented habitat may need further assessment to determine adverse effects and the level of anticipated impacts from activities prior to proceeding.

7.7.6 Conservation Measures Specific to the Northern Long-Eared Bat

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 the NLEB. If a no effect or NLAA determination cannot be reached the FHWA/USFWS range-wide consultation must be used (see the following sections for more information). As applicable, the following conservation measures must be used 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 5.1.7) for the NLEB.
- Conduct tree removal activities outside of the northern long-eared bat pup season (June 1 to August 15) and/or the active season (April 15 – October 31).
- 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 known roosts or documented foraging habitat during any time of year.
    - *Note – At this time, there are no known NLEB roosts or document foraging habitat in North Dakota. Should these types of features be identified in the future, this measure should be implemented to avoid adverse effects.*

Bridge/Culvert

- Perform any bridge repair, retrofit, maintenance, and/or rehabilitation work during the inactive season (November 1 – April 14).
- Perform any repair, retrofit, maintenance, and/or rehabilitation work on culverts with entrance height/diameter greater than 4.5 ft (roughly 1.3 m) during the inactive season (November 1 – April 14).
- If construction activity is planned during the active season (April 15 – October 31), perform a bridge/culvert assessment for presence of bats. See USFWS Range-wide Indiana Bat and Northern Long-eared bat Survey Guidelines for the bat assessment guidance and form at

https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines

- If a bridge assessment suggests presence of 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 percussive (vibration) or noise levels above general traffic (i.e., 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 percussive or noise levels above general traffic (i.e., some abutment, beam end, scour, or pier repair).
- If a bridge assessment suggests presence of bats and the activities to be conducted do not meet those described above, contact the USFWS to discuss additional surveys (e.g., presence/absence surveys) that can be conducted.
- If a culvert assessment suggests the presence of bats, contact the USFWS to discuss additional surveys (e.g., presence/absence surveys) that can be conducted.
- *Note – Qualified individuals to conduct NLEB presence/absence surveys are in short abundance, and the survey window for the species is restricted to May 15 – August 15; therefore, projects may be significantly delayed should NLEB surveys be required. Early project planning is essential to ensure surveys do not impact project schedules*

Structures

Note – This category includes manmade structures that may provide bat roosting habitat that are not bridges or culverts. They may include, but are not limited to, rest areas, welcome centers, offices, picnic shelters, sheds, outbuildings, barns, storage facilities, structures at weigh stations, and parking garages.

- Perform an inspection of the structure for signs of bat use prior to demolition/removal or repair work (See USFWS Range-wide Indiana Bat and Northern Long-eared bat Survey Guidelines).
    - If no signs of bat use are observed, structure demolition/removal or modifications may occur.
    - If signs of bat use are observed:
        - Perform maintenance/repair work during the inactive season (November 1 – April 14).
        - If maintenance/repair work needs to be conducted during the active season (April 15 – October 31) contact the local USFWS field office to discuss additional survey that can be conducted.
        - 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.

- If a structure needs to be removed, demolition must occur during the inactive season (November 1 – April 14) unless there is an imminent threat to human life/health/safety.

Other

- Where practicable, a 300 ft (91.4 m) buffer should be employes to separate fueling areas and other major contaminant risk activities from caves, sinkholes, fissures, or other karst features.

7.7.7 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.

For further details on resources available visit: https://www.fws.gov/program/endangered-species/bat-consultation-conservation-strategy

The Programmatic Consultation for Transportation Projects Determination Key can be found on the IPaC website at the following link: https://ipac.ecosphere.fws.gov/

7.7.8 Effect Determination

No effect determinations are appropriate when the proposed action requires tree removals, building demolitions, or work on bridges, culverts, or other anthropogenic structure types that are:

- Outside the NLEB range.
- Inside the NLEB range but no suitable habitat is within the project area.
- Activities that do not cause any stressors to NLEBs, such as those that do not involve ground disturbance, vibrations, noise above existing background levels (including general traffic).
- Removal, replacement, or alteration of culverts that are smaller than suggested culvert height/dimension for assessments (see USFWS Range-wide Indiana Bat and Northern Long-eared bat Survey Guidelines)

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 [m] 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 ft (304.8 m) 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 or local USFWS field office for assistance.

With the implementation of general (Section 6.2) and specific (Section 7.7.6) conservation measures, design/implementation of SWPPP and SPCC plans, timing restrictions, habitat assessments, and assessments of bat usage prior to work on bridges, culverts, and structures, the potential effects to the NLEB are expected to be reduced to an insignificant or discountable level for many of the proposed actions and therefore a ***may affect, but is not likely to adversely affect*** determination is made for the NLEB.

Because the level of impact from the proposed actions are dependent on factors such as habitat quality, amount, location, and time of year, some described activities could result in ***may affect, likely to adversely affect*** determinations. This determination type is outside the scope of this PBA and separate consultation would be required. In some instances these actions can be processed under the Programmatic Consultation for Transportation Projects if they fall within the scope of that agreement.

7.8 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 affect this species directly or indirectly. Until detected at previously occupied sites or re-introductions occur, the proposed action is not likely to adversely affect the Poweshiek skipperling (i.e., potential effects to suitable habitat or DCH). 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 DCH for the Poweshiek skipperling.

7.8.1 Disturbance (Ground/Soil/Vegetation)

Direct and indirect effects could occur to the Poweshiek skipperling from 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 a dispersal corridor for Poweshiek skipperlings; therefore, adults may be directly affected if construction activities occur 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.

7.8.2 Exposure to Contaminants

Roadway construction activities adjacent to or within native prairies located in southeastern North Dakota have the potential to inadvertently introduce contaminants into suitable habitat for the

Poweshiek skipperling. Exposure to contaminants may directly or indirectly affect Poweshiek skipperlings, depending on the location and quantity of release. Injury to Poweshiek skipperlings from exposure to contaminants could occur from a poisoned food source, decrease in food supply, or habitat degradation.

Direct exposure of contaminants to adults, larvae, or eggs, such as wind carried herbicide/pesticide application from ROW maintenance activities, would adversely affect the Poweshiek skipperling (e.g., direct injury, mortality). However, with proper handling, the potential for these types of contaminants to adversely affect the Poweshiek skipperling is insignificant or discountable.

Large releases of contaminants in suitable Poweshiek skipperling habitat are unlikely to occur for a roadway construction project. In some cases, SPCC plans may be required for projects, which define measures to properly contain contaminants and address any inadvertent releases. Small releases of contaminants such as oil or gas from vehicles or construction equipment may occur; however, any release of a contaminant must be remediated according to state and federal laws. Additionally. with design of a SWPPP and SPCC plan (when required) tailored to the specific project that may occur in Poweshiek skipperling habitat, adverse effects to the species from inadvertent release of contaminants are not expected. See Section 6.1.2 for more details on the potential effects exposure to contaminants could have on listed species and Section 6.2.1 for further information on SWPPPs and SPCC plans.

7.8.3 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, ECMs required as part of the SWPPP would be implemented as necessary to stabilize soils and lessen the amount of fugitive dust created. Therefore, with the implementation of dust abatement and ECMs; no adverse effects from dust, erosion, or sedimentation to the Poweshiek skipperling or its habitat are likely. See Section 7.9.3 for a more in depth look at standard dust control procedures for NDDOT project.

7.8.4 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 within DCH units) after a project is constructed. This could in-turn cause a reduction in the quality of habitat for the Poweshiek skipperling such as reducing nectar sources or increasing cool season grasses, noxious weeds, or other undesirable plants that over-competing with native grasses. NDCC 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. Control of noxious weeds is generally coordinated with the 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 a project is not anticipated by the contractor. Such application would be conducted by district staff or hired pesticide applicators (i.e., county weed board) during routine maintenance operations. Spot spraying is typically used to control noxious weeds in NDDOT ROW, rather than broadcast applications.

As part of ECMs for SWPPP and NDDOT seeding requirements; disturbed areas that are seeded must be free of all prohibited noxious weed seed and should not contain more than ½ of 1% by weight of restricted noxious weed seeds as classified by the North Dakota 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 Poweshiek skipperling habitat (i.e., noxious weeds or other undesirable species establishing in areas disturbed by the proposed actions and encroaching outside the ROW onto adjacent land) is highly unlikely.

7.8.5 Conservation Measures Specific to the Poweshiek Skipperling

No conservation measures specific to the Poweshiek skipperling have been identified. However, conservation measures identified for the Dakota skipper (Section 7.9.5) would also afford protection to the Poweshiek skipperling, should re-introductions occur in the future as they are found in the same counties and similar habitat. NDDOT work activities occurring outside of the ROW in high quality prairie has the potential to cause adverse effects to the Poweshiek skipperling (if re-introductions occur).

7.8.6 Effect Determination

The Poweshiek skipperling has not been identified in North Dakota since 2001. If the Poweshiek skipperling is observed or re-introductions occur in the future, the proposed action has the potential to affect this species directly or indirectly 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 if surveys are conducted to determine if suitable habitat is present within an action area. If suitable habitat is identified, and the project would directly affect areas that may be occupied by the 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 new observations or 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.

7.9 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 sections details potential direct and indirect effects to the Dakota skipper as a result of NDDOT project stressors.

7.9.1 Disturbance (Ground/Soil/Vegetation/Noise/Human Presence)

Direct and indirect effects could occur to the Dakota skipper from ground, soil, or vegetation disturbance. The crushing/killing of eggs, larvae, or adults could occur if construction equipment operates in areas of suitable habitat, 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, there are existing ditches with native vegetation that have documented observations of Dakota skippers (USFWS 2024, Unpubl. Geodatabase) and may serve as a dispersal corridor; therefore, adults may be directly affected if construction activities occur 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.

Dakota skippers likely do not have any auditory capability and several experts assert that sound is highly unlikely to impact the species or cause a response (Dana 2015, pers. Comm.; Royer 2015, pers. Comm.; Westwood 2015, pers. Comm.). While it is suspected that adults may be able to sense vibrations from other flying insects for the purposes of mate seeking (Dana 2015, pers. Comm.), there is no evidence suggesting that acoustics from construction activities would disrupt behavior or impair physiology in adults or larvae of the species.

During the adult flight period, foraging Dakota skipper adults tend to stay within contiguous habitat (especially if it has nectar sources), and they avoid areas of disturbance and do not actively seek out or cross areas of unsuitable habitat (USFWS 2014, Dana, Royer, and Westwood, 2015, pers. Comm.). During the flight period, it is not anticipated Dakota skippers would be found within the ROW in areas dominated by cool season invasive grasses with low forb/nectar diversity.

Although it is unlikely Dakota skippers would be found within the limits of construction (outside of suitable habitat) of a proposed project during the adult flight period, if individuals were in these areas; construction equipment moves at a slow pace (<15 mph) and vehicular traffic would be slowed to typically less than 45mph for most projects under the proposed action. The species would be able to flee from the area in a manner that would not cause a negative response (such as increased energy expenditure to a level that would cause harm to an individual) as suitable habitat would be in close proximity which would provide refuge for individuals. Potential direct mortality from traffic would also be reduced from baseline conditions since speeds would be significantly lowered.

7.9.2 Exposure to Contaminants

Roadway construction activities adjacent to or within native prairies that meet Type A or Type B habitat have the potential to inadvertently introduce contaminants into suitable habitat for the Dakota skipper. Exposure to contaminants may directly or indirectly affect Dakota skippers, depending on the location and quantity of release. Injury to Dakota skippers from exposure to contaminants could occur from a poisoned food source, decrease in food supply, or habitat degradation.

Direct exposure of contaminants to adults, larvae, or eggs, such as wind carried herbicide/pesticide application from ROW maintenance activities, would adversely affect the Dakota skipper (e.g., direct injury, mortality). However, with proper handling, the potential for these types of contaminants to adversely affect the Dakota skipper is insignificant or discountable.

Large releases of contaminants in suitable Dakota skipper habitat are unlikely to occur for a roadway construction project. In some cases, SPCC plans may be required for projects, which define measures to properly contain contaminants and address any inadvertent releases. Small releases of contaminants such as oil or gas from vehicles or construction equipment may occur; however, any release of a contaminant must be remediated according to state and federal laws. Additionally. with design of a SWPPP and SPCC plan (when required) tailored to the specific project that may occur in Dakota skipper habitat, adverse effects to the species from inadvertent release of contaminants are not expected. See Section 6.1.2 for more details on the potential effects exposure to contaminants could have on listed species and Section 6.2.1 for further information on SWPPPs and SPCC plans.

7.9.3 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 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).

The NDDOT Standard Specification Manual states that if the Engineer determines that dust from the performance of the work is creating a hazard to traffic or a nuisance to the public, dust will be controlled on paved surfaces using a vacuum or pickup sweeper and on unpaved surfaces using water. If the

Engineer determines the vacuum or pickup sweeper is not adequate, water is used in conjunction with the sweeper to control the dust.

Although NDDOT utilizes standard dust control procedures on all projects, a more rigorous dust abatement plan is used in situations where erionite is a concern or there are other concerns for fugitive dust (i.e., Dakota skipper habitat). In these instances, a Special Provision (SP) pertaining to dust control is applied to the project. Personnel on the project will be required to more regularly apply water to aggregate, crushed/milled asphalt, and any exposed courses and embankments to prevent fugitive dust. The SP will also require enhanced dust control for the temporary aggregate/gravel driving surface during construction with either prime coat or chloride treatments. Discussions with NDDOT District Staff indicate that when prime coat or chloride treatments are utilized on temporary gravel traffic surfaces, dust is controlled exceptionally well. The application of the prime coat or chloride significantly reduces potential for fugitive dust until the new asphalt is applied for the final roadway design. If surfactants are used, they must be properly contained. If a spill occurs, measures are taken to properly contain and remediate the release. In addition, ECMs required as part of the SWPPP would be implemented as necessary to stabilize soils and lessen the amount of fugitive dust created. Therefore, with the implementation of dust abatement and ECMs; no adverse effects from dust, erosion, or sedimentation to the Dakota skipper or its habitat are anticipated.

7.9.4 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 within DCH units) after a project is constructed. This could in-turn cause a reduction in the quality of habitat for the Dakota skipper such as reducing nectar sources or increasing cool season grasses, noxious weeds, or other undesirable plants over-competing with native grasses. NDCC 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 a 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.

As part of ECMs for SWPPP and NDDOT seeding requirements; disturbed areas that are seeded must be free of all prohibited noxious weed seed and should not contain more than ½ of 1% by weight of restricted noxious weed seeds as classified by the North Dakota 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 (i.e., noxious weeds or other undesirable species establishing in areas disturbed by this project and encroach outside the ROW onto adjacent land) is highly unlikely.

7.9.5 Conservation Measures Specific to the Dakota Skipper

For work outside or within the ROW that may directly impact high quality native prairie the following commitments 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 DCH units. See Section 7.10 for further information on DCH units.*
- If suitable habitat is identified and would be impacted by construction, a presence/absence survey for the Dakota skipper must be conducted by qualified individuals. Contact the local USFWS field office to ensure the most up to date guidance for Dakota skipper presence/absence surveys are being utilized.
    - 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.
    - *Note – Qualified individuals to conduct Dakota skipper presence/absence 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. Early project planning is essential to ensure surveys do not impact project schedules.*
- A Special Provision (SP) pertaining to dust control will be implemented. Personnel on the project will be required to more regularly apply water to aggregate, crushed/milled asphalt, and any exposed courses and embankments to prevent fugitive dust. The SP will also require enhanced dust control for the temporary aggregate/gravel driving surface during construction with either prime coat or chloride treatments.
- In instances where suitable habitat for the Dakota skipper is present, but would not be directly impacted, a specialized native seed mix including a variety of forbs will be developed for areas within 250 meters of the identified suitable Dakota skipper habitat.

7.9.6 Effect Determination

NDDOT projects that occur adjacent to or within occupied Dakota skipper habitat or DCH have the potential 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 or presumed occupied habitat that is suitable for the species. Surveys for suitable Type A or Type B habitat would occur prior to construction for projects anticipated to disturb high quality prairie outside of the previously disturbed ROW. With the implementation of general (Section 6.2) and specific (Section 7.9.5) conservation measures, design/implementation of SWPPPs and SPCC 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.

7.10 Dakota Skipper and Poweshiek Skipperling Designated Critical Habitat Stressors

NDDOT projects that either directly or indirectly affect the physical or biological features (PBF) identified for the Dakota skipper and Poweshiek skipperling DCH can reduce or modify habitat components essential for the survival of these species. Refer to Section 5.1.10 for more information on identified PBFs. The potential stressors from NDDOT projects that may affect PBFs include direct habitat modification and/or removal, erosion/sedimentation, spills, introduction or spread of noxious/invasive species, and exposure to contaminants.

Eleven units of DCH have been designated for the Dakota skipper (80 FR 59248). 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 DCH have been designated for the Poweshiek skipperling (80 FR 59248). Both units are in Richland County. One of the units is located adjacent to a county road, and neither unit contain NDDOT ROW.

7.10.1 Designated Critical Habitat Modification/Removal

NDDOT projects that occur adjacent to or within DCH have the potential to directly or indirectly affect the PBFs needed by these species for breeding, feeding, and sheltering. New road construction (i.e., new alignment) proposed through either Dakota skipper or Poweshiek skipperling DCH is not covered under this PBA due to the high likelihood of adverse effects.

Ground disturbance such as clearing, grading, and general earthwork has the potential to directly and indirectly affect identified PBFs for the Dakota skipper and Poweshiek skipperling, as these activities remove/destroy existing vegetation. Although high quality untilled native prairie does not exist directly adjacent to existing roadways (due to soil disturbance to build and establish the roadway), roadside ditches may serve as dispersal habitat within the occupied DCH 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 PBF. 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 PBFs may occur.

If appropriate measures are not taken to reestablish 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 within DCH units) after construction. This could in-turn cause a reduction in the quality of habitat for the Dakota skipper or Poweshiek skipperling (e.g., reduced nectar sources, increase cool season grasses that out-compete with native grasses). The establishment of undesirable vegetation may also reduce the quality of dispersal habitat within highway ROWs. NDCC 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, and 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. The application of pesticides is typically not conducted for roadway projects. Such applications 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.

As part of ECMs for SWPPP and NDDOT seeding requirements; disturbed areas that are seeded must be free of all prohibited noxious weed seed and should not contain more than ½ of 1% by weight of restricted noxious weed seeds as classified by the North Dakota 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, but 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 DCH is highly unlikely.

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

7.10.2 NDDOT ROW Containing Designated Critical Habitat for the Dakota Skipper

Eleven DCH units have been designated in North Dakota for the Dakota skipper within the following counties: McHenry (five units), McKenzie (two units), Ransom (two units), Richland (one unit), and Rolette (one unit) (80 FR 59248). Of these eleven DCH units, four contain portions of NDDOT ROW. The following sections will break down each unit containing NDDOT ROW regarding location, site status, and other pertinent information.

DCH Unit 5 – McHenry County – Highway 14

DCH unit 5 consists of 1,053 acres located in McHenry County. A majority is owned by the North Dakota State Land Department (557 acres), approximately 439 acres is owned by private individuals, and the remaining 58 acres is owned by the USFWS. This DCH 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 DCH unit occurs approximately 7.8 miles northeast of Karlsruhe, North Dakota, on both sides of North Dakota State Highway 14 and one mile north of 48th Street. See Appendix D for a map of this DCH unit.

Dakota skippers have been observed both within and adjacent to this DCH unit, the most recent of which occurring in 2023 (USFWS 2024, Unpubl. Geodatabase). This DCH 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 one km (0.6 mi) of native high-quality prairie that connects patches of higher quality native prairies.

In 2015, NDDOT ETS staff collected more detailed information and pictures of ROW located within this DCH unit, of which the onsite characteristics remain relatively the same today. The ROW within DCH 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 (*Schizachyrium scoparium*), various wetland species such as foxtail barley (*Hordeum jubatum*), prairie cordgrass (*Spartina pectinata*), cattails (*Typha spp.*) and 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 observed within the ROW of this unit include 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.

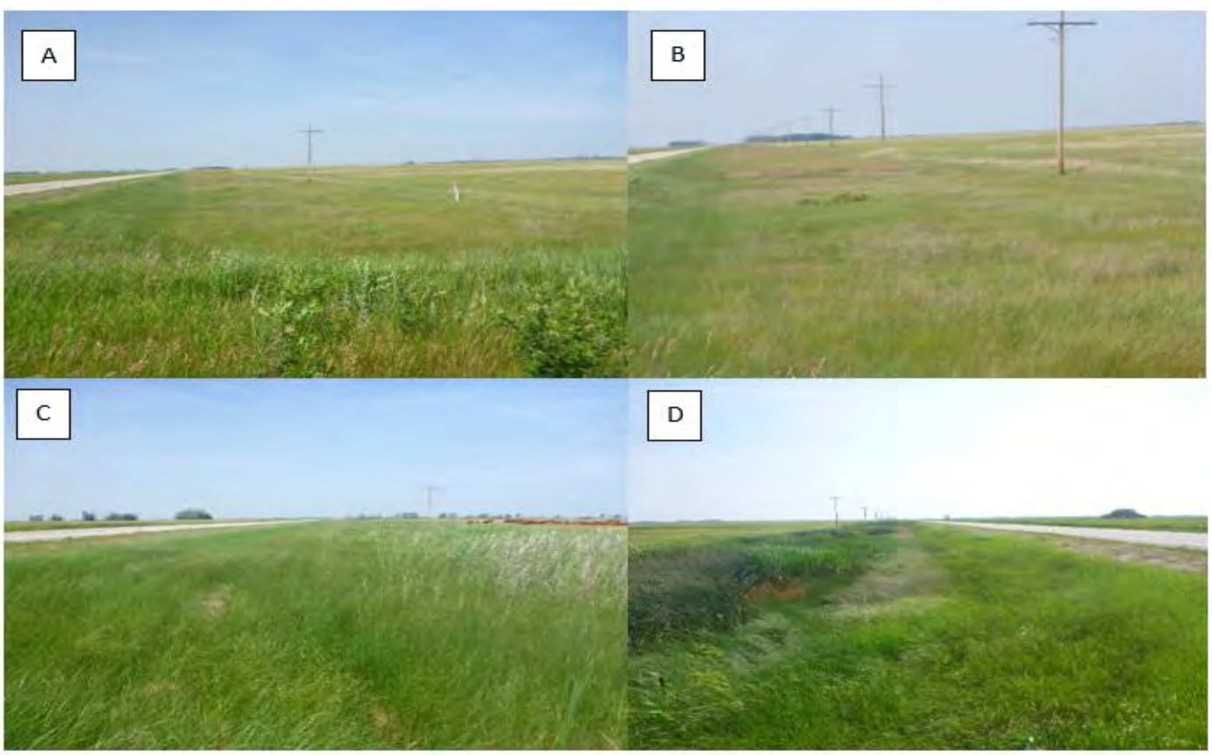

Figure 14: [A & B] – DCH unit 5 vegetation within boundaries of ROW. Native and non-native grasses and forbs are scattered in this area of the DCH unit. [C & D] – DCH unit 5 vegetation within boundaries of ROW. Dominated by wetland vegetation with scattered native and non-native grasses and forbs.

DCH Unit 6 – McHenry County – Highway 14

DCH unit 6 consists of 80 acres in McHenry County and is owned entirely by the North Dakota State Land Department. Located in T157N, R76W, Sections 17 and 18, this DCH unit occurs on both sides of North Dakota State Highway 14, approximately 5.5 miles west of Willow Road (9th Avenue NE), 0.3 mile north of 69th Street NE, 0.5 mile south of 70th Street, and immediately east of 3rd Avenue NE. See Appendix D for a map of this DCH unit.

Dakota skippers have been observed both within and adjacent to this DCH unit, the most recent of which occurring in 2016 (USFWS 2024, Unpubl. Geodatabase). The DCH 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 DCH unit are described as varying from fair to good quality.

In 2015, NDDOT ETS staff collected more detailed information and pictures of ROW located within this DCH unit, of which the onsite characteristics remain relatively the same today. 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 a nectar source for adult Dakota skippers. These forbs include purple coneflower, harebell, upright prairie coneflower, black-eyed susan, and wood lily.

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

DCH Unit 7 – McHenry County – Highway 2

DCH unit 7 consists of 280 acres in McHenry County and is 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 D for a map of this DCH unit.

Dakota skippers have been observed both within and adjacent to this DCH unit, the most recent of which occurred in 2012 within the DCH unit and in 2023 roughly 5 miles west of the DCH unit (USFWS 2024, Unpubl. Geodatabase). The DCH 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 DCH unit are described as fair to good quality prairie. This DCH 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.

In 2015, NDDOT ETS staff collected more detailed information and pictures of ROW located within this DCH unit, of which the onsite characteristics remain relatively the same today. The ROW within CH unit 7 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 DCH unit is not anticipated to function as dispersal habitat due to the lack of native grasses and forbs preferred by the species.

Figure 16: Unit 7 ROW vegetation. Dominated by wetland species and contains low quality dispersal habitat for the Dakota skipper.

DCH Unit 9 – Rolette County – Highway 281

DCH unit 9 consists of 288 acres in Rolette County and is 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 DCH 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 recorded here in 2014, however, the most recent surveys, in 2022, did not detected the species within the DCH unit. The DCH 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.

In 2015, NDDOT ETS staff collected more detailed information and pictures of ROW located within this DCH unit, of which the onsite characteristics remain relatively the same today. The ROW within this DCH 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 DCH unit. However, all three forbs indicative of Type A Dakota skipper habitat were observed within the ROW (e.g., wood lily, harebell, and smooth camas).

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 DCH unit. 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.

Figure 17: Unit 9 ROW vegetation. ROW within this unit may function as dispersal habitat for the Dakota skipper.

7.10.3 Conservation Measures Specific to Designated Critical Habitat for the Dakota Skipper and Poweshiek Skipperling

Conservation measures specific to the Dakota skipper and Poweshiek skipperling can be found in the above stressor and response section (Section 7.9.5 & 7.8.5, respectively) of this document. The following conservation measures are specific to Dakota skipper and Poweshiek skipperling DCH.

- Clearly mark limits of construction within or adjacent to boundaries of DCH.
    - *Note - This measure is intended to reduce potential effects of the proposed action on the PBFs of DCH and ensure construction activities are limited to what is included in design plans.*
- Do not place fueling or staging areas directly adjacent to or within the boundaries of DCH.
- For projects within DCH that functions as dispersal habitat, any ground disturbing activities and mowing of the ROW should be avoided from June 10 – July 25.

7.10.4 Effect Determination

NDDOT projects that require ground disturbing activities (i.e., major rehabilitation, sliver widening, etc.) in the ROW that falls within the boundary of a DCH unit are outside the scope of this PBA and 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 and modification/removal of dispersal habitat).

Projects that remain on the surface of the roadway throughout the boundary of a DCH unit would fall within the scope of this PBA, provided that staging and fueling areas are not stored within the boundaries of a DCH unit and mowing of the ROW within the boundaries of a DCH unit are not conducted prior to the end of the flight period (July 15) for the Dakota skipper.

Overall, NDDOT projects that occur adjacent to or within Dakota skipper or Poweshiek skipperling DCH have the potential to directly and indirectly modify the PBFs of the DCH 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. However, with the implementation of general (Section 6.2) and specific (Section 7.10.3) conservation measures, design/implementation of SWPPPs and SPCC plans, NDDOT standard seeding practices, dust abatement, and noxious weed control, potential direct and indirect effects to Dakota skipper or Poweshiek skipperling DCH are anticipated to be insignificant or discountable. Therefore, the proposed actions that fall within the scope of this PBA are not anticipated to cause ***destruction or adverse modification*** of DCH for the Dakota skipper and Poweshiek skipperling.

7.11 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 directly or indirectly effect 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.

7.11.1 Disturbance (Ground/Soil/Vegetation)

New road construction, roadway widening, or any other ground disturbing activities within Ransom and Richland Counties, could directly or indirectly affect the western prairie fringed orchid. Although the species is typically found in remnant native prairie, wet prairies and wet meadows, they have been observed in roadside ditches and other disturbed areas. In areas where western prairie fringed orchids are present, construction activities such as clearing and grading, operation of equipment, utility relocations, and any other activity that has the potential to crush or remove vegetation could adversely affect the species.

7.11.2 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.

Large releases of contaminants into areas containing western prairie fringed orchids are unlikely to occur for a roadway construction project. In some cases, SPCC plans may be required for projects, which define measures to properly contain contaminants and address any inadvertent releases. Small releases of contaminants such as oil or gas from vehicles or construction equipment may occur; however, any release of a contaminant must be remediated according to state and federal laws. Additionally, with design of a SWPPP and SPCC plan (when required) tailored to the specific project that may occur where western prairie fringed orchids are located, adverse effects to the species from inadvertent release of contaminants are not expected. See Section 6.1.2 for more details on the potential effects exposure to contaminants could have on listed species and Section 6.2.1 for further information on SWPPPs and SPCC plans.

7.11.3 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, ECMs required as part of the SWPPP would be implemented as necessary to stabilize soils and lessen the amount of fugitive dust created. Other ECMs are used to reduce the potential for erosion/sediment transport.

Excessive erosion or sedimentation caused by construction activities could 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 ECMs; no adverse effects from dust, erosion, or sedimentation to the western prairie fringed orchid are anticipated.

7.11.4 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 reestablish 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). NDCC 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, and 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 a 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 western prairie fringed orchid areas into their weed control contracts (i.e., must spot spray instead of broadcast herbicides).

As part of ECMs for SWPPP and NDDOT seeding requirements; disturbed areas that are seeded must be free of all prohibited noxious weed seed and should not contain more than ½ of 1% by weight of restricted noxious weed seeds as classified by the North Dakota 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 the proposed actions and encroach either inside or outside the ROW is highly unlikely.

7.11.5 Conservation Measures Specific to the Western Prairie Fringed Orchid

Surveys for western prairie fringed orchids shall be conducted prior to construction for projects occurring within Ransom and Richland Counties that require ground disturbing activities. Guidelines for conducting western prairie fringed orchid surveys can be found on the NDDOT Design Manual References and Forms webpage. 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).

7.11.6 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 general (Section 6.2) and specific (Section 7.11.5) 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.

Note – There are no Federal prohibitions under the ESA for the take of listed plants on non-Federal lands, unless taking of those plants is in violation of State law. The USFWS may authorize plant destruction on Federal lands when no other options are available and when it has been determined through Section 7 consultation that the action will not jeopardize the continued existence of the species. While there is an Incidental Take Permit process for animals [in section 10 (a)(1)(B)], there is no such process for plants.

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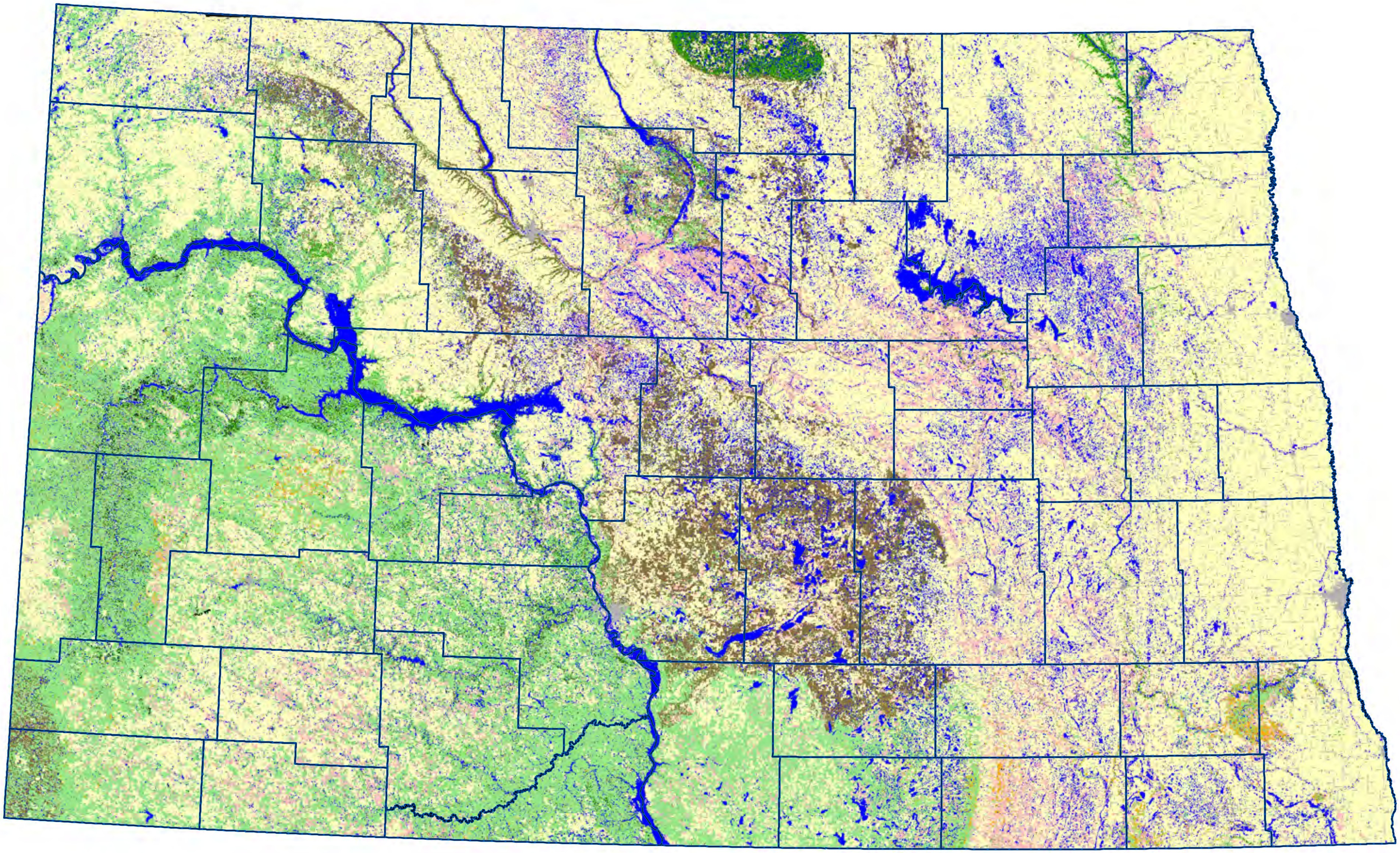
*Personal communication for Dana 2015, Royer 2015, and Westwood 2015, was conducted by Wenck Associates and has been included in previous Biological Assessments prepared by the NDDOT and approved by the USFWS.

