Appendix XV

Unanticipated Discovery Plan

Unanticipated Discoveries Plan for Cultural Resources and Human Remains

Guidelines for Unanticipated Discovery of Cultural Resources and Human Remains

Introduction

Pursuant to the regulatory requirements of Section 106 of the National Historic Preservation Act (NHPA) (16 United States Code [U.S.C.] 470) and its implementing regulation 36 Code of Federal Regulations (CFR) 800 (as amended August 5, 2004), and Section 3(d) (U.S.C. Part 3002) of the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. Part 3001-3013), the Archaeological Resource Protection Act (ARPA) (Public Law 96-95, 16 U.S.C. 470aa-mm); North Dakota Century Code (NDCC) 27; NDCC §55-02-07; and the administrative rules in the North Dakota Administrative Code (NDAC) Chapter 40-02-03, BakkenLink Pipeline LLC (BakkenLink) has established the following procedures to be followed by BakkenLink personnel and their contractors in the event previously unrecorded and unanticipated cultural resources or human remains are found during construction of the BakkenLink Dry Creek to Beaver Lodge Project (Project). This document serves as the primary guidance tool for BakkenLink and its contractors so they can comply with federal and state laws and regulations.

Cultural resources include locations of human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral history. The term includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include locations (sites or places) of traditional, religious, and cultural importance to specified social and/or cultural groups.

A cultural resource discovery could consist of, but is not limited to:

- Prehistoric features (e.g., hearths, occupational surfaces, middens, charcoal stains)
- Prehistoric artifacts (e.g., debitage, projectile points)
- Historic features (e.g., wells, trails, foundations, cisterns)
- Historic artifacts (e.g., pottery, pipes, glass beads, shell)
- Burials and funerary items (including, but not limited to skeletal remains, headstones, coffin wood fragments, burial goods [e.g., pipes, pottery, ornaments])

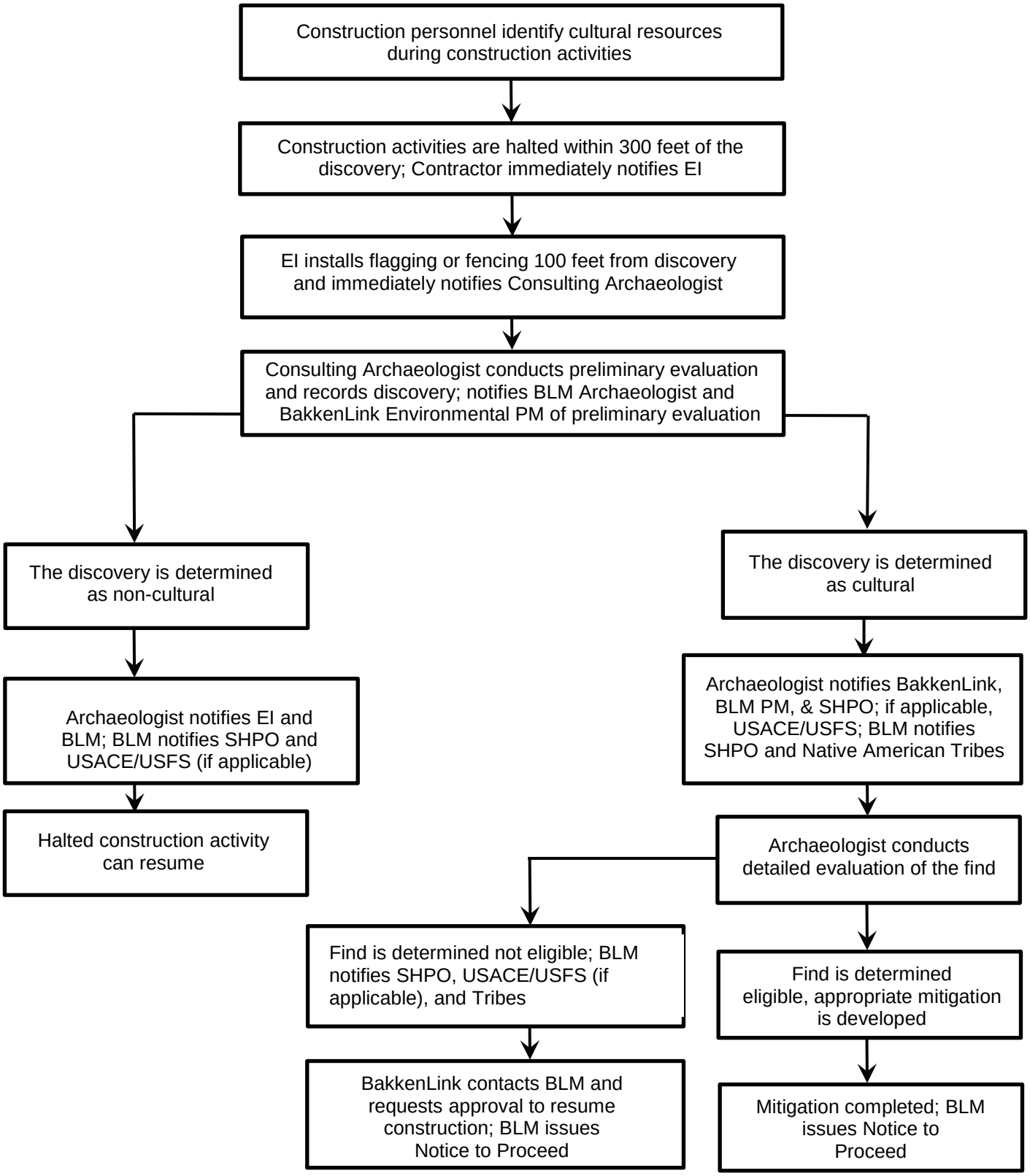
Unanticipated Discoveries Plan

A. Discovery of Cultural Material

The procedures for the discovery of cultural material are detailed below and also are shown on **Figure 1**.

- In the event construction personnel or the archaeological monitor identify a previously unrecorded cultural resource during construction activities, the Contractor will immediately cease work within a 300-foot radius of the discovery to protect the integrity of the find, and immediately notify the Environmental Inspector (EI). No cultural material will be moved from its original location.
- The EI will immediately notify BakkenLink's Environmental Project Manager, who will coordinate with the Consulting Archaeologist. The Consulting Archaeologist will travel to the location of the discovery to conduct a preliminary evaluation of the find.
- The EI will install temporary flagging or fencing approximately 100 feet from the discovery to provide a sufficient buffer and to protect the discovery itself from additional disturbance. No fencing will be installed outside of the ROW without prior approval from the landowner (if on private land).

Figure 1
Procedures for Unanticipated Discovery of Cultural Resources



- The Consulting Archaeologist will document the find using the appropriate North Dakota Cultural Resource Survey (NDCRS) form within 48 hours of the discovery, and will consult with the North Dakota State Historic Preservation Officer (SHPO), to determine if the discovery qualifies as a an archaeological site and if the site is potentially eligible for listing in the National Register of Historic Places (NRHP). The Consulting Archaeologist will notify BakkenLink' Environmental Project Manager and the Bureau of Land Management (BLM) Archaeologist of the preliminary evaluation of the significance of the find within 72 hours, or sooner if possible.
- If the discovery is determined by the BLM and SHPO, in consultation with the federal land managing agency Archaeologist, as appropriate, and Native American Tribes, as non-cultural or determined to be an isolated find or a site that is not eligible for the NRHP, the BLM Archaeologist will provide written notification to BakkenLink that construction can resume, and the Consulting Archaeologist will notify the EI that construction can resume. The EI will have the authority to remove the stop-work order and resume construction activities. Within 5 business days of the discovery, the Consulting Archaeologist will submit a letter report summarizing the findings to the BLM Archaeologist.
- If the discovery is determined by the BLM Archaeologist and SHPO, in consultation with the federal land managing agency Archaeologist, as appropriate, and Native American Tribes to be a site that is potentially eligible for the NRHP, the Consulting Archaeologist will notify BakkenLink's Environmental Project Manager and the BLM Project Manager, and the procedures outlined below in Section B, "Discovery of Potentially Significant Materials" will be followed. If the discovery is determined to be human remains, the procedures outlined below in Section D, "Discovery of Human Remains," will be followed.

B. Discovery of Potentially NRHP-Eligible Cultural Material

As previously discussed in Section A, the EI will ensure that the appropriate measures have been taken to protect and secure the discovery from additional disturbance. The procedures for the discovery of potentially significant cultural material are detailed below and also are shown on **Figure 1**.

- In addition to the BLM Project Manager and BakkenLink's Environmental Project Manager, the Consulting Archaeologist will notify SHPO, and if applicable the U.S. Forest Service (USFS) Archaeologist and the U.S. Army Corps of Engineer (USACE) Archaeologist within 24 hours of determination of the site's potential significance. If the site is associated with prehistoric or historic Native American culture, the BLM Archaeologist will immediately notify the Native American Tribes participating in the consultation efforts for the Project.
- The Consulting Archaeologist will be provided 3 days to conduct a detailed assessment and evaluation of the significance of the find assuming that it is safe to do so. If due to safety reasons, the significance of the find cannot be determined in 3 days an extension will be given so that the proper safety mechanisms can be put in place. The Consulting Archaeologist will provide recommendations regarding the NRHP eligibility and the potential adverse effects associated with construction activities. Within 3 days of completing the assessment and evaluation, the Consulting Archaeologist will provide the findings to the BLM Archaeologist, SHPO, and federal land managing agency Archaeologist, as appropriate.
- If the find is determined by the BLM Archaeologist and federal land managing Archaeologist, as appropriate, in consultation with SHPO, to be eligible for listing in the NRHP and at risk of being adversely affected by construction activities, BakkenLink will request mitigation recommendations from the BLM who in turn will consult with the federal land managing agency Archaeologist (as appropriate), SHPO, and Native American Tribes. If needed, a mitigation or treatment plan will be developed by the Consulting Archaeologist and submitted to the BLM Archaeologist within 3 days of the determination. The mitigation or treatment plan will take into consideration any safety issues that may be present near the discovery. The

BLM Archaeologist will forward the treatment plan to the federal land managing agency Archaeologist, as appropriate, SHPO, and interested Native American Tribes, who in consultation will have 5 business days to review and approve the plan. Mitigation may include:

- Variance request to reroute around the site;
- Site visits by the BLM, SHPO, Native American tribes, and other applicable parties;
- Data recovery, which may include the systematic professional excavation of the site; or
- Other mitigation (in lieu of data recovery) determined by the BLM Archaeologist through consultation with the SHPO, Native American tribes, and other applicable parties.

- Mitigation will commence immediately after approval of the mitigation or treatment plan by the BLM Archaeologist, SHPO, and federal land managing agency Archaeologist (if applicable). All necessary permits will be issued by the federal land managing agency in consultation with the BLM prior to the commencement of mitigation. No construction activities in the area of the discovery will be resumed until treatment has been completed and the BLM Project Manager has issued a Notice to Proceed. If the site does not qualify as an historic property, BakkenLink will consult with the BLM, SHPO, and other applicable parties, and will request approval to resume construction activities. BLM will provide written notice that construction activities can resume at the discovery location.

C. Discovery of Underwater Cultural Material(s) and Visual Inspection of the Lake Crossing

Construction activities for the lake crossing, that include lowering the pipe and pulling the pipe across the lake bottom, have the potential for underwater inadvertent discoveries. Commercial divers will be trained to identify cultural material(s) that may require additional investigation by a Consulting Archaeologist. The role of the commercial diver will be to observe the lowering of the pipe, take measurements concerning pipe depth, and observe the underwater construction for the possibility of an inadvertent discovery from a safe distance. A commercial diver will make a video recording of the closed trench of the lake crossing after all construction activity has been completed. This video will be made available to the public upon request.

If BakkenLink discovers potential cultural material(s), such as sonar image or visual confirmation of stone features and/or artifacts, during construction of the lake crossing, BakkenLink will:

- Immediately cease lake bottom disturbing activities within the area of the discovery and immediately notify the EI. No cultural materials will be transported from its original location unless directed to do so by the BLM Archaeologist in consultation with SHPO.
- The EI will notify BakkenLink's Environmental Project Manager who will coordinate with the Consulting Archaeologist and the BLM Archaeologist regarding the preliminary evaluation of the find. If the discovery is determined by the Consulting Archaeologist, in consultation with the BLM Archaeologist, as non-cultural or determined to be an isolated find or site of no significance, the Consulting Archaeologist will immediately notify the EI that construction can resume. The EI will have the authority to remove the stop-work order and resume construction activities. Within 5 business days, the Consulting Archaeologist will submit a letter report summarizing the findings to the BLM Archaeologist.
- If the discovery is determined by the Consulting Archaeologist, in consultation with the BLM Archaeologist, as a potentially significant site, the Consulting Archaeologist will notify BakkenLink's Environmental Project Manager and the BLM Project Manager, and the procedures outlined below in Section B, "Discovery of Potentially Significant Materials", will be followed. If the discovery is determined to be human remains, the procedures outlined below in Section D, "Discovery of Human Remains" will be followed. If necessary, a trained underwater archaeologist will be used to investigate the inadvertent discovery.

D. Discovery of Human Remains

BakkenLink will comply with relevant federal laws and the NDCC 23-06-27 and accompanying administrative rules (NDAC 40-02-03). In addition, the Advisory Council on Historic Preservation's Policy Statement on the Treatment of Burial Sites (2007) also will be taken into account to assure that the remains are treated with dignity and respect. Procedures for the discovery of human remains are detailed below and also are shown on **Figure 2**.