APPENDIX A
Land Cover Map



* Legend located on next page

North Dakota state agencies, the ND GIS Hub, USGS, US Fish and Wildlife, NASS

0 37.5 75 Miles

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 B
Deconstruction Matrix

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

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
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

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
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

<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: 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

<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
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 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)
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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
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

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
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	NE
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	NE
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	NE

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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
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	NE
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	NE
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	NE
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	NE

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
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	NE
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	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	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	NE
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	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: 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	NE
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	NE
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	NE

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	NE
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	NE

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

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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: 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

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 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

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	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)
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
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 ●Obtain and Apply Surfactant/Water ●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

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
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)
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
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

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
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

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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

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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

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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

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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

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: 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

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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: 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

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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
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

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: 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

<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: 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

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
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

<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
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

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
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)
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
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 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: 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 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: 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 Susceptability to Predation ●Increased Energy Expenditure	●See Programmatic Biological Assessment for list of Conservation Measures for the NLEB (Section 6.11).	NE or 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: 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

<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
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

<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 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

<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 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)
<u>Resulting Effects of Action:</u> 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
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)
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: 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

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<u>Resulting Effects of Action:</u> 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

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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
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

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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
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

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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

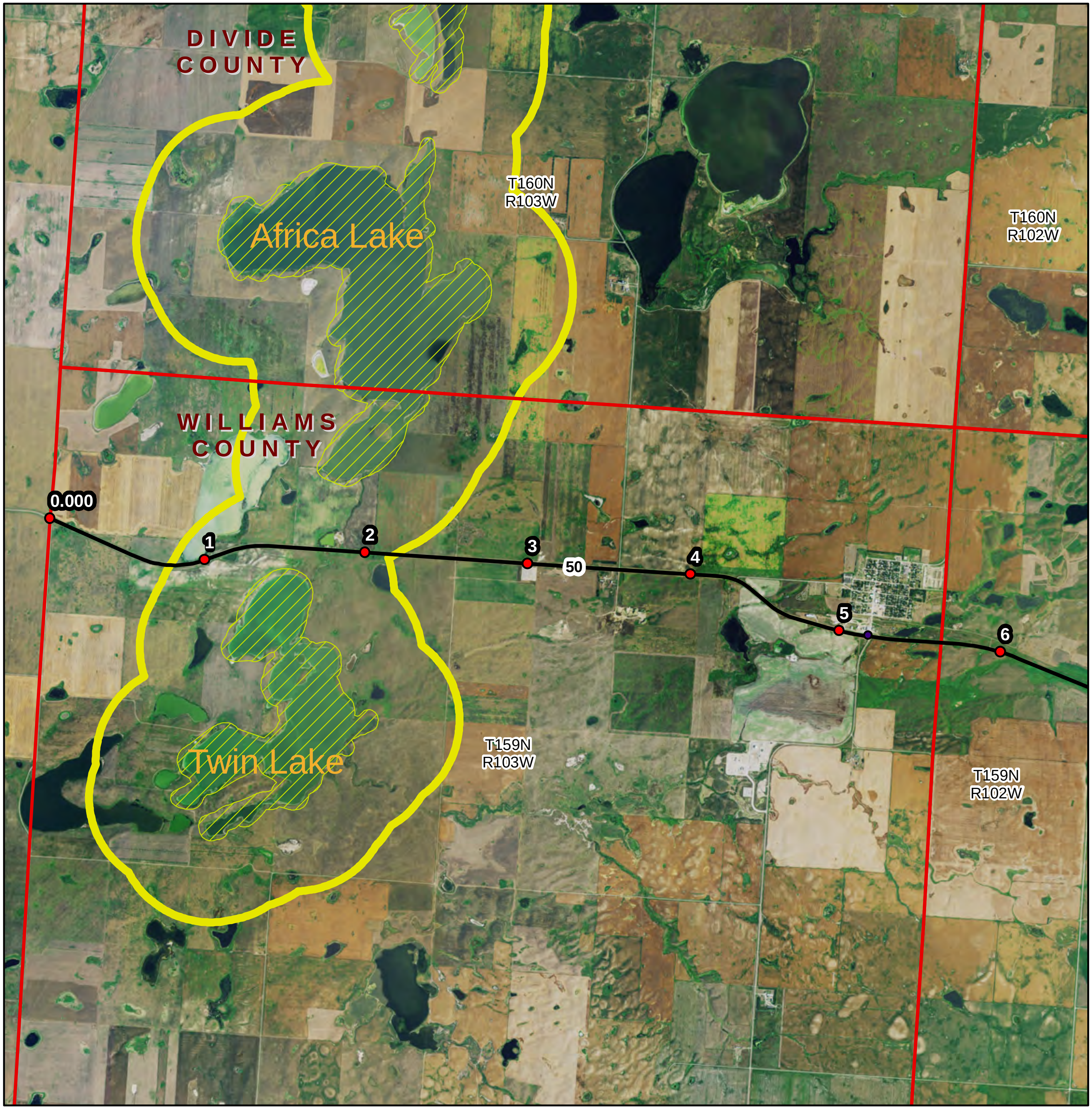
<u>Duration:</u> Short- < 1 Month, Long- > 1 Month (*Dependent on Length and Scope of Project)
<u>Resulting Effects of Action:</u> NE- No Effect, NLAA- May Affect Not Likely to Adversely Affect

Deconstruction Matrix: Poweshiek Skipperling Desginated Critical Habitat

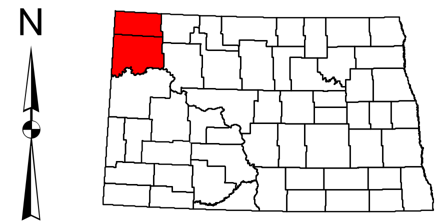
Phase/Sub Phase	Activity	Sub-Activity	Location	Stressor	Duration	Response to Stressor	Conservation Measures- *General conservation measures to be applied to all projects to lessen the potential for effects to all listed resources are described in Section 7 of the Programmatic Biological Assessment.*	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	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 C
Piping Plover Critical Habitat Maps and Table



Unit 1 - Divide and Williams Counties



Divide and Williams Counties, North Dakota

Legend

State Highways

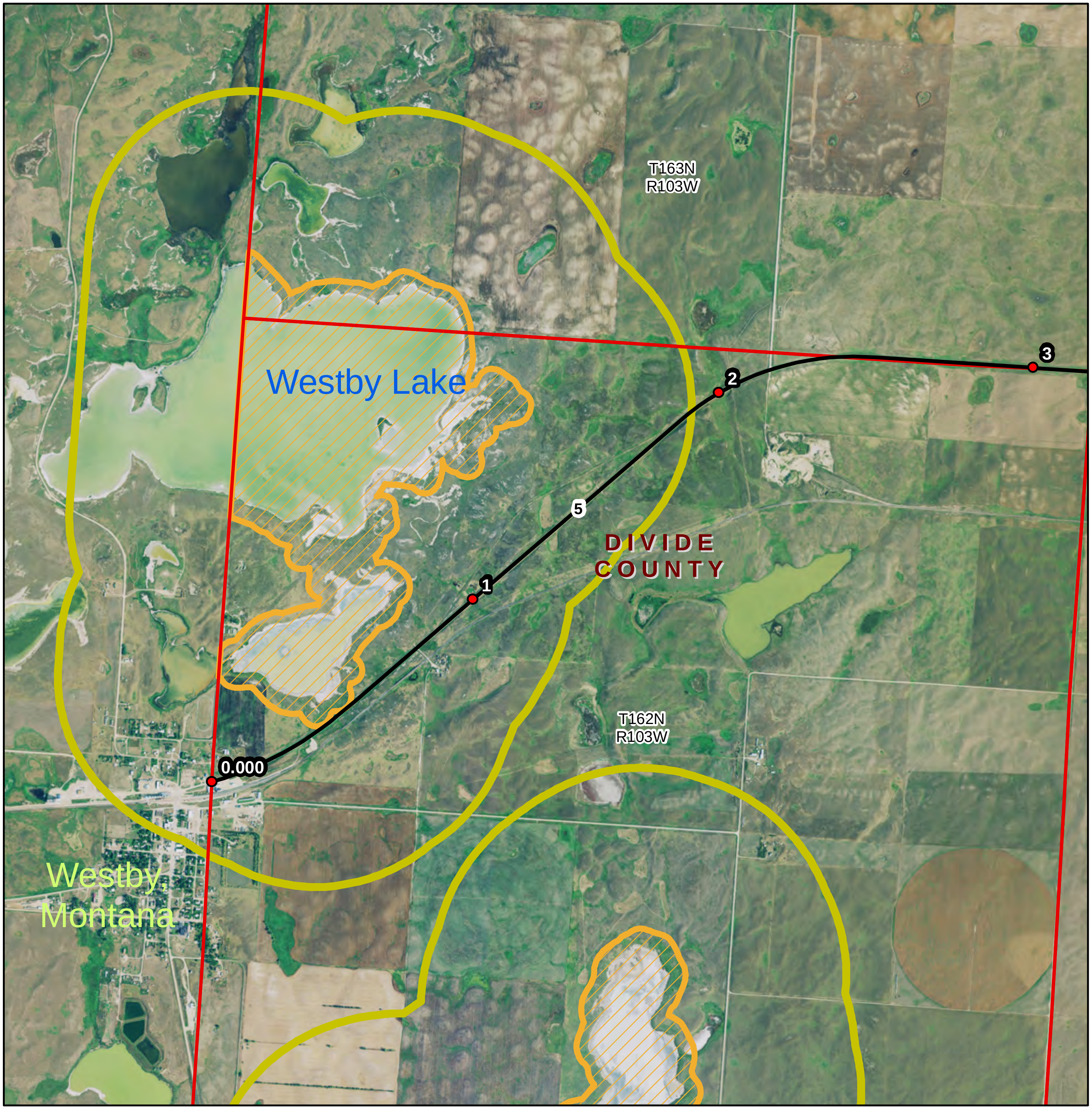
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

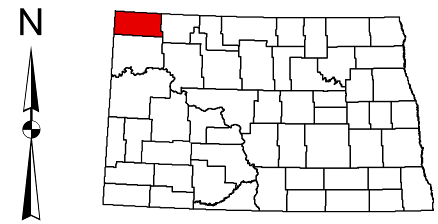
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota
Department of Transportation

0 0.75 1.5
Miles



Unit 1 - Divide County



Divide County, North Dakota

Legend

State Highways

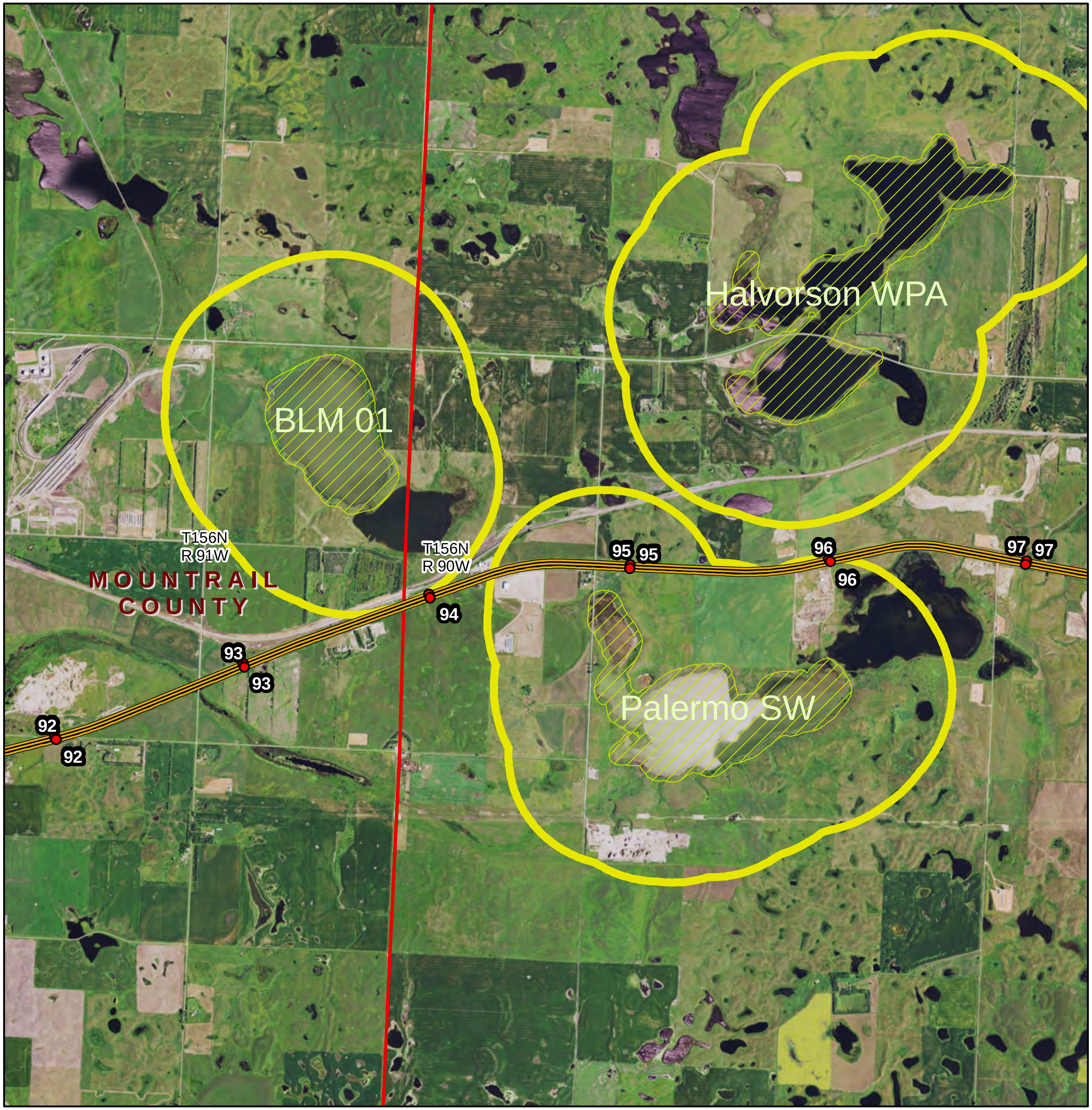
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

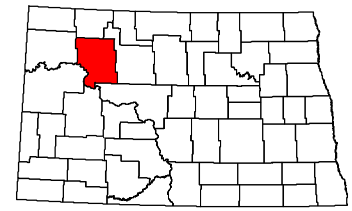
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota Department of Transportation

0 0.475 0.95 Miles



Unit 2 - Mountrail County



Mountrail County, North Dakota

Legend

State Highways

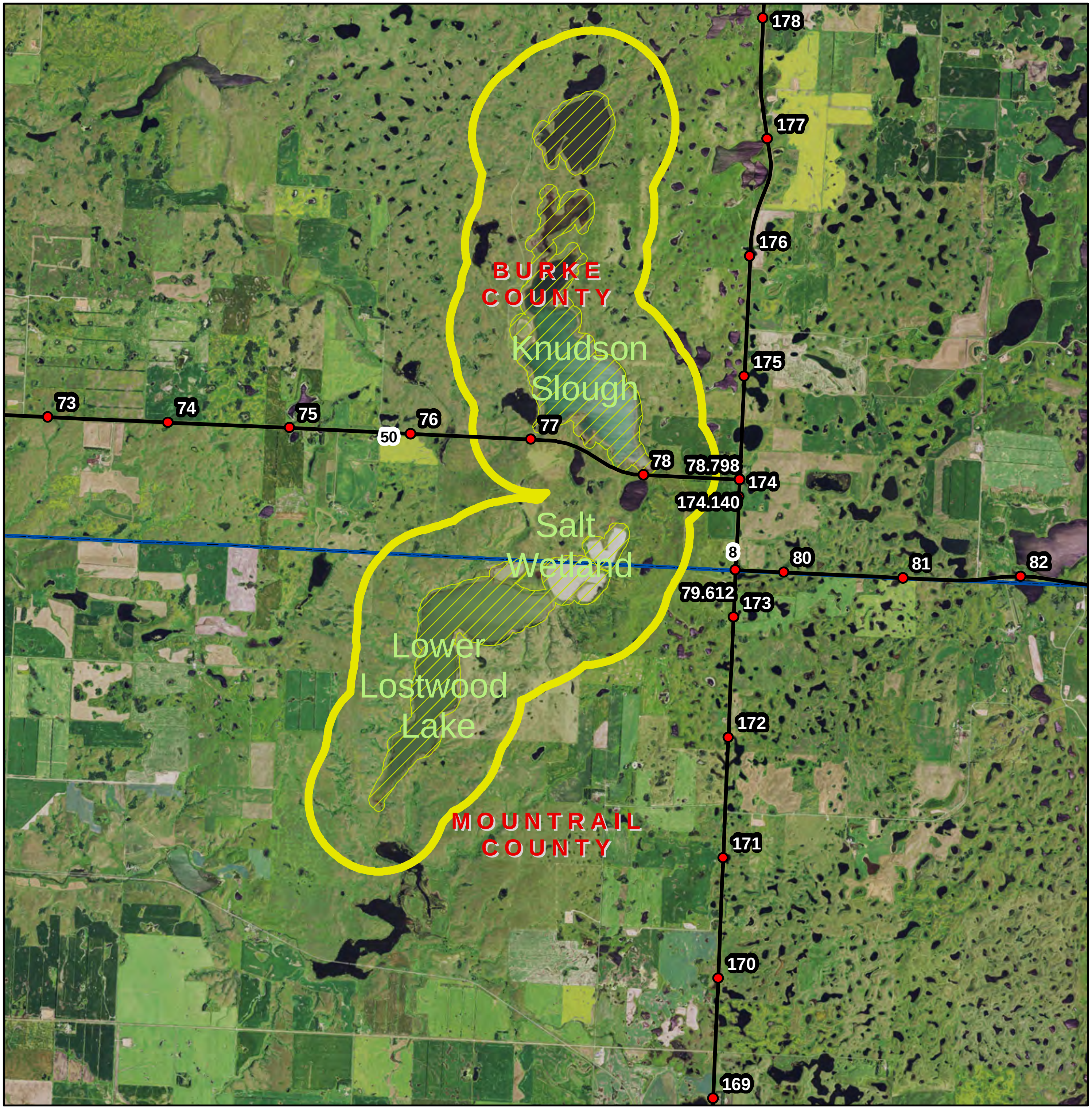
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat

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



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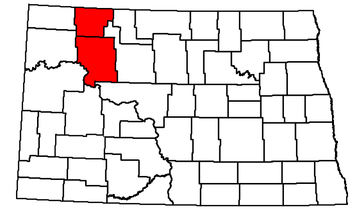


Burke and Mountrail Counties, North Dakota

Legend

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

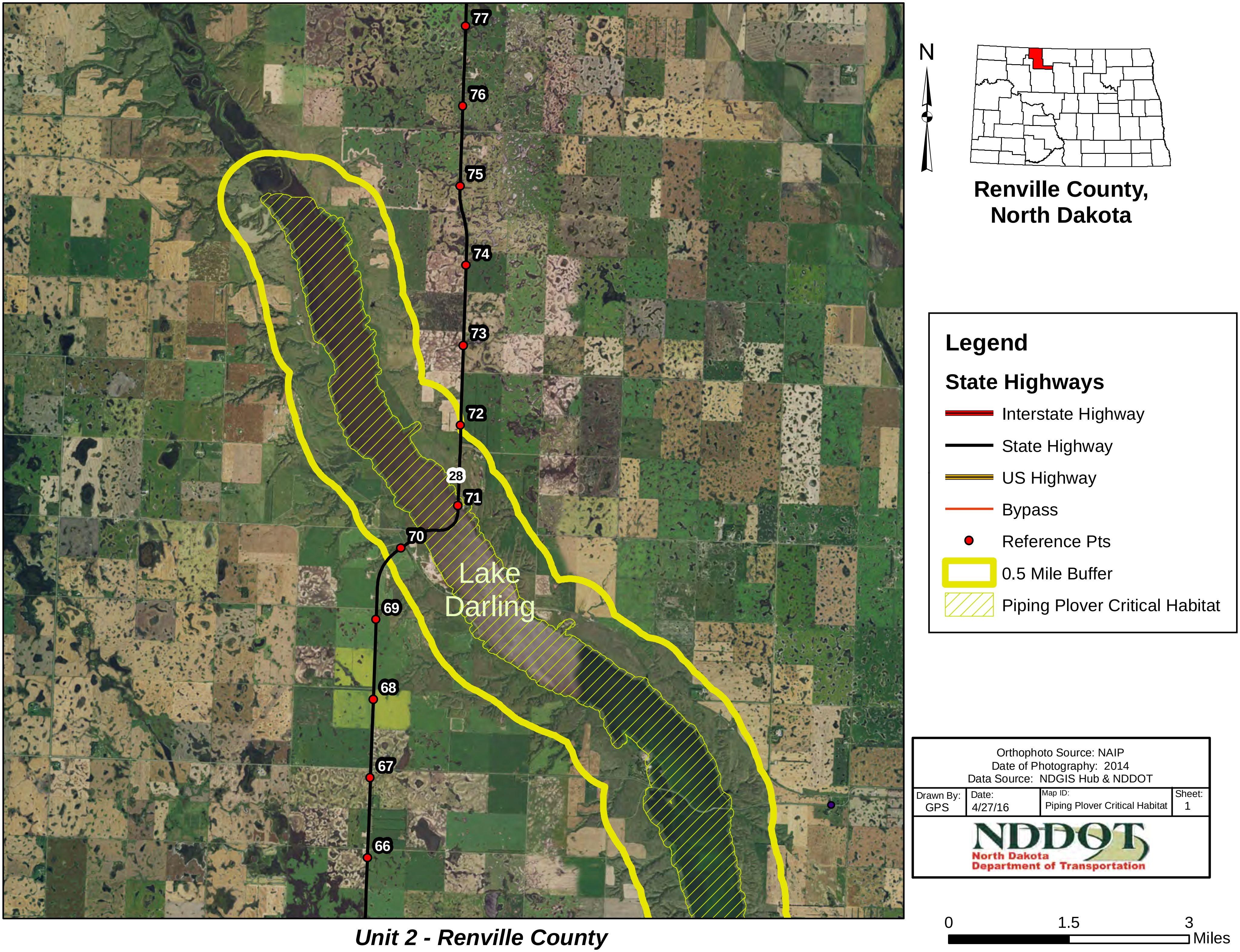
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

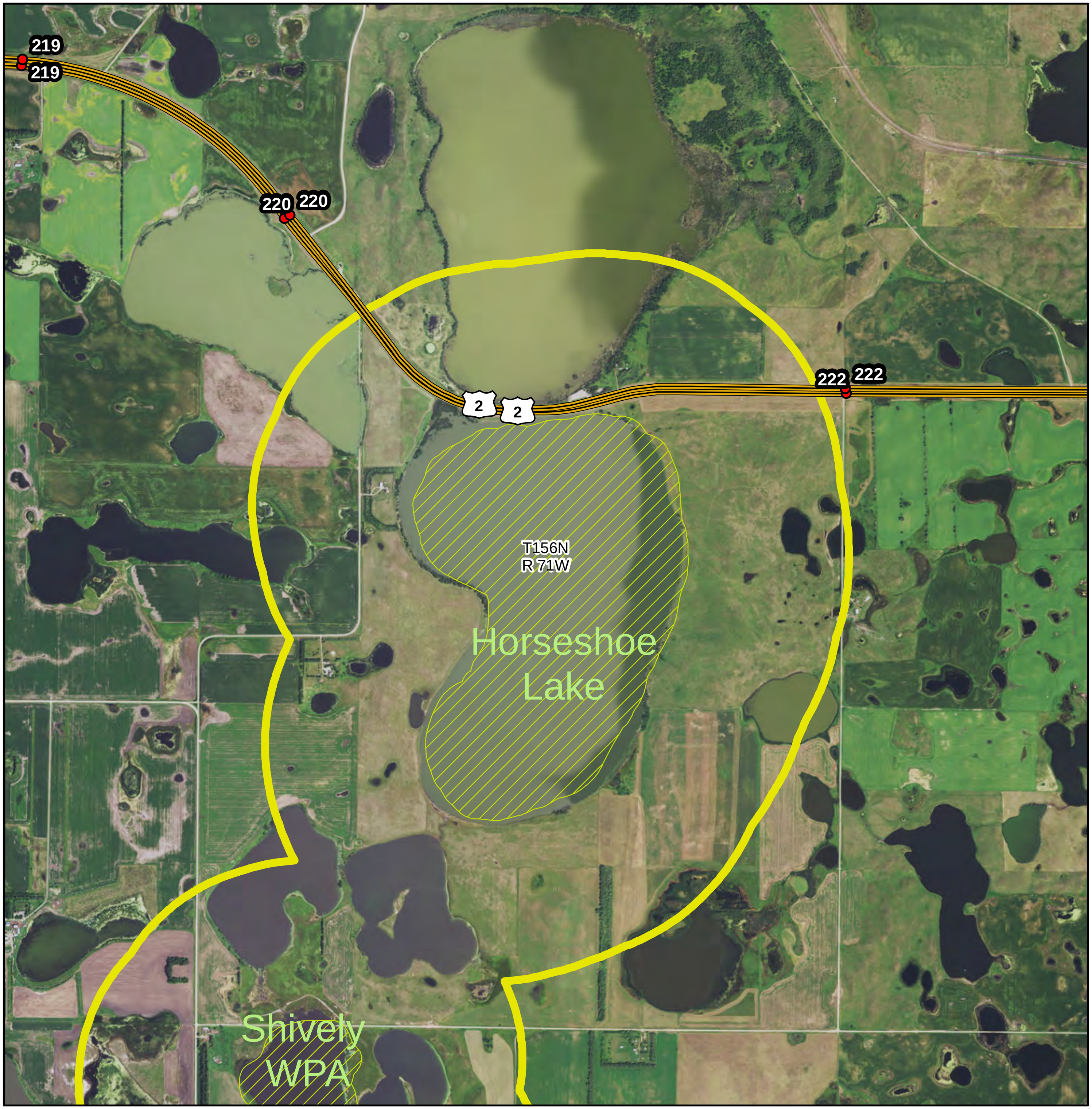
NDDOT
North Dakota
Department of Transportation

0 1.25 2.5 Miles

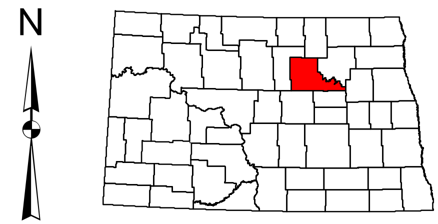
Unit 2 - Burke and Mountrail Counties



Unit 2 - Renville County



Unit 6 - Benson County



Benson County,
North Dakota

Legend

State Highways

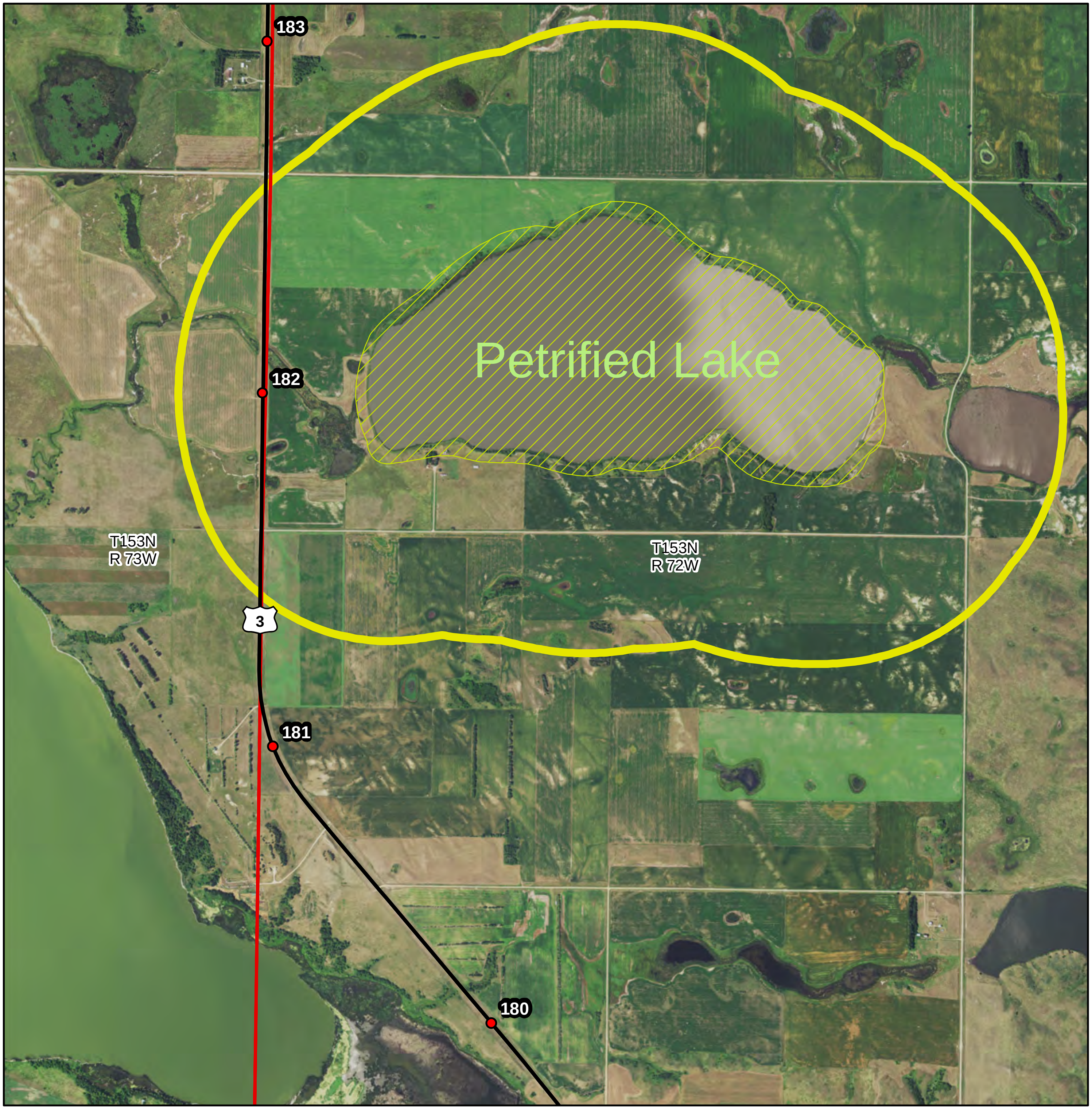
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

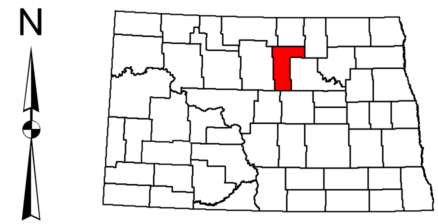
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota
Department of Transportation

0 0.475 0.95
Miles



Unit 6 - Pierce County



Pierce County, North Dakota

Legend

State Highways

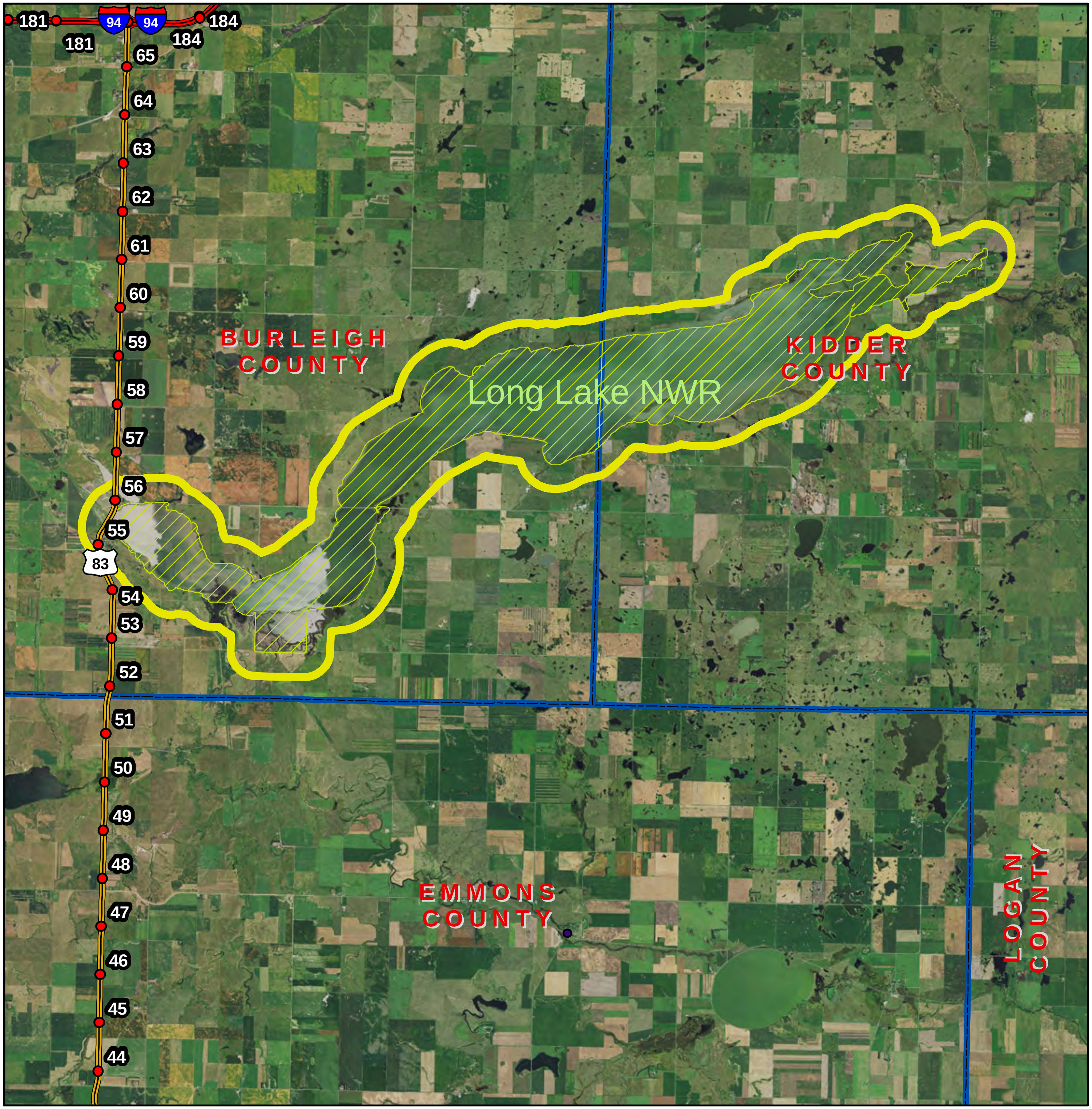
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- PLSS Townships

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



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

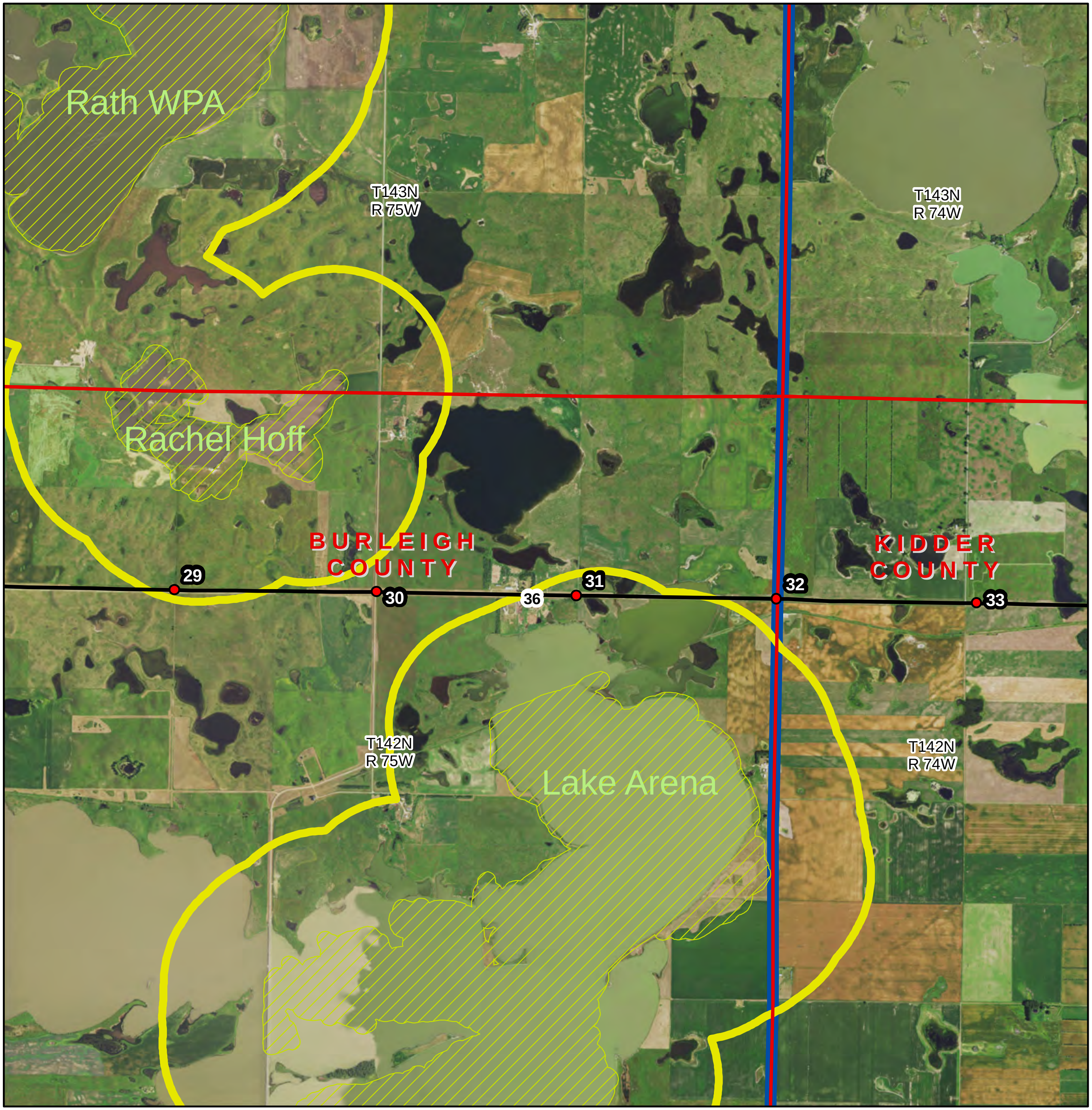
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

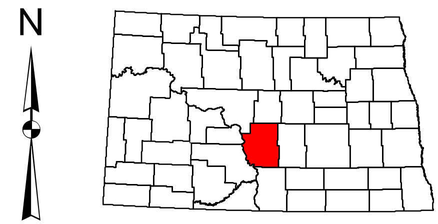
Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat	Sheet: 1

NDDOT
North Dakota Department of Transportation

0 3 6 Miles

Unit 7 - Burleigh and Kidder Counties





Legend

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

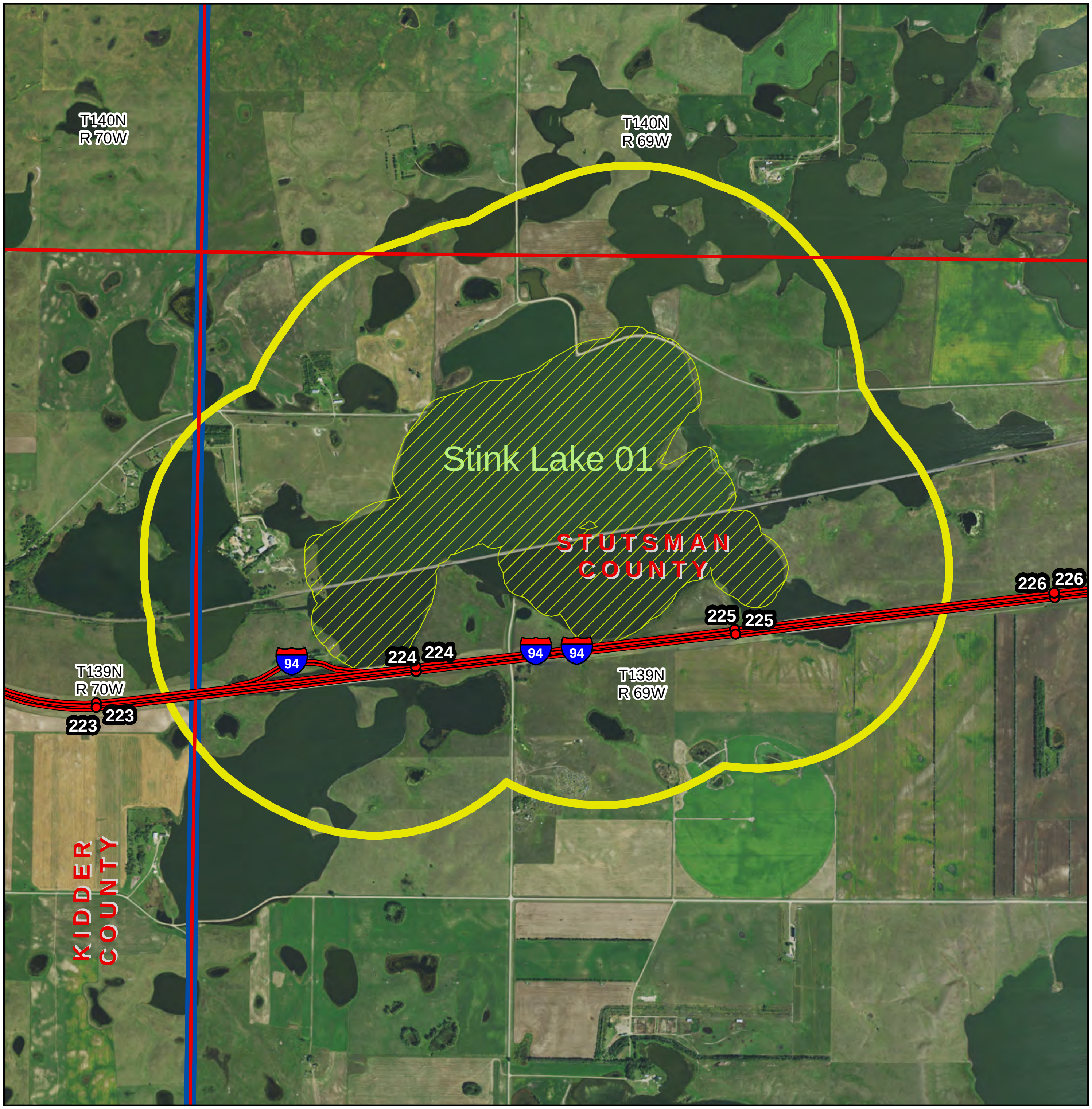
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat	Sheet: 1

NDDOT
North Dakota
Department of Transportation

0 0.75 1.5 Miles

Unit 7 - Burleigh County



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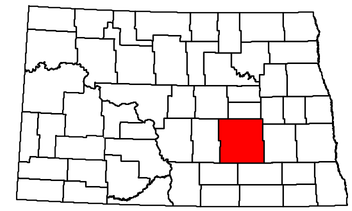


Stutsman County, North Dakota

Legend

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

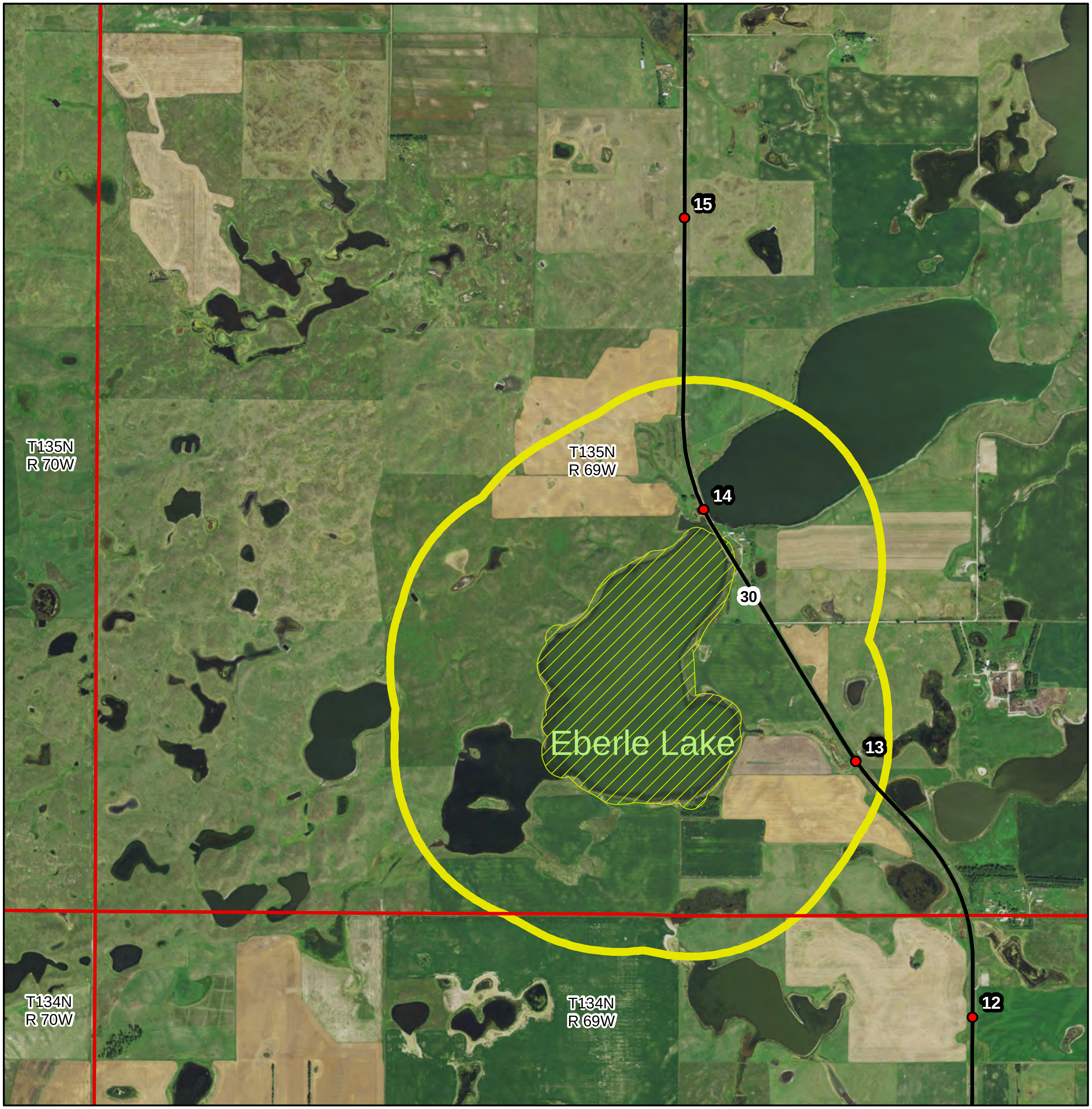
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By: 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 8 - Stutsman County



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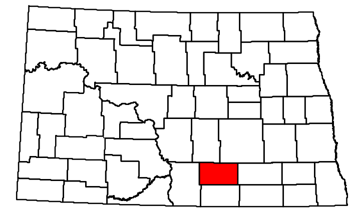


Logan County, North Dakota

Legend

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- PLSS Townships

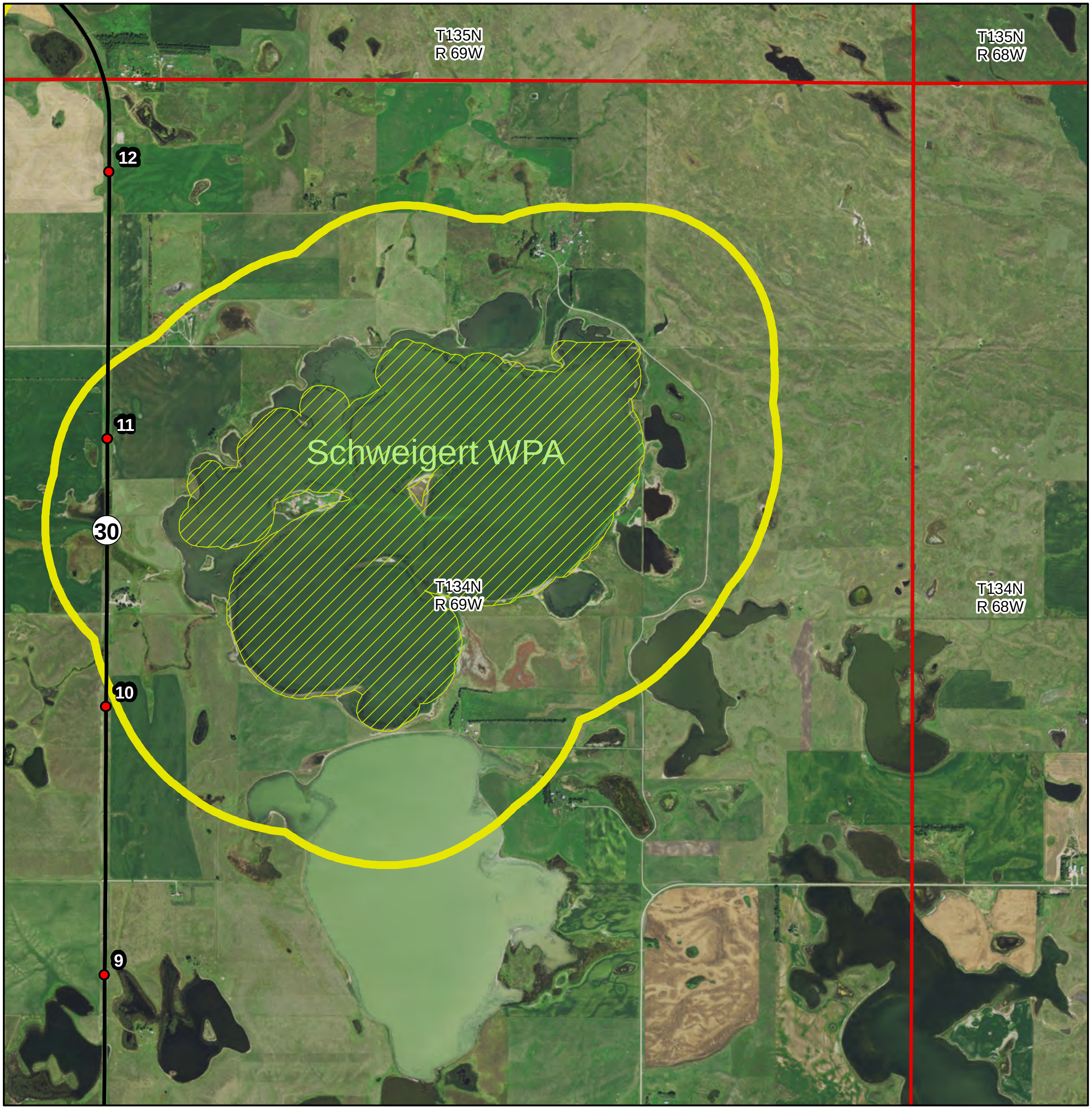
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota Department of Transportation

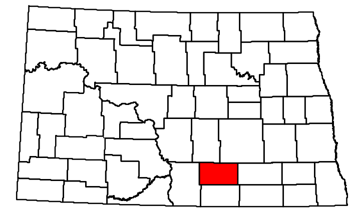
0 0.5 1
Miles

Unit 9 - Logan County



Unit 9 - Logan County

N



**Logan County,
North Dakota**

Legend

State Highways

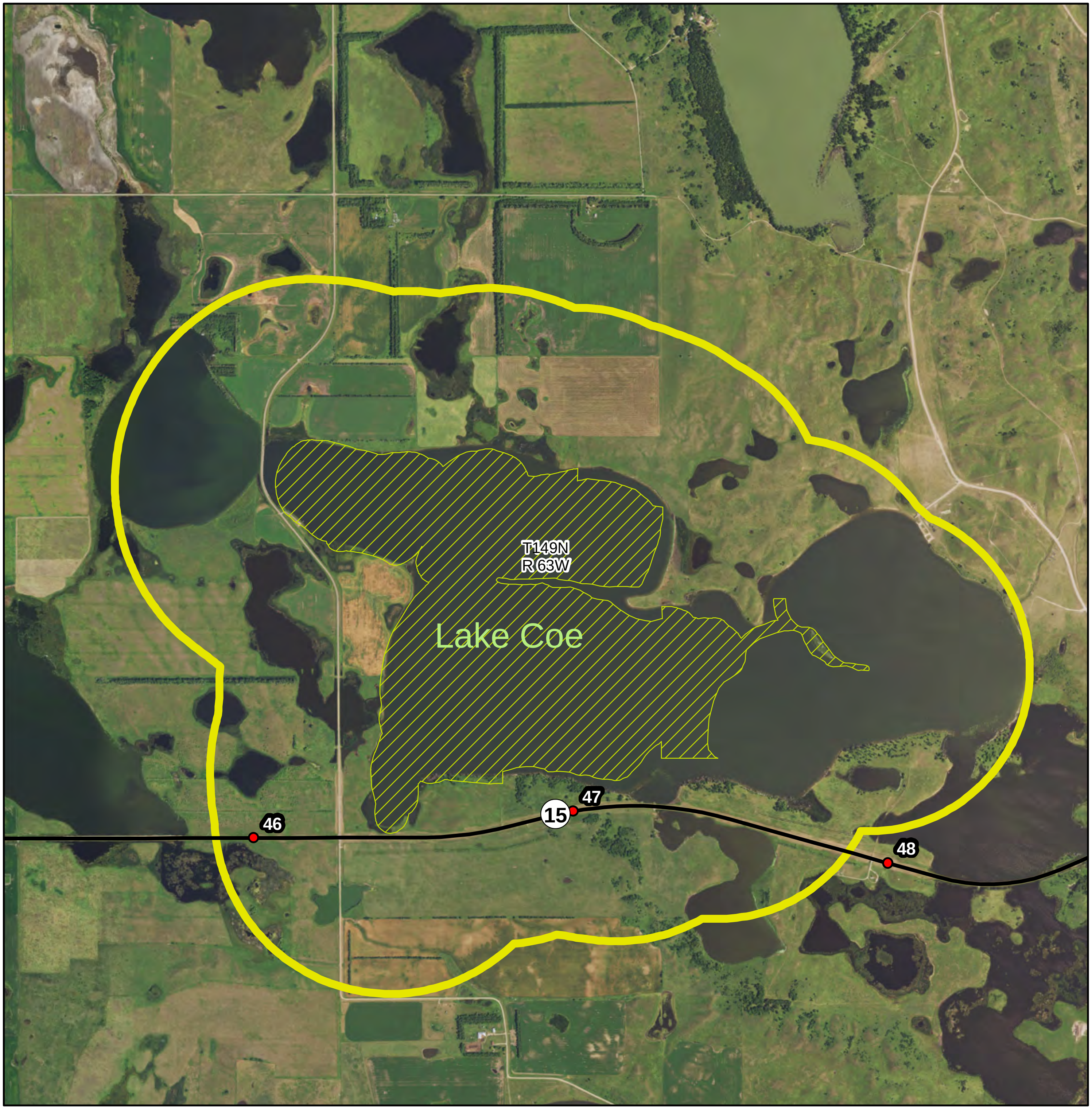
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

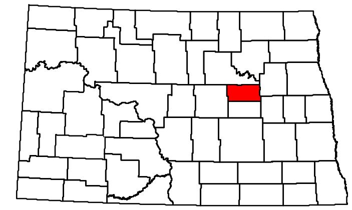
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota
Department of Transportation

0 0.5 1
Miles



Unit 10 - Eddy County



N

Eddy County, North Dakota

Legend

State Highways

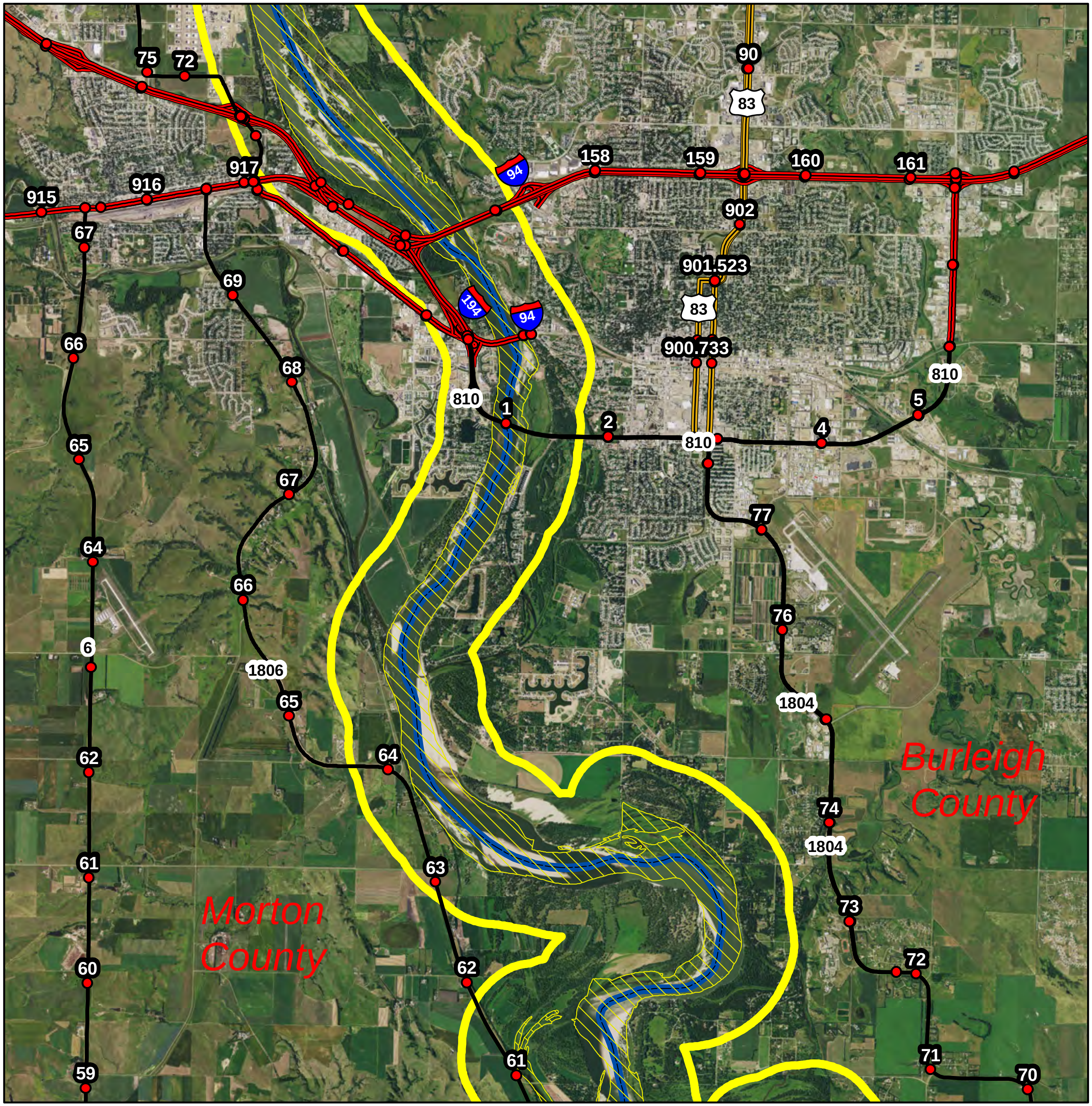
- Interstate Highway
- State Highway
- US Highway
- Bypass
- Reference Pts
- 0.5 Mile Buffer
- Piping Plover Critical Habitat

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

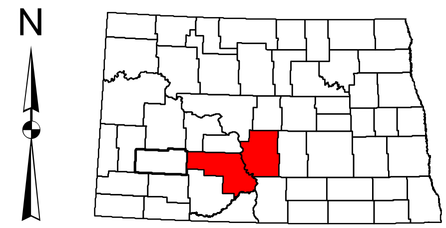
Drawn By:	Date:	Map ID:	Sheet:
GPS	4/27/16	Piping Plover Critical Habitat	1

NDDOT
North Dakota Department of Transportation

0 0.45 0.9 Miles



Unit 11 - Missouri River System



Burleigh and Morton Counties, North Dakota

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

State Highways

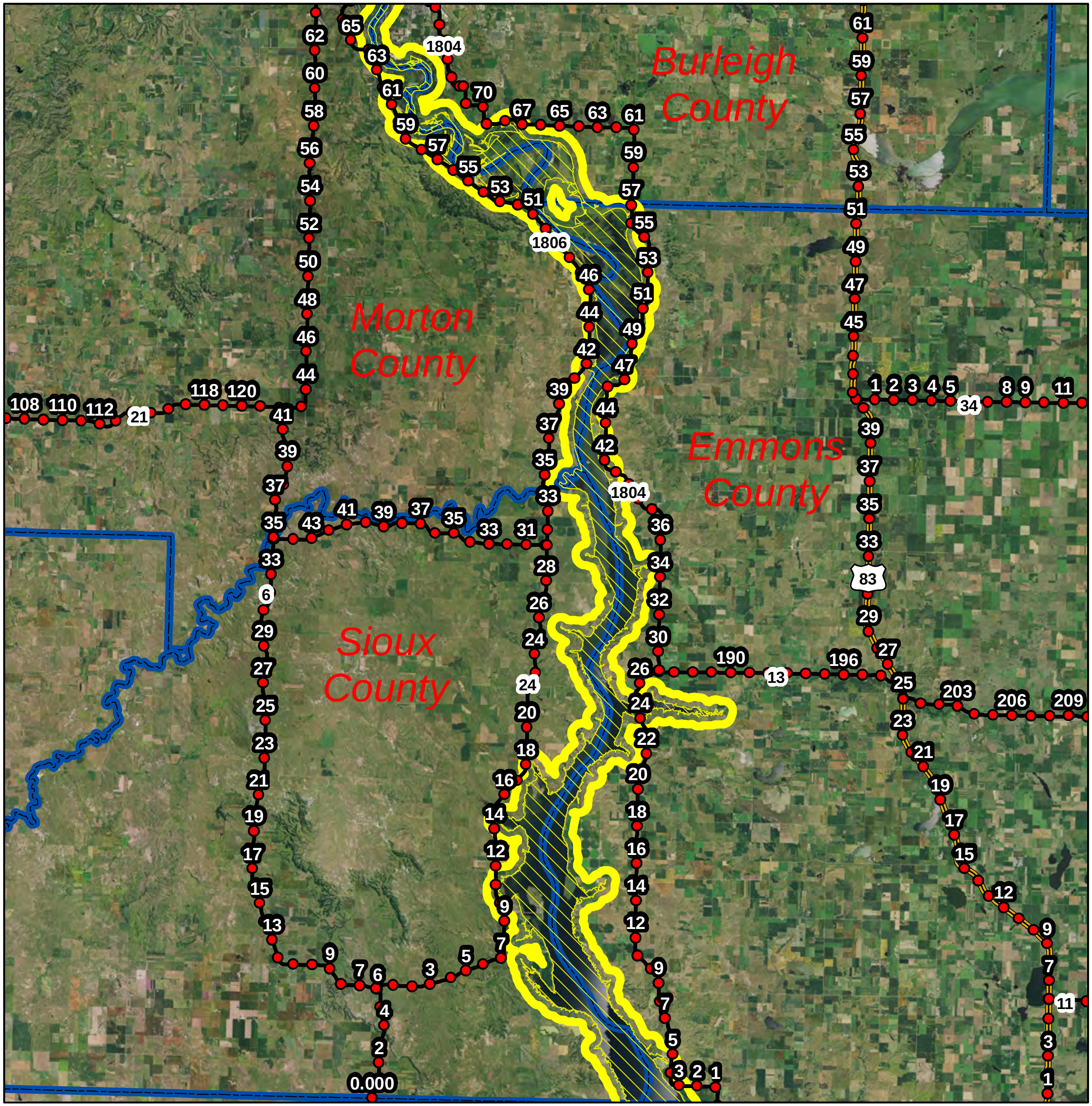
- Interstate Highway
- State Highway
- US Highway
- Bypass

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

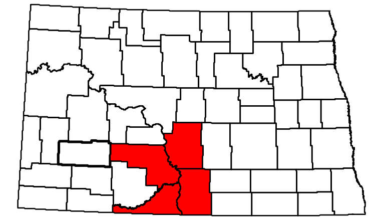
NDDOT North Dakota Department of Transportation

0 1.25 2.5 Miles



Unit 11 - Missouri River System

N



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

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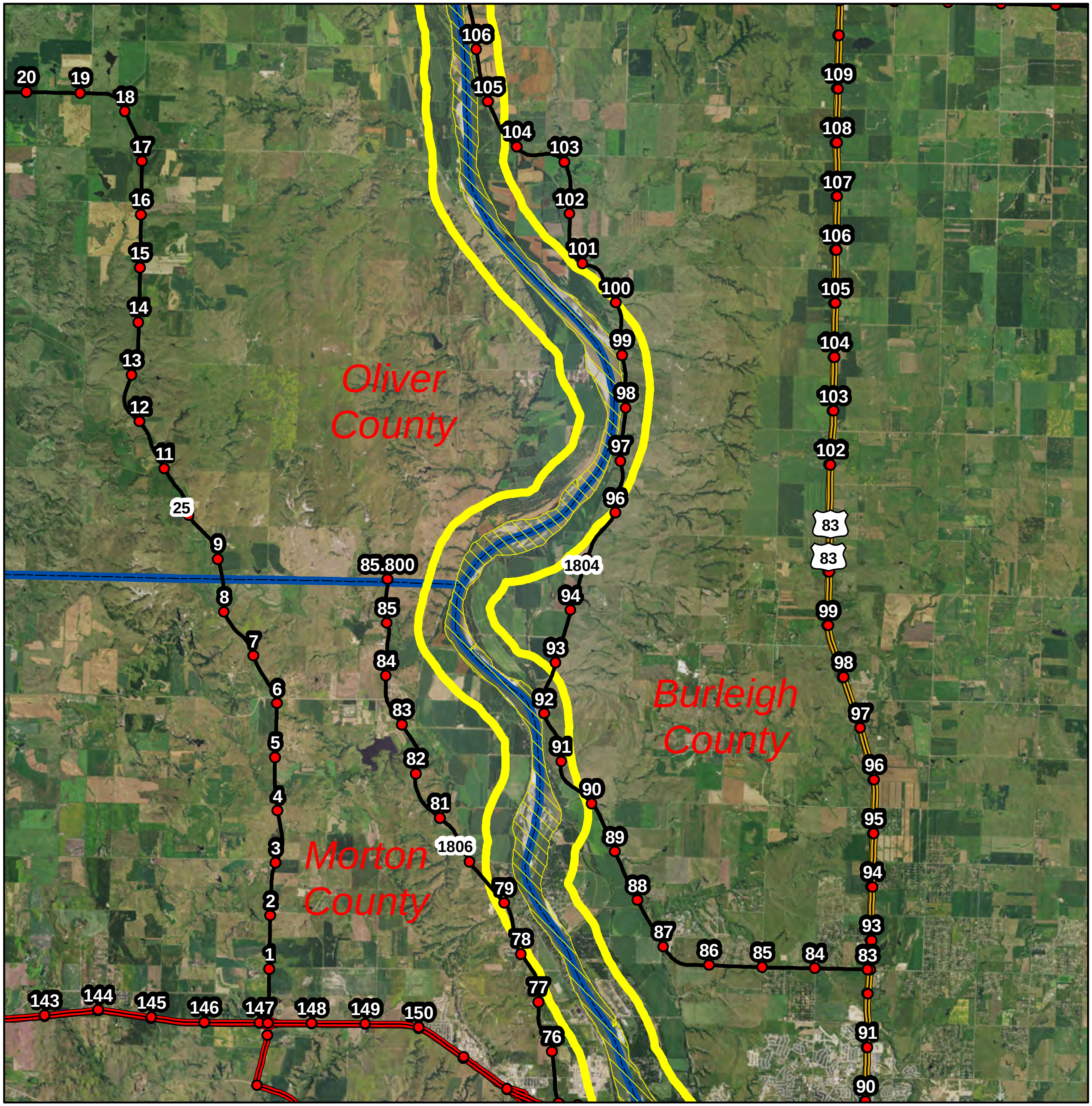
NDDOT
North Dakota Department of Transportation

0 5 10 Miles



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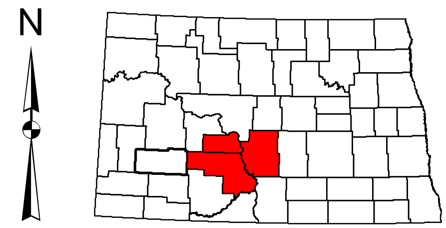