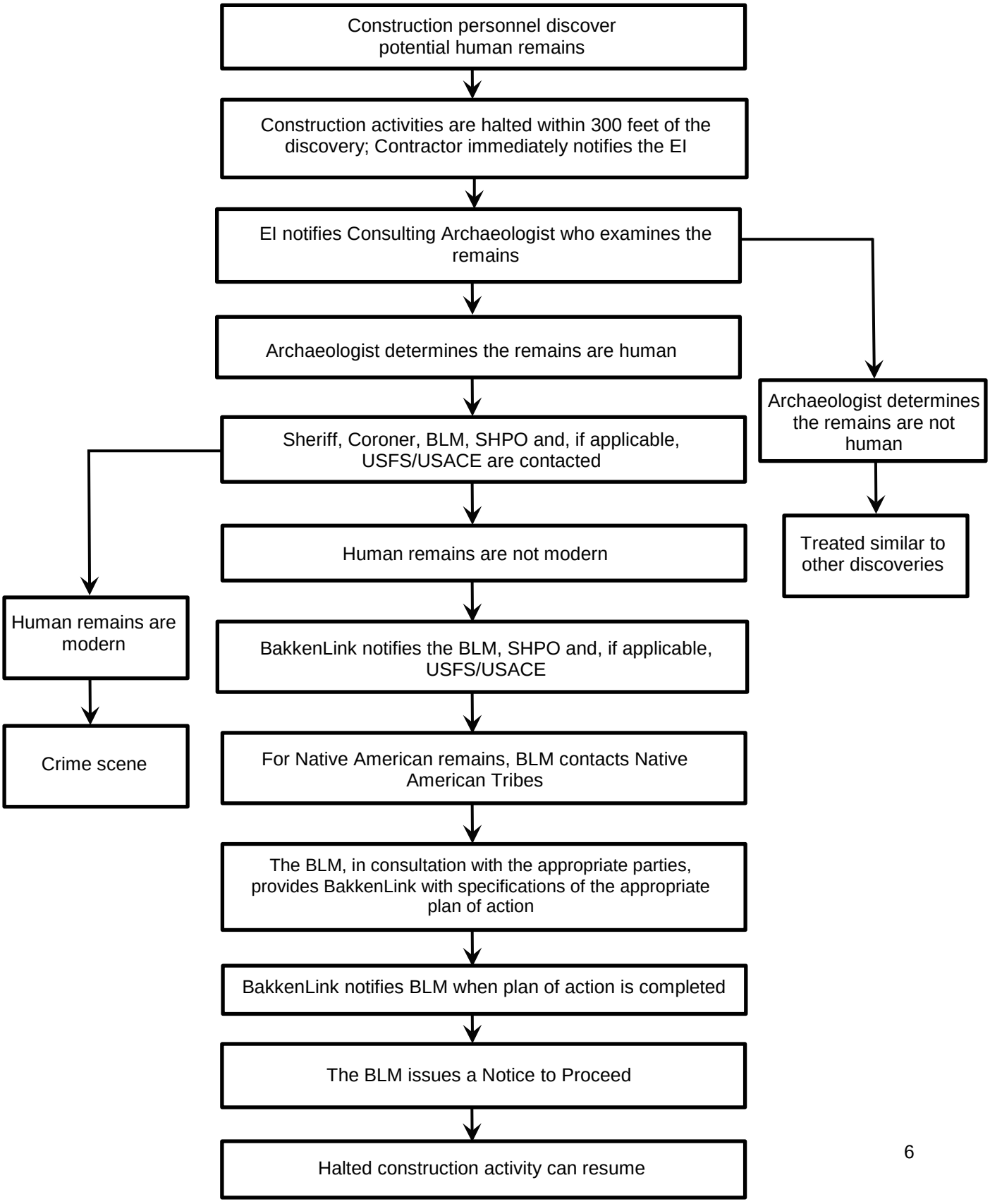
The following three bullet items will be followed regardless of land ownership:

- If human remains are encountered during construction, all construction activities will cease immediately within a 300-foot radius of the remains, and the Contractor will immediately notify the EI. The EI will notify the Consulting Archaeologist, who will examine the remains.
- If the remains are determined to be non-human and are associated with cultural material, the procedures outlined in Section A will be followed.
- If the remains are determined to be human, the EI will immediately contact the BLM Project Manager, BLM Archaeologist, and BakkenLink Environmental Project Manager. The remains will be left in place, and the EI will erect exclusionary fencing in a 50-foot radius around the discovery. In the event of adverse weather conditions, the remains will be covered with protective, waterproof material. Vehicle traffic will be prohibited from passing through the area, and, if necessary, a guard will be posted at the site.

For Human Remains Found on Non-federal Land

- BakkenLink' Environmental Project Manager will immediately notify the county sheriff of the find, and will request that the sheriff contact the county coroner. If the sheriff or coroner determines that the remains are modern and constitute a law enforcement issue, all further work will be at the direction of the country sheriff, including notification that construction can resume.
- If the sheriff or coroner determines that the remains are not a law enforcement issue, the BLM Archaeologist in coordination with the SHPO will consult with BakkenLink, Native American Tribes, and other applicable parties regarding treatment of the remains. The BLM Archaeologist will ensure that appropriate treatment of the human remains is carried out by BakkenLink prior to construction activities being resumed in the area of the discovery. Treatment may involve excavation of the remains, documentation, and consultation. Construction activities will not resume until the BLM Project Manager has issued a Notice to Proceed.

Figure 2
Procedures for the Unanticipated Discovery of Human Remains



For Human Remains Found on Federal Land

- If the remains are found on USFS land, the USFS Archaeologist will be immediately notified by the BLM Archaeologist. For discovery of remains on USACE land, the BLM Archaeologist will immediately notify the USACE Archaeologist.
- Further treatment of the remains will be at the direction of the BLM Archaeologist, in consultation with the applicable federal agency Archaeologist, including determination of whether the remains are modern and constitute a law enforcement issue or are not modern. If the remains are modern, the BLM Archaeologist will be responsible for contacting the county sheriff, and will request that the sheriff contact the coroner. All further work will be at the direction of the country sheriff, including notification that construction can resume.
- If the remains are not modern, the BLM Archaeologist in coordination with the federal land managing agency Archaeologist, as appropriate, and SHPO will consult with BakkenLink and interested Native American Tribes regarding treatment of the remains. The BLM Archaeologist will ensure that appropriate treatment of the human remains is carried out by BakkenLink prior to construction activities being resumed in the area of the discovery. Treatment may involve excavation of the remains, documentation, and consultation. All necessary permits will be issued by the federal land managing agency in consultation with the BLM. Construction activities will not resume until the BLM Project Manager has issued a Notice to Proceed.

For Native American Human Remains Found on Federal Lands

- For Native American human remains, funerary objects, and objects of cultural patrimony, the BLM will comply with the requirements of NAGPRA for discovery situations on a case-by-case basis in accordance with 43 CFR 10. All of the Native American Tribes involved in the government-to-government consultation efforts for the Project will be notified immediately of the discovery, and every effort will be m made to identify the Tribe with cultural affinity to the remains. The applicable federal agency (USFS or USACE) will be notified of the discovery.
- Within 7 business days of the discovery, an action plan will be written by the Consulting Archaeologist in coordination with the BLM Archaeologist and interested Native American Tribe(s) participating in the consultation efforts. The applicable federal agency (USFS or USACE) also will be involved in preparation of the action plan. Treatment and handling of the human remains will take place immediately following completion and approval of the plan. All necessary permits will be issued by the federal land managing agency in consultation with BLM and the affected tribes.
- Construction activities within the 300-foot radius buffer area will not resume until the remains have been appropriately treated in accordance with the action plan, and the BLM Project Manager has issued a Notice to Proceed.

Table 1 lists the federal, state, and local agency contact information in the event of an unanticipated discovery.

Table 1 Federal, State, and Local Agency Contact Information

Name	Title/Agency	Phone	E-mail
Bureau of Land Management			
Lowell Hassler	Project Manager	406-538-1909 (direct) 701-290-4235 (cell)	lhassler@blm.gov
Shannon Gilbert	Project Archaeologist	406-683-8029 (direct)	sgilbert@blm.gov

Table 1 Federal, State, and Local Agency Contact Information

Name	Title/Agency	Phone	E-mail
BakkenLink			
?	Project Manager	?	?
Stantec			
?	Environmental Inspector	?	?
Archaeological Consultant			
?	Cultural Resource Manager		
?	Consulting Archaeologist		
State Historic Preservation Office			
Claudia Berg	Director, State Historical Society of North Dakota	701-328-2672 (direct)	cberg@nd.gov
Paul Picha	State Archaeologist, State Historical Society of North Dakota	(701) 328-3574	ppicha@nd.gov
U.S. Forest Service			
Liv Fetterman	Archaeologist	701-250-4443 x 108 (office) 701-516-4009 (cell)	lfetterman@fs.fed.us
U.S. Army Corps of Engineers			
David Cain	Archaeologist	(701)654-7706	David.Cain2@usace.army.mil
County Sheriff			
Ron Rankin	McKenzie County Sheriff	701-444-3654 x 1420	
Scott Busching	Williams County Sheriff	701-577-7700	

Appendix XVI

Spill Prevention, Containment, and Countermeasure Plan (SPCC)

Spill Prevention, Containment, and Countermeasure Plan for Construction of the BakkenLink Pipeline LLC

June 2015

Spill Prevention, Containment, and Countermeasure Plan for Construction of the BakkenLink Pipeline LLC June 2015

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Appendices

1.0 Introduction

BakkenLink Pipeline LLC (BakkenLink) has prepared this Spill Prevention, Containment, and Countermeasure (SPCC) Plan to be implemented during construction of the BakkenLink Pipeline Project (Project). This SPCC Plan outlines specific preventive measures to be followed to reduce the likelihood of an accidental release of a hazardous or regulated liquid during construction activities. This SPCC Plan also sets forth procedures and response actions in the event of an actual release.

This SPCC Plan restricts the location of fuel storage, refueling activities, and construction equipment maintenance along the construction right-of-way and provides procedures, materials, and lines of communication to facilitate the prevention, containment, and cleanup of spills during construction activities. It also sets forth minimum standards for handling and storing regulated substances. The goal of the SPCC Plan is to minimize the potential for a spill of these materials, to contain any spillage to the smallest area possible, and to protect areas that are considered environmentally sensitive (e.g. streams, groundwater wells, wetlands, etc.). This SPCC Plan does not certify the Contractor or individuals as licensed waste haulers.

Measures and procedures defined in this SPCC Plan will be implemented by indepent Contractors and construction inspectors hired by BakkenLink. These Contractors and inspectors will have day-to-day responsibility to ensure compliance with this SPCC. BakkenLink, by completing the Delegation of Authority Form (following page), grants authority to the named parties to act on its behalf on matters pertaining to this SPCC. Any signed Delegation of Authority form shall be kept with this SPCC at all times.

Delegation of Authority Form

Delegation of Authority

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Spill Prevention Control and Countermeasure plan, at the _____ construction site. The designee is authorized to sign any reports, storm water pollution prevention plans and all other documents required by the permit.

_____ (name of person or position)
_____ (company)
_____ (address)
_____ (city, state, zip)
_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in _____ (Reference State Permit), and that the designee above meets the definition of a "duly authorized representative" as set forth in _____ (Reference State Permit).

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____ **Date:** _____

2.0 Regulated Materials Storage and Handling

Table 1 presents typical vehicle and equipment fuels, lubricants, and hazardous materials stored or used during construction, and briefly describes the location, typical quantities, and usual methods of storage. Storage methods and quantities vary with length of construction segment, time of year, and type of terrain.

Table 1
Typical Fuel, Lubricants, and Hazardous Materials

Fluid Uses	Fluids	Typical Quantity	Method of Storage	Storage Location
Fuels	Diesel	5,000 to 10,000 gallons	Tanks or Tankers	Contractor Yard Warehouse
	Gasoline	5,000 to 10,000 gallons	Tanks or Tankers, 5-Gallon Containers, Pick-up Tanks	Contractor Yard Warehouse
Lubricants	Engine Oil	<100 gallons	Bulk Storage Retail Packaging	Contractor Yard Warehouse Service Trucks
	Transmission/Drive Train Oil	<50 gallons	Retail Packaging on Service Trucks	Contractor Yard Warehouse Service Trucks
	Hydraulic Oil	<100 gallons	Bulk Storage Retail Packaging	Contractor Yard Warehouse Service Trucks
	Gear Oil	<50 gallons	Retail Packaging on Service Trucks	Contractor Yard Warehouse Service Trucks
	Lubricating Grease	<25 gallons	Tubes stored in paper cases	Contractor Yard Warehouse Service Trucks
Coolants, Hydraulic Fluids, Other	Ethylene Glycol	<100 gallons	Bulk Storage Retail Packaging	Contractor Yard Warehouse Service Trucks
	Propylene Glycol	<100 gallons	Bulk Storage Retail Packaging	Contractor Yard Warehouse Service Trucks
	Power Steering Fluid	<50 gallons	Retail Packaging on Service Trucks	Contractor Yard Warehouse Service Trucks
	Brake Fluid	<50 gallons	Retail Packaging on Service Trucks	Contractor Yard Warehouse Service Trucks
	Propane	25-100 gallons	Pressurized Tanks	Contractor Yard Warehouse Welding Trucks

3.0 Preventive Measures

BakkenLink will ensure that all practicable measures are implemented to minimize the potential for and consequences of a spill during construction of the Project and related facilities. BakkenLink intends to comply with applicable environmental and safety laws and regulations and to provide training and equipment designed to prevent pollution. The Contractor will ensure that a copy of this SPCC Plan is available onsite to all construction crew members. In addition, Contractors will ensure that construction crew members are properly trained in handling fuels to prevent spills and to effectively contain spills, and that equipment required to implement the provisions of this SPCC Plan are available on site.

BakkenLink will provide training on the provisions of this SPCC Plan to Construction and Inspection personnel.

3.1 Staging Areas/Work Yards

Fuel and hazardous liquid storage will require secondary containment structures as described below:

- The Contractor will construct temporary liners and seamless berms around aboveground bulk tanks so that in the event of a leak or spill, liquids will be contained and collected in specified areas that are isolated from water bodies. Storage tanks will not be placed in areas subject to periodic flooding and washout.

- The Contractor will visually inspect aboveground tanks frequently and whenever the tank is refilled. The Contractor will maintain inspection records for every tank.

- Secondary containment structures must be constructed so that no outlet is provided and any spill will be contained within the containment structure. Accumulated rainwater may be removed if authorized by an Environmental Inspector. Accumulated water that has a visible sheen will be collected for proper storage and disposal.

- The Contractor will remove secondary containment structures at the conclusion of the Project. The Contractor is also responsible for returning the storage impoundment area to its original ground contours and appearance upon completion of the Project.

- Fuels and lubricants will be stored only at designated staging areas and in proper service vehicles. The storage area will be at least 100 feet away from the edge of a wetland or waterbody, at least 200 feet away from a private water supply well, and at least 400 feet away from a municipal water supply well, unless a larger buffer is required by governing agencies.

- Storage containers will display labels that identify the contents of the container and whether the contents are hazardous. Appropriate labels will identify the specific hazard (flammable, toxic, etc) will be affixed to the containers and readily visible. The Contractor shall maintain and furnish on demand to BakkenLink copies of all Material Safety Data Sheets.