Burleigh,Morton, and Oliver Counties, North Dakota

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

State Highways

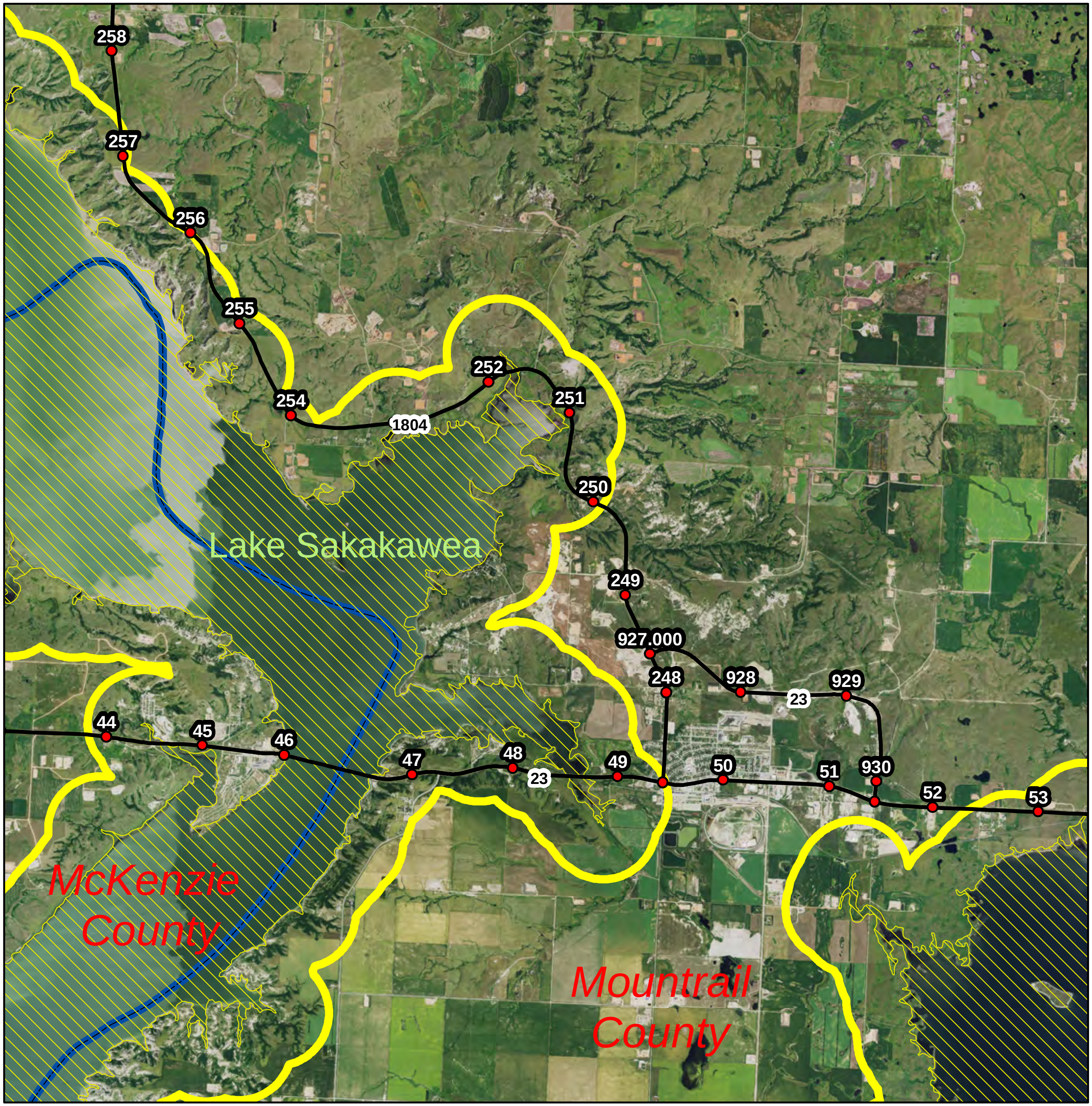
- Interstate Highway
- State Highway
- US Highway
- Bypass

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

NDDOT North Dakota Department of Transportation

0 2.75 5.5 Miles



Unit 11 - Missouri River System

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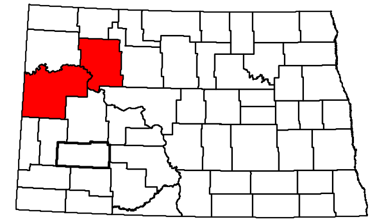


McKenzie and Mountrail Counties, North Dakota

Legend

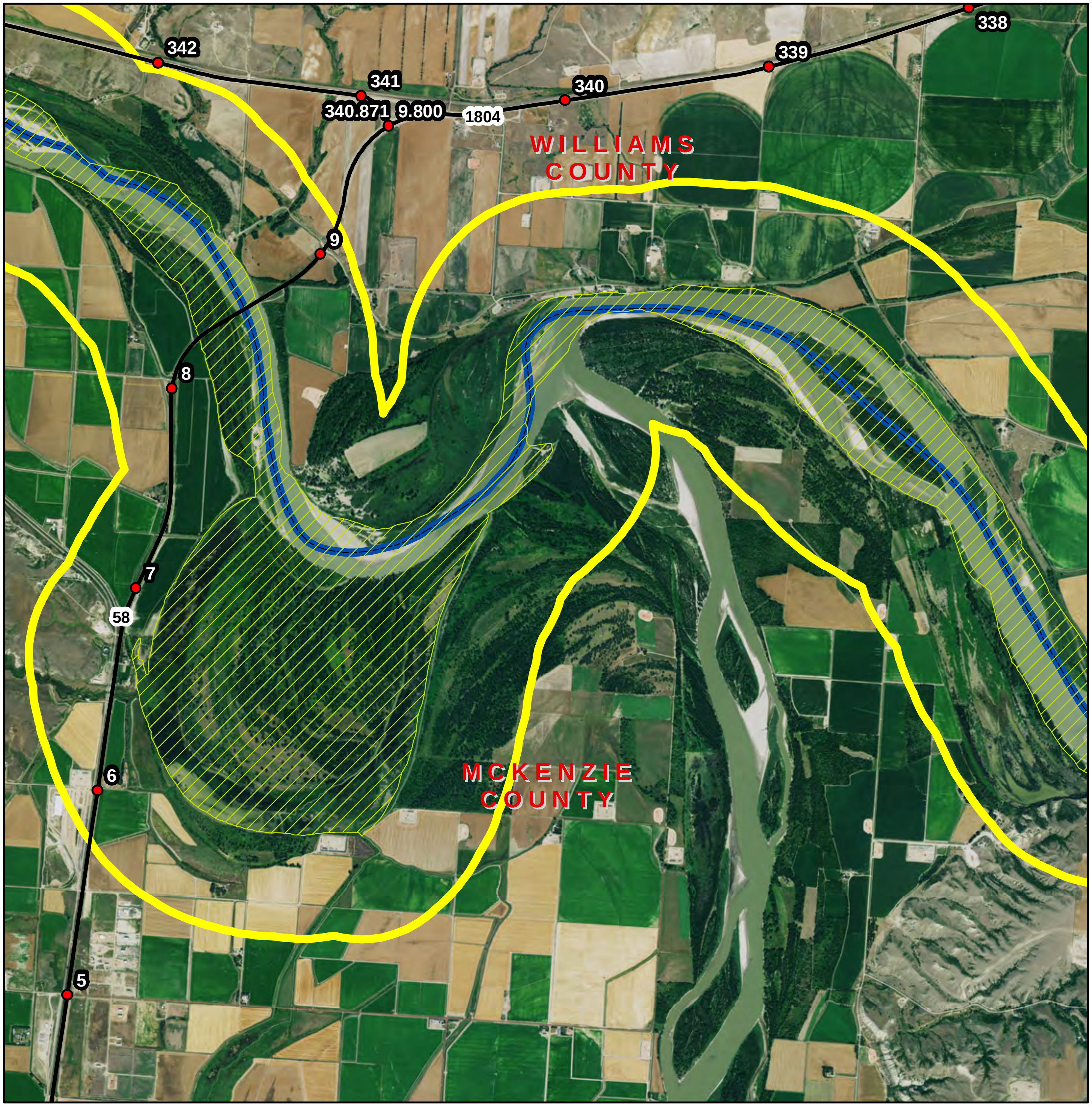
State Highways

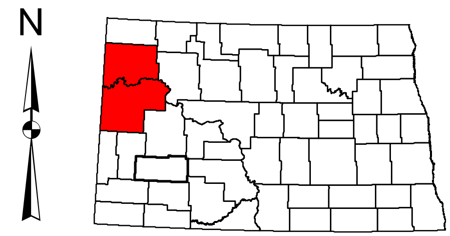
- Interstate Highway
- State Highway
- US Highway
- Bypass
- 0.5 Mile Buffer
- Piping Plover Critical Habitat
- County Boundaries

Orthophoto Source: NAIP Date of Photography: 2014 Data Source: NDGIS Hub & NDDOT		
Drawn By: GPS	Date: 4/27/16	Map ID: 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

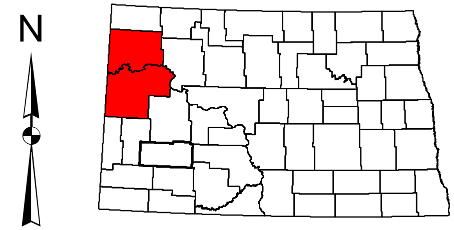
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By: GPS	Date: 4/27/16	Map ID: 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

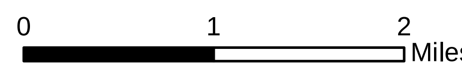
State Highways

- 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



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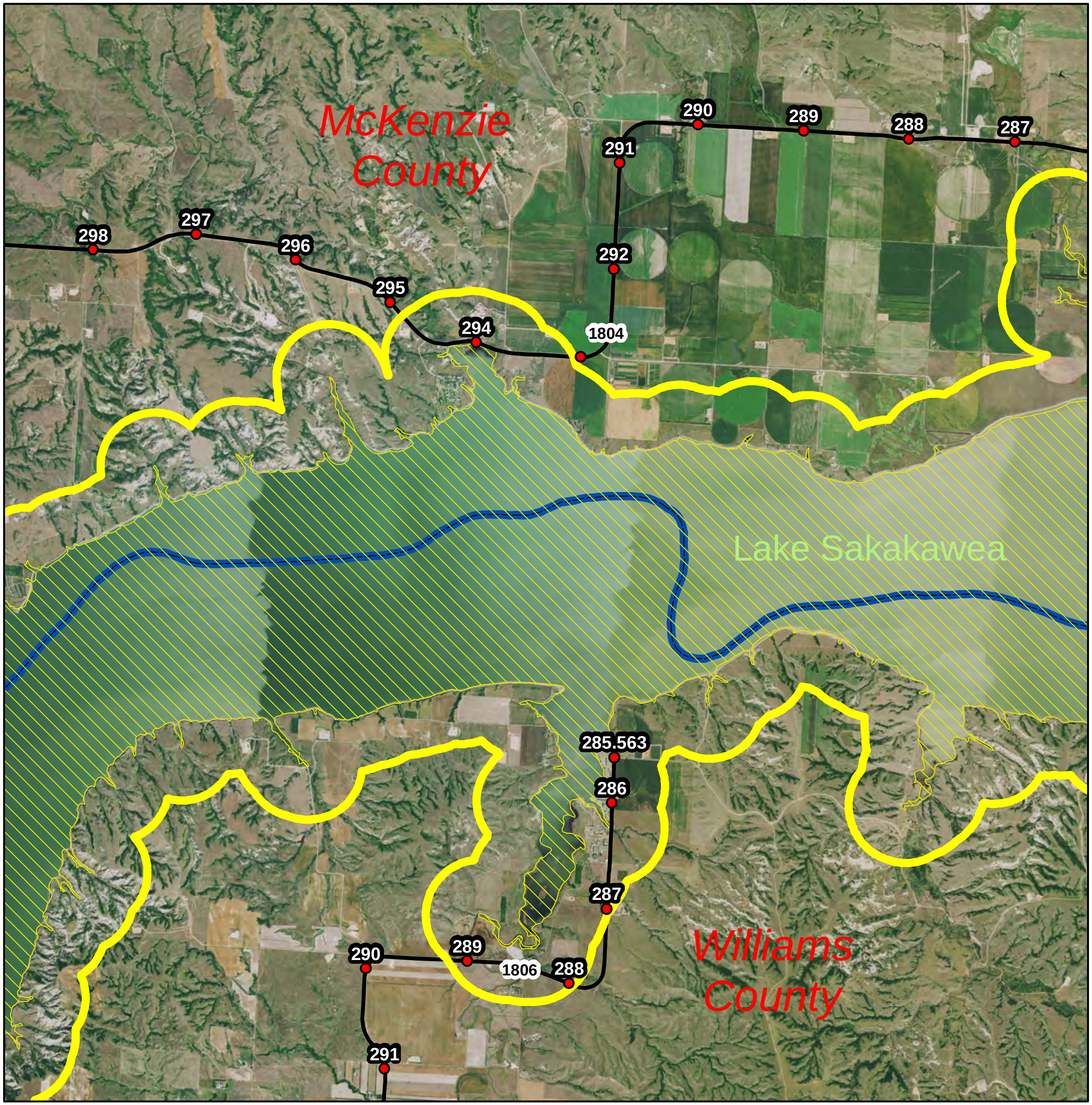
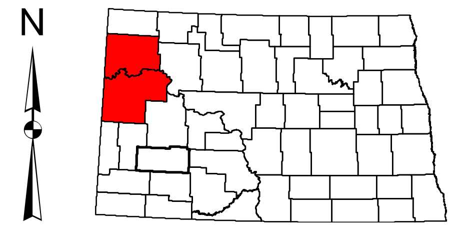




McKenzie and Williams Counties, North Dakota

Legend

County Boundaries
Piping Plover Critical Habitat
0.5 Mile Buffer

State Highways

Interstate Highway
State Highway
US Highway
Bypass

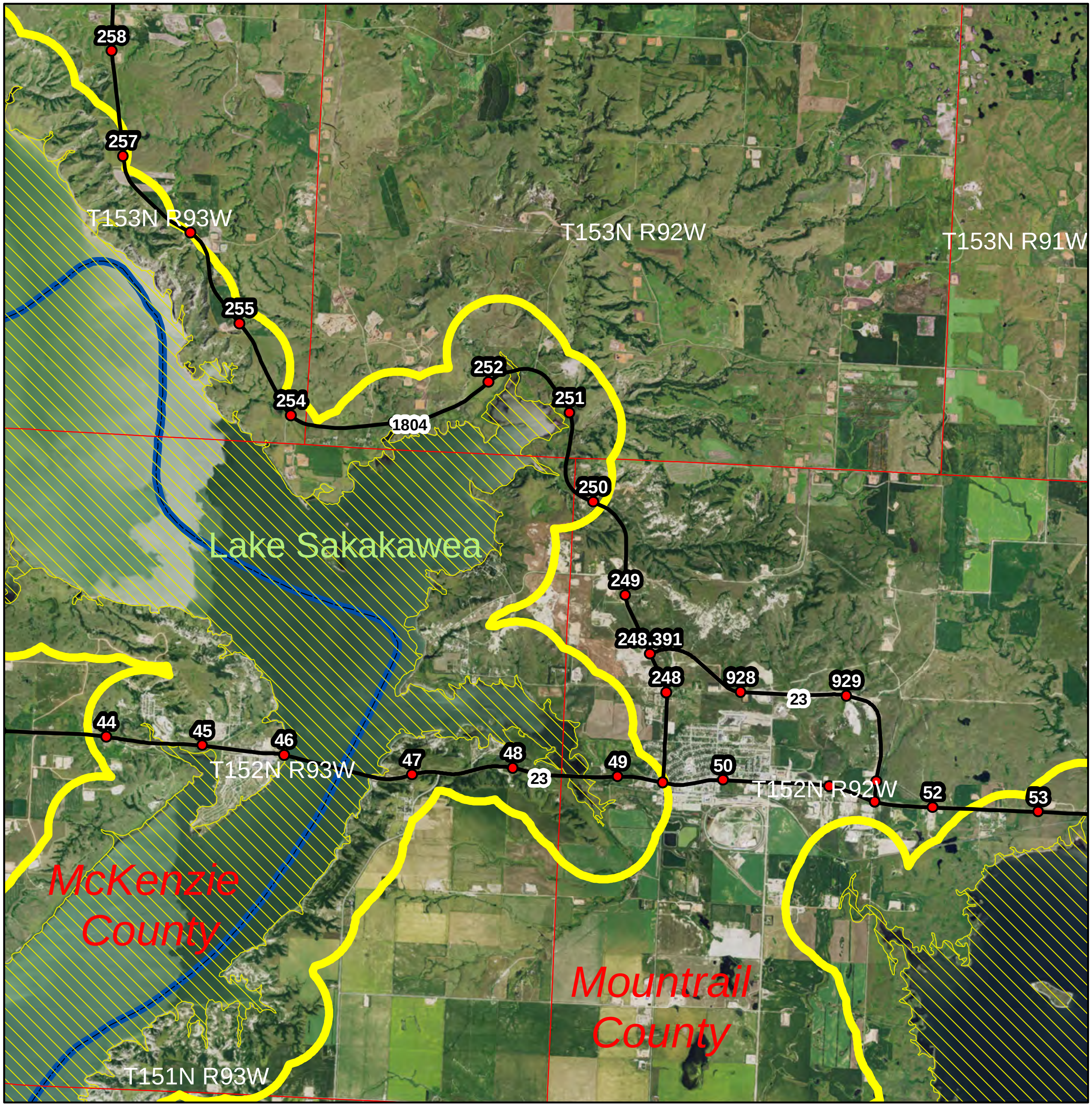
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat

NDDOT North Dakota Department of Transportation

0 1.25 2.5 Miles

Unit 11 - Missouri River System



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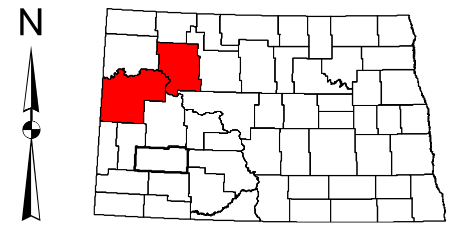


McKenzie and Mountrail Counties, North Dakota

Legend

- PLSS Townships
- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

State Highways

- Interstate Highway
- State Highway
- US Highway
- Bypass

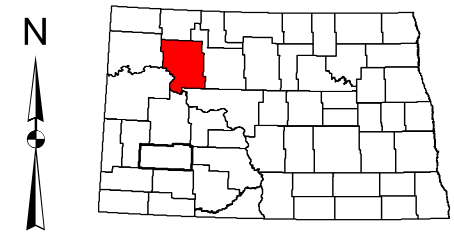
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

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



Mountrail Couny, North Dakota

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer

State Highways

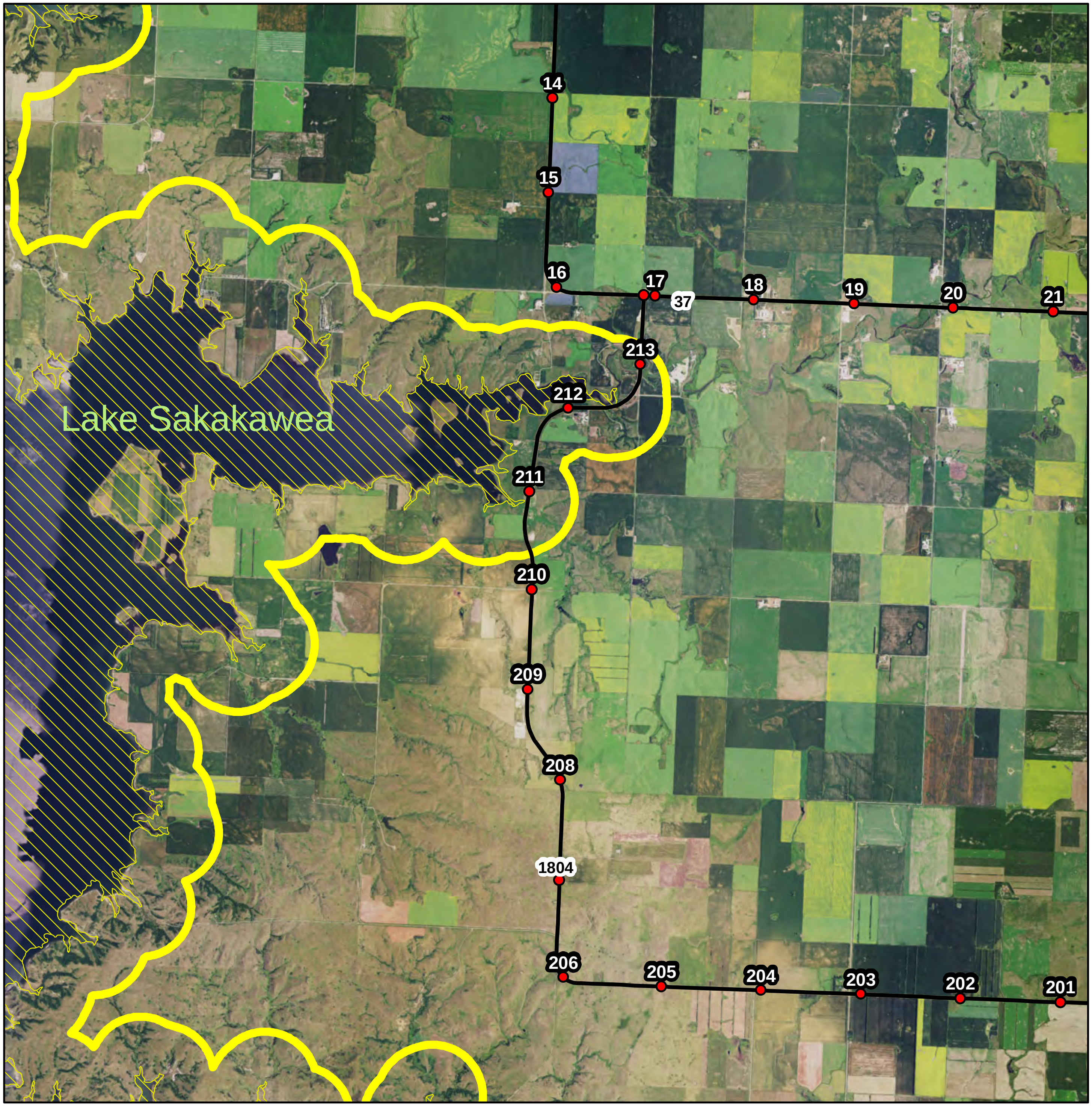
- Interstate Highway
- State Highway
- US Highway
- Bypass

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



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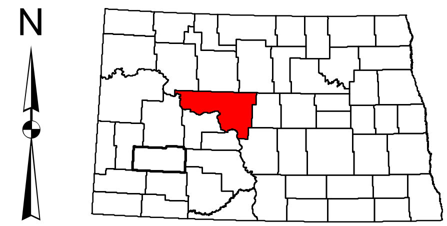


McLean Couny, North Dakota

Legend

Piping Plover Critical Habitat

0.5 Mile Buffer

State Highways

Interstate Highway

State Highway

US Highway

Bypass

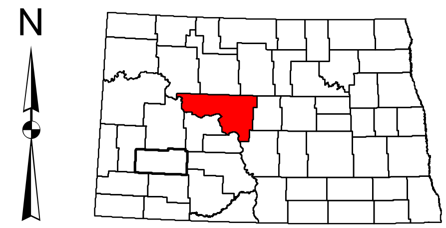
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

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

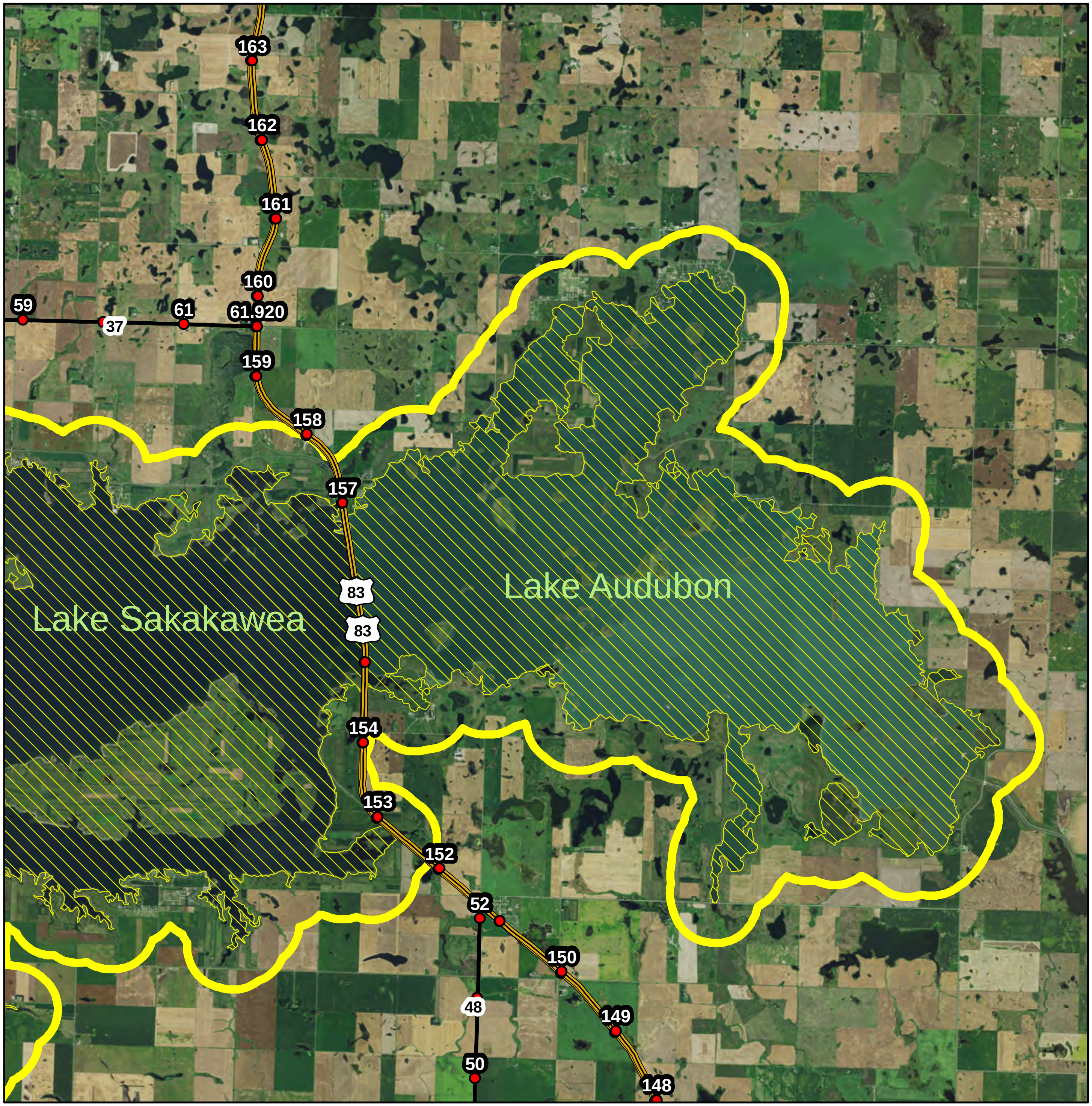
- Interstate Highway
- State Highway
- US Highway
- Bypass

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

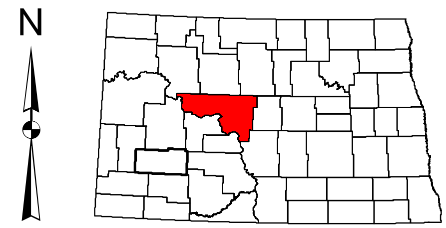
Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

NDDOT
North Dakota Department of Transportation

0 1.75 3.5 Miles



Unit 11 - Missouri River System



McLean Couny, North Dakota

Legend

Piping Plover Critical Habitat

0.5 Mile Buffer

State Highways

Interstate Highway

State Highway

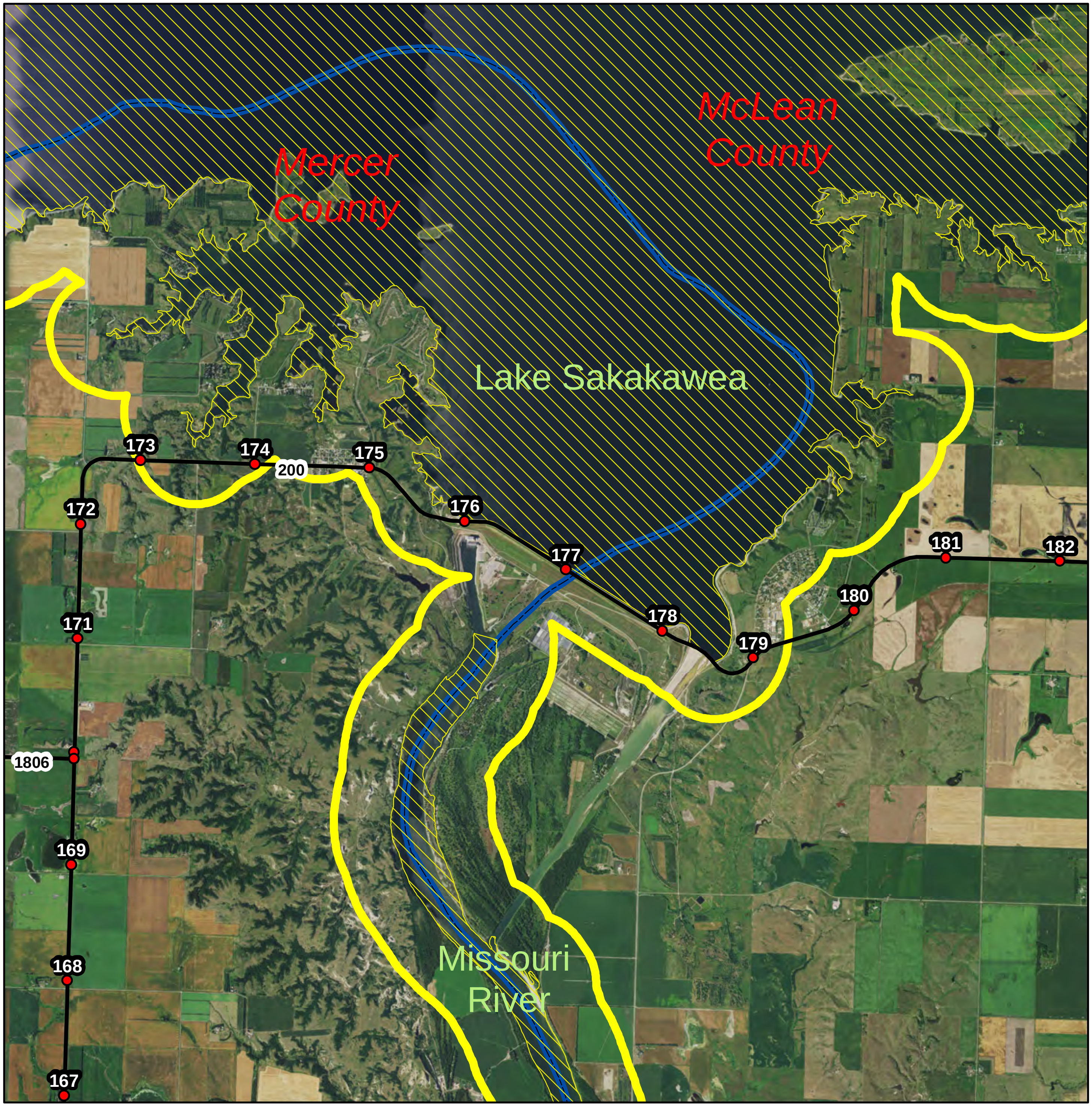
US Highway

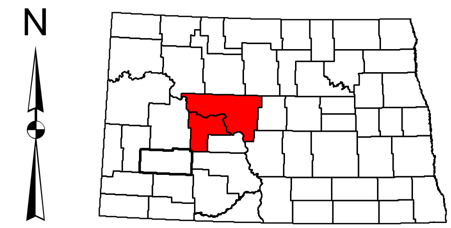
Bypass

0 1.75 3.5 Miles

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





McLean and Mercer Counties, North Dakota

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

State Highways

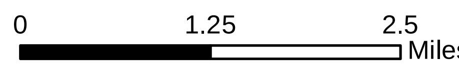
- Interstate Highway
- State Highway
- US Highway
- Bypass

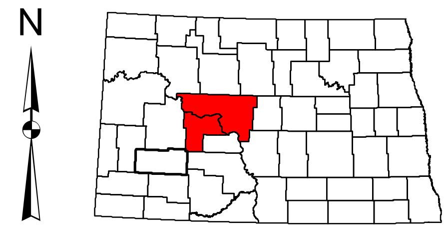
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

NDDOT
North Dakota Department of Transportation

Unit 11 - Missouri River System





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

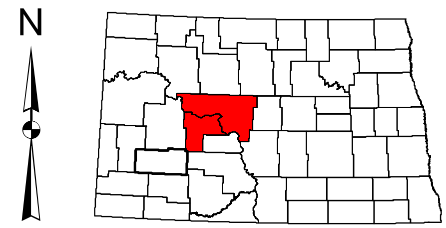
Drawn By: GPS	Date: 4/27/16	Map ID: Piping Plover Critical Habitat

NDDOT North Dakota Department of Transportation

0 1.5 3 Miles

Unit 11 - Missouri River System

Unit 11 - Missouri River System



McLean and Mercer 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
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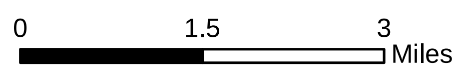
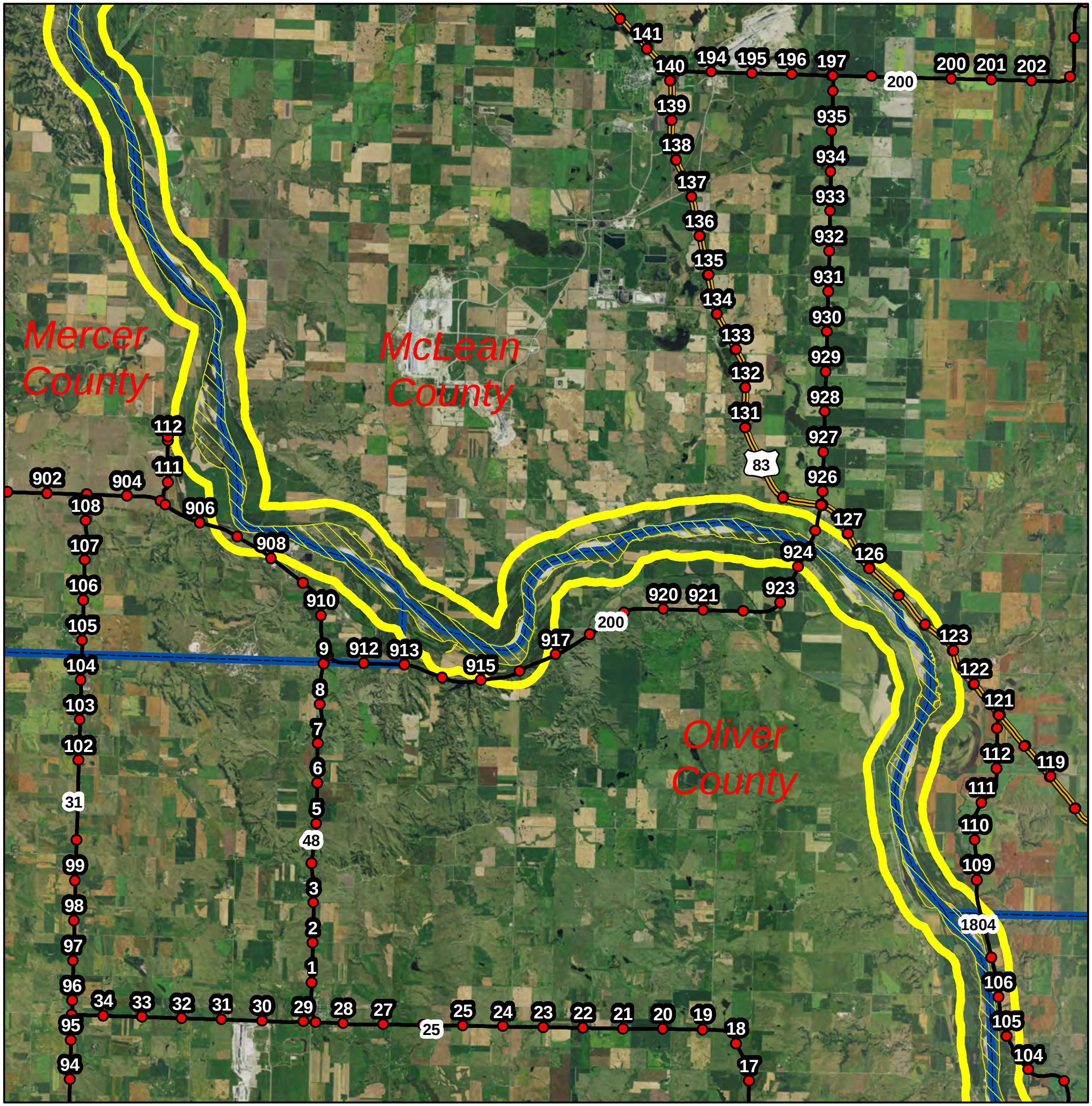
NDDOT
North Dakota Department of Transportation





Unit 11 - Missouri River System

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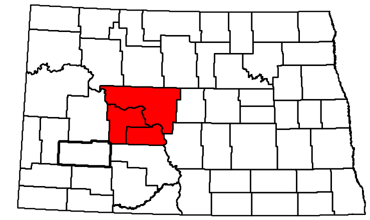


McLean, Mercer, and Oliver Counties, North Dakota

Legend

- Piping Plover Critical Habitat
- 0.5 Mile Buffer
- County Boundaries

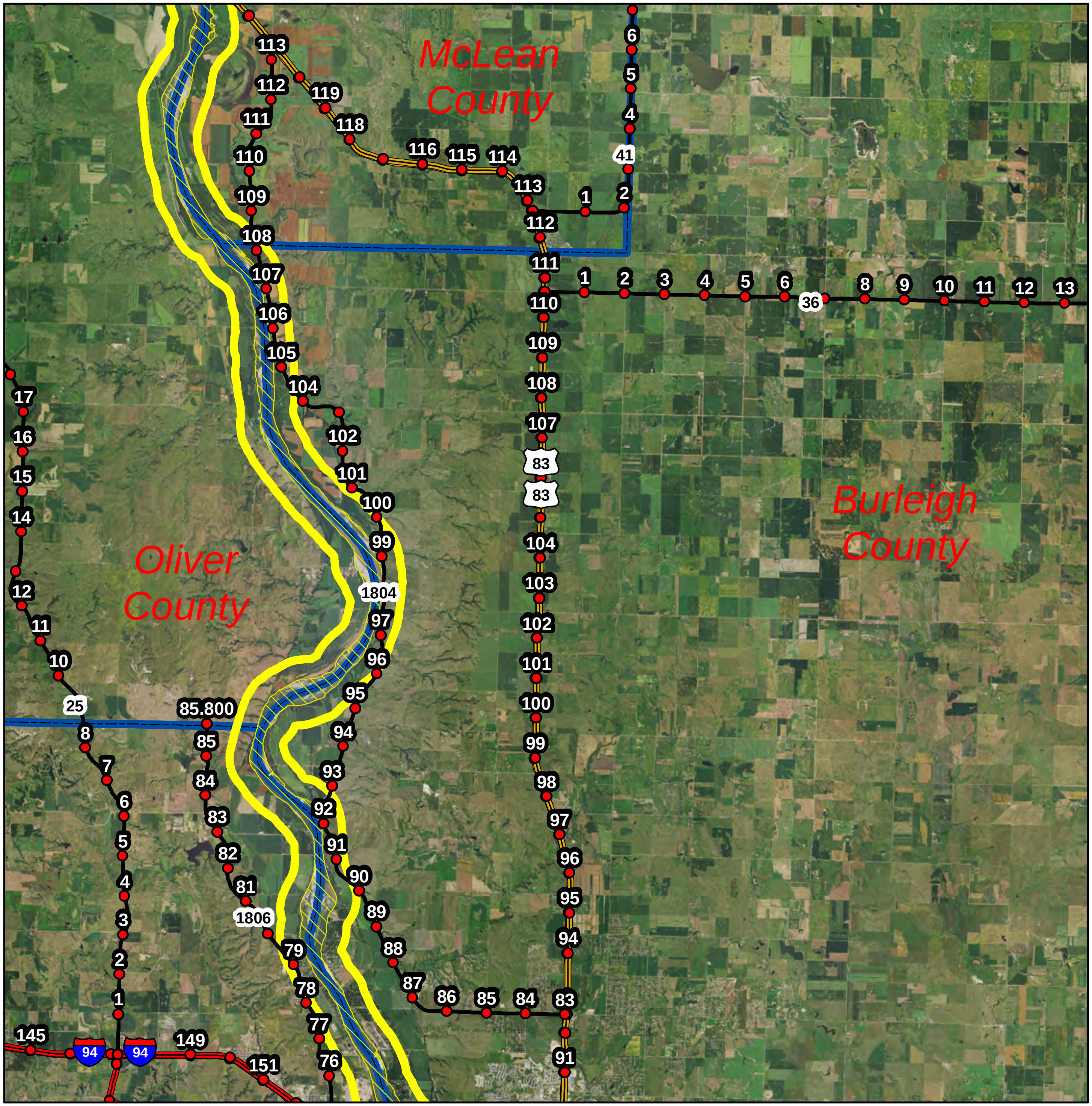
State Highways

- 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

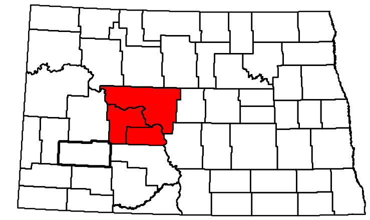
NDDOT
North Dakota Department of Transportation

0 3.75 7.5 Miles



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

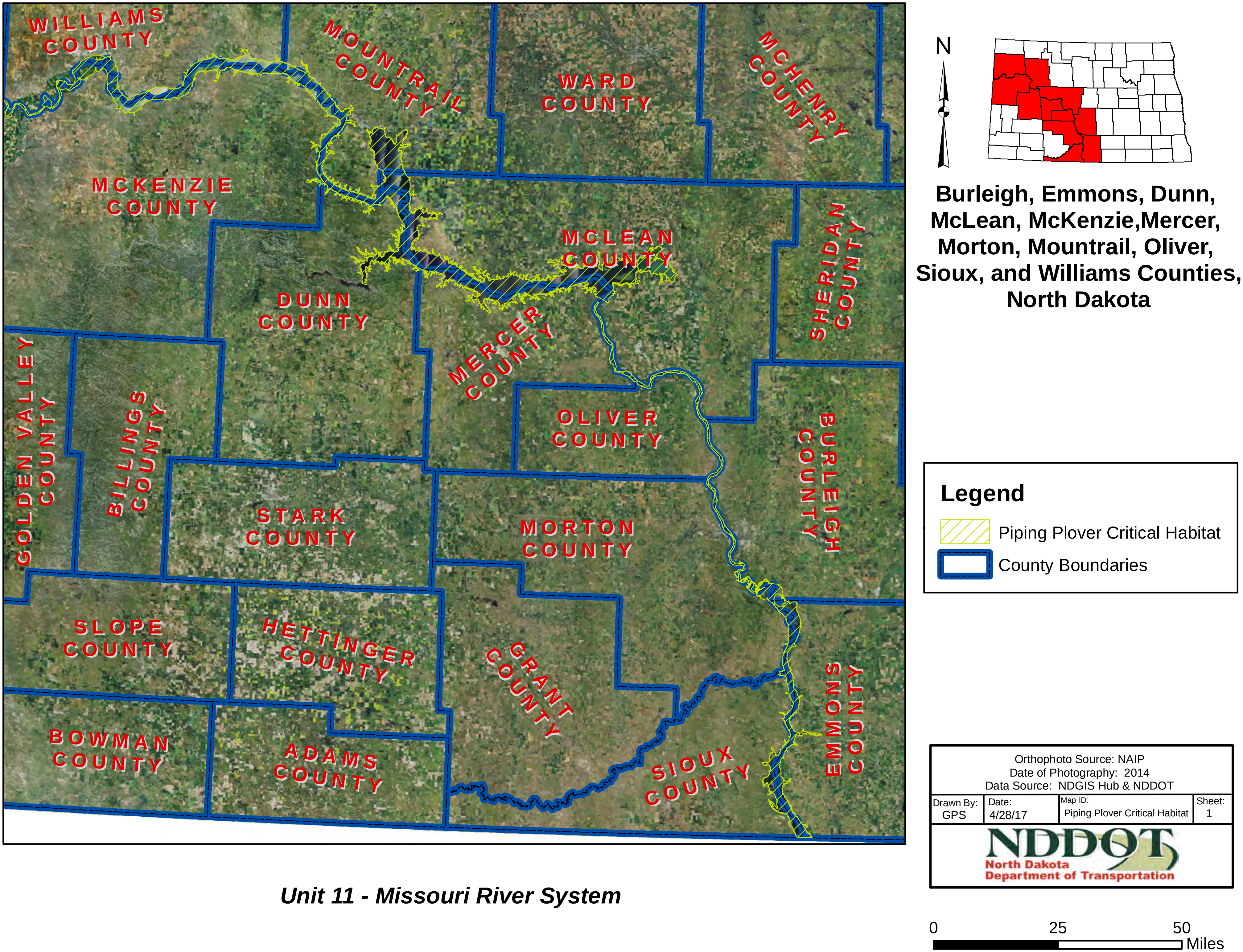
- Interstate Highway
- State Highway
- US Highway
- Bypass

Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

Drawn By:	Date:	Map ID:
GPS	4/27/16	Piping Plover Critical Habitat

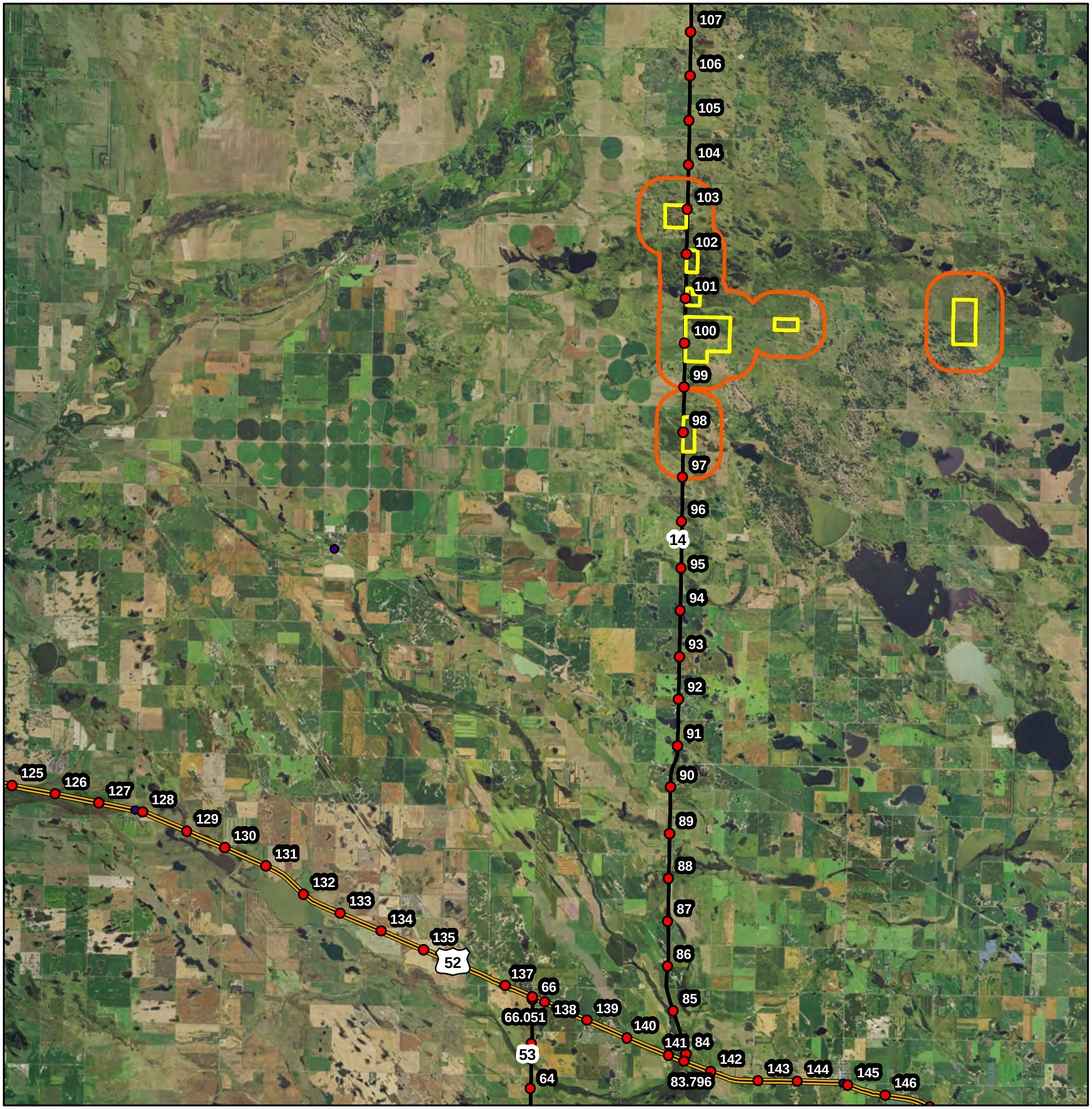
NDDOT
North Dakota Department of Transportation

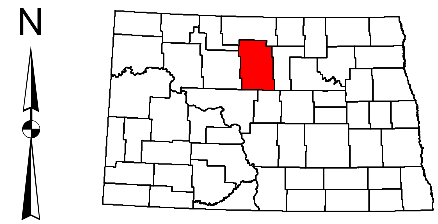
0 3.75 7.5 Miles



Unit 11 - Missouri River System

APPENDIX D
Dakota Skipper Critical Habitat Maps





McHenry County, North Dakota

Legend

- 0.6 Mile Dispersal Buffer
- Dakota Skipper Critical Habitat
- Reference Pts

State Highways

- State Highway
- US Highway

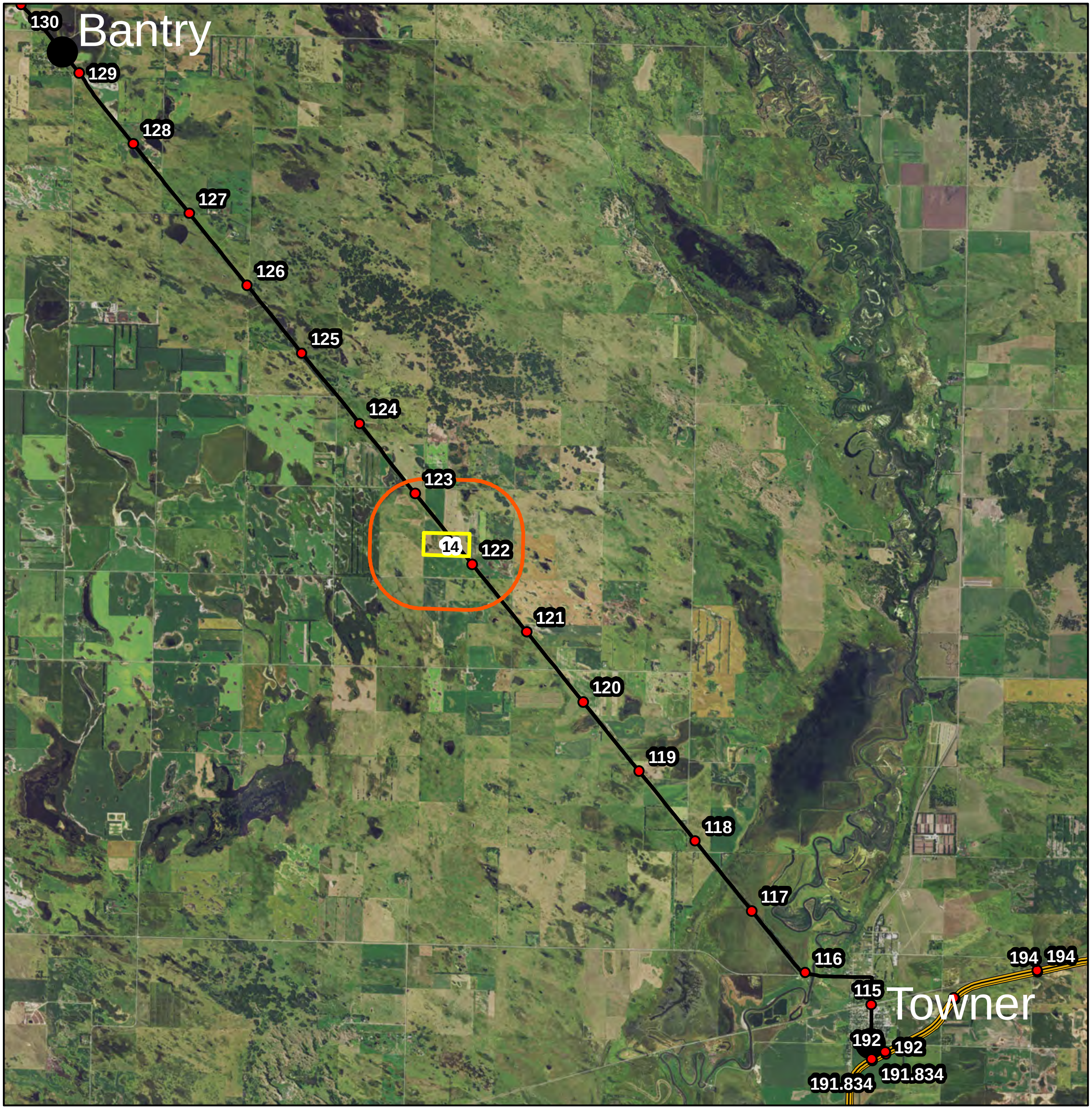
Orthophoto Source: NAIP
Date of Photography: 2014
Data Source: NDGIS Hub & NDDOT

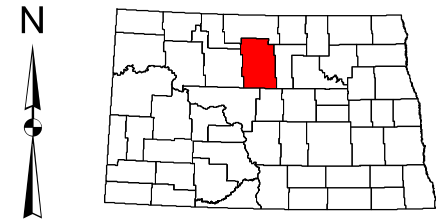
Drawn By:	Date:	Map ID:	Sheet:
GPS	2/11/16	Dakota Skipper Critical Habitat	1

NDDOT
North Dakota Department of Transportation

0 3.25 6.5 Miles

Unit 5 - N.D. Highway 14 - McHenry County





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:
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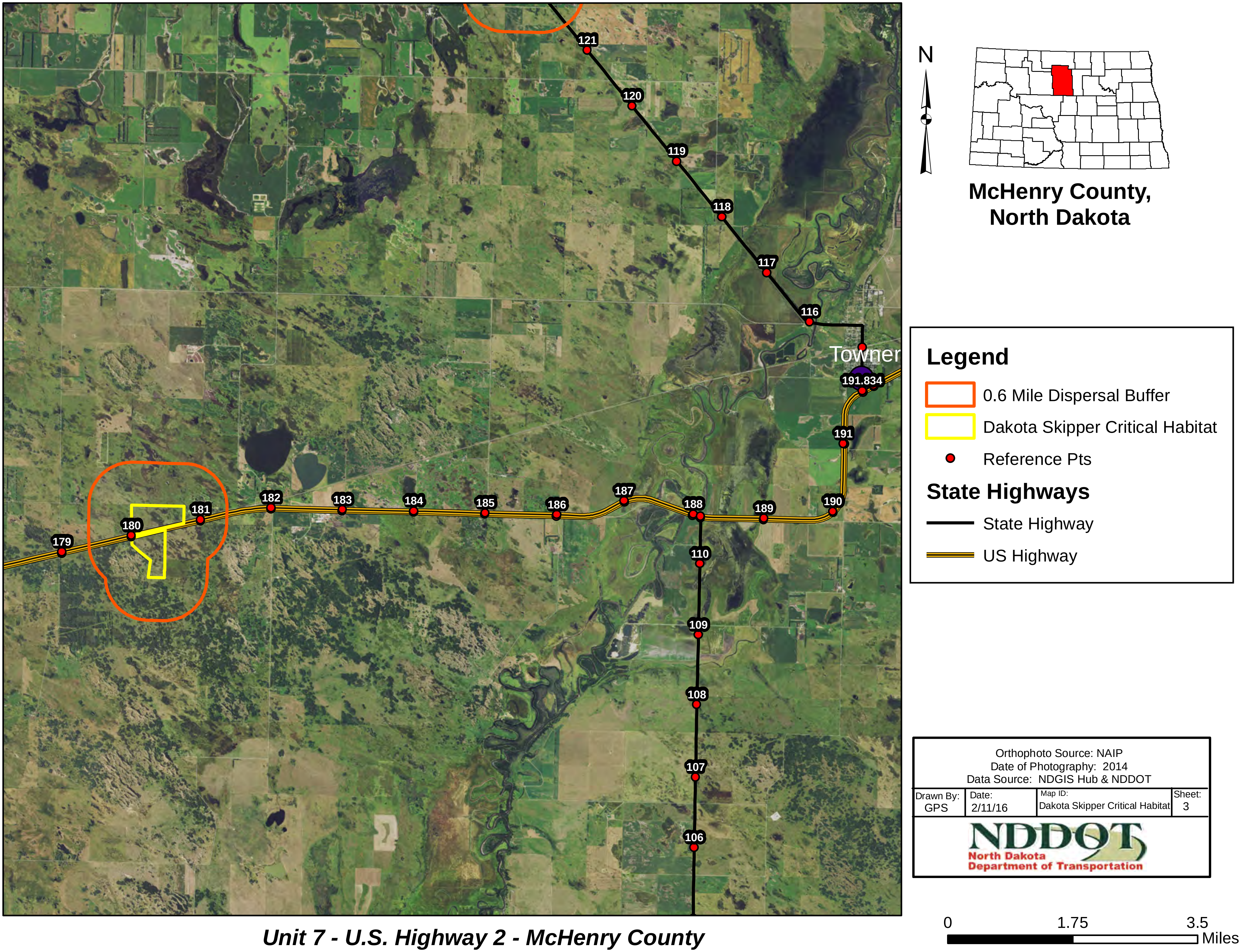
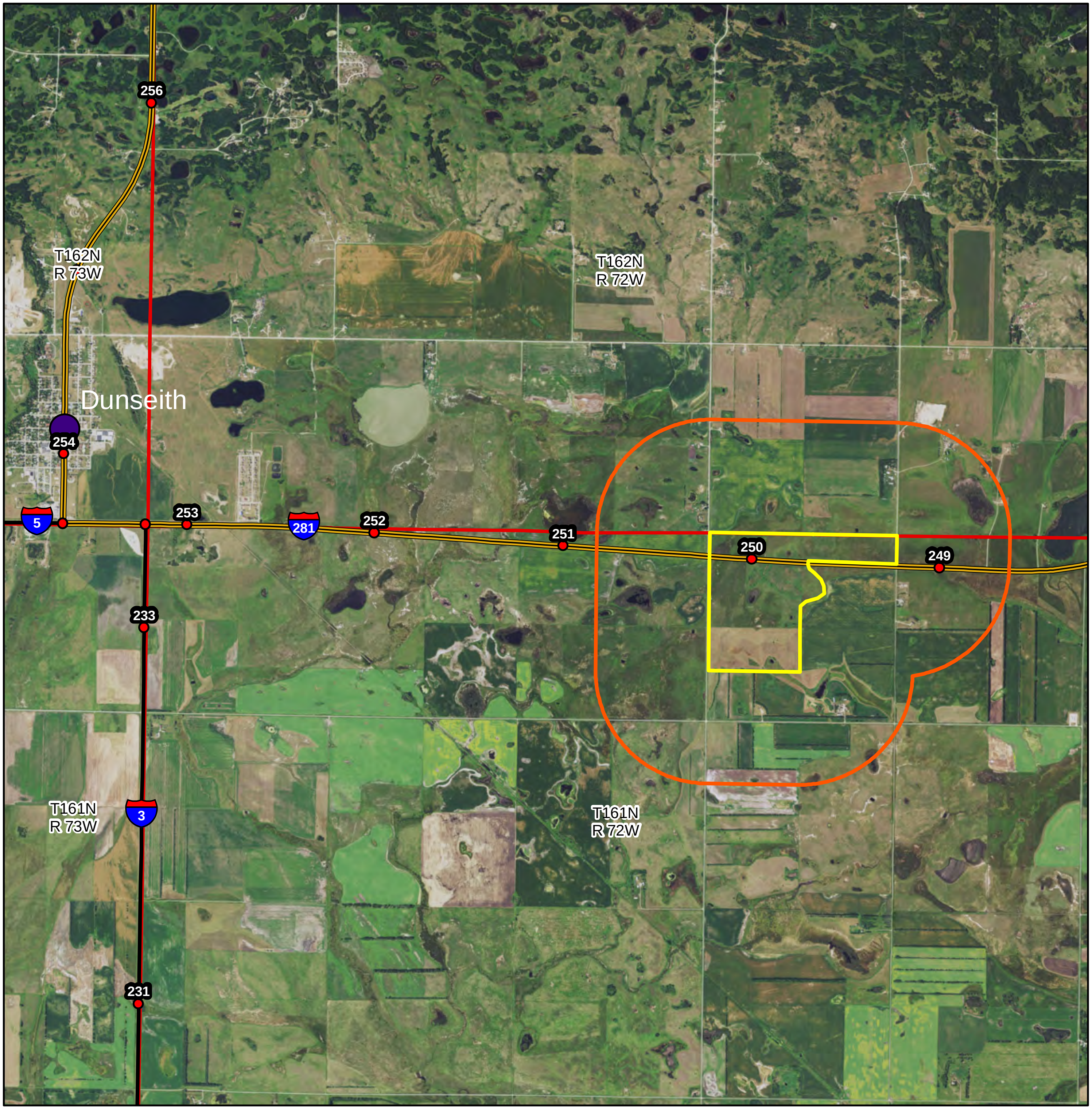
NDDOT
North Dakota Department of Transportation

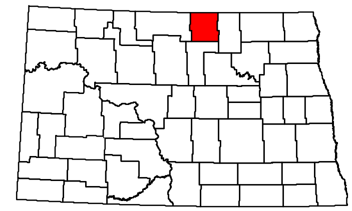
0 1.5 3 Miles

Unit 6 - N.D. Highway 14 - McHenry County



Unit 7 - U.S. Highway 2 - McHenry County





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

Unit 9 - N.D. Highway 281 - Rolette County

APPENDIX E
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

Contents

List of Figures

List of Tables

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*.

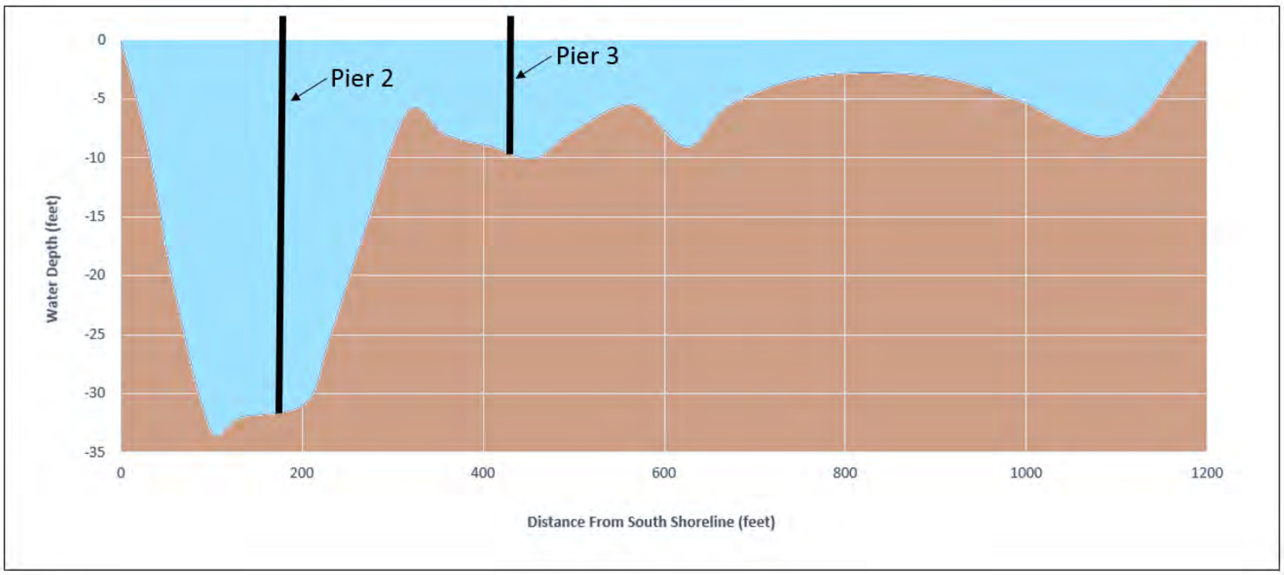


Figure 2, River Profile

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.

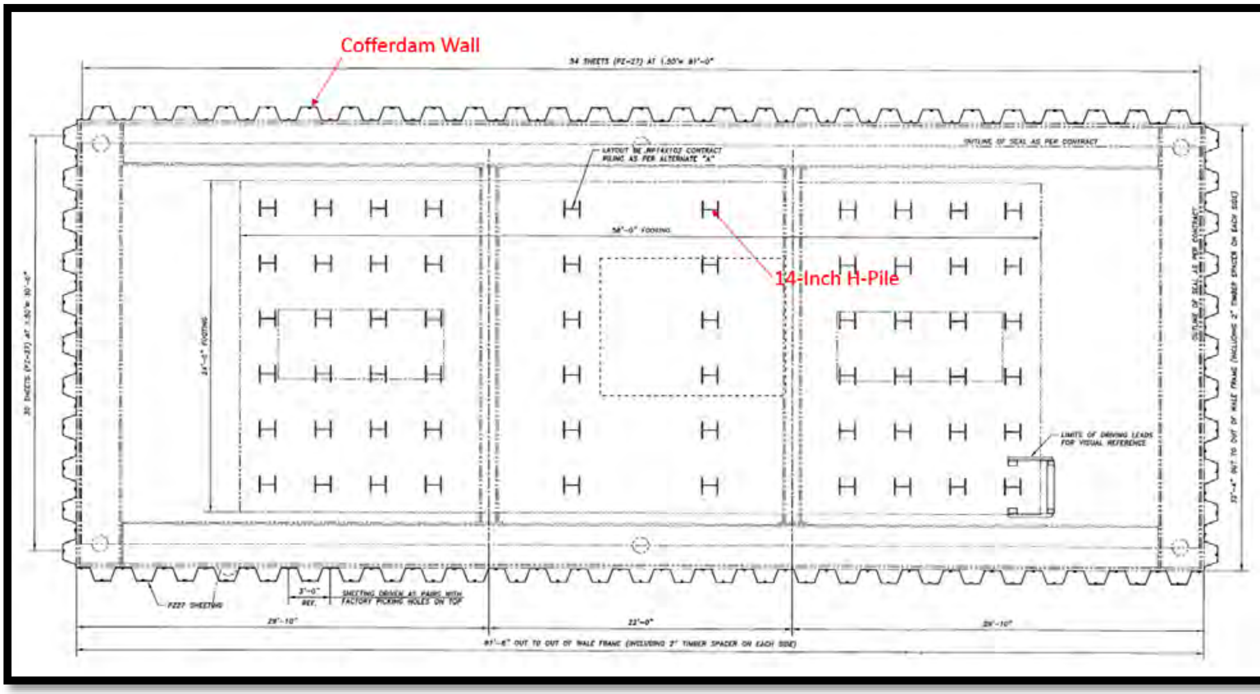

Figure 4, Cofferdam Layout (Top View)

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

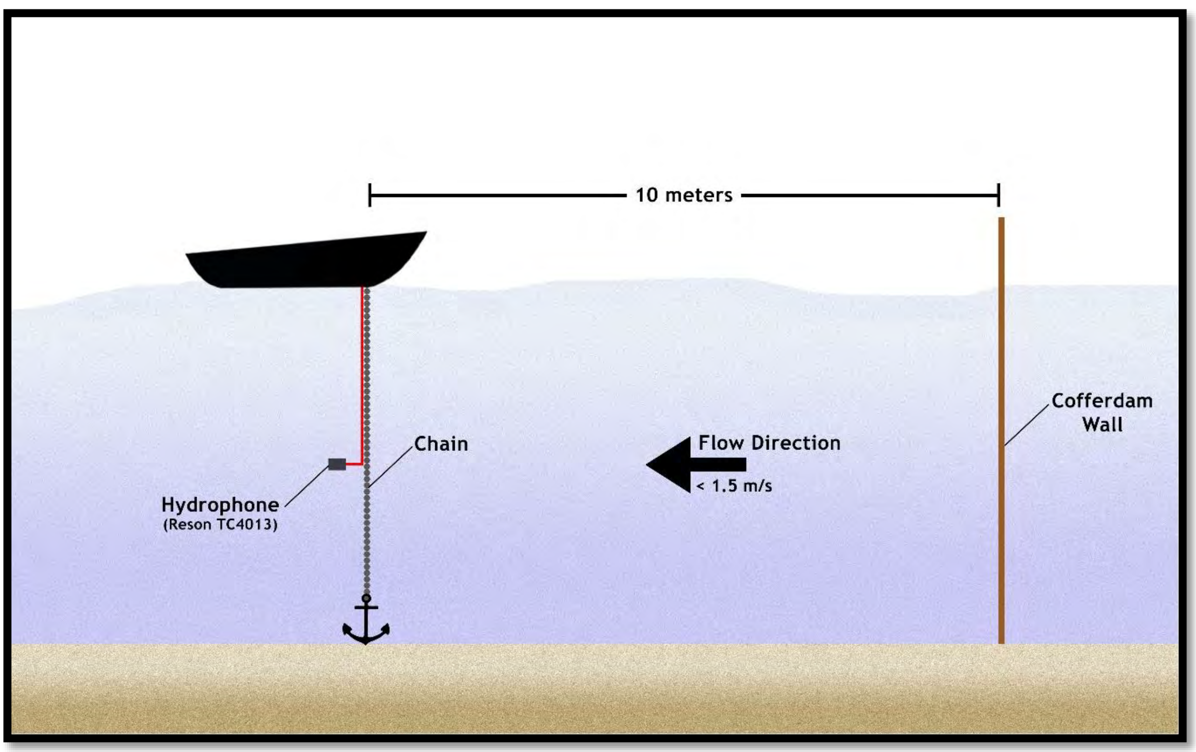

Figure 6, Hydrophone Setup Diagram

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.