- To the extent practicable, Contractors will conduct routine equipment maintenance such as oil changes in staging areas and will dispose of waste oil in a proper manner (e.g. place in labeled, sealed containers and transport to a recycling facility).

- The Contractor will correct visible leaks in tanks as soon as possible.

- Drain valves on temporary storage tanks will be locked to prevent accidental or unauthorized discharges from tanks.

- Fuel nozzles shall be equipped with functional automatic shut-off valves.

- Drivers of tank trucks shall be responsible for spill prevention during tank truck unloading. Procedures for loading and unloading tank trucks will meet the minimum requirements established by the Department of Transportation. Drivers will observe and control the fueling operations at all times to prevent overfilling.

- Prior to departure of a tank truck, outlets of the vehicle will be examined by the driver for leakage, and tightened, adjusted, or replaced as required to prevent liquid leakage while in transit.

- The Contractor shall stock a sufficient supply of sorbent and barrier materials at the construction staging area to allow the rapid containment and recovery of a spill. Sorbent and barrier materials will be utilized to contain runoff from spill areas.

- Shovels and labeled 55-gallon drums will be kept at each of the staging areas. If small quantities of soil become contaminated within a staging area, they will be collected and placed in the drums. Large quantities of contaminated soil will be collected using heavy equipment and stored in drums or other suitable containers prior to disposal. Disposal of contaminated soil will be in accordance with applicable state and federal regulations. Typical disposal methods will include transporting the soil to a licensed disposal or treatment facility or thin-spreading in compliance with state guidelines.

3.2 Right-of-Way

The following preventive measures apply to refueling and lubrication activities within the construction right-of-way:

- Refueling and lubricating of construction equipment will be restricted to upland areas located at least 100 feet from stream channels and wetlands, at least 200 feet from private water supply wells, and at least 400 feet from municipal water supply wells. Where this is not feasible, the equipment will be fueled and lubricated by designated personnel with specific training in refueling, lubricating, and spill containment and cleanup.

- Fuel trucks transporting fuel to construction areas shall travel only on approved access roads.

- Equipment shall not be washed in streams.

- Fuel and service trucks shall carry a minimum of 20 lbs. of suitable commercial sorbent and barrier materials.

3.3 Vulnerable Aquifer Areas

The Contractor's Construction Superintendent or designated Spill Coordinator must immediately notify the BakkenLink Representative and the Environmental Inspector of any release or spill of a petroleum product or hazardous liquid, regardless of volume. The Spill Coordinator shall implement the following response actions:

- Follow spill containment response actions described in Section 4 below.

- Immediately excavate obviously impacted soils. Store and dispose of impacted soils in accordance with this SPCC Plan.

4.0 Spill Response

The response action priorities upon discovery of a spill are to protect the safety of personnel and the public, minimize environmental impacts, and control costs associated with cleanup and restoration. Key actions immediately following discovery of a spill are:

- Assess the safety of the situation, both in the immediate vicinity and for the surrounding public.
- Remove sources of ignition if it is safe to do so.
- Shut off the source of the spill if it is safe to do so.

The person discovering a spill shall promptly notify the Spill Coordinator, the Environmental Inspector, and the Construction Superintendent. The Spill Coordinator shall implement spill control measures as described below.

4.1 Land Spill Response

Implement the following response actions for spills on land:

- Construct berms using available equipment and/or deploy barrier materials to contain the spill.
- Apply sorbent materials to the spill area.
- Minimize traffic on contaminated soils.
- Excavate contaminated soils and vegetation and transport to a licensed and approved treatment or disposal facility.

4.2 Wetland or Waterbody Spill Response

Implement the following response actions for spills in or near a wetland or waterbody:

- Implement the response actions described in Section 4.1 in shoreland areas. Excavate trenches if necessary to create collection sumps to prevent liquids from entering wetlands or waterbodies.
- If a spill occurs into a stream, lake, or other waterbodies containing standing or flowing water, the BakkenLink Representative shall notify the National Response Center immediately.
- Secure the services of an Emergency Response Contractor (see Appendix B) if required to assist with containment and cleanup of the spill.
- Deploy booms, curtains, and sorbents to minimize the spread of the spill.

- Use skimmer pumps and holding tanks to remove released materials from the water surface.

- Excavate contaminated soils from wetlands and place on plastic sheeting in an approved containment area located at least 100 feet from the wetland and waterbodies. Cover stockpiled soil with plastic sheeting. Remove stockpiles as soon as practicable and transport to a licensed and approved treatment or disposal facility.

- Restore the contaminated area in accordance with recommendations from site remediation specialists and as required by state guidelines.

4.3 Field Coordinator

Subject to approval by BakkenLink, the Contractor shall appoint a Field Coordinator who will be responsible for reporting of spills, coordinating Contractor personnel for spill cleanup, completing subsequent site investigations, and preparing incident reports. The Field Coordinator will report to the designated BakkenLink Representative and the Environmental Inspector. The BakkenLink Representative will contact and report to state and federal agencies as required.

5.0 Unanticipated Discovery of Hazardous Materials

Soil contamination, not directly resulting from construction of the pipeline, may be encountered during construction of the BakkenLink pipeline. Locations where contamination may be present include:

- Third party pipeline crossings;
- Oil and natural gas processing facilities;
- Injection/disposal wells;
- Undocumented disposal/dump sites; and
- Agricultural equipment refueling, pesticide/herbicide loading areas, and storage areas.

Identification and recognition of existing contamination is the first step in the response action. During construction, indicators of possible contamination include, but are not limited to:

- Gasoline smells or other odors which emanate when the earth is disturbed;
- Stained or discolored earth in contrast with adjoining soil;
- Oily residue intermixed with earth;
- Sheen on groundwater;
- Fill material containing debris other than construction-related items;
- Household trash covered by earth or industrial waste debris;
- Rusted barrels and containers;
- Cinders and other combustion products like ash; and
- Structures such as asbestos cement (transite) pipe, abandoned oil & gas lines, and underground storage tanks also require special handling when disturbed.

When unanticipated soil contamination is discovered in the right-of-way (ROW), especially if it will be excavated, the appropriate response actions will need to be performed to address the contamination. The following are the major steps that should be taken when contamination is discovered:

- Recognize that the area may be contaminated with hazardous materials;
- Secure the site to protect workers and the public;

- Do not allow the prime contractor, subcontractor, or other personnel to handle or disturb the contaminated material or the surrounding soil;

- Notify the Environmental Inspector(s) and construction manager(s).

The Environmental Inspector will in turn notify the proper authorities (North Dakota Department of Health (NDDH) contact information is given in Section 7). Reporting procedures are similar to those employed if a spill has occurred.

In no instance will an effort be made to characterize the contamination or begin remedial action(s), including hauling and disposal of the contaminated soil, until the NDDH has made a determination as to the appropriate action(s) to take. The Contractor shall make every effort to limit the spread of contamination and shall employ mitigation or protection measures to prevent the contamination from reaching a water supply well, surface water, stockpiled material, and other construction areas.

6.0 Training

BakkenLink will provide spill prevention and response training and safety training to its supervisory and inspection personnel. In addition, training will be required of all construction personnel. Training will be required before construction personnel are allowed to enter the ROW. The training program will be designed to improve awareness of safety requirements, pollution control laws, proper operation and maintenance of equipment, and implementation of spill response actions.

7.0 Reporting Procedures

BakkenLink will prepare a Spill Report Form (Appendix A) and notify state and federal agencies as required in the event of a release. These agencies may include but are not necessarily limited to:

National Response Center (Washington, D.C.)
Phone: 800-424-8802 (24 hours)

North Dakota Department of Health
Division of Emergency Management
24-hour State Notification (State Radio)
In-State Phone: 800-472-2121; Outside North Dakota 701-328-2121

North Dakota Division of Water Quality
Phone: 701-328-5210

BakkenLink will coordinate with these agencies regarding contacting additional parties or agencies.

Appendix A

Spill Report Form

Spill Report Form
BakkenLink Pipeline LLC

Date/Time of Spill:_____ Date/Time of Spill Discovery_____

Name and Title of Discoverer:_____
Legal Description of spill location and milepost:_____
Type, estimated volume, and manufacturer's name:_____
Media in which the release exists (circle): sand silt clay upland wetland waterbody other_____
Topography and surface conditions:_____
Proximity to wetlands or waterbodies (including ditches):_____
Proximity to private or public water supply wells:_____
Directions from nearest community:_____
Weather conditions at the time of release:_____
Describe the causes and circumstances resulting in the spill:_____

_____

Describe the extent of observed contamination, both horizontal and vertical (i.e. spill stained soil in a 5-foot radius to a depth of 1 inch):_____

_____

Describe immediate spill control and cleanup methods used and implementation schedule:_____

_____

Location of excavated/stockpiled contaminated soil:_____
Describe the extent of spill-related injuries and remaining risk to human health and the environment:_____

_____

Name, company, and telephone number of responsible party (Contractor):_____

_____

Current status of cleanup actions:_____

Name and Company for the following:
Construction Superintendent:_____
Field Coordinator:_____
BakkenLink Representative:_____
Environmental Inspector:_____
Chief Inspector:_____

Government agencies notified:
Agency:_____ Date:_____
Agency:_____ Date:_____
Agency:_____ Date:_____

Landowner Notified:_____ Date:_____

Form Complete By:_____ Date:_____

Field Coordinator must complete this form for any spill, regardless of size, and submit the form to the BakkenLink Representative and Environmental Inspector within 24 hours of the occurrence. Any spill to water shall be reported IMMEDIATELY.

Appendix B

Emergency Response Contractors

Emergency Response Contractors
BakkenLink Pipeline Project

The Contractor must dispose of all wastes according to applicable state and local requirements. A listing of potential Emergency Spill Response contractors is listed below. This list was developed from state-wide databases and represents firms operating at the time the database was queried. This list is presented as a service to the user and does not represent a recommendation by the state agencies or BakkenLink. It is the user's responsibility to assure that the emergency response contractor is properly licensed. Selection of an Emergency Response Contractor is subject to approval by BakkenLink.

North Dakota Contractors

Clean Harbors 4438 Sims Street Dickinson, ND 58601	701-483-4332 800-645-8265
Baranko Brothers Inc. 3048 Highway 22 N Dickinson, ND 58601	701-483-5868
Earthmovers Inc. 708A – 38th Street NW Fargo, ND 58102	701-852-4560 800-373-5259
Western Plains Consulting 1102 S Washington St. Suite 210 Bismarck, ND 58504	701-221-3113 888-821-3113

Out-of-State Contractors

Bay West Environmental 5 Empire Drive St. Paul, MN 55103	651-291-0456 800-279-0456
Clean Harbors National Response Center	800-645-8265
Hulcher Services Inc. 2300 Willis Miller Drive Hudson, WI 54016	715-386-5770 800-637-5471
OSI Environmental 300 Fayal Road Eveleth, MN 55734	800-777-8542
Veolia Environmental Services Emergency Response Center	800-688-4005
West Central Environmental Consultants 14 Green River Road, PO Box 594 Morris, MN 56267	320-589-2039 800-422-8356

Appendix C

Licensed Waste Disposal Facilities

Licensed Waste Disposal Facilities
BakkenLink Pipeline Project

The Contractor must dispose of all wastes according to applicable state and local requirements. Licensed disposal facilities in the State of North Dakota are listed below. This list was developed from state-wide databases and represents facilities operating at the time the database was queried. This list is presented as a service to the user and does not represent a recommendation by the state agencies or BakkenLink. It is the Contractor's responsibility to assure that the facility is properly licensed.

North Dakota Facilities

Bismarck Municipal Landfill 2111 N 52nd Street Bismarck, ND 58506	701-355-1700
Dakota Landfill 7972 129th Avenue SE Gwinner, ND 58040	701-678-2306
Dickinson Municipal Landfill 3389 Energy Drive Dickinson, ND 58601	701-456-7783
Dishon Disposal Williston, ND 58801	701-572-9079
Fargo Municipal Landfill 4501 7th Avenue N. Fargo, ND 58102	701-241-1449
Grand Forks Municipal Landfill 724 North 47th Street Grand Forks, ND 58206	701-738-8740
Indian Hills Disposal 14070 43rd Street NW Williston, ND 58801	701-774-8514
Jahner Sanitation 7971 32ne Avenue SE Wishek, ND 58495	701-452-2666
Jamestown Municipal Landfill 8980 35th Street SE Jamestown, ND 58401	701-252-5900
McDaniel Landfill, Inc. 12300 247th Avenue Sawyer, ND 58781	701-624-5250

McKenzie County Sanitary Landfill 2491 132nd Avenue NW Watford City, ND 58854	701-5863445
Mercer County Regional Landfill 5251 County Road 26 Hazen, ND 58545	701-748-5839
Minot Municipal Landfill 3100 20th Avenue SW Minot, ND 58701	701-857-4140
Noonan Landfill Noonan, ND 58765	701-838-1182
Prairie Disposal Tioga, ND 58852	800-490-2160
Sawyer Disposal Services 12400 247th Avenue SE Sawyer, ND 58781	701-624-5622
Williston Municipal Landfill 5176 134th Avenue NW Williston, ND 58801	701-577-6368

Appendix XVII

Stormwater Pollution Prevention Plan (SWPPP)

Storm Water Pollution Prevention Plan (SWPPP)

BakkenLink Pipeline LLC

MCKENZIE AND WILLIAMS COUNTIES, NORTH DAKOTA

NDPDES Permit #NDR-10-000

October 2015

Storm Water Pollution Prevention Plan (SWPPP) BakkenLink Pipeline LLC

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APPENDICES

1.0 Introduction

BakkenLink Pipeline LLC is proposing to build, own, and operate an approximately 37.1-mile long pipeline for the transportation of crude oil from existing and proposed truck receipt locations and pipeline gathering receipt stations. The proposed pipeline will be constructed in portions of McKenzie and Williams counties, North Dakota (Figure 1).

1.1 Plan Purpose/Objectives

The Storm Water Pollution Prevention Plan (SWPPP) shall identify potential sources of pollution, which may reasonably be expected to affect the quality of storm water discharges from construction of the pipeline. The SWPPP shall describe and ensure the implementation of mitigation or protection measures, which will be used to reduce the pollutants in storm water discharges associated with construction activity at the construction site and to assure compliance with the terms and conditions of this permit.

The SWPPP shall:

- Be completed prior to initiating construction activities and updated as appropriate; and
- Provide for compliance with the terms and schedule of the SWPPP beginning with the initiation of construction activities.
- For the purposes of this plan, runoff management is defined as practices that divert, infiltrate, reuse, or treat storm water runoff, and not practices that limit exposure of potential pollutants to direct rainfall or runoff. The purpose of the SWPPP is to:
- Identify sources of pollutants associated with construction activities that may affect the quality of storm water runoff from construction sites; and
- To identify storm water management practices to abate pollutants in storm water discharges from the construction site, both during and after construction.

This SWPPP has been designed to outline the specific measures implemented at the construction site for minimizing potential pollutants that may otherwise impact storm water runoff during construction. Mitigation or protection measures are used to prevent or minimize the discharge of pollutants. Specific mitigation or protection measures for minimizing runoff and erosion are described in Sections 4 and 5 of this SWPPP. Mitigation or protection measures should be employed to properly cover and store materials, minimize contact of materials with rainfall and runoff, minimize waste, properly dispose of waste, and recycle where possible.

1.2 Facility Conformance and Regulatory Compliance

This SWPPP has been developed in compliance with Standard Conditions provided at 40 CFR 122.41 and as defined at 40 CFR 122.26. Enforcement of these provisions is delegated to the North Dakota Department of Health (NDDH) for activity within the State of North Dakota. The NDDH authorizes permits to discharge under the North Dakota Pollution Discharge Elimination System (NDPDES) rules found in Chapter 33-16-01 promulgated under Chapter 61-28 of the North Dakota Century Code. Further information regarding the requirements of the NDPDES can be found at http://www.ndhealth.gov/WQ/Storm/Construction/ConstructionHome.htm.

Together with inspection reports, maintenance reports, and data records for the construction activities, this SWPPP shall be retained at the construction site during construction. In addition, a record of revisions to the SWPPP (Appendix A) shall be retained at the construction site.

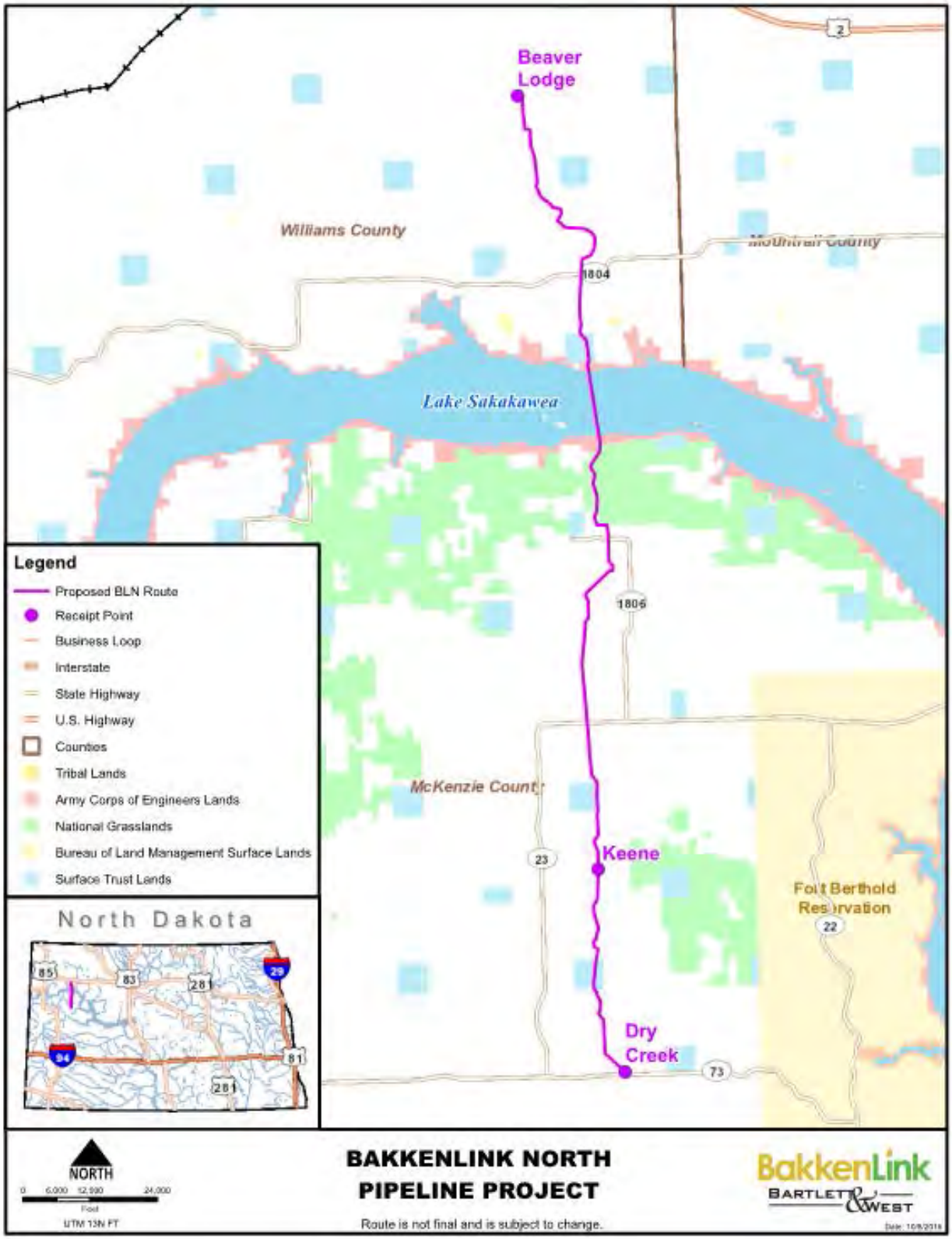


Figure 1. Location Map.

Reports and records will be made available, upon request, for a period of at least three (3) years following final site stabilization. Further information on record keeping is provided in Section 10 of this SWPPP.

Conformance with the requirements of this SWPPP includes timely inspections, proper maintenance, record keeping, tracking, and documentation. Required maintenance will be conducted as soon as practicable before the next anticipated storm event. If existing mitigation or protection measures need to be modified or additional mitigation or protection measures are necessary, corrections will be completed before the next anticipated storm event.

1.3 Termination Clause

This SWPPP will cease to be valid within thirty (30) days after:

- Final stabilization of the entire site;
- Another operator has assumed control of the unstabilized areas of the site; or
- Temporary stabilization has been completed and control has been transferred to the property owner.

A Notice of Termination (NOT) will be filed with the NDDH upon completion of any of the above criteria. A copy of the NOT is included as Appendix B.

2.0 Responsible Party/Signatory Certification

BakkenLink has prepared this SWPPP in compliance with the requirements of the NDPDES General Permit for Discharges for Large and Small Construction Activities (Permit Number NDR 10-1000) as administered by the NDDH. BakkenLink is responsible for implementing the provisions of this operational control over the construction plans and specifications, including the ability to make modifications to those plans and specifications, or day-to-day operational control of those, which are necessary to ensure compliance with the SWPPP for the site or other permit conditions.

Operator
BakkenLink Pipeline LLC
333 Clay Street, Suite 4060
Houston, Texas 77002
Off 713.800.7994
Fax 281.833.8281

Project Manager
Darren Snow
BakkenLink Pipeline LLC
2101 46th Ave SE
Mandan, ND 58554
Ph: 701-751-3401

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____ **Title:** _____

Signature: _____ **Date:** _____

3.0 Delegation of Authority

BakkenLink will own and operate the pipeline; however, construction of the pipeline will be performed by independent Contractors and construction inspectors hired by BakkenLink. These Contractors and inspectors will have day-to-day responsibility to ensure compliance with this SWPPP. BakkenLink, by completing the Delegation of Authority Form (following page), grants authority to the named parties to act on its behalf on matters pertaining to this SWPPP. Any signed Delegation of Authority form shall be kept with this SWPPP at all times.

Delegation of Authority Form

Delegation of Authority

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Construction General Permit, at the _____ construction site. The designee is authorized to sign any reports, storm water pollution prevention plans and all other documents required by the permit.

_____ (name of person or position)
_____ (company)
_____ (address)
_____ (city, state, zip)
_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in _____ (Reference State Permit), and that the designee above meets the definition of a "duly authorized representative" as set forth in _____ (Reference State Permit).

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____ **Date:** _____

4.0 Project Description

The project consists of a pipeline transportation system to transport crude oil from existing and proposed truck stations and gathering systems located in McKenzie and Williams Counties. The pipeline will be installed within a defined right-of-way (ROW). The temporary construction ROW will be 100 feet wide. The temporary construction ROW may be reduced in some areas as necessary to avoid impacts to environmentally sensitive areas. The pipeline is proposed to be constructed in rural areas with no established storm water drainage systems. Local roads are predominantly gravel/clay. Several major paved roads exist in the area.

Generally, the permanent pipeline ROW will be 50 feet wide, with the pipeline centered within that ROW. The location of the pipeline within the permanent ROW may vary depending on terrain, the presence of other existing facilities, and landowner requests.

Additional temporary workspace will be required at certain locations (e.g. road, railroad, and river crossings). These workspace areas may vary in size depending on the feature being crossed and crossing construction method(s).

Equipment and pipe storage areas will also be required. These areas may not be located adjacent to the proposed ROW. Off-site material storage areas (also including overburden and stockpiles of dirt, borrow areas, etc.), used solely by the permitted project, are considered a part of the project and shall be subject to the same control requirements as the ROW.

4.1 Sequence of Construction Activity

Pipeline construction is much like a moving assembly line. The construction activities will occur in the general order listed and include, but are not limited to, the following:

- Clearing
- Grading
- Stringing
- Bending
- Welding
- Ditching (excavation)
- Laying pipe
- Backfill
- Tie-ins
- Clean up

In general, construction will proceed along the pipeline in one continuous operation. As construction proceeds along a spread, construction at any single point along the pipeline, from initial surveying and clearing, to backfilling and finish grading is anticipated to last about six to ten weeks. Different phases of construction may occur at multiple locations at the same time. The entire process will be coordinated in such a manner as to minimize the total time an individual tract is disturbed, exposed to erosion, or temporarily precluded from its normal use.

4.2 Construction Site Estimates

A total of 476.3 acres of land would be required for construction-related activities for the project [i.e., 406.3 acres for combined temporary construction ROW and permanent easements, 70 acres for temporary pipe storage yards and purchased project-related land.]

4.3 Soils, Slopes, Vegetation, and Drainage Patterns

The pipeline route traverses varying terrain, from nearly level cropland to rugged badlands. The construction ROW will be cleared and graded (where necessary) to provide a relatively level surface for construction equipment, a sufficiently wide workspace for the passage of heavy equipment, and safety for pipeline workers. The construction contractor will limit ground disturbance wherever possible. Natural features will be retained to the maximum extent possible. Native vegetation, especially trees, is to be retained to the maximum extent possible.

To avoid soil mixing, topsoil will be removed and segregated from underlying subsoil. Topsoil will be stored separately from subsoil and protected from construction-related activities. Topsoil is typically stored at the far edge of the ROW on the opposite side of the trench from where construction machinery does its work.

Once the pipeline is installed, the trench will be backfilled and then compacted while grading. Disturbed areas will be restored to their original contours and condition to the extent practical, unless landowner consent is obtained to do otherwise. After grading is complete and during the process of backfilling, final stabilization measures will be taken to ensure minimal erosion. In general, the ROW will revert to the previous land use after construction is completed and during operation of the pipeline.

The general flow of storm water will remain the same throughout the project. Measures will be taken to ensure the minimal amount of erosion possible, as well as the least impact on the receiving bodies of water.

4.5 Receiving Waters

A comprehensive wetland and waterbody delineation survey has been conducted along the entire route. The proposed pipeline will cross wetlands and intermittent and perennial waterbodies. The location of delineated wetlands and waterbodies are indicated on the construction drawings. In general, the following practices will be observed at these locations:

- In wetland or riparian zones, the Contractor will install sediment control structures along the construction right-of-way edges prior to vegetation removal where practicable.
- Where waterbodies or wetlands are adjacent to the construction right-of-way, the Contractor shall install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way.
- Sediment barriers will be installed across the entire ROW immediately upslope of the wetland boundary at all standard (saturated or standing water) wetland crossings as necessary to prevent sediment flow into the wetland. Sediment control barriers are not required at “dry” wetlands.
- Sediment barriers will be installed across the entire ROW immediately upslope of any flowing waterbody or impoundment.

5.0 Erosion and Sediment Control Mitigation or Protection Measures

Erosion and sediment controls include stabilization practices, as well as structural controls. General structural practices may include, but are not limited to, silt fences, earth dikes, drainage swales, sediment traps, check dams, reinforced soil retaining systems, gabions, temporary or permanent sediment basins and flow diversion. Typical erosion control details are included in Appendix C. Temporary erosion and sediment control measures shall be installed immediately after initial disturbance of the soil, maintained throughout construction (on a daily basis), and reinstalled as necessary until replaced by permanent erosion control structures or restoration of the construction ROW is complete.

Specifications and configurations for erosion and sediment control measures may be modified by BakkenLink as necessary to suit actual site conditions. However, all work shall be conducted in accordance with applicable permits.

The intent of the mitigation or protection measures is to prevent any damage due to transported sediments or adding any erosion burden by diverting storm water runoff into sensitive areas. The intent is not to vegetate areas that are not naturally vegetated, but to prevent the increase of erosion rates over and above what is caused by natural drainage in the area. In general:

- Construction-phase erosion and sediment controls should be designed to retain sediment on-site to the maximum extent practicable.
- All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or incorrectly, the permittee must replace or modify the control for site situations.
- If sediments escape the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize off-site impacts.
- Sediment must be removed from sediment traps or sedimentation ponds when design capacity has been reduced by 50%.
- Litter, construction debris, and construction chemicals exposed to storm water shall be prevented from becoming a pollutant source for storm water discharges (e.g., screening outfalls, picked up daily, etc.).
- Ensure that silt fences are intact and that there are no gaps at the fence-ground interface or tears along the length of the fence. If gaps or tears are found, they should be repaired or the fabric should be replaced immediately. Accumulated sediments should be removed from the fence base when the sediment reaches one-third to one-half the height of the fence.
- Large debris, trash, and leaves should be removed from check dams (hay bales).

The center of a check dam should always be lower than its edges. If erosion or heavy flows cause the edges of a dam to fall to a height equal to or below the height of the center, repairs should be made immediately. Accumulated sediment should be removed from the upstream side of a check dam when the sediment has reached a height of approximately one-half the original height of the dam (measured at the center).