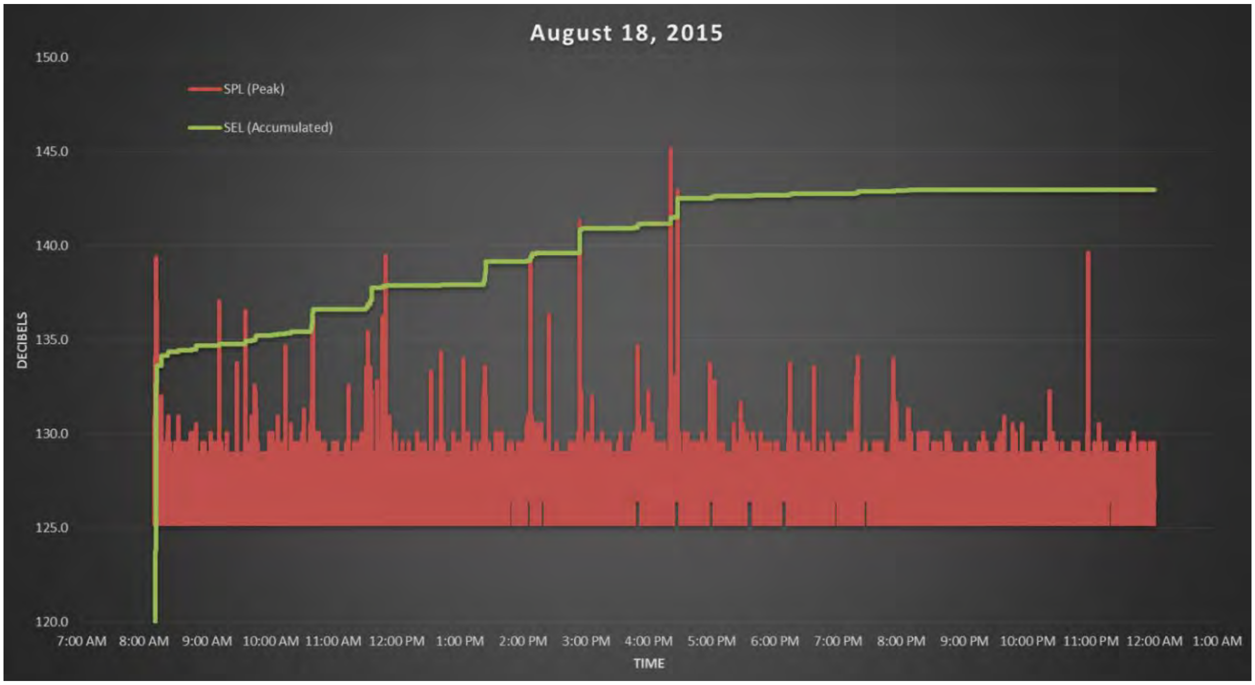

Figure 7, Vibratory Hammer Recording Session (8/18/2015)

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.

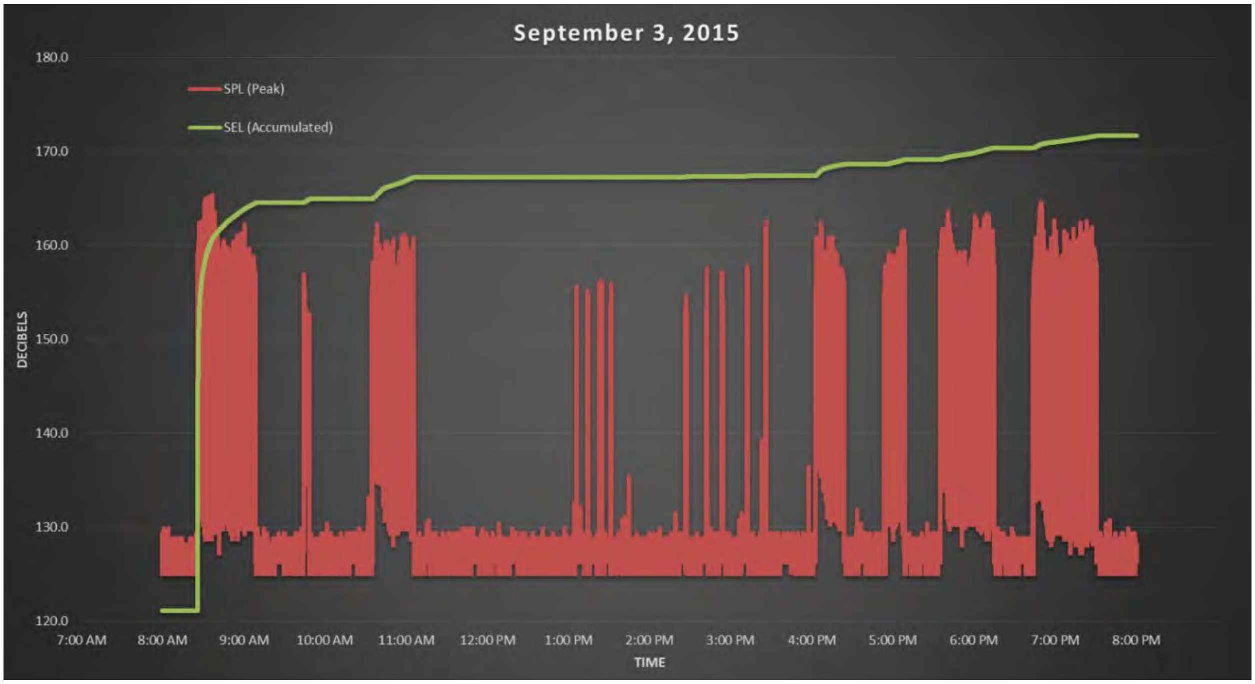

Figure 8, Recorded Sounds Levels (September 3, 2015)

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.

Full cofferdam bubble curtain cost per cofferdam

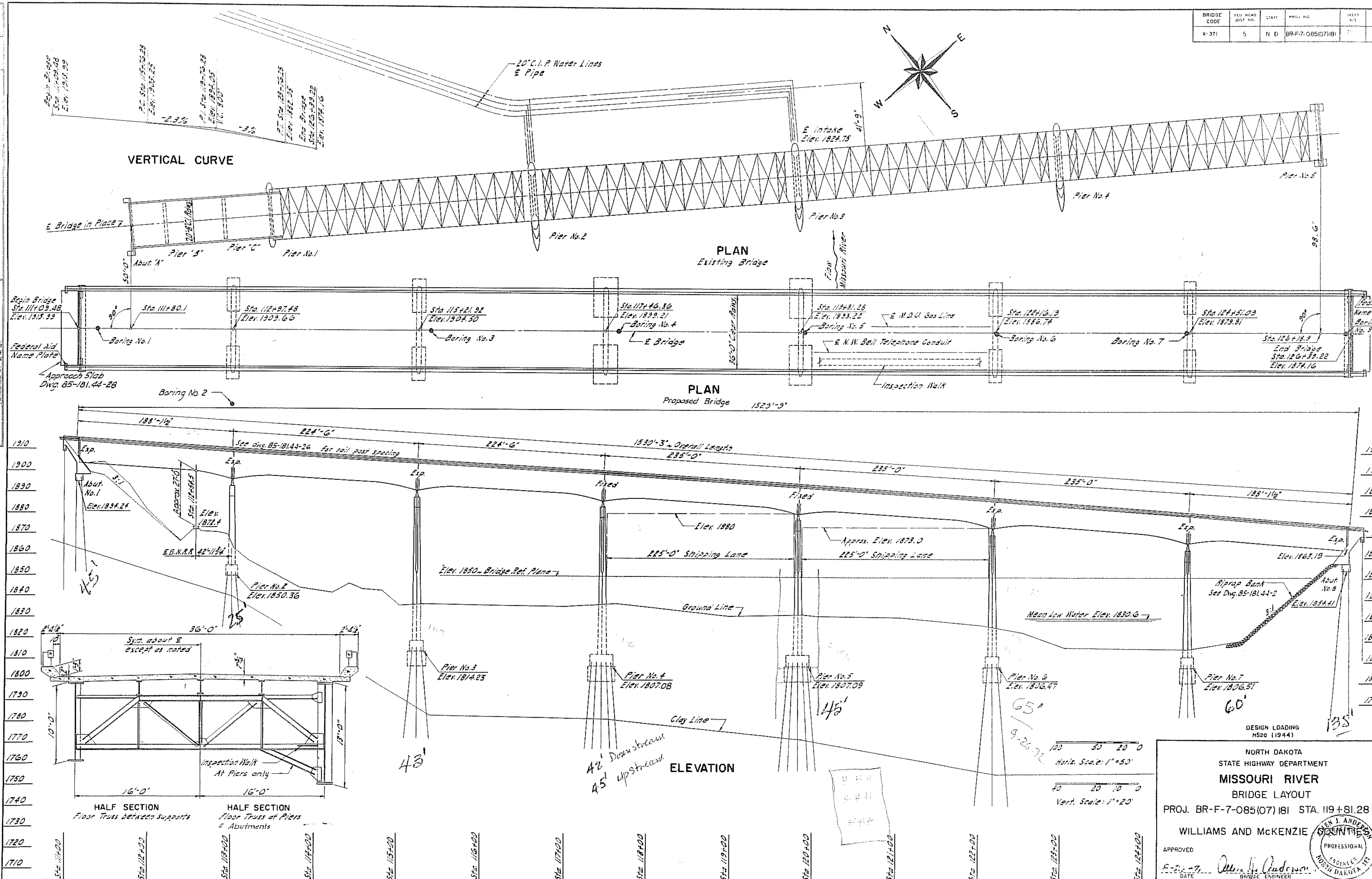
Compressor (7 compressors required) and air hose rental:	$126,000
Fabrication and maintenance of bubble curtain:	$10,000
Reduced production rate associated with bubble curtain deployment: (Approximately 5% of bid cost for HP14x102)	$20,000
Total:	**$156,000/cofferdam**

Individual pile bubble curtain cost per cofferdam

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	FED. ROAD DIST. NO.	STATE	PROJ. NO.
X-371	5	N.D.	BR-F-7-085(07)181

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

MISSOURI RIVER

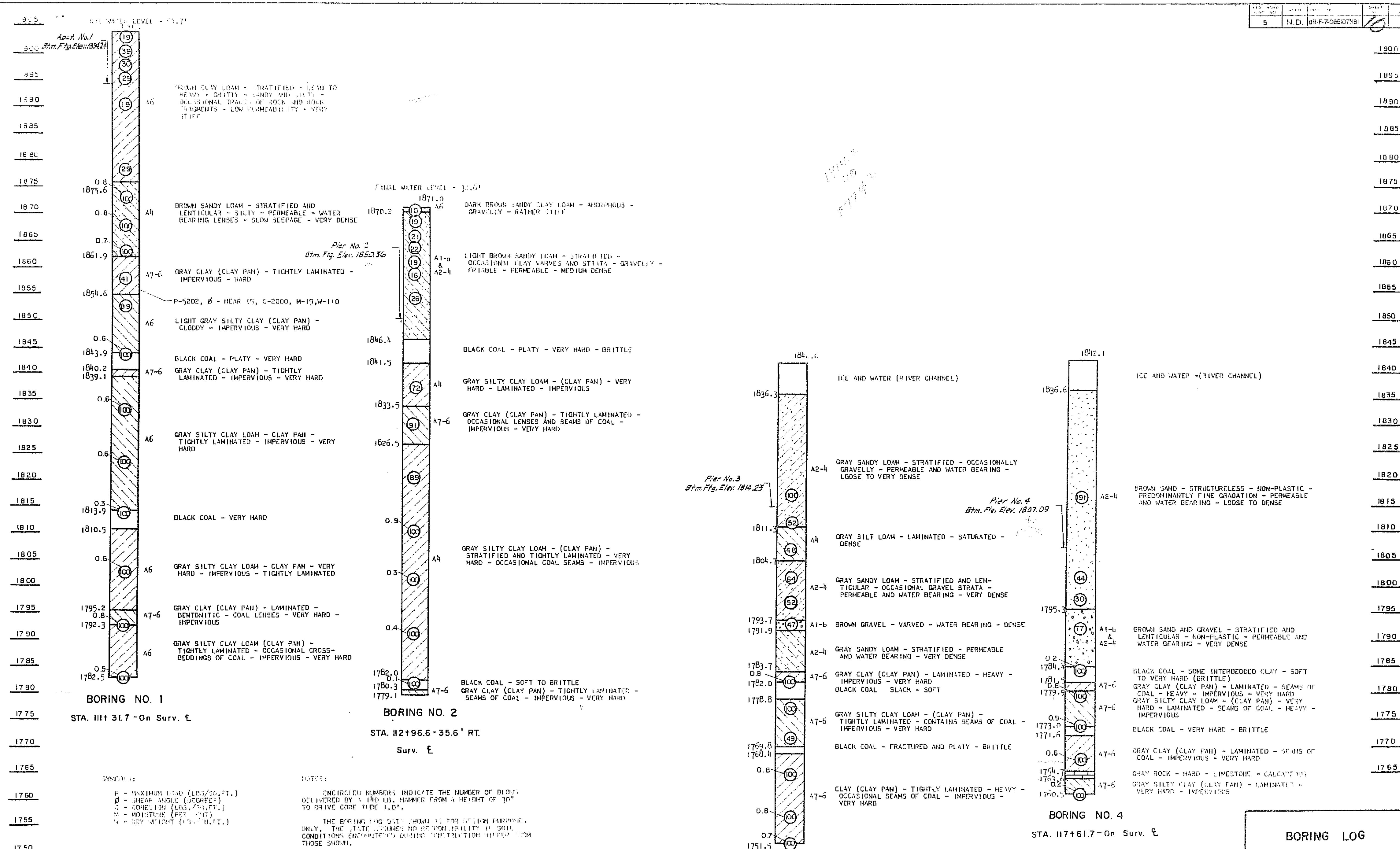
BRIDGE LAYOUT

PROJ. BR-F-7-085(07)181 STA. 119+81.28

WILLIAMS AND McKENZIE COUNTIES

APPROVED

DATE — BRIDGE ENGINEER



SYMBOLS:

P - MAXIMUM LOAD (LBS/SQ.FT.)
Ø - SHEAR ANGLE (DEGREES)
C - COHESION (LBS./SQ.FT.)
M - MOISTURE (PER CENT)
W - DRY WEIGHT (LBS./CU.FT.)

NOTES:

ENCIRCLED NUMBERS INDICATE THE NUMBER OF BLOWS DELIVERED BY A 140 LB. HAMMER FROM A HEIGHT OF 30" TO DRIVE CORE TUBE 1.0'.

THE BORING LOG DATA SHOWN IS FOR DESIGN PURPOSES ONLY. THE STATE ASSUMES NO RESPONSIBILITY IF SOIL CONDITIONS ENCOUNTERED DURING CONSTRUCTION DIFFER FROM THOSE SHOWN.

5 | N.D. | BR-F-7-085(03)181

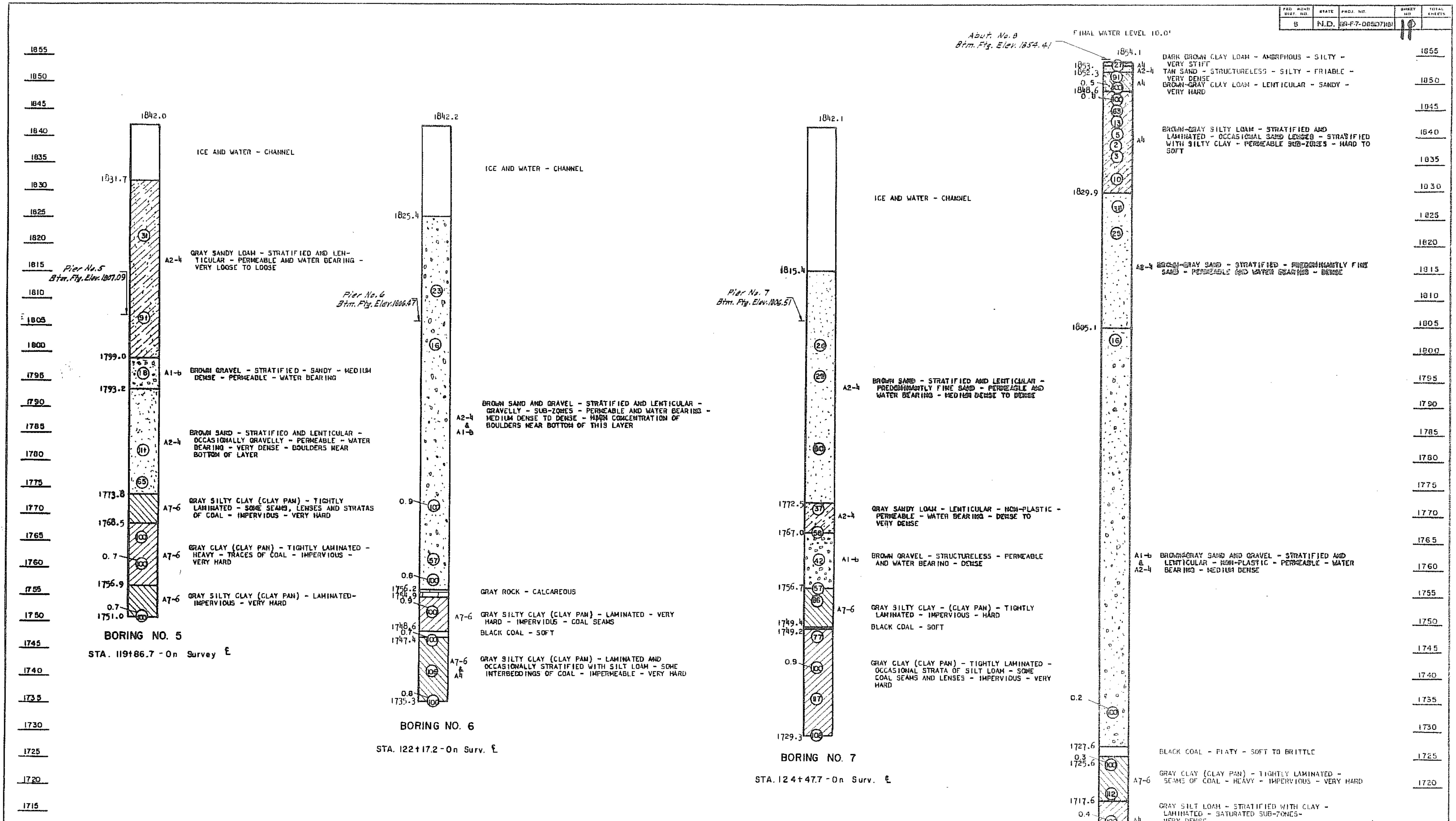
BORING LOG

F-7-085(03)178

Sheet 1 of 2

WILLIAMS & McKENZIE CO.

85-181.44-3



Sheet 2 of 2

BORING LOG

F-7-085(03)178

WILLIAMS & McKENZIE CO.

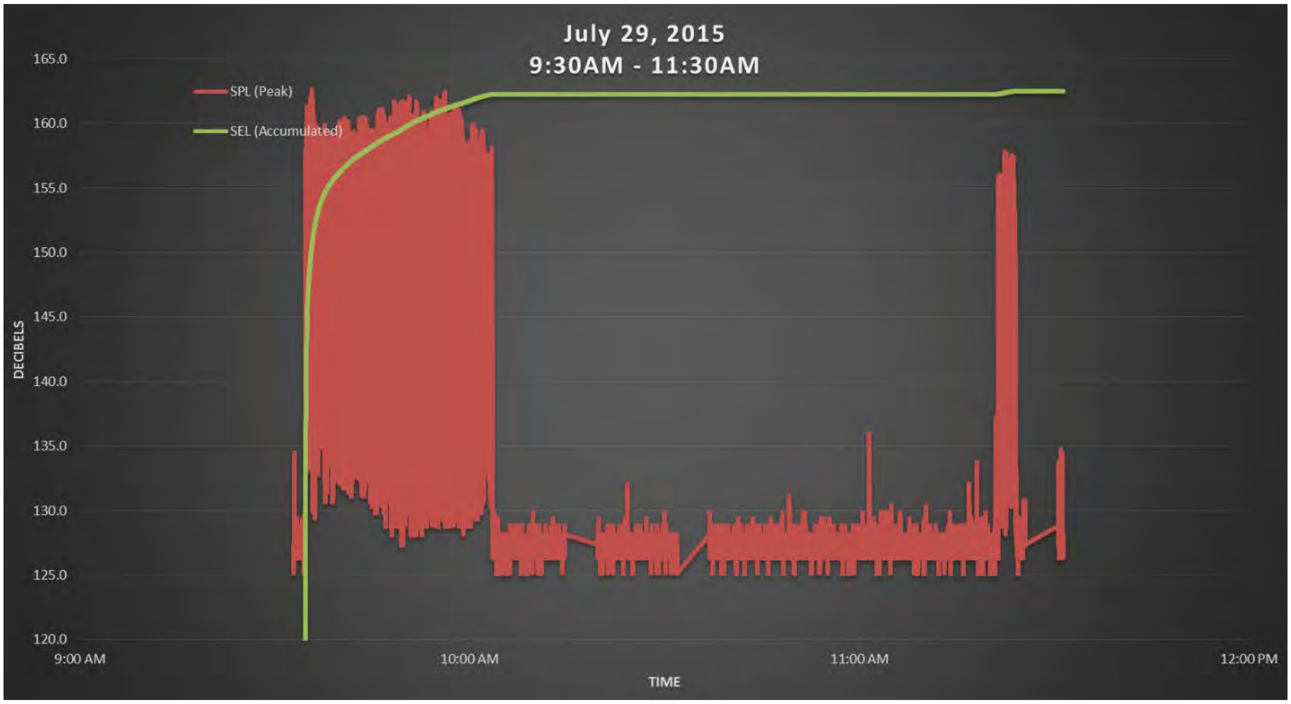
85-181.44-4

85-181.44-4

APPENDIX C:

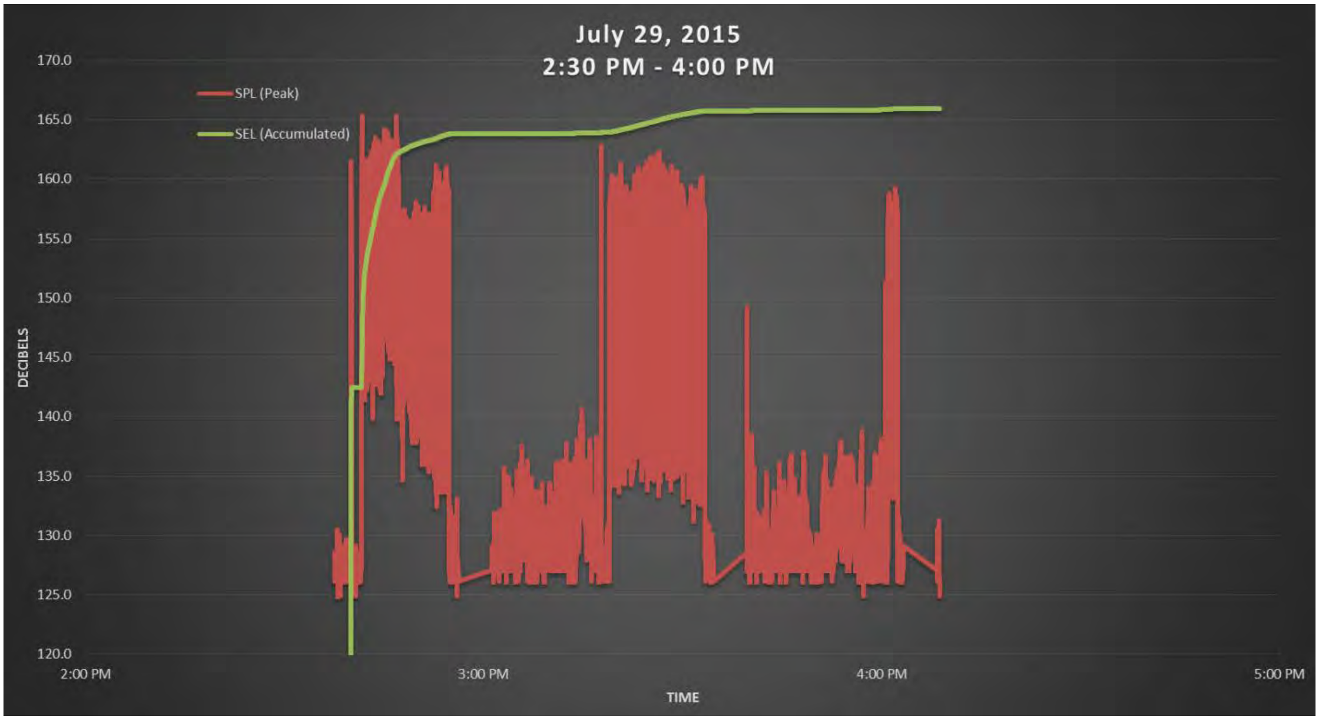
INDIVIDUAL MONITORING SESSION SUMMARIES

Impact Hammer



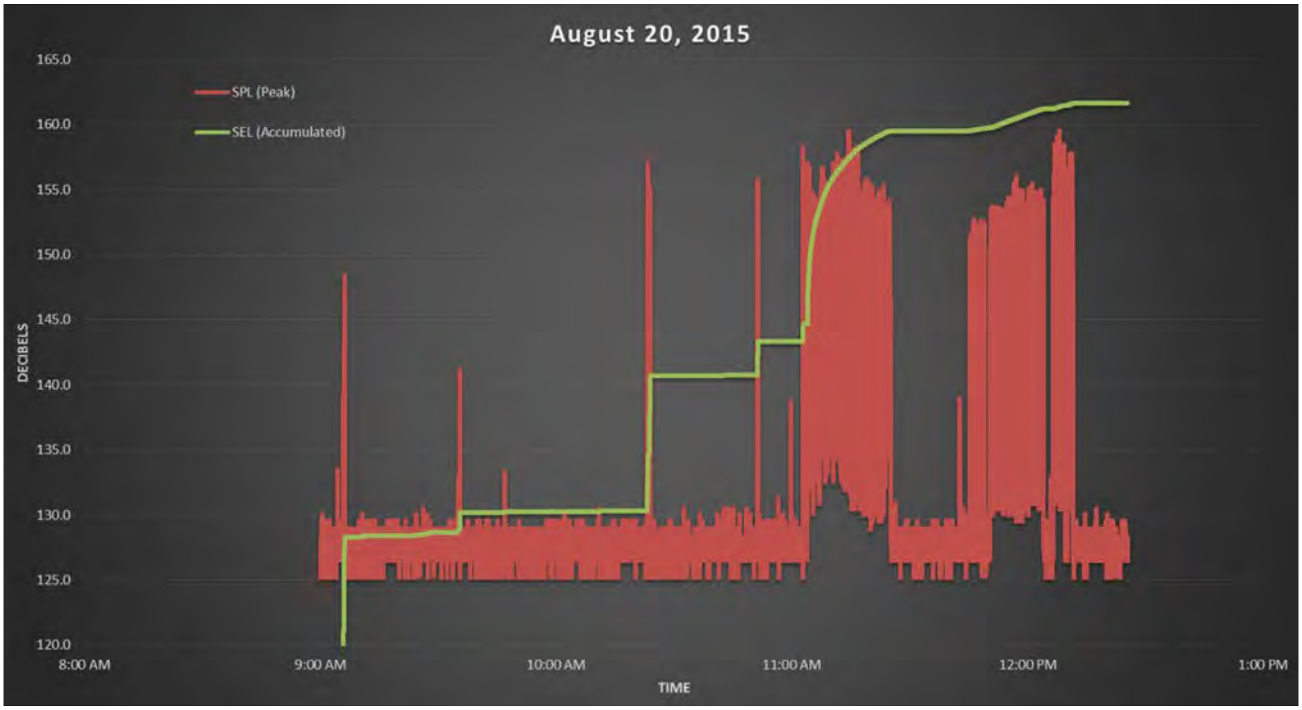
Date:	7/29/2015	Accumulated SEL:	162.6 dB
Calibration Time:	7/29/15 7:55 AM	SPL Peak (max):	162.6 dB
Start Time:	7/29/15 9:32 AM	RMS (max):	147.7 dB
End Time:	7/29/15 11:31 AM		
Duration:	1h 59m		
Hammer:	ICE 80S		
Total Blow Count:	1,293		
Total Number of Piles Driven:	Test Pile		

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



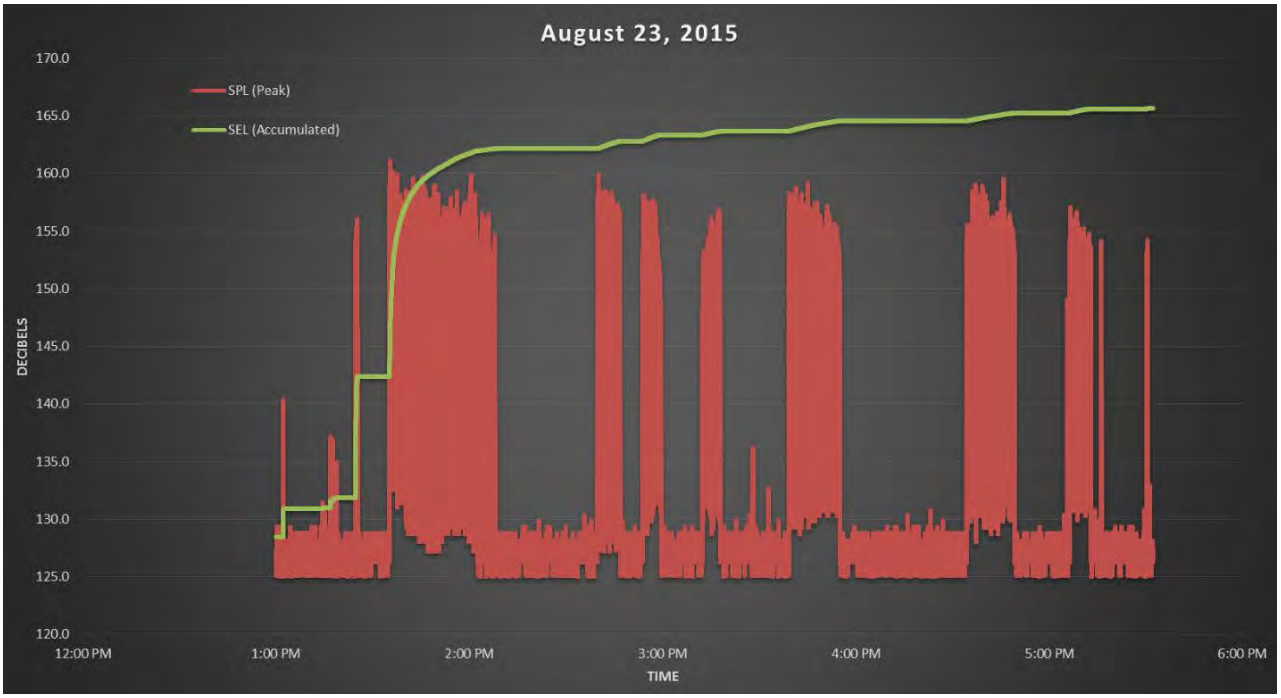
Date:	7/29/2015	Accumulated SEL:	166.0 dB
Calibration Time:	7/29/15 1:17 PM	SPL Peak (max):	165.3 dB
Start Time:	7/29/15 2:37 PM	RMS (max):	153.2 dB
End Time:	7/29/15 4:08 PM		
Duration:	1h 31m		
Hammer:	ICE 80S		
Total Blow Count:	1,518		
Total Number of Piles Driven:	Test Pile		

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



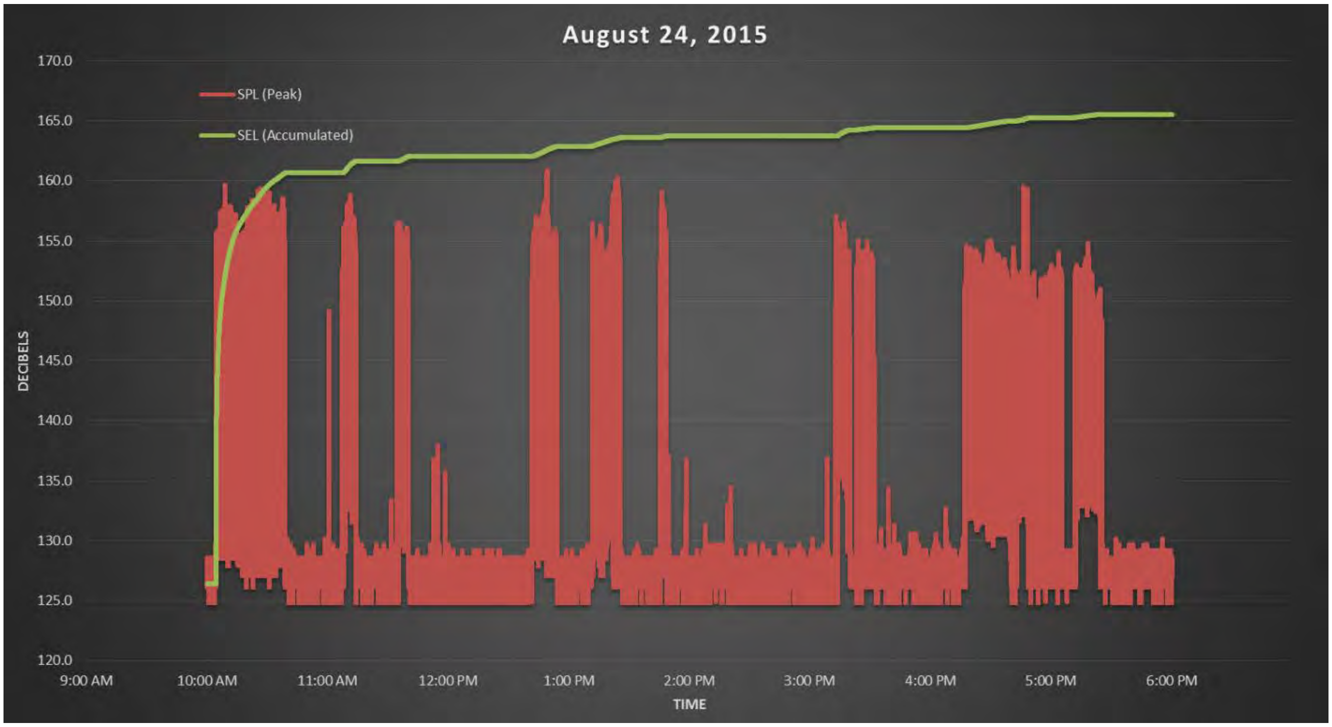
Date:	8/20/15	Accumulated SEL:	161.8 dB
Calibration Time:	8/20/15 7:50 AM	SPL Peak (max):	159.6 dB
Start Time:	8/20/15 9:00 AM	RMS (max):	147.1 dB
End Time:	8/20/15 12:25 PM		
Duration:	3h 25m		
Hammer:	ICE 80S		
Total Blow Count:	1,697		
Total Number of Piles Driven:	1		