Sediment control barriers shall be placed so as not to hinder construction operations. If silt fence or straw bale sediment barriers (in lieu of drivable berms) are placed across the entire construction ROW, a provision shall be made for temporary traffic flow through a gap for

vehicles and equipment to pass within the structure. Immediately following each day's shutdown of construction activities, a row of straw bales or a section of silt fence shall be placed across the upgradient side of the gap with sufficient overlap at each end of the barrier gap to eliminate sediment bypass flow, followed by bales tightly fitted to fill the gap. Following completion of the equipment crossing, the gap shall be closed using silt fence or straw bale sediment barrier.

The Contractor shall remove sediment barriers, except those needed for permanent erosion and sediment control, during cleanup of the construction right-of-way. The following sections describe erosion and sediment goals to be considered during construction and practices expected to be implemented to achieve those goals during construction.

5.1 Run-on Protection

The pipeline ROW will be graded to provide relatively flat surfaces that facilitate the movement and maneuvering of heavy equipment. Natural drainage swales will be utilized to the extent possible when planning locations to intercept, divert and convey storm water and runoff around the ROW. Some minor contouring may be necessary to enhance the drainage and take advantage of the natural drainage characteristics of the terrain; however, to capture sediment transported by overland flow, some structural mitigation or protection measures may be installed. These include:

- Earthen dikes established on high side of location to intercept, divert and convey storm water and/or runoff around the project site.
- Trenching/ditching around high side of location to intercept, divert and convey surface runoff around the project site.

Drainage channels or ditches shall be used on a limited basis to provide drainage along the construction right-of-way and toe of cut slopes as well as to direct surface runoff across the construction right-of-way or away from disturbances and onto natural undisturbed ground. Channels or ditches shall be constructed by the Contractor during grading operations. Where there is inadequate vegetation at the channel or ditch outlet, sediment barriers, check berms, or other appropriate measures shall be used to control erosion.

5.2 Stabilizing Soils

The soils that generally will require stabilization are those used for berm construction and soil stockpiles. Stabilization methods include, but are not limited to, soil compaction and seeding of disturbed soil once backfilling and/or grading is complete. General stabilization practices may include, but are not limited to, establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures.

Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Reseeding with an approved seed mix should be completed in areas (uncultivated) that have no traffic. Erosion control matting may be installed on slopes, as needed.

Interim stabilization practices are not expected to be needed or implemented during active construction. Wherever possible, existing vegetation will remain in place to minimize erosion potential. Final re-vegetation and stabilization of each disturbance area will occur once active construction is completed.

Topsoil piles should be stabilized as soon as practical after stripping is complete. Topsoil piles may be stabilized by seeding with an approved temporary seed mixture or by hydromulching.

Soil stockpile may be stabilized by wetting with water, or by the use of soil tackifiers. When wetting topsoil piles with water does not prevent wind erosion, the Contractor shall temporarily suspend topsoil handling operations and apply a tackifier to topsoil stockpiles at the rate recommended by the manufacturer. Should construction traffic, cattle grazing, heavy rains, or other related construction activity disturb the tackified topsoil piles and create a potential for wind erosion, additional tackifier shall be applied by the Contractor.

5.3 Slope Protection

Use berms to divert location flow from slopes to established drainages where practical. Minimize removal of existing vegetation on new locations. Use approved seed to reseed/vegetate existing locations in areas no longer traveled.

Trench breakers shall be installed in steep terrain where necessary to limit the potential for trench line erosion and at the base of slopes adjacent to waterbodies and wetlands. Trench breakers shall be constructed of materials such as sand bags, sand/cement bags, bentonite bags, or other suitable materials. The Contractor shall not use topsoil in trench breakers.

Permanent slope breakers (water bars) shall be constructed of soil or, in some instances, sand bags. The Contractor shall construct permanent slope breakers on the construction right-of-way where necessary to limit erosion, except in cultivated areas. Slope breakers shall divert surface runoff to adjacent stable vegetated areas or to energy-dissipating devices. In general, permanent slope breakers should be installed immediately downslope of all trench breakers. Permanent slope breakers shall be installed as specified on the construction drawings or generally with a minimum spacing as shown on the following table:

Slope (%)	Spacing (feet)
5 - 15	300
>15 – 30	200
>30	100

The gradient (fall) for each slope breaker shall be two percent to four percent unless otherwise approved by BakkenLink based on site-specific conditions.

Manufactured erosion control mats shall be installed across areas that have eroded and cannot be stabilized by normal seeding and mulching practices. Erosion control matting shall be made of biodegradable, natural fiber such as straw or coir (coconut fiber).

The Contractor shall prepare the soil surface and install the erosion control matting to ensure it is stable and the matting makes uniform contact with the soil of the slope face or waterbody bank with no bridging of rills, gullies, or other low areas. Mats shall be properly anchored.

5.4 Perimeter Controls and Sediment Barriers

The Contractor shall install silt fence or fiber rolls (wattles) as necessary to provide a sediment barrier. Sediment barriers should be installed at the lowest elevation of the location, at the boundary where disturbed (bare) soils meet undisturbed (vegetated) soils. Sediment barriers should be installed in ditches along the lower perimeter of locations. Straw bales may be installed as an alternative to silt fence or fiber rolls.

If none of the above mitigation or protection measures are effective, installation of systems that are more complex are required. This may include the construction of sediment traps or detention basins.

5.5 Construction Entrance/Exits

Accumulations of tracked and deposited sediment on paved roadways must be removed within 24 hours or sooner if required by local authorities.

5.6 Concrete Wash Water

Concrete wash water may not be discharged to any water of the state or allowed to drain onto adjacent properties. The Contractor shall designate an area for cement washout. The area must be sufficient to contain the wash water and residual cement.

5.7 Additional Mitigation or Protection Measures

Additional/optional mitigation or protection measures will be used as necessary when other methods are not effective. Mitigation or protection measures are subject to approval from the project engineer as well as permitting/land management agencies. Other mitigation or protection measures will be used site-wide to minimize pollutants in storm water from other potential sources in accordance with the control requirements. These include:

Waste Disposal – No solid materials, including building materials, shall be discharged to waters of the State. Solid materials refer to such items as boards, wrapping materials, bricks and concrete debris, and land clearing debris such as leaves and tree limbs, but do not include total suspended solids.

Off-Site Vehicle Tracking – Mitigation or protection measures will be used in the minimization of vehicle tracking of sediments off-site and minimization of dust generation. The construction site will have limited access. Gravel drives will be used at the entrances to undeveloped areas.

State/Local Sanitary Sewer, Septic System or Waste Disposal Regulations – All sanitary wastewater from temporary facilities located within the construction site (trailers, portable toilets, etc.) will be removed for disposal off-site by a contractor. No sanitary wastewater will be discharged from the construction site.

Storage of Construction and Waste Materials – Vehicle maintenance, repair, refueling, and cleaning will be performed in a designated area at the construction site in order to minimize the potential for contamination of storm water by oil and grease. Any waste oil collected during such activities will be collected in drums or other compatible oil container

and will be removed from the site. All waste collected from the site will be disposed of off-site at a registered waste disposal facility. There will be no on-site storage of gasoline or diesel for refueling vehicles.

5.8 Maintenance

Maintenance of the erosion and sediment control mitigation or protection measures will be conducted in a timely manner once the need for maintenance activities are deemed necessary. If during inspections, a mitigation or protection measures requiring maintenance is identified, the maintenance will be accomplished prior to the next anticipated storm event, or as necessary to maintain the continued effectiveness of the mitigation or protection measures. When maintenance of the mitigation or protection measures cannot be accomplished prior to the next storm event, the maintenance will be scheduled and performed as soon as practicable.

Except for sediment basins, all accumulated sediment shall be removed from structural controls when sediment deposits reach 1/3 to 1/2 the height of the control. For sediment basins, accumulated sediment shall be removed when the capacity has been reduced by 50%. All removed sediment deposits shall be property disposed of. Non-functioning controls shall be repaired, replaced, or supplemented with functional controls within 24 hours of discovery or as soon as field conditions

6.0 Good Housekeeping Mitigation or Protection Measures

Good housekeeping is used to maintain a clean and orderly workplace and to reduce the potential for accident spills or releases of materials that could contaminate storm water. Generally, the following general good housekeeping mitigation or protection measures will be used:

- Designate areas for equipment maintenance and repair. These areas must have provisions to contain any potential pollutants in an area that can be regularly removed and properly disposed.
- Establish proper equipment/vehicle fueling and maintenance practices (drip pans, spill kits).
- Spills that occur shall be cleaned up immediately and reported, as necessary.
- Designate equipment wash-down areas and provide appropriate control of wash water.
- Construction materials should be stored in designated areas until these materials are required and should be loaded and off-loaded in the designated areas.
- Each contractor and subcontractor is encouraged to bring to the job site only the material to be used that day.
- Large items should be placed next to their installation locations to minimize handling.
- Provide protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic materials. If such materials are used, these storage areas should be enclosed with temporary fencing where practical. Curbing/temporary berms can be provided to minimize storm water run-on onto storage areas.
- Provide waste receptacles at convenient locations and provide regular collection of wastes.
- Debris and waste should be properly disposed of according to the applicable federal, state, and local laws.
- Provide adequately maintained sanitary facilities.
- Contractors/subcontractors should be provided with a storage yard in which to park vehicles during off-hours.
- Drums and tanks will be clearly tagged and labeled.
- Tanks and equipment will be regularly inspected.

6.1 Material Handling and Waste Management

The Contractor shall keep the ROW policed of all trash and debris. Garbage will be stored in a dumpster and its contents disposed of according to local and state regulations at an approved facility. No burning or burying of garbage will be allowed.

Portable chemical toilets will be provided for construction personnel. Portable toilets shall not be located near drainage facilities or in areas that will collect/accumulate water. Sewage shall be disposed of according to local and state requirements

6.2 Material Staging Areas

The Contractor shall follow these guidelines at material staging areas:

- Store materials indoors when possible.

- Do not store any hazardous materials on the ground.
- Store bags and boxes on pallets under cover and liquids in drums under cover. Insure that all bags/boxes are completely covered when not being used.
- Store materials in their original packages with the original product labels. Have MSDS information available on site for all materials.
- Provide for proper containment in accordance with the Spill Prevention Control and Countermeasure (SPCC) Plan developed for the project.
- Store all products with sufficient space to allow for spill cleanup and emergency response access.

6.3 Equipment/Vehicle Fueling and Maintenance

Fuel will be delivered to the construction areas via steel tanks mounted in pick-up trucks or by bulk delivery trucks. Trucks shall be equipped with spill containment kits and tools. All personnel engaged in refueling operations on site will be required to attend all nozzles or transfers during the entire time fuel transfer is occurring.

Oil and oily wastes, such as crankcase oil, cans, rags, and paper dropped in oil and lubricants, can be best disposed of in proper receptacles or recycled. Waste oil for recycling should not be mixed with degreasers, solvents, antifreeze, or brake fluid. Dumping of these wastes in storm sewers and other drainage channels is illegal and could result in fines or job shutdown.

A further source of these pollutants is leaky vehicles. Proper maintenance of equipment and placing tarps/drip pans underneath vehicles parked for a period of one or more days will further reduce pollution by this source. Refer to the SPCC Plan prepared for further guidance.

6.4 Additional Mitigation or Protection Measures

Wash facilities will not be provided to clean mud/dirt from construction equipment/vehicles. If excessive mud is on vehicles, use shovels and or brooms to brush off prior to entering county roads.

7.0 Post-Construction Mitigation or Protection Measures

Post construction activities shall, at a minimum, include:

- Reseeding/restoration of areas not needed for agricultural operations.
- Drainage ditches, earthen dikes, drainage swales, and other sediment control and diversion structures shall remain in place. Those not made permanent should be made permanent prior to final stabilization of the project area.
- Any exposed slopes should be protected using already established mitigation or protection measures cited above.
- Reference is made to all of the above mitigation or protection measures specifications mentioned previously in this plan and they are hereby incorporated into this section of the plan.

Only certified, weed-free, seed will be used for reseeding. Once the points of disturbance have been re-contoured, broadcast seeding will be used as the application method for re-vegetation. If necessary, the seeded area will be lightly dragged after broadcasting the seed in order to get ¼- to ½-inch soil coverage and certified noxious weed-free mulch, composed of either annual grain residue or native hay, will be crimped into the soil. If seeding is done by drill seeding methods, the rates above will be reduced by 50%.

Final stabilization means that all soil-disturbing activities at the site have been completed and all soils must be stabilized by a uniform perennial vegetative cover with a density of 70 percent over the entire pervious surface area, or other equivalent means necessary to prevent soil failure under erosive conditions and;

a. All drainage ditches, constructed to drain water from the site after construction is complete,must be stabilized to preclude erosion;
b. All temporary synthetic, and structural erosion prevention and sediment control mitigation or protection measures (such as silt fence) must be removed as part of the site final stabilization; and
c. The permittee(s) must clean out all sediment from conveyances and from temporary sedimentation basins that will be used as permanent water quality management basins. Sediment must be stabilized to prevent it from being washed back into the basin, conveyances or drainage ways discharging off-site; or to surface waters. The cleanout of permanent basins must be sufficient to return the basin to design capacity.

8.0 Potential Sources of Pollution

The following substances listed below may be expected to be present on-site during construction:

- Concrete
- Detergents
- Paints (enamels and latex)
- Metal studs
- Fertilizers
- Fuels
- Cleaning solvent
- Lubricants
- Wood
- Pipe coatings/lubricants

The most economical and effective way to control pollutants other than sediment is to exercise good housekeeping practices and to require construction workers, planners, engineers, and developers to be aware of the need to comply with federal, state, and local regulations. The following sections discuss practices that will minimize the potential for pollutants to enter storm water discharges.

Petroleum products are commonly used during construction activities. These products are used as fuels and lubricants for vehicular operations, power tools, general operation, and equipment maintenance. These pollutants include oils and fuels such as gasoline, diesel oil, kerosene, lubricating oils, and grease. Most of these pollutants adhere to soil particles and other surfaces easily. One of the best practices of control is to retain sediments that contain oil, if any, on the construction site.

Soil erosion and sediment control practices can effectively accomplish this. Improved maintenance and safe storage facilities will reduce the potential for contaminating construction sites. Guidelines for storing construction related products are as follows:

- Clearly label all products.
- Keep tanks off the ground.
- Keep lids securely fastened.
- Post information for procedures in case of spills. Persons trained in handling spills should be on-site or on-call at all times.
- Keep materials for cleaning up spills on-site and easily available. Spills should be cleaned up immediately and the contaminated material properly disposed of.
- Specify a staging area for all vehicle maintenance activities. This area should be away from all drainage courses.
- During subcontractor or safety meetings, remind workers about proper storage and handling of materials.

8.1 Non-Storm Water Discharge Management

Allowable non-storm water discharges are:

- Air Conditioning condensate from vehicles on location,
- Discharges from fire-fighting activities,
- Uncontaminated ground water or spring water,
- Uncontaminated excavation dewatering, and
- Landscape irrigation.

9.0 Inspections

The project area will be regularly inspected by qualified personnel to ensure that mitigation or protection measures are maintained in good and effective order. Personnel shall receive training in the SWPPP plan, SWPPP Plan implementation and mitigation or protection measures purpose, construction, use and inspection.

Erosion and sediment control measures shall be inspected on a regular basis. Disturbed areas and storage areas that are exposed to rainfall or run-on must be inspected for evidence of, or the potential for, pollutants entering site runoff. Site access shall also be inspected to determine if sediment is being tracked onto adjacent roads.

During day-to-day operations, inspections will be conducted by construction personnel. Each location is normally visited at least once per week. An inspection shall be conducted at this time and any problems areas noted on the Inspection Log (Appendix D). If all mitigation or protection measures are in place and functioning properly, a negative report should be entered.

9.1 Inspection Schedule

Routine inspections will occur a minimum of once every 14 calendar days and within 24 hours of the end of a storm event of or greater than 0.5 inches of precipitation. The frequency of inspections will be reduced if:

- The entire site is temporarily stabilized;
- Runoff is unlikely due to winter conditions (e.g., site is covered with snow, ice, or the ground is frozen);
- Construction is occurring during a seasonal arid period.

Inspections must include all areas of the site disturbed by construction activity and areas used for storage of materials that are exposed to precipitation. Sedimentation and erosion control measures identified in the SWPPP must be inspected to ensure proper operation. Discharge locations must be inspected to ascertain whether erosion control measures are effective. . Locations where vehicles enter or exit the site must be inspected for evidence of off-site sediment tracking.

Based on inspection results, the site description and pollution prevention measures must be revised in this SWPPP if inadequacies are discovered. The inspection and plan review process must include timely implementation of any changes to the SWPPP within seven (7) calendar days after the inspection. If existing mitigation or protection measures need to be modified or if additional mitigation or protection measures are necessary, implementation shall be completed before the next anticipated storm event. If implementation of changes to mitigation or protection measures is not practical before the next anticipated storm event, modifications shall be implemented as soon as practical.

A waiver of the inspection requirements is available until one month before thawing conditions are expected to result in a discharge if all of the following requirements are met:

- Frozen conditions are anticipated to continue for more than one month;
- Land disturbance activities have been suspended; and

- Beginning and ending dates of the waiver period are documented in the SWPPP.

9.2 Inspection Report

The inspection reports should summarize the scope of inspections, names and qualifications of inspection personnel, the inspection dates, major observations, and remedial actions taken. These records shall be retained as part of the SWPPP for at least three (3) years after the date of inspection.

The Inspection Form describes what to look for during inspections and the types of maintenance measures to undertake. The checklist includes:

- Visual inspection
- Good housekeeping
- Site assessment

9.3 Corrective Action Log

If problems are encountered, the issue shall be promptly reported to the field superintendent or his designated representative. Corrected action shall be planned immediately and initiated as soon as feasible. Corrective actions shall be recorded on the Corrective Action Log included in Appendix E.

10.0 Recordkeeping and Training

10.1 Recordkeeping

The following records should be kept for a period of at least three (3) years from the date all site work has been completed:

- Dates of grading, construction activity, and stabilization;
- A copy of the letter from NDDH verifying the receipt of the complete Notice of Intent (NOI)/application;
- The signed and certified NOI form or permit application form;
- Inspection reports; and
- Date(s) when an area is either temporarily or permanently stabilized.

10.2 Training

SWPPP training sessions will be held prior to and during construction, as needed. Contractor construction supervisory personnel and construction inspectors are required to attend. Training topics will include the following items:

- General storm water and mitigation or protection measures awareness training for staff and subcontractors;
- Spill prevention and response, as described by the SPCC components of this SWPPP;
- Standard housekeeping measures;
- Materials handling procedures; and
- A review of the most recent inspection results and any resulting changes to storm water pollution prevention or new requirements.

11.0 Log of Changes to the SWPPP

Amendments to the SWPPP will be required if any of the following occur:

- There are changes to the plan of construction or operations that affect the quality of storm water runoff;
- There are changes in the requirements of the NDPDES that require changes within the SWPPP to meet these new permit conditions; and/or
- A revision is requested by the EPA, an EPA representative, or the NDDH.

Amendments and dates of the amendments shall be recorded on the Revision Record to the SWPPP in Appendix A.

Appendix A

Revision Record

Revision Record

Project Name:
SWMP Contact:

Amendment No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title(s)]

Appendix B

Notice of Termination

NOTICE OF TERMINATION TO CANCEL COVERAGE UNDER NDPDES GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY (NDR10-0000)

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF WATER QUALITY
SFN 19146 (02/10)

FOR DEPT. USE ONLY

Date Received: ____/____/_____

GENERAL INFORMATION

Name of Construction Project		Permit ID Number **NDR10-**	
Name of Owner of Construction Project	Contact Person Name (Mr / Ms)	Contact Phone No.	
Mailing Address	City	State/Province	Zip Code

Please indicate which condition has been met before submitting the NOT.

☐ The site has achieved final stabilization. In order to achieve final stabilization, one of the following conditions must be met. Please indictate which condition has been met.

☐ All soil disturbing activities are complete and all soils are stabilized by a uniform perennial vegetative cover with a density of 70 percent over the entire pervious surface area or other equivalent means necessary to prevent soil failure under erosive conditions. In addition, the following conditions have been met:

i. All drainage ditches which drain water from the site have been stabilized.

ii. All temporary synthetic and structural erosion prevention and sediment controls (e.g., silt fence) have been removed.

iii. Sediment has been removed from conveyances and temporary sediment basins used for permanent water quality management, and the sediment has been stabilized.

☐ For areas with an average annual rainfall of less than 20 inches, all soil disturbing activities at the site have been completed and temporary erosion control measures have been selected, designed and installed along with the appropriate seed base to provided erosion control for three years and achieve 70 percent vegetattive coverage within three years without active maintenance.

☐ For soil disturbing activities on agricultural land, the land is returned to its pre-disturbance agricultural use. Areas not used for agricultural activities such as buffer strips adjacent to waters of the state and areas not being returned to pre-disturbance agricultural use must meet the criteria above.

☐ Another operator/permittee has assumed control in accordance with the transfer provision over all areas of the site that have not achieved final stabilization.

☐ For residential construction, all lots have been sold with temporary erosion protection and down gradient perimeter controls installed; a homeowner fact sheet has been given to the homeowner(s); and all other lots have achieved final stabilization.

CERTIFICATION STATEMENT

Return Completed Form to:

North Dakota Department of Health
Division of Water Quality, 4th Floor
918 East Divide Avenue
Bismarck, ND 58501-1947

Telephone: 701.328.5210
Fax: 701.328.5200

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein. Based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

Printed Name of Owner	Title
Signature of Owner	Date

(Attach additional pages if needed)

Appendix C

Typical Details

Appendix D

Inspection Record

SITE INSPECTION RECORD
NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF WATER QUALITY
SFN 19391

Permit Number: NDR10-_____

Instructions: Please fill out the inspection information below for the permit number referenced above. See example below:

Time & Date	**Name of Inspector**	**Date, Amount (inches), & Duration of Precipitation Event**	**Observations and actions taken:** Document incidents such as erosion, sediment accumulation, spills, SWPP – related maintenance, remediation, etc.
Example: 2:00 pm 7/2/2002	Example: John Smith	Example: 7/1/2002, 2 inches of rain, 5 hours	Example: Up to 20 inches of sediment captured behind silt fence on western edge of property – sediment needs to be removed. Silt fence on northern side is OK. Noticed small oil leak from fuel tank.

BakkenLink Pipeline LLC
Site Inspection Record - Construction

Project Name: BakkenLink Pipeline LLC

Coverage Number: _____

Inspector: _____ Date: _____ Time: _____

Precipitation Amount: _____ Date: _____

Areas Inspected (Choose Applicable):
- ☐ Active areas
- ☐ Stabilized areas with less than 70% cover
- ☐ Areas that have achieved final stabilization

Is there evidence of, or the potential for, pollutants entering drainage systems or waters of the state from:

Material Storage Areas	☐ Y	☐ N
Vehicle Maintenance Areas	☐ Y	☐ N

Observations / Corrective Actions:

_____

_____

_____

☐ Y ☐ N	Have all erosion and sediment controls and mitigation or protection measures identified in the plan been installed or implemented?
☐ Y ☐ N	Are erosion and sediment controls operating correctly and in serviceable condition?
☐ Y ☐ N	Are erosion and sediment controls operating consistently and effectively?
☐ Y ☐ N	Are there any devices similar to silt fence or fiber rolls where sediment has reached more than 1/3 the height of the device? (Removal and repairs must be made within 24 hours.)
☐ Y ☐ N	Are there any sediment basins where collected sediment has reduced the storage capacity by 1/2? (Drainage and removal must be completed within 72 hours.)
☐ Y ☐ N	Is there evidence of sediment deposits in surface waters, drainage ditches or other stormwater conveyance systems? (Removal and stabilization must be completed within 7 days unless prohibited by legal, regulatory or physical access constrains. All reasonable efforts must be made to obtain access. Once permission is granted, removal must take place within 7 days.)
☐ Y ☐ N ☐ NA	Is there evidence of sediment being tracked off-site by vehicles or equipment? (Sediment tracked or deposited on paved surfaces must be removed within 24 hours.)
☐ Y ☐ N	Is there evidence of sediment depositing off-site other than in surface waters, drainage ditches and stormwater conveyance systems? (Sediment must be recovered in a manner and frequency sufficient to minimize off-site impacts – for example, sediment could wash away during the next precipitation event.)
☐ Y ☐ N ☐ NA	Is stormwater flow distributed evenly over vegetative buffers?
☐ Y ☐ N ☐ NA	Is sediment accumulating in vegetative buffers?
☐ Y ☐ N ☐ NA	Are rills forming within vegetative buffers? (If vegetative buffers are silted covered, contain rills or are otherwise rendered ineffective, other erosion and sediment controls must be implemented. Eroded areas must be repaired and stabilized.)

☐ Y ☐ N	Are litter, debris, chemicals and parts being managed properly to minimize stormwater pollution?
☐ Y ☐ N	Are liquid or soluble materials like oil, fuel, paint, etc., properly stored to prevent spills, leaks or other discharges?
☐ Y ☐ N	Is there evidence of concrete wash water discharging to waters of the state, storm sewer systems or onto adjacent properties?
☐ Y ☐ N	Is there evidence of wastewater from processing operations or sanitary facilities (i.e., portable toilets) discharging from the site? (These types of discharges are not covered by the construction general permit, NDR10-0000. They must be stopped immediately if they are not covered by another type of permit. The following non-stormwater discharges are allowable if the appropriate prevention measures are in place: fire-fighting, fire hydrant flushing, potable water line flushing, infrequent building and equipment wash down without detergents, uncontaminated foundation drains, springs, lawn watering and air conditioning condensate. Please note that discharges from temporary dewatering activities, such as hydrostatic testing or disinfection of new pipelines may require coverage under the temporary dewatering general permit, NDG07-0000.)
☐ Y ☐ N	Is there evidence of wash water from tools or equipment draining to waters of the state, drainage ditches or storm sewer systems?
☐ Y ☐ N ☐ NA	Are permanent stormwater management measures (e.g., oil-water separators, rain gardens) functioning properly?

Corrective Actions and Schedule:

_____

_____

_____

Are mitigation or protection measures effective to minimize the discharge of sediment from the site? ☐ Y ☐ N

Do mitigation or protection measures need to be adjusted? ☐ Y ☐ N

Are additional mitigation or protection measures needed? ☐ Y ☐ N

Comments:

_____

_____

_____

List all spills, leaks or hose-breaks that have occurred since the last inspection:

-Size	-Location	-Was it reportable?	-Was it reported?
_____	_____	☐ Y ☐ N	☐ Y ☐ N
_____	_____	☐ Y ☐ N	☐ Y ☐ N
_____	_____	☐ Y ☐ N	☐ Y ☐ N

Were Spill Prevention Procedures adequate? ☐ Y ☐ N

What Spill Response Procedures were used?