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



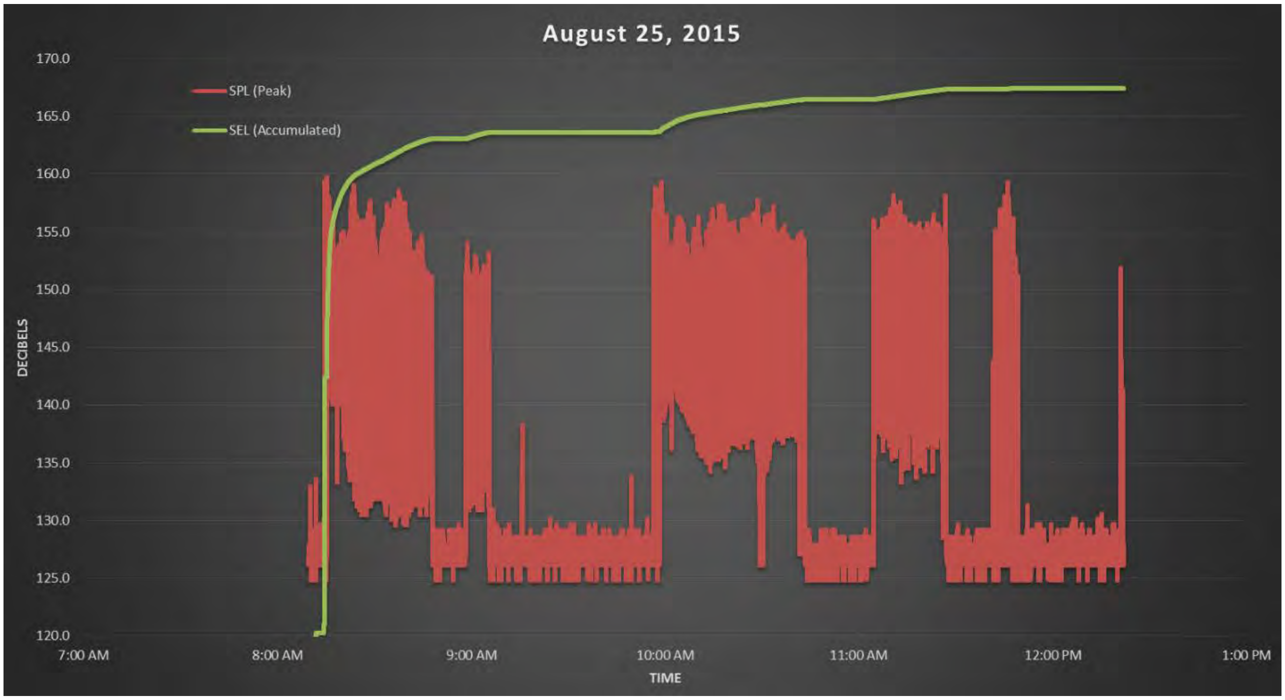
Date:	8/23/15	Accumulated SEL:	165.7 dB
Calibration Time:	8/23/15 8:03 AM	SPL Peak (max):	161.2 dB
Start Time:	8/23/15 1:00 PM	RMS (max):	157.4 dB
End Time:	8/23/15 5:32 PM		
Duration:	4h 32m		
Hammer:	ICE 80S		
Total Blow Count:	3,375		
Total Number of Piles Driven:	3		

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



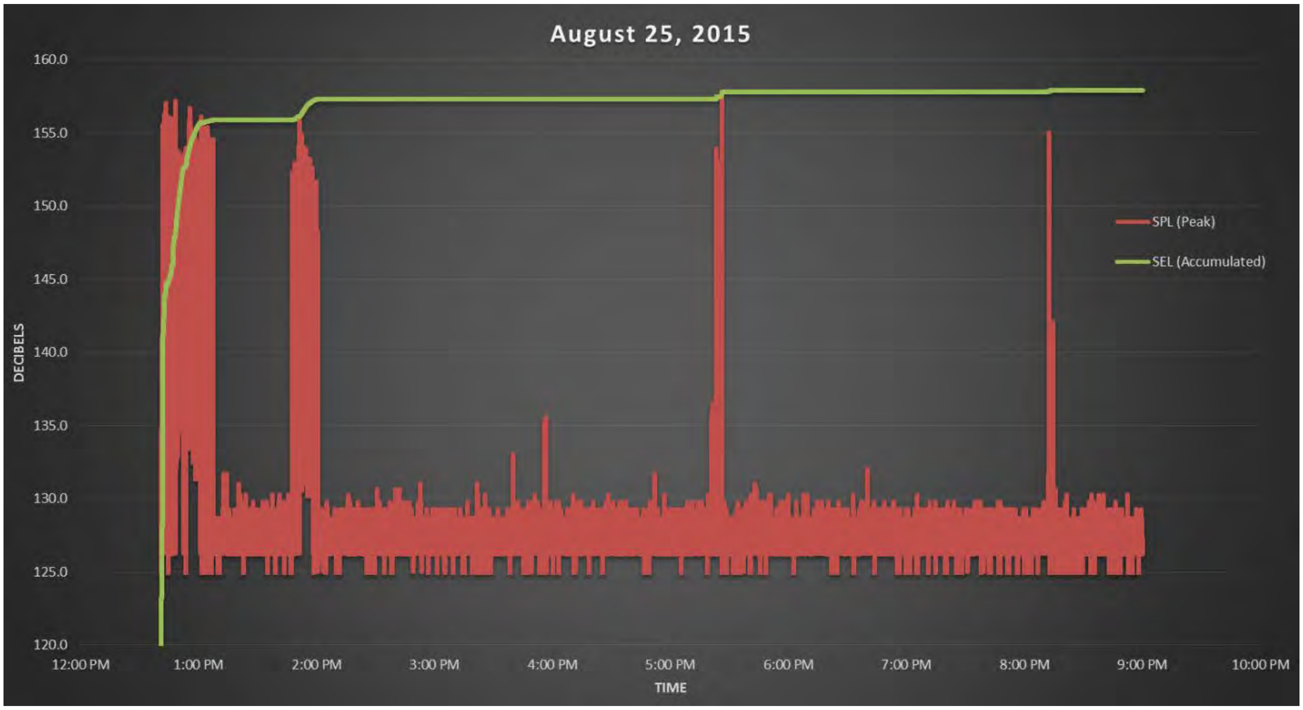
Date:	8/24/15	Accumulated SEL:	165.9 dB
Calibration Time:	8/24/15 8:00 AM	SPL Peak (max):	160.9 dB
Start Time:	8/24/15 10:00 AM	RMS (max):	151.4 dB
End Time:	8/24/15 6:00 PM		
Duration:	8h 00m		
Hammer:	ICE 80S		
Total Blow Count:	5,303		
Total Number of Piles Driven:	2		

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



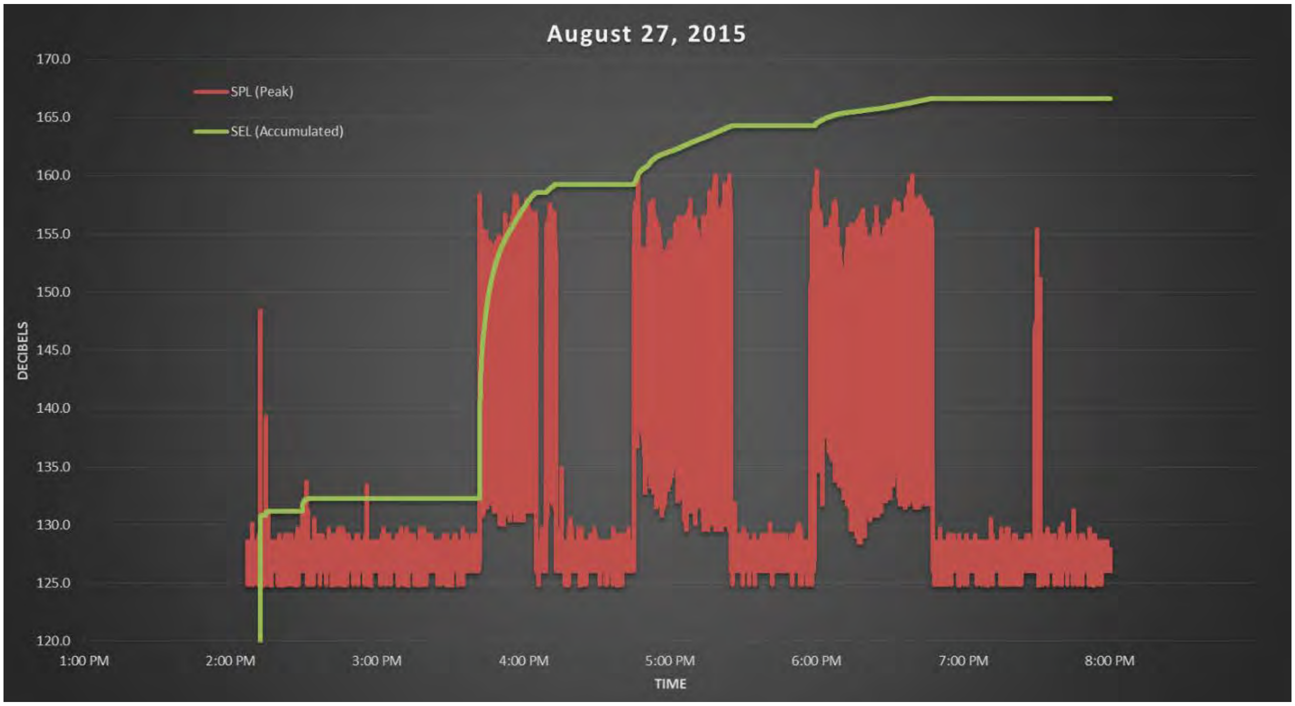
Date:	8/25/15	Accumulated SEL:	167.5 dB
Calibration Time:	8/25/15 8:05 AM	SPL Peak (max):	159.7 dB
Start Time:	8/25/15 8:10 AM	RMS (max):	147.9 dB
End Time:	8/25/15 12:20 PM		
Duration:	4h 10m		
Hammer:	ICE 80S		
Total Blow Count:	4,558		
Total Number of Piles Driven:	2		

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



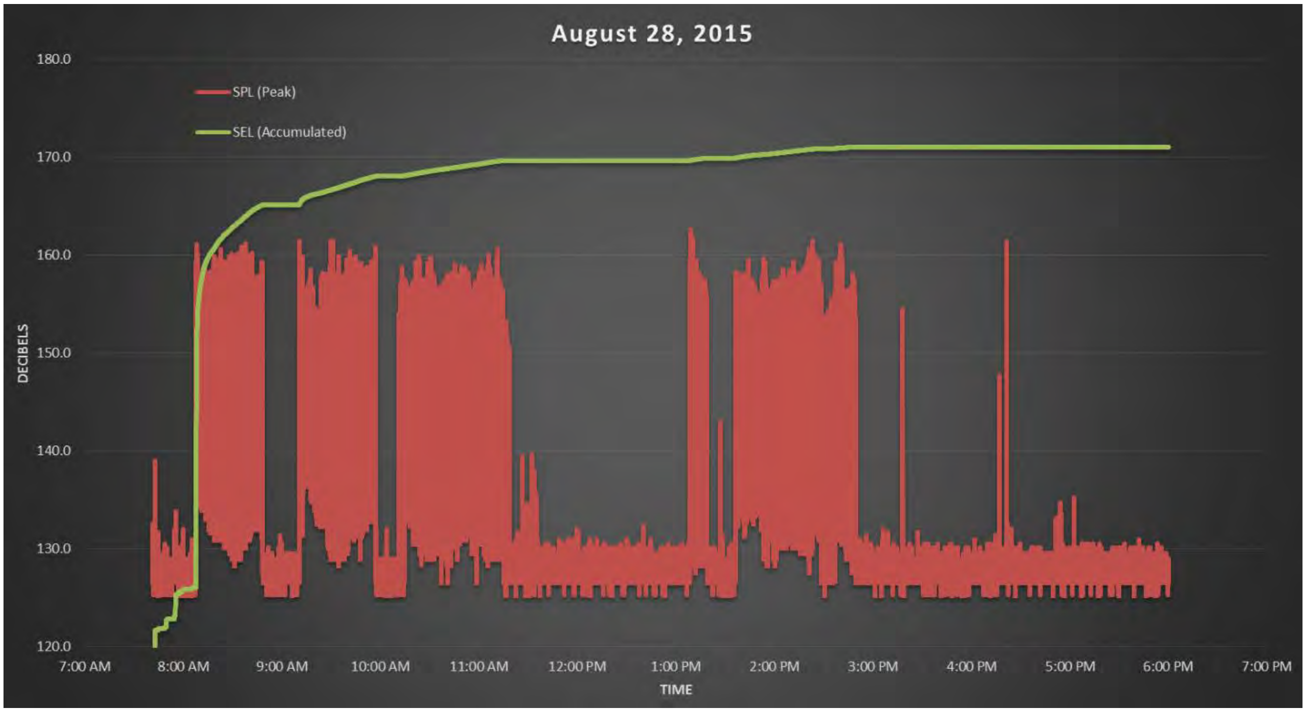
Date:	8/25/15	Accumulated SEL:	157.9 dB
Calibration Time:	8/25/15 12:34 PM	SPL Peak (max):	157.8 dB
Start Time:	8/25/15 12:40 PM	RMS (max):	150.3 dB
End Time:	8/26/15 9:00 PM		
Duration:	8h 20m		
Hammer:	ICE 80S		
Total Blow Count:	1,075		
Total Number of Piles Driven:	1		

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



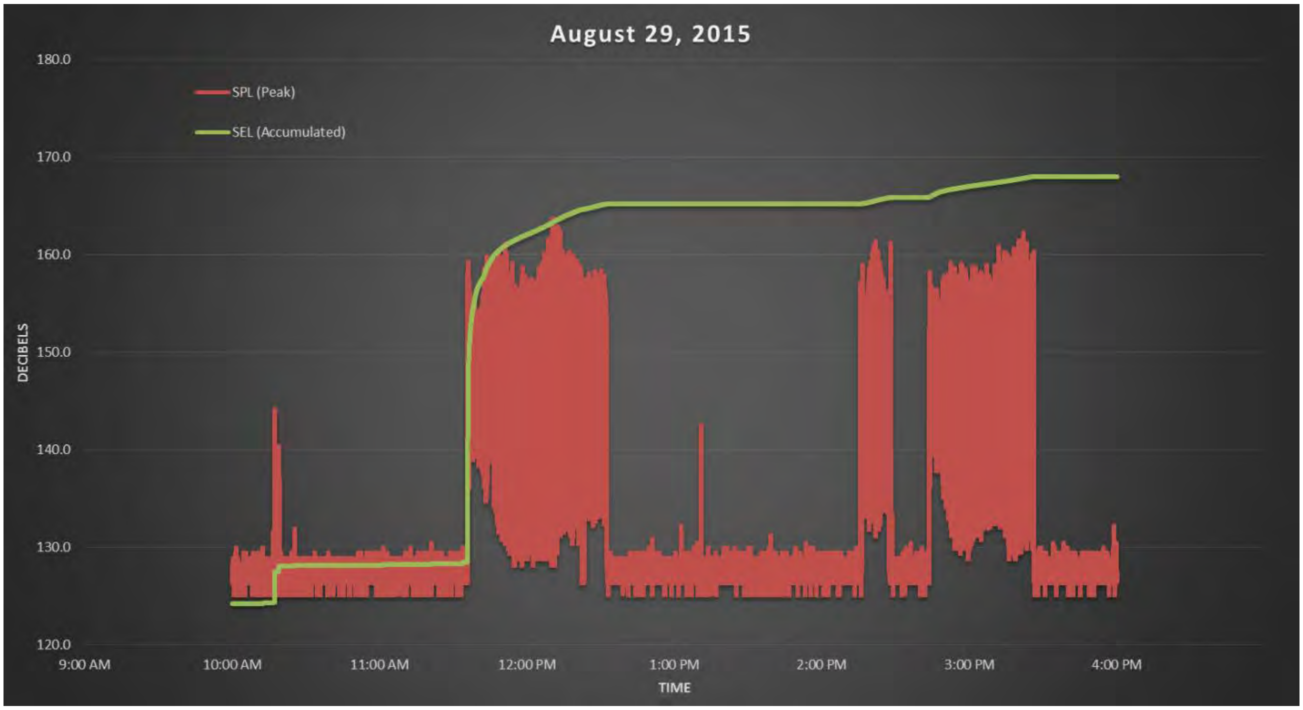
Date:	8/27/15	Accumulated SEL:	166.8 dB
Calibration Time:	8/27/15 2:02 PM	SPL Peak (max):	160.4 dB
Start Time:	8/27/15 2:06 PM	RMS (max):	147.6 dB
End Time:	8/27/15 8:00 PM		
Duration:	5h 54m		
Hammer:	ICE 80S		
Total Blow Count:	5,842		
Total Number of Piles Driven:	2		

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



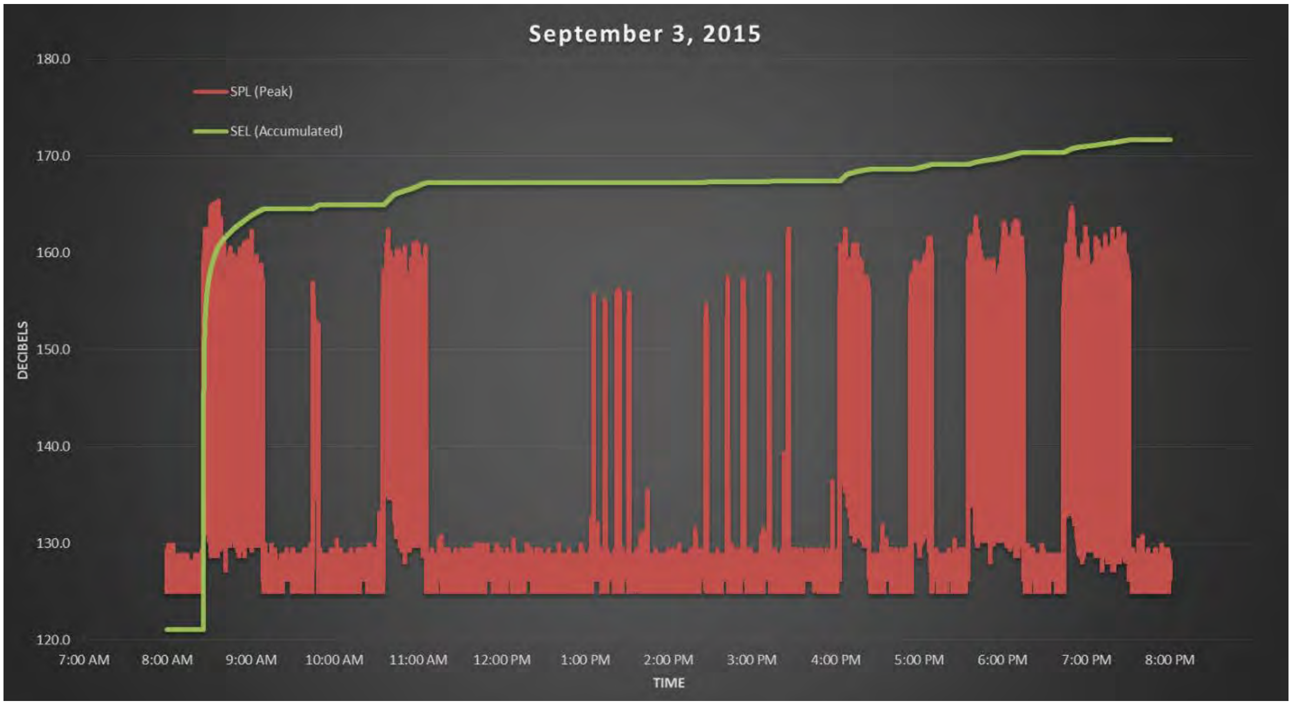
Date:	8/28/15	Accumulated SEL:	171.1 dB
Calibration Time:	8/28/15 7:37 AM	SPL Peak (max):	162.6 dB
Start Time:	8/28/15 7:40 AM	RMS (max):	152.5 dB
End Time:	8/28/15 6:00 PM		
Duration:	10h 20m		
Hammer:	ICE 80S		
Total Blow Count:	8,846		
Total Number of Piles Driven:	4		

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



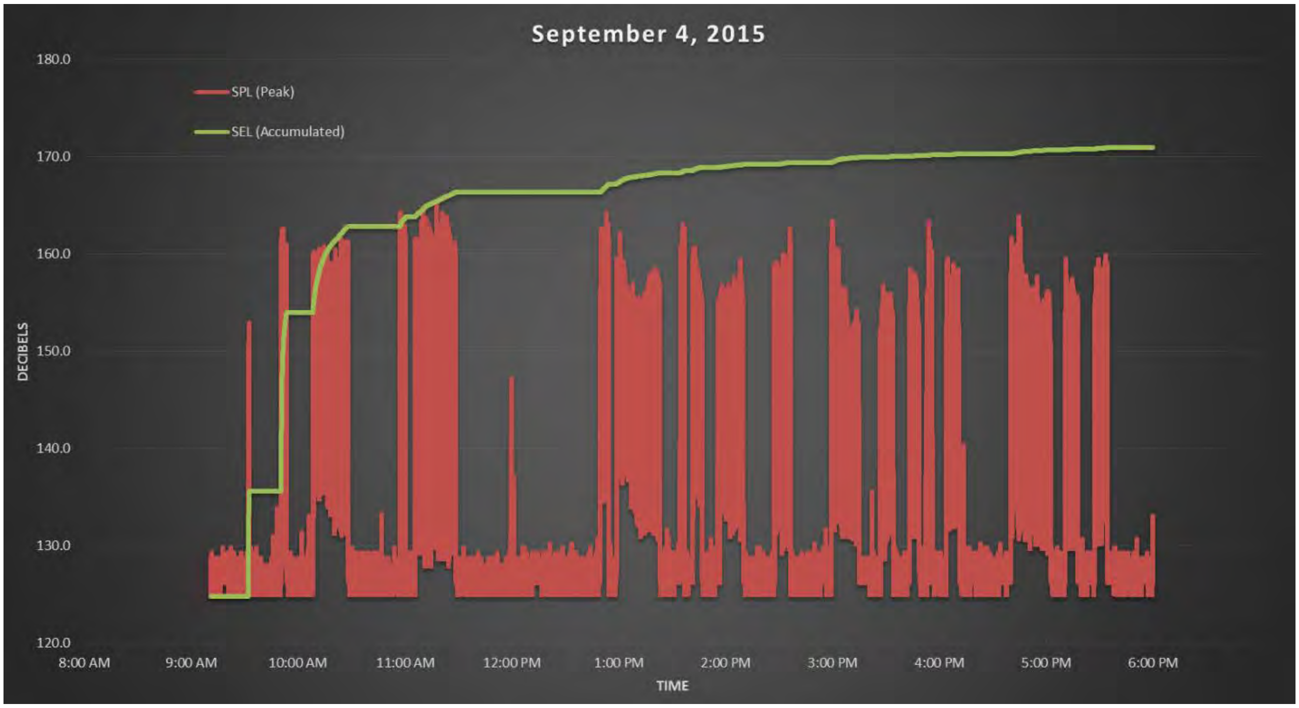
Date:	8/29/15	Accumulated SEL:	168.1 dB
Calibration Time:	8/29/15 7:47 AM	SPL Peak (max):	163.9 dB
Start Time:	8/29/15 10:00 AM	RMS (max):	151.1 dB
End Time:	8/29/15 4:00 PM		
Duration:	6h 00m		
Hammer:	ICE 80S		
Total Blow Count:	4,686		
Total Number of Piles Driven:	2		

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



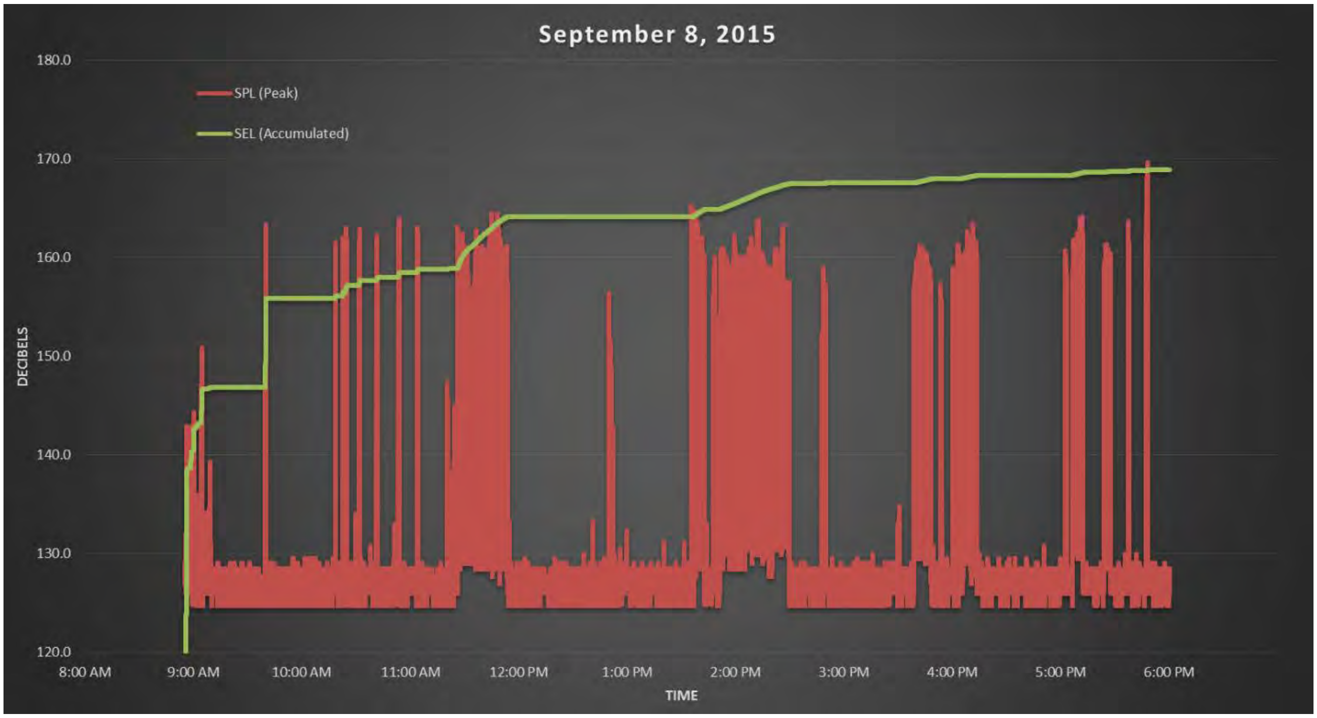
Date:	9/3/15	Accumulated SEL:	171.7 dB
Calibration Time:	9/3/15 7:45 AM	SPL Peak (max):	165.4 dB
Start Time:	9/3/15 7:47 AM	RMS (max):	147.7 dB
End Time:	9/3/15 8:00 PM		
Duration:	12h 13m		
Hammer:	ICE 80S		
Total Blow Count:	7,968		
Total Number of Piles Driven:	5		

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



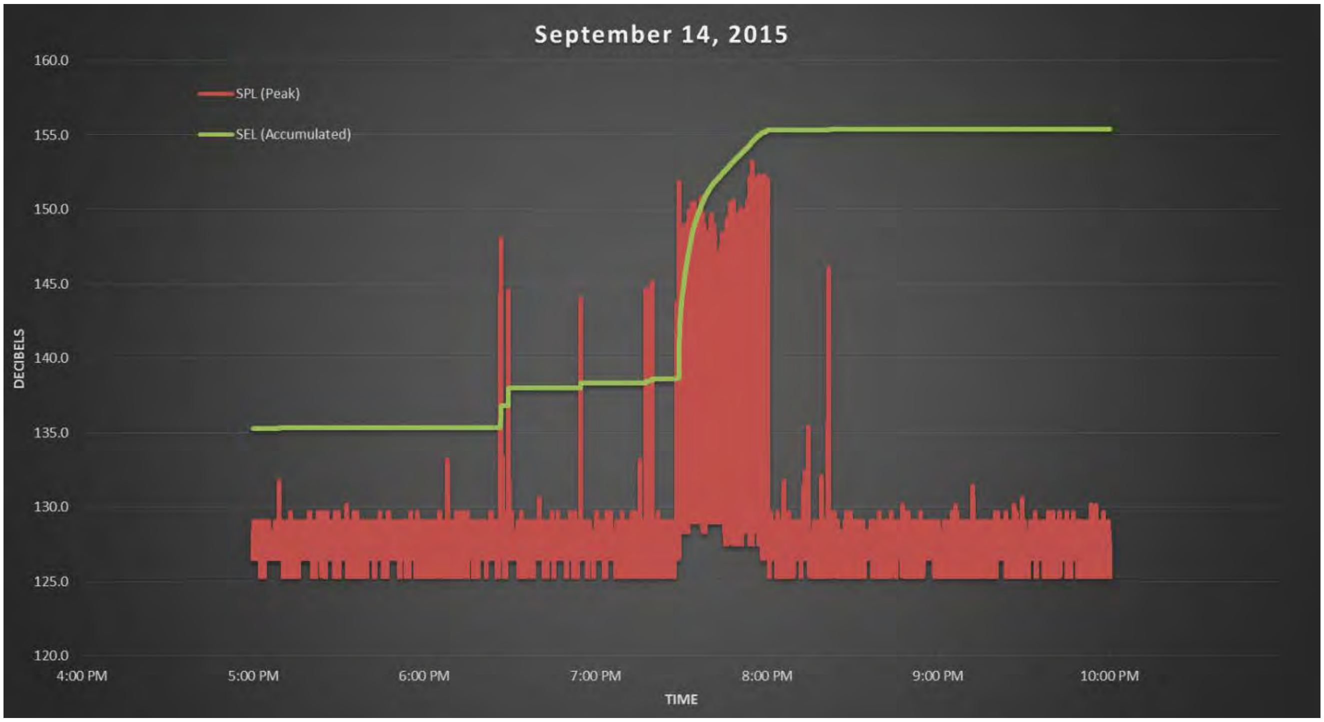
Date:	9/4/15	Accumulated SEL:	170.9 dB
Calibration Time:	9/4/15 8:59 AM	SPL Peak (max):	165.3 dB
Start Time:	9/4/15 9:03 AM	RMS (max):	158.9 dB
End Time:	9/4/15 6:02 PM		
Duration:	8h 59m		
Hammer:	ICE 80S		
Total Blow Count:	8,071		
Total Number of Piles Driven:	7		

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



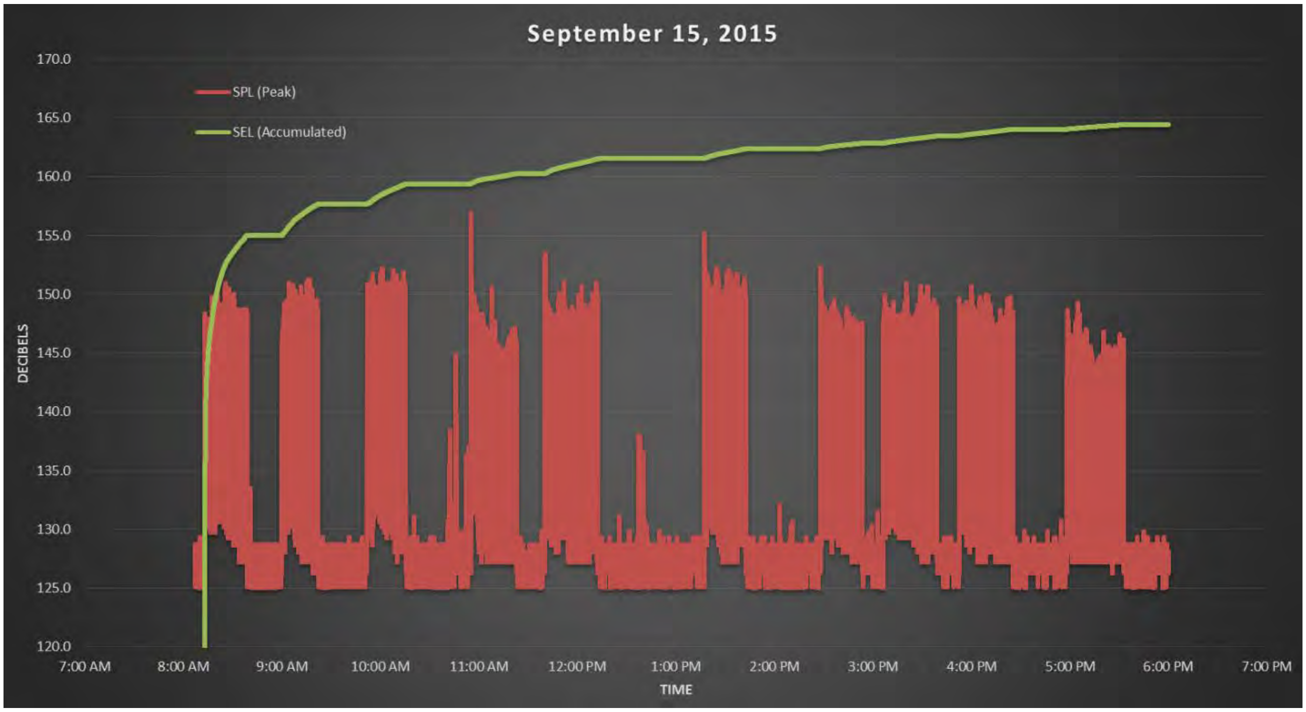
Date:	9/8/15	Accumulated SEL:	169.0 dB
Calibration Time:	9/8/15 8:46 AM	SPL Peak (max):	169.7 dB
Start Time:	9/8/15 8:55 AM	RMS (max):	160.7 dB
End Time:	9/8/15 6:00 PM		
Duration:	9h 05m		
Hammer:	ICE 80S		
Total Blow Count:	3,900		
Total Number of Piles Driven:	11 Restrikes		