Comments

Has the SWPP Plan been updated as a result of this inspection?	☐ Y	☐ N
Has the Site Map been updated as a result of this inspection?	☐ Y	☐ N

Appendix E

Corrective Action Log

Corrective Action Log

Project Name:
SWPPP Contact:

Inspection Date	Inspector Name(s)	Description of Mitigation or Protection Measures Deficiency	Corrective Action Needed (including planned date/responsible person)	Date Action Taken/Responsible person

Appendix XVIII

Summary of Environmental Protection Measures

Table 2-4 Summary of Environmental Protection Measures for the Project

Resource	Environmental Protection Measures As Design Features
Air Quality	Water or chemical soil binders would be used to control dust along the ROW and access roads during construction in accordance with federal, state, and local requirements.
Geology and Minerals	The HDD construction method would be used to avoid impacts to landslide areas associated with the bluffs on the north and south sides of Lake Sakakawea.
Soils	Soil erosion would be minimized by implementing procedures described in the Storm Water Pollution Prevention Plan (SWPPP), and the Construction, Mitigation, and Reclamation Plan (CMRP).
	If construction is planned during a storm event, vehicle traffic and equipment would be restricted to prevent excessive rutting.
	Use of temporary roads across agricultural lands may result in some compaction and seasonal loss of crops. When necessary, compacted soils would be disked following Project completion and landowners would be compensated for any crop loss.
	During reclamation, compacted areas (typically any area that received repeated traffic or three or more passes by heavy equipment) would be decompacted, to the depth of compaction, by subsoiling or ripping to the depth of compaction. This would help prepare the seed bed, encourage infiltration, and help to prevent accelerated runoff and erosion. Where topsoil has been salvaged and segregated, decompaction would occur prior to respreading topsoil. Scarification would be used only on shallow soils.
	Salvaged topsoil would be protected from wind and water erosion at all times. To ensure proper erosion control of topsoil piles, all sediment and erosion control measures would be inspected after large rain events and repairs would be performed as needed.
Water Resources and Wetlands	The SWPPP would be implemented to minimize storm water transport of sediment from disturbed areas to streams, wetlands, and Lake Sakakawea. All Project-related storm water and hydrostatic test water discharges would be in compliance with a NPDES permit.
	No aboveground facilities or staging areas would be constructed/located within wetlands, riparian areas, or other WUS.
	Biologists familiar with wetland and riparian area identification would post signs at the edges of the wetland/waterbody features prior to construction to avoid surface disturbance and resource impacts.
	ATWSs would be located a minimum of 50 feet outside wetland boundaries. Protection measures (including installation of erosion control devices) would be utilized at all wetland and waterbody crossings to minimize sedimentation. For areas where additional setbacks are deemed necessary to protect the resource, the applicability of the appropriate setback would be determined in consultation with agencies on a site-specific basis.
	No refueling or lubricating would occur within 100 feet of wetlands and/or perennial/intermittent waterbodies. Hazardous materials, chemicals, fuels, etc., would not be stored within 100 feet of wetlands or perennial/intermittent waterbodies.
	Application of pesticides in the vicinity of wetlands and waterbodies would follow pesticide use protocol, label instructions, and restrictions outlined in the Noxious Weed and Aquatic Nuisance Species Control Plan.
	For dry crossings, topsoil within the trench line would be segregated from subsoil in wetland and riparian areas for use in reclamation as specified in the CMRP.
	For standard wetland or riparian area crossings, topsoil stripping is impractical due to the saturated nature of the soil as specified in the CMRP.
	Where crossings of wetland or riparian areas cannot be reasonably avoided, the construction ROW width would be reduced to approximately 75 feet or less in standard wetlands and measures would be taken to minimize impacts. The construction ROW width would be reduced to approximately 50 feet or less on all federal lands.

Table 2-4 Summary of Environmental Protection Measures for the Project

Resource	Environmental Protection Measures As Design Features
Water Resources and Wetlands (Continued)	To control aquatic nuisance species ***(ANS)***, equipment and boats would be washed to remove all vegetative matter and ***ANS*** prior to arrival at the construction site and after constructing through waterbody crossings (e.g., Lake Sakakawea), where water is evident. ***Project staff would spray/wash equipment with high pressure hot water when leaving a wetland/waterbody, or would dry equipment for at least 5 days before use at a different wetland/waterbody. A minimum of 72 hours notice would be provided to the NDGFD for scheduling an inspection. The NDGFD's ANS Biologist, Mr. Fred Ryckman, would be contacted at the NDGFD Riverdale Office (701-770-0920) for equipment inspections or any additional information regarding ANS prevention protocols.***
	Water used for hydrostatic testing, dust control during construction, etc., would be obtained from municipal or other permitted water supply wells. The installation or abandonment of any wells is not anticipated. Surface water or non-permitted groundwater appropriation is not anticipated.
	Sensitive areas would be marked and flagged as an "environmental sensitive area."
	Pipeline crossings of any surface waterway would be scheduled at times of minimal rainfall to minimize the risk of construction-related sediment sources being washed into waterbodies or wetlands.
	A Section 404 permit would be obtained and mitigation would be required in consultation with the USACE. Mitigation areas would need to be monitored for a minimum of 5 years. Annual reports would have to be submitted to the North Dakota USACE regulatory office. Successful performance criteria would need to be developed in a mitigation and monitoring plan that should be submitted with a completed 404 permit application. North Dakota USACE regulatory staff would be able to provide additional guidance as necessary.
Vegetation	The USFS-approved revegetation seed mix for native prairie would be applied on federal lands. The USFS-approved seed mix would be applied on state and private lands unless state and private landowners request a different seed mix. The CMRP outlines the procedures to be followed for returning the land to pre-existing vegetative cover and land uses. All seed would be certified or registered by the State of North Dakota or the state of origin.
	Trees and shrubs would be replaced in accordance with the PSC's tree and shrub mitigation specifications ***and the USACE's tree and shrub mitigation specifications (SOP #14 – Garrison Project Tree/Vegetation Mitigation) on USACE-administered land***. BakkenLink would coordinate with the appropriate agencies to identify efficient restoration and mitigation measures following construction.
	Post-construction monitoring of reclaimed areas would be conducted for 3 to 5 years following the first growing season, depending on land ownership, to determine the success of revegetation focusing on vegetative cover, noxious weeds, and invasive species cover. On private lands, if revegetation is successful after the third growing season, no additional monitoring would be conducted. On USFS, State, and USACE-***administered*** lands, if revegetation is successful after the fifth growing season, no additional monitoring would be conducted. ***Annual reports would be sent to the BLM and appropriate land management agency.*** Reclamation success would be based on the revegetation to at least 70 percent of the background cover. On USFS lands, if revegetation is successful at any time during the 5-year monitoring period, no additional monitoring would be conducted.

Table 2-4 Summary of Environmental Protection Measures for the Project

Resource	Environmental Protection Measures As Design Features
Vegetation (Continued)	In grasslands identified as high and moderate quality Dakota Skipper habitat, post-construction monitoring inspections would be conducted for 5 years following the first growing season to determine the success of revegetation focusing on vegetative cover and noxious weeds and invasive species establishment. The monitoring period may be shortened to 3 years upon request if located on private land. If 2 consecutive years of successful revegetation is not documented, additional mitigation measures (e.g., reseeding) and extended monitoring may be required. Additional mitigation measures would be determined in consultation with the BLM, landowner/manager, and the USFWS.
	Sensitive areas would be marked and flagged as an "environmental sensitive area."
Noxious Weeds	The Project's Noxious Weed and Aquatic Nuisance Species Control Plan would be implemented to minimize the spread of noxious weeds.
	Noxious weed monitoring and control would continue for any ROW over which BakkenLink would retain control over the land surface use after construction.
	ROW monitoring for noxious weeds and invasive species would be conducted following reclamation in conjunction with ROW monitoring of reclamation success. BakkenLink would be responsible for noxious weed control within the permanent ROW for the life of the Project.
Wildlife and Fisheries	BakkenLink would construct escape ramps every 0.5 mile to reduce the potential for livestock and wildlife becoming trapped in the pipeline trench.
	To the extent practicable, mowing, clearing, and grubbing of the Project ROW would occur in the fall or winter (i.e., outside of migratory bird nesting season [February 1 through July 15]) to minimize disturbance to nesting birds.
	If construction occurs during migratory bird breeding season (February 1 to July 15), BakkenLink would conduct pre-construction surveys for active nests, including raptor nests, in order to avoid disrupting migratory birds during the breeding season. BakkenLink would have a qualified biologist survey the proposed route for nesting migratory birds within 5 days of any ground disturbing activity. To minimize impacts to migratory birds (including some game birds, waterfowl, and raptors), active nests would be avoided during construction and maintenance activities, in coordination with USFWS. If surveys or other available information indicate a potential for take of migratory birds, their eggs, or active nests, BakkenLink would suspend activities and contact the USFWS for further coordination on the extent of the impact and the long-term implications of the intended use of the Project on migratory bird populations.
	Any open posts (1.5-inch-diameter or greater), which may be utilized in pipeline construction or operation (such as markers, signs, stacks, etc.), would be permanently covered or filled with sand or gravel. This is necessary to prevent wildlife mortalities by entrapment.
	To avoid/minimize impacts to nesting bald eagles from construction activities, BakkenLink would: 1) maintain a minimum 0.5-mile buffer between the activity and any bald eagle nest if no landscape buffer exists; 2) maintain a minimum 660-foot buffer and landscape buffer or natural area between the activity and around the nest tree; and 3) avoid activities during the bald eagle nesting season (February 1 to July 15).

Table 2-4 Summary of Environmental Protection Measures for the Project

Resource	Environmental Protection Measures As Design Features
Wildlife and Fisheries (Continued)	To avoid/minimize impacts to golden eagles, BakkenLink would conduct surveys prior to any on-the-ground activities to determine the extent of any golden eagle breeding territories in the area that may be impacted by the Project. BakkenLink would conduct an aerial nest survey (preferably by helicopter) within 1 mile of the Project ROW to identify any occupied and unoccupied golden eagle nest sites in proximity to the Project area. Aerial surveys would be conducted between March 1 and May 15, before leaf-out, so that nests are visible and their status (active or inactive) can be determined. A nesting territory or inventoried habitat would be designated as unoccupied by golden eagles only after at least two complete aerial surveys in a single breeding season. Aerial surveys would include the following: 1. Due to the ability to hover and facilitate observations of the ground, helicopters are preferred over fixed-wing aircraft, although small aircraft also may be used. BakkenLink would report any golden eagle nests, as well as other nests of any other raptors found during the survey. Where possible, BakkenLink would utilize two observers to conduct the surveys. 2. BakkenLink would record any observations of golden eagle nest sites using a global positioning system. The date, location, nest condition, activity status, and habitat would be recorded for each sighting. 3. BakkenLink would share the qualifications of the biologist(s) conducting the survey, method of survey, and results of the survey with the USFWS.
	Alternatively, BakkenLink may conduct ground surveys to identify golden eagle nests within 1 mile of the Project ROW between March 1 and May 15. However, ground surveys are much less reliable than aerial surveys, even during leaf-off conditions, and 75 percent of golden eagle nests present may be missed. BakkenLink would conduct at least two ground observation periods lasting at least 4 hours or more per linear mile to designate inventoried habitat or territory as unoccupied as long as all potential nest sites and alternate nests are visible and monitored. If a golden eagle nest is observed, BakkenLink would contact the USFWS for further consultation to determine appropriate protection measures and possible “take” permit implications.
Special Status Species	Prior to the initiation of construction, applicable biological surveys would be conducted through areas of suitable habitat for specific species during the appropriate season, as determined by the jurisdictional agencies (e.g., BLM, USFS, USACE, and USFWS) and survey results reported in compliance with Section 7 of the ESA.
	If threatened, endangered, candidate, or sensitive plant species are identified in proposed disturbance areas prior to construction, appropriate protection measures would be determined in consultation with agencies.
	Surface use is prohibited from March 1 through June 15 within 1 mile (line of sight) of active sharp-tailed grouse leks.
	The loss of special status plant species individuals or populations may occur as a result of adjacent noxious weed-related herbicide application treatments. To effectively mitigate this impact, consultation between the special status plant species jurisdictional agency and the weed control specialists would be completed prior to treatments. The location of known special status plant species and noxious weed species individuals and populations would be confirmed prior to treatments. In addition, techniques for special status plant species avoidance via direct and indirect applications would be developed.
	The revegetation plan would include a commitment to reseed disturbed native prairie with USFS-approved seed mixture and planting a diverse mixture of native cool- and warm-season grasses and forbs.
	BakkenLink would obtain a seed source that is as local as possible to ensure the particular cultivars are well adapted to the local climate.

Table 2-4 Summary of Environmental Protection Measures for the Project

Resource	Environmental Protection Measures As Design Features
Special Status Species (Continued)	Disturbed native prairie would be reclaimed to its original condition using USFS-approved seed mixes specified by applicable state and federal agencies. The objective is for no net loss of native prairie habitat to occur. Where avoidance of native prairie is not feasible, the following protection measures would be implemented to minimize impacts to the Dakota skipper, regal fritillary, Ottoe skipper, and tawny crescent: 1. Restrict workspaces where the ROW crosses native prairie habitat; 2. Salvage and segregate topsoil in native prairie to maintain the native seed sources for re-vegetation of the ROW in native prairie; and 3. Eliminate pesticide use where Dakota skippers, regal fritillaries, Ottoe skippers, and tawny crescents are found.
	If construction occurs during spring or fall migration, BakkenLink would provide whooping crane monitors in suitable habitat along the ROW. If a whooping crane is sighted within 1 mile of a pipeline or associated facilities during construction, all work would cease within 1 mile of the area and the USFWS would be contacted immediately. In coordination with the USFWS, work would resume after the bird(s) leave the area.
	If construction were to occur during the rufa red knot migration period (Fall: July 15 through November 15; Spring: March 15 through June 15), BakkenLink would conduct surveys in suitable habitat within 0.5 mile of the Lake Sakakawea crossing location. Surveys would be conducted by a qualified wildlife biologist who is able to identify rufa red knots and would occur daily before and after construction activities. Surveys would last for at least 2 hours prior to the start of construction each day and continue for at least 1 hour after construction has finished each day. If rufa red knots are observed within line-of-sight of the Project area, no work would begin or continue and the BLM and USFWS would be contacted within 24 hours. In coordination with the USFWS, work may resume after the bird(s) leave the area. Similar constraints may apply to pipeline maintenance activities if conducted within 0.5 mile of suitable habitat.
	If construction were to occur during the interior least tern or piping plover breeding season (April 1 through August 31), BakkenLink would conduct surveys in suitable habitat within 0.5 mile of the Lake Sakakawea crossing location. A qualified biologist would survey no more than 5 days prior to construction-related activities to identify occupied breeding territories and/or active nest sites. If occupied breeding territories and/or active nest sites are identified, the USFWS would be notified. Appropriate protection measures, such as seasonal constraints and the establishment of a spatial buffer area, would be implemented on a site-specific basis in coordination with the USFWS. Similar constraints and/or mitigation measures may apply to pipeline maintenance activities if conducted during the breeding season within 0.5 mile of the Project area.
Land Use	Any range improvements such as fences, gates, cattle guards, and developed water sources located within disturbance or access routes would be repaired to the satisfaction of the agency or private landowner.
	If construction would disturb or destroy a natural barrier used for livestock control, the opening would be temporarily closed during construction and permanently closed following construction, as required by the agency or private landowner.
	BakkenLink would coordinate with landowners to minimize impacts to their lands. Lands would be restored to cropland and farming use following the construction phase of the Project.
	In cultivated areas, the depth of cover may be increased to avoid interference with land use activities.