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



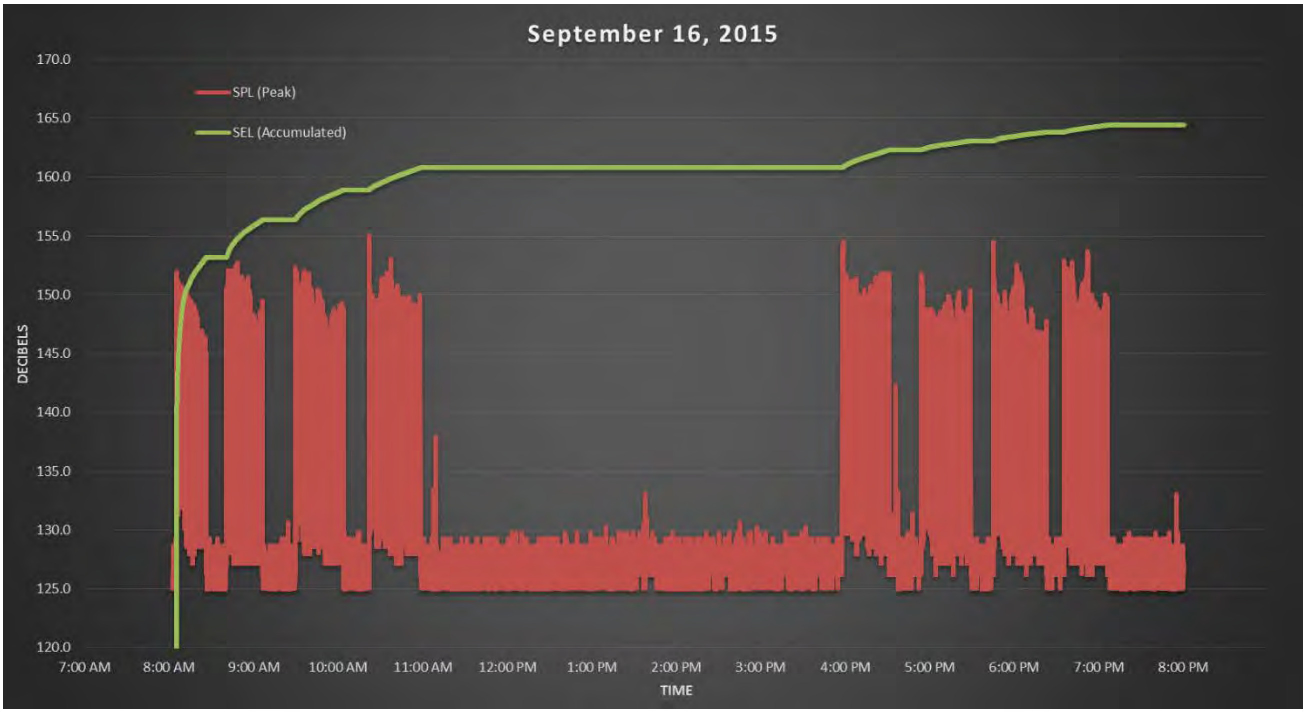
Date:	9/14/15	Accumulated SEL:	155.8 dB
Calibration Time:	9/14/15 9:02 AM	SPL Peak (max):	153.2 dB
Start Time:	9/14/15 5:00 PM	RMS (max):	141.2 dB
End Time:	9/14/15 10:00 PM		
Duration:	5h 00m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	1,368		
Total Number of Piles Driven:	1		

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



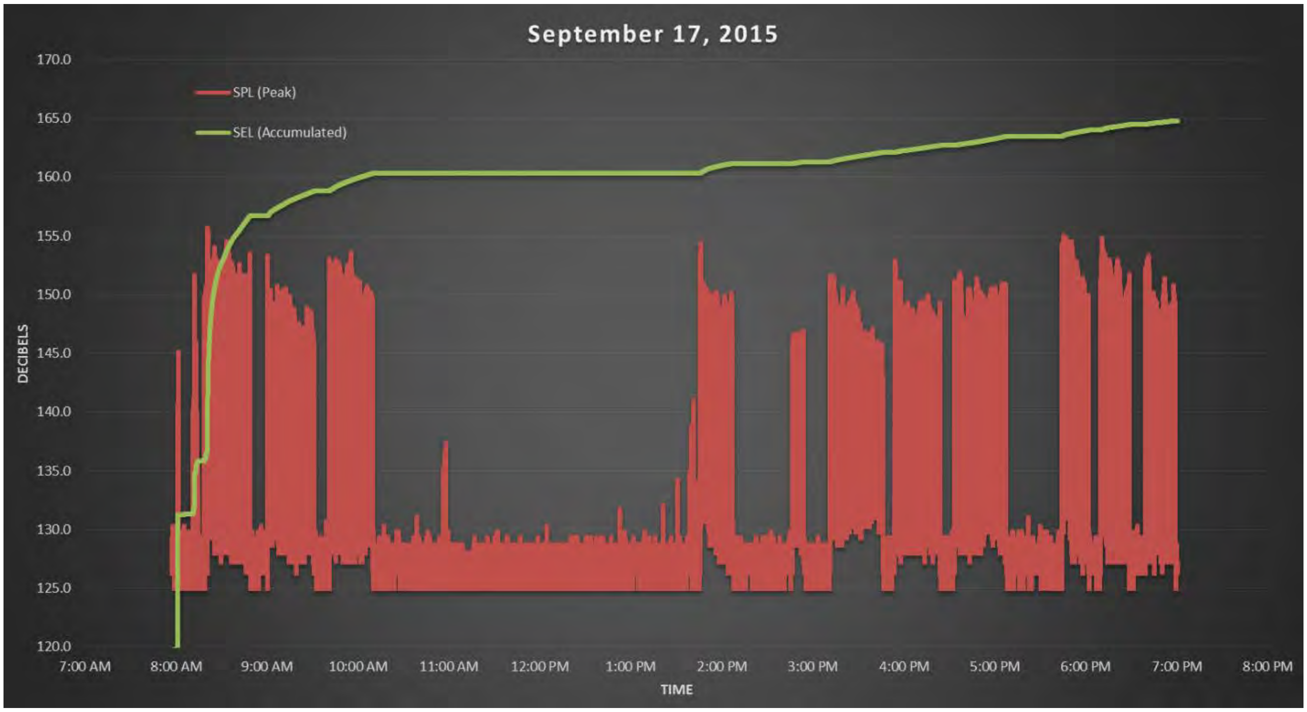
Date:	9/15/15	Accumulated SEL:	164.7 dB
Calibration Time:	9/15/15 8:04 AM	SPL Peak (max):	156.8 dB
Start Time:	9/15/15 8:07 AM	RMS (max):	145.7 dB
End Time:	9/15/15 6:00 PM		
Duration:	9h 53m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	12,554		
Total Number of Piles Driven:	10		

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



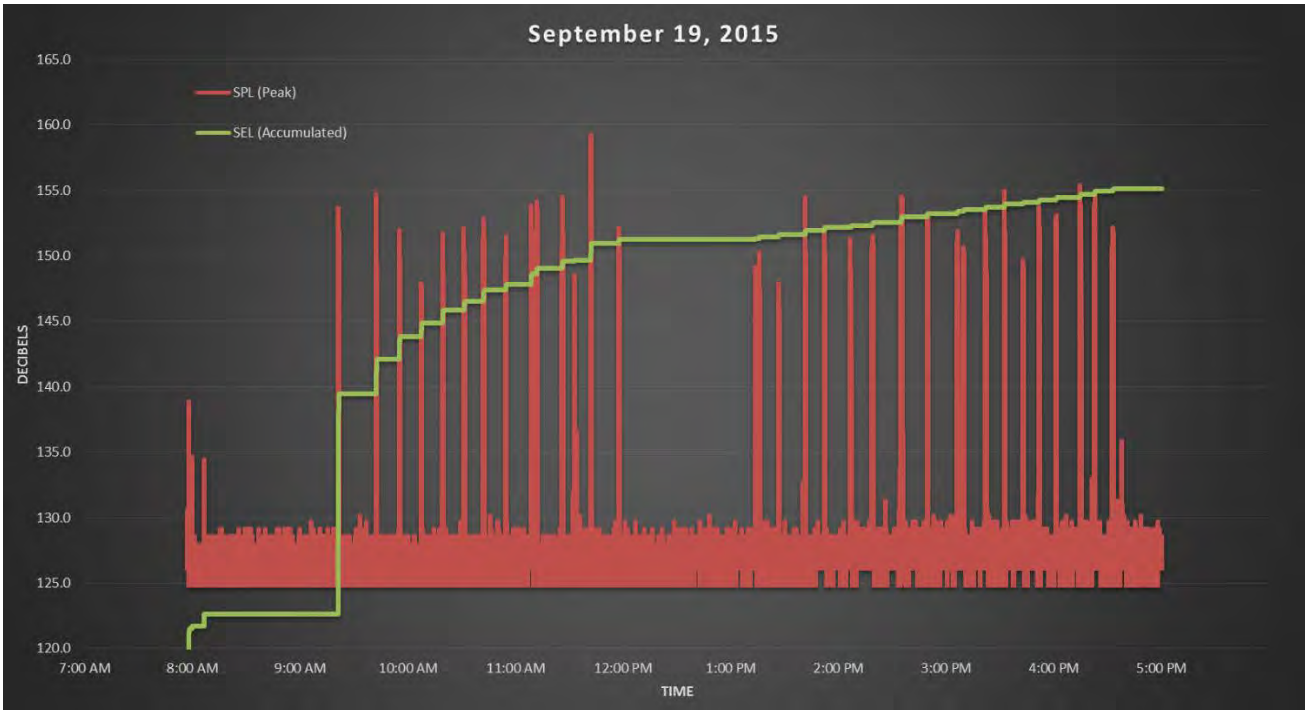
Date:	9/16/15	Accumulated SEL:	164.7 dB
Calibration Time:	9/16/15 7:58 AM	SPL Peak (max):	155.0 dB
Start Time:	9/16/15 8:02 AM	RMS (max):	143.0 dB
End Time:	9/16/15 8:00 PM		
Duration:	11h 58m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	8,717		
Total Number of Piles Driven:	8		

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



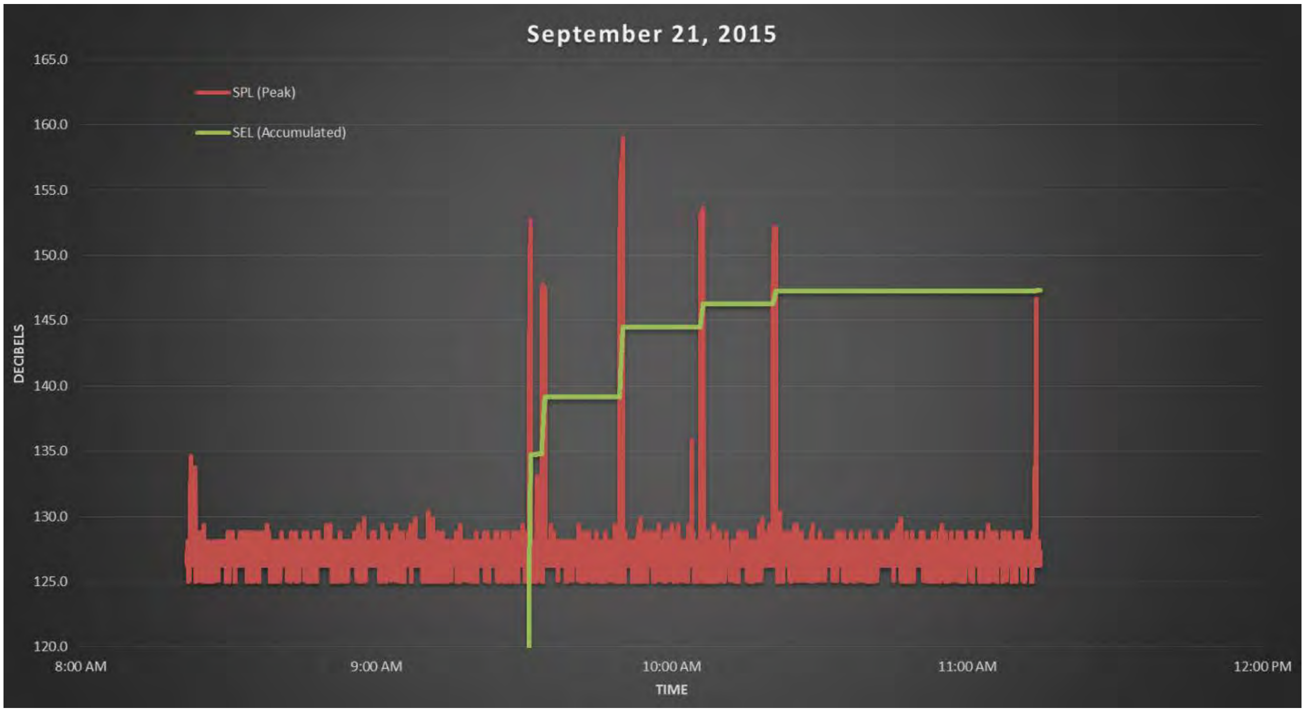
Date:	9/17/15	Accumulated SEL:	165.1 dB
Calibration Time:	9/17/15 7:54 AM	SPL Peak (max):	155.7 dB
Start Time:	9/17/15 7:57 AM	RMS (max):	142.9 dB
End Time:	9/17/15 7:00 PM		
Duration:	11h 03m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	11,882		
Total Number of Piles Driven:	10		

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



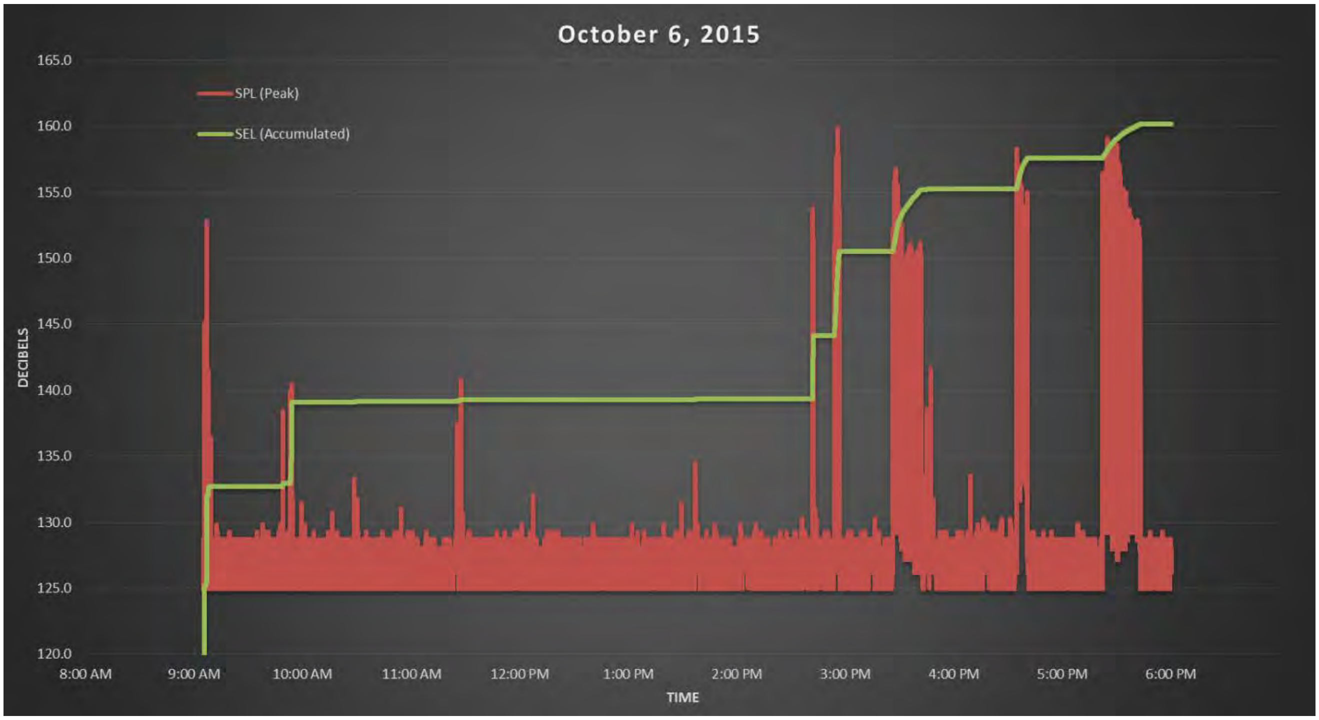
Date:	9/19/15	Accumulated SEL:	155.1 dB
Calibration Time:	9/19/15 7:52 AM	SPL Peak (max):	159.2 dB
Start Time:	9/19/15 7:57 AM	RMS (max):	144.0 dB
End Time:	9/19/15 5:00 PM		
Duration:	9h 03m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	723		
Total Number of Piles Driven:	29 Restrikes		

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



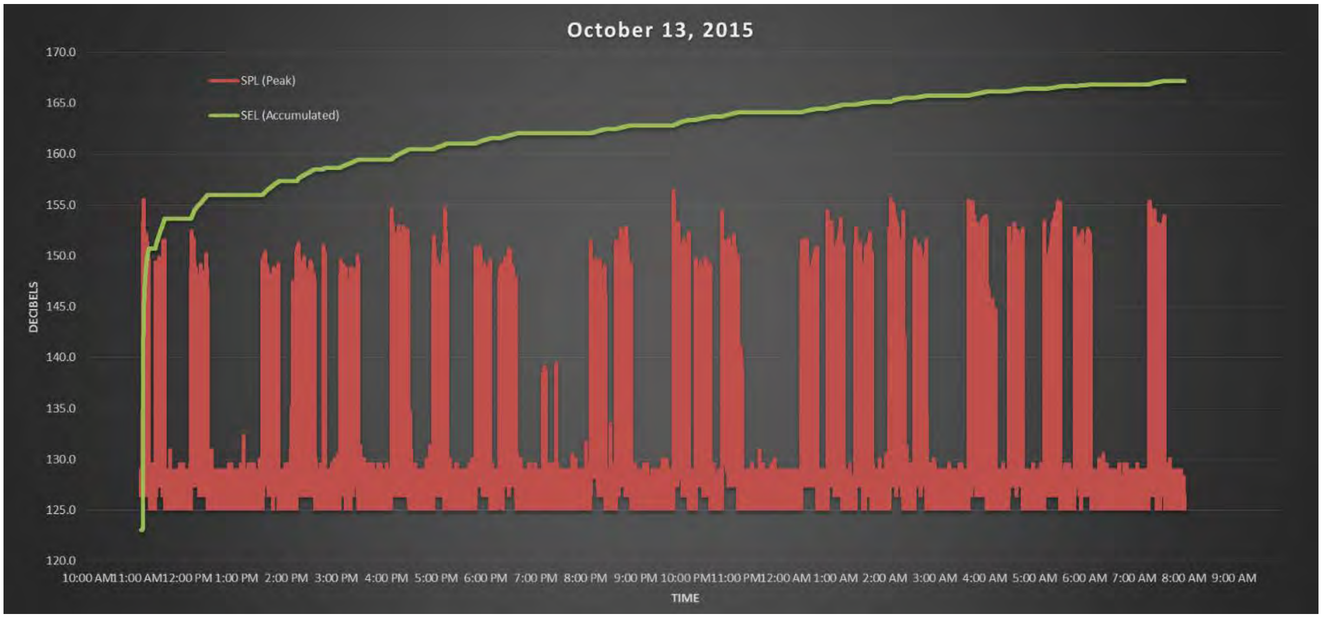
Date:	9/21/15	Accumulated SEL:	148.5 dB
Calibration Time:	9/21/15 8:19 AM	SPL Peak (max):	159.0 dB
Start Time:	9/21/15 8:21 AM	RMS (max):	142.9 dB
End Time:	9/21/15 11:14 AM		
Duration:	2h 53m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	100		
Total Number of Piles Driven:	4 Restrikes		

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



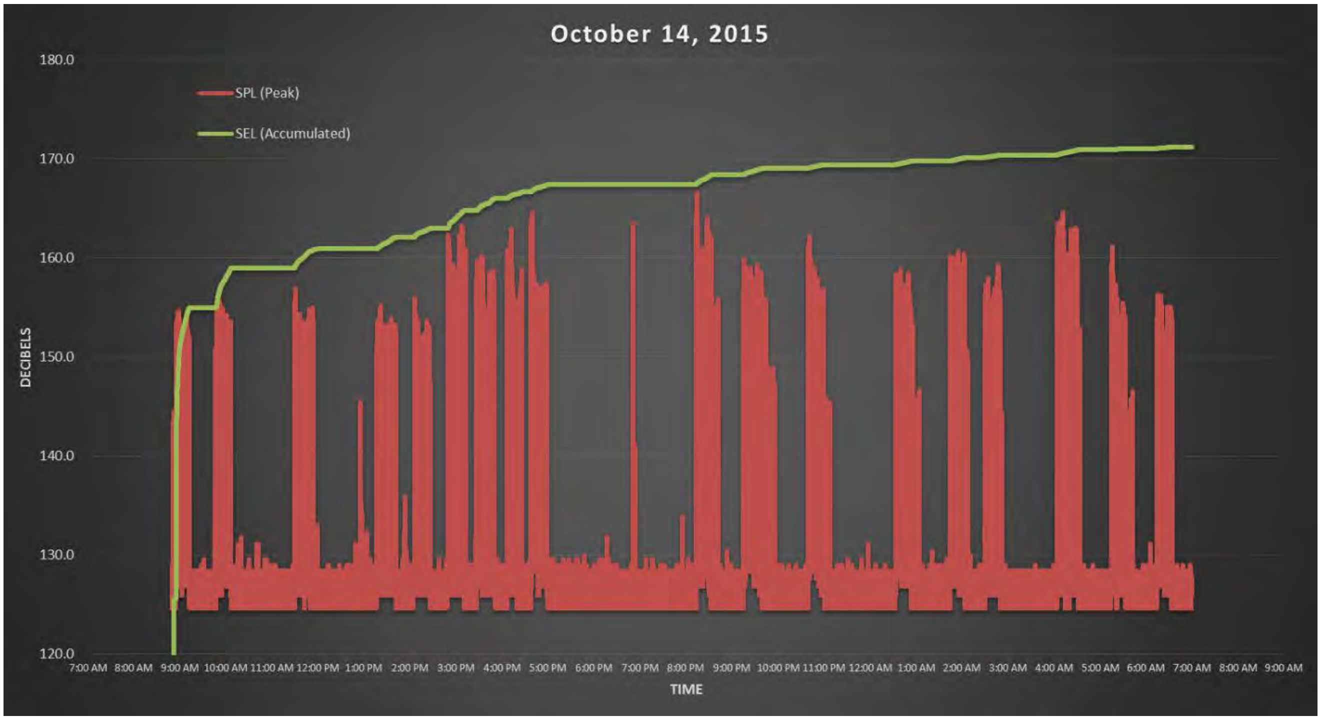
Date:	10/6/15	Accumulated SEL:	160.7 dB
Calibration Time:	10/6/15 9:02 AM	SPL Peak (max):	159.8 dB
Start Time:	10/6/15 9:04 AM	RMS (max):	145.1 dB
End Time:	10/6/15 6:00 PM		
Duration:	8h 56m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	1,613		
Total Number of Piles Driven:	2 Test Piles		

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



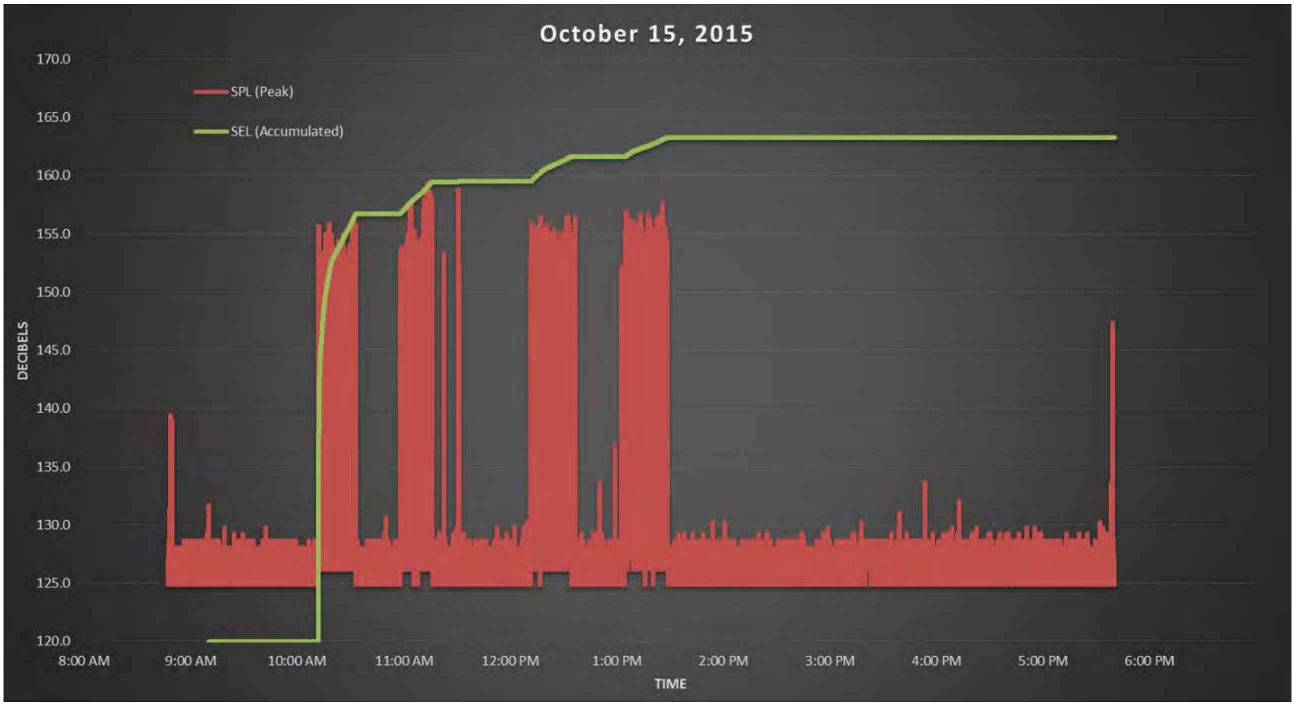
Date:	10/13/15	Accumulated SEL:	167.3 dB
Calibration Time:	10/13/15 10:14 AM	SPL Peak (max):	156.4 dB
Start Time:	10/13/15 11:05 AM	RMS (max):	145.2 dB
End Time:	10/14/15 8:05 AM		
Duration:	21h 00m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	17,693		
Total Number of Piles Driven:	24		

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



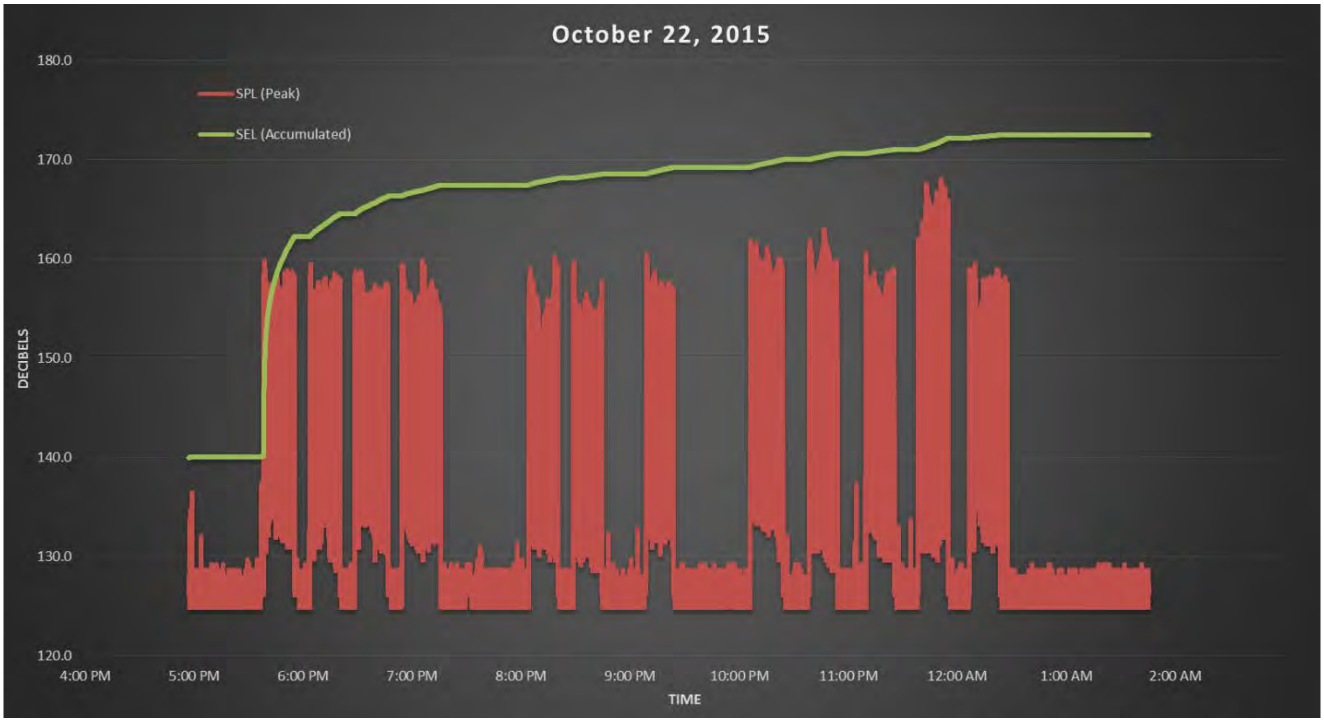
Date:	10/14/15	Accumulated SEL:	171.3 dB
Calibration Time:	10/14/15 8:47 AM	SPL Peak (max):	166.6 dB
Start Time:	10/14/15 8:50 AM	RMS (max):	157.4 dB
End Time:	10/15/15 7:00 AM		
Duration:	22h 10m		
Hammer:	ICE Model I-46^{V2}		
Total Blow Count:	13,071		
Total Number of Piles Driven:	18		

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-46V2		
Total Blow Count:	3,260		
Total Number of Piles Driven:	4		

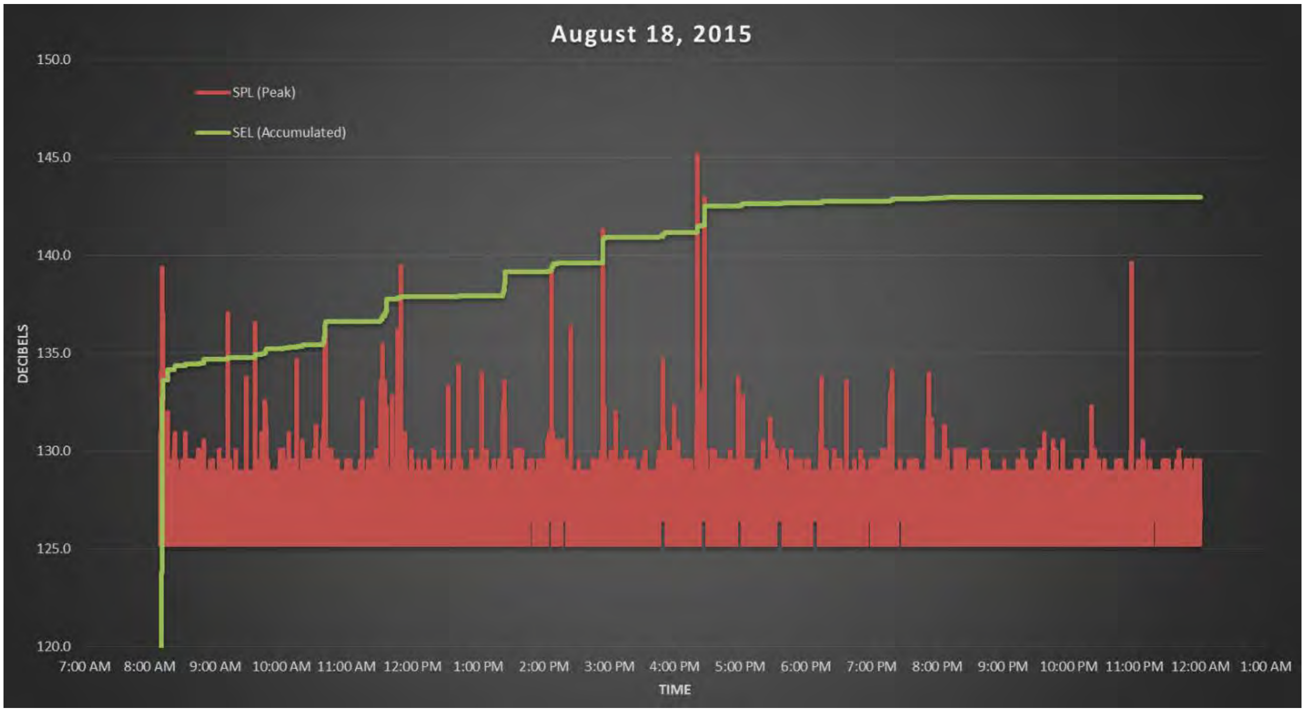
Pier Number:	3
Water Depth:	1.8 m (6 ft)
Distance from cofferdam:	10.0 m (33 ft)
Distance from Pile:	16.7 m (55 ft)
River Flow Velocity:	< 1.5 m/s



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		

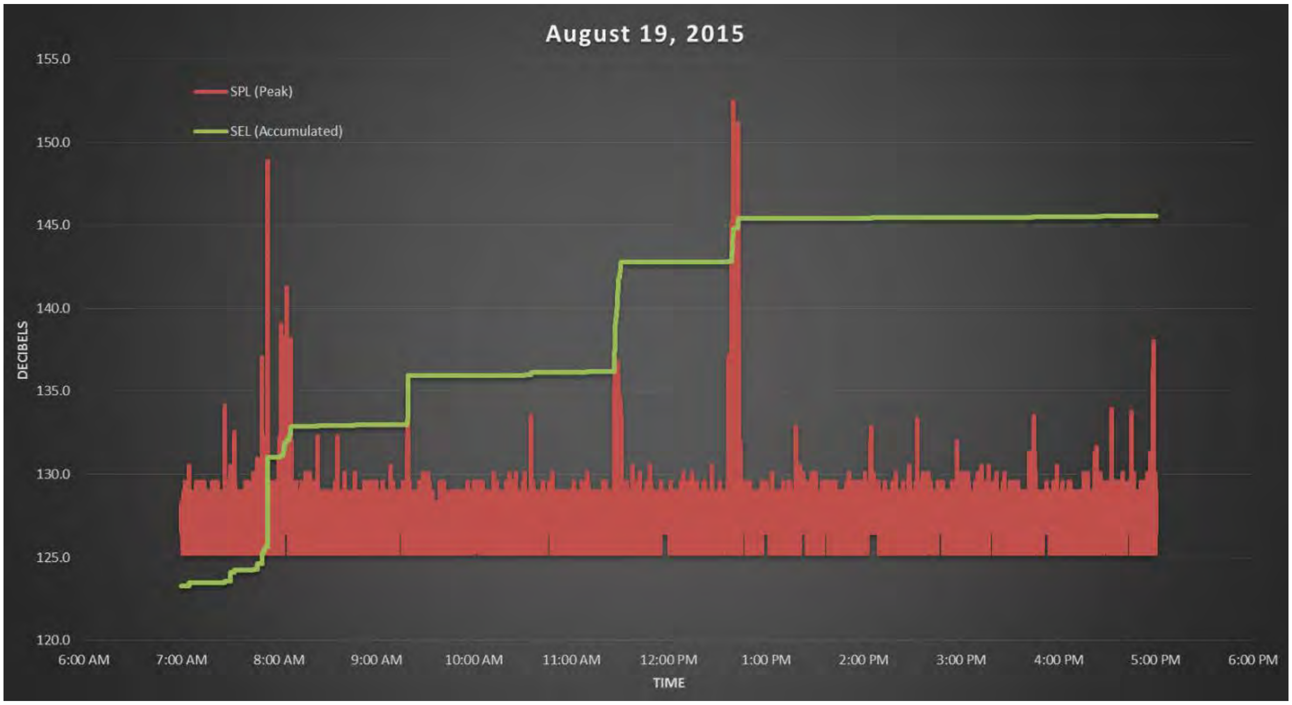
Pier Number:	3
Water Depth:	6.4 m (21 ft)
Distance from cofferdam:	Inside
Distance from Pile:	16.8-19.2 m (55-63 ft)
River Flow Velocity:	< 1.50 m/s

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