Table 2-4 Summary of Environmental Protection Measures for the Project

Resource	Environmental Protection Measures As Design Features
Recreation and Visual Resources	Measures would be implemented to minimize the visual effects of construction on high value road, river, and trail crossings as identified by the BLM, USFS, or USACE.
	To prevent unauthorized use of the ROW by off-road vehicles and subsequent potential impacts to soil, vegetation, and wildlife resources, access to the ROW would be restricted by BakkenLink during construction. On federally administered lands (i.e., USFS and USACE), existing regulations regarding off-road vehicles also would apply.
	Aboveground structures would be painted with BLM-approved environmental colors to minimize contrasts with surrounding landscapes.
Transportation	All major highway and improved gravel or scoria road crossings would be bored to limit traffic interruptions.
	Placement of temporary access would be designed to avoid sensitive features such as wetlands. Areas used for temporary roads or working areas during construction would be restored to their original condition to the extent practicable.
Cultural and Paleontological Resources	Prior to the Project construction, cultural and paleontological resource inventories would be conducted on all proposed disturbance areas not previously inventoried. All cultural resources recorded during the inventories would be evaluated for eligibility to the National Register of Historic Places (NRHP). Avoidance ***is*** recommended for cultural resources listed on the NRHP***,*** evaluated as eligible for listing on the NRHP***, or unevaluated***. If avoidance is not possible, a treatment plan would be developed by the BLM in consultation with the North Dakota State Historic Preservation Office (SHPO), USFS/USACE (if on their lands), and interested tribes. The treatment plan would be implemented prior to Project construction.
	Twenty-two cultural resources (32MZ1151, 32MZx1423, 32MZ2695, 32MZ2696, 32MZ2718, 32MZ2741, 32MZ2753, 32MZ2760, 32MZ2761, 32MZ2762, 32MZ2763, 32MZ2766, 32MZ2767, 32MZ2773, 32WI1124, 32WI1209, 32WI1488, 32WI1491, 32WI1492, 32WI1506, 32WI1513, and 32WI1514) have been identified in the Project area and all of these cultural resources have been avoided by the Project through redesign of the Project ROW. On January 7, 2015, SHPO concurred with BLM's determination that the Project would not have an adverse effect on these cultural resources. In accordance with the cultural resource monitoring plan, archaeological monitoring and protective fencing would be utilized during construction near seven of the cultural resources (32MZ1151, 32MZx1423, 32MZ2695, 32MZ2741, 32MZ2753, 32MZ2763, and 32WI1124). One area near the Project ROW would be monitored due to the possibility of encountering buried archaeological resources and/or paleosols.
	No paleontological resources were identified during the survey; however, paleontological resource monitoring is required on lands designated as Potential Fossil Yield Classification (PFYC) Class 4 bedrock during Project construction. Paleontological monitoring would be conducted by a paleontological resource consultant approved and permitted by the BLM.
	To minimize indirect impacts to cultural and paleontological resources, Project-related personnel would be educated as to the sensitive nature of the resources; a strict policy of prohibiting collecting of these resources would be implemented.
	Sensitive areas would be marked and flagged as an "environmental sensitive area."

Table 2-4 Summary of Environmental Protection Measures for the Project

Resource	Environmental Protection Measures As Design Features
Cultural and Paleontological Resources (Continued)	If cultural resources, including human remains, are discovered during Project construction, all work would stop in the area of the discovery and the procedures outlined in the Unanticipated Discoveries Plan ***(POD, Appendix XV)*** would be followed. ***If the cultural resource is determined to be a historic property, and cannot be avoided, then appropriate mitigation measures would be developed in consultation with SHPO, applicable federal agency if found on USACE- or USFS-administered lands, and interested tribes.*** Written permission stating that work in this area no longer presents a hazard to cultural resources would be required before work could resume in the area of the discovery. ***If human remains are discovered, the Environmental Inspector would immediately stop construction in a 300-foot radius and notify the BLM. If human remains are found on federal lands and determined to be Native American, BLM would follow the requirements under the Native American Graves Protection and Repatriation Act (NAGPRA). BLM would provide written notice to BakkenLink indicating they can proceed with construction once the remains have been fully evaluated and appropriate treatment of the discovery has been completed.*** If paleontological resources are discovered during Project construction, all work would cease ***within 100 feet of the discovery,*** and the Unanticipated Discoveries Plan for Paleontological Resources ***(POD, Appendix XXVIII)*** would be ***followed. A*** certified paleontologist permitted by the State of North Dakota and the BLM would be contacted to determine appropriate resource identification and protection procedures. ***Construction activities would not resume until the BLM project manager has provided written notice that construction can proceed.***
Tribal Treaty Rights and Interests	***Several areas of tribal concern have been identified within the Project ROW. These areas of tribal concern would be avoided by the Project by realignment, narrowing of the Project construction ROW, or use of the HDD construction method.***
Noise	The proposed route would be at least 500 feet from occupied houses and structures. At this distance, noise created during construction should be below ambient background levels, especially near highways and railroad lines.
Health and Safety	The Project would be located a minimum distance of 500 feet from residences to minimize hazards to human health and safety. Also, isolation valves would be installed along the pipeline in accordance with federal regulations to isolate the pipeline during a potential leak to minimize the release.
	A Spill Risk Assessment (**Appendix A**) has been completed to identify HCAs and potential impacts as a result of an accidental release of crude oil during pipeline operation.
	Any burning during the Project would comply with all federal, state, county, and local fire regulations pertaining to burning permits.
	All hazardous and potentially hazardous materials would be transported, stored, and handled in accordance with applicable regulations.
	If toxic or hazardous waste materials are encountered during construction, construction would stop immediately, and would not restart until clearance is granted by the appropriate agency.
USFS-Specific Mitigation Measures	Keep disturbance to a minimum to reduce impacts to suitable sensitive species habitat and native vegetation communities in general, and also to reduce spread of invasive species.
	Where the disturbance area would intersect noxious weeds or patches of invasive species, treat the noxious weeds or invasive species at least 2 weeks prior to construction, or salvage and stockpile the topsoil from these sites separately to isolate the vegetative propagules and seed. These areas should be identified to ensure they are monitored after reclamation.

Table 2-4 Summary of Environmental Protection Measures for the Project

Resource	Environmental Protection Measures As Design Features
USFS-Specific Mitigation Measures (Continued)	Use a USFS-approved native seed mix for reclamation ***and*** monitor to ensure proper establishment. Monitor annually for 5 years following reclamation to ensure reclamation success and to identify noxious weeds and invasive species establishment. ***Reclamation success would be based on the revegetation to at least 70 percent of the background cover. On USFS-administered lands, if revegetation is successful at any time during the 5-year monitoring period, no additional monitoring would be conducted.***
	If invasive species are found on reclaimed sites that are in areas mostly dominated by native species, treat the invasive species sites and reseed if necessary.
	If noxious weeds are found on reclaimed sites, treat the weeds and reseed if necessary.
	Clean vehicles and equipment used for construction at approved water or air wash stations (monitored by an EI) prior to entering the LMNG to remove all seeds and plant propagules (seeds and vegetative parts that may sprout) in order to prevent the potential spread of noxious weeds and invasive species. Approved wash stations would include commercial car washes and on-site locations. This mitigation would be applied when moving equipment from an area containing invasive species to an area that does not contain invasive species.
	Clearly mark (stake/fence/flag) sensitive plant populations within or very near the ROW prior to construction and note them on alignment sheets to ensure that they are avoided. Ensure that such marking is still visible prior to reclamation activities.
	Any discovery of sensitive or watch plants within the Project area should be reported to the McKenzie Ranger District Office. Sensitive plant populations discovered after Project approval should be protected; therefore, last-minute alterations of the Project design or access route may be requested in order to avoid negative impacts to such populations.
USACE-Specific Mitigation Measures	***Prior to construction, all Project personnel would be trained on environmental permit requirements and environmental specifications, including fuel handling and storage, cultural resource protection methods, stream and wetland crossing requirements, and sensitive species protection measures.***
	Construction would occur between August 15 and April 1 to avoid potential impacts to sensitive species. If construction is proposed outside of this schedule restriction, then the USACE would be contacted as early as possible to allow for coordination with pertinent state and federal resource agencies.
	BakkenLink would provide a minimum of one third-party environmental inspector at the Lake Sakakawea crossing to ensure that construction activities are compliant with the permit-approved environmental mitigation and reclamation requirements specified in all permits and this EA. An email would be sent to USACE staff every day documenting construction activities.
	If fish kills[1] are observed, construction would stop and the USACE lake manager would be contacted. USACE would contact the NDDH and/or NDGFD who will dispatch staff to investigate cause of fish kill. Work may resume with permission from either agency.
	No refueling or lubricating of non-stationary equipment would occur on USACE-administered lands. Refueling and lubricating of stationary equipment associated with the Project would be done on USACE-administered land only with equipment located within a secondary containment system.
	Drilling mud pits would not be constructed on lands administered by the USACE.
	When working in water, the backhoe would always use a silt curtain and the jet trench would always use a turbidity mat and diffuser.

Table 2-4 Summary of Environmental Protection Measures for the Project

Resource	Environmental Protection Measures As Design Features
USACE-Specific Mitigation Measures (Continued)	***During construction, BakkenLink would deploy turbidity monitoring instrumentation with a third-party inspector monitoring turbidity levels. The third-party inspector would have stop work authority if turbidity levels exceeded 100 NTUs above pre-workday/work period background levels. Pre-work background turbidity readings would be taken at a location 1,000 feet perpendicular and to the east of the construction area and no greater than 1 hour prior to work starting. Turbidity monitoring readings taken during construction would be 1,000 feet perpendicular and to the east of the construction area, taken at mid-depth of the reservoir, and at intervals of 1 hour after work commences and then every 4 hours until work has ceased for that day/work period. Should work be stopped due to turbidity levels, work would not commence again until turbidity levels fall below the 100 NTU's above pre-workday/work period background levels.***
	No sheet piling would be used to construct the Project.
	Trees and shrubs would be replaced in accordance with the USACE's tree and shrub mitigation specifications (SOP #14 – Garrison Project Tree/Vegetation Mitigation) on USACE-administered land.
	Use ***the USFS***-approved native seed mix for reclamation ***unless the USACE requests a different seed mix and*** monitor to ensure proper establishment. ***Post-construction monitoring of reclaimed areas would be conducted for 3 years following the first growing season to determine the success of revegetation focusing on vegetative cover, noxious weeds, and invasive species cover. Reclamation success would be based on the revegetation to at least 90 percent of the background cover. On USACE-administered lands, if revegetation is successful at any time during the 3-year monitoring period, no additional monitoring would be conducted. Annual reports would be sent to the USACE Garrison Project Office.***
	To control ANS, equipment and boats would be washed to remove all vegetative matter and ANS prior to arrival at the construction site and after constructing through waterbody crossings (e.g., Lake Sakakawea), where water is evident. NDGFD would be given a minimum of 72 hours notice to enable a biologist to inspect the equipment and boats.
	BakkenLink would install remotely controlled double mainline valves on both sides of Lake Sakakawea. In the event of a pipeline leak or rupture at the proposed Lake Sakakawea crossing, Lake Sakakawea water permit holders would be notified immediately as described in BakkenLink's Emergency Response Plan (ERP).
	The pipeline would be monitored 24 hours a day, 365 days a year, from an Operations Control Center (OCC), located in Fryburg, North Dakota, using a sophisticated SCADA system.
	BakkenLink would follow the Spill, Prevention, Containment and Countermeasures (SPCC) Plan to reduce the likelihood of an accidental release of hazardous fluids.
	BakkenLink has committed to join the SASR Team, which provides access to adequate equipment for quick spill response.
	Rectifiers and deep well anodes that are a part of the cathodic protection system would be inspected at least six times per year and replaced if necessary.
	BakkenLink commits to having a threat assessment annual meeting with USACE to determine if additional riprap protection around the pipe or initiation of "evacuate and shut-in" provisions are needed based on annual Missouri River and accompanying reservoirs water level forecast.

Table 2-4 Summary of Environmental Protection Measures for the Project

Resource	Environmental Protection Measures As Design Features
USACE-Specific Mitigation Measures (Continued)	***In order to prevent shoreline erosion (scour) and possible pipeline exposure in the long term, BakkenLink has committed to protecting with riprap or lowering the pipe if reservoir levels draw down. If for any reason the threat is imminent, leaving insufficient time to take measures to physically protect the pipe, BakkenLink temporarily would suspend service and remove all oil from the pipe at the Lake Sakakawea crossing until such threat passes. See Section 2.2.5.5, Waterbody Crossings, and Appendix B, Erosion Monitoring Plan, for more information.***
	BakkenLink would maintain a non-public boat launch on USACE lands to be used only for launching emergency response boats.
	BLM regulations at 43 CFR 2880, Rights-of-way under the Mineral Leasing Act, would be followed for the abandonment process.

[1] A "fish kill" is a significant and sudden death of fish, shellfish, and other aquatic animals. Such events are characterized by large numbers of animals dying over a short time, usually in a defined area.

Appendix XIX

Legal Corridor Description

Appendix XIX. Legal Corridor Description

County	Civil Township	TWN	RNG	Section(s)
McKenzie	Grail	150N	95W	18
McKenzie	Unorganized Territory	150N	96W	1, 12, 13
McKenzie	Blue Butte	151N	96W	1,12,13,24,25,36
McKenzie	Keene	152N	96W	1,12,13,24,25,36
McKenzie	Elm Tree	153N	95W	3,4,9,15,16,22,27,28,33
McKenzie	Unorganized Territory	154N	95W	27,34
Williams	Unorganized Territory	154N	95W	4,9,16,21,27,28
Williams	Dry Fork	155N	95W	6,7,8,17,20,21,27,28,29,33,34
Williams	Pleasant Valley	156N	95W	31

Appendix XX

Road Crossings and Methodology

Appendix XX. Road Crossings and Methodology

ROAD CROSSINGS				
Road Name	Approx. MP	Construction Method	Bore Length (ft)	Condition
28th St NW	1.7	Bore	150	Improved Scoria
30th St NW	3.3	Bore	150	Improved Scoria
32nd St NW	5.4	Bore	150	Improved Scoria
33rd St NW	6.4	Bore	150	Improved Scoria
34th St NW	7.4	Bore	150	Improved Scoria
38th St NW	11.6	Bore	150	Improved Scoria
Highway 23	12.6	Bore	150	Paved Highway
40th St NW	13.6	Bore	150	Improved Scoria
42nd St NW	15.8	Bore	150	Improved Scoria
43rd St NW	16.8	Bore	150	Improved Scoria
104th AVE	17.7	Bore	150	Improved Scoria
44th St NW	18.2	Bore	150	Improved Scoria
Highway 1806	19.2	Bore	150	Paved Highway
104th AVE	20	Bore	150	Improved Scoria
46th St NW	21.1	Bore	150	Improved Scoria
48th St NW	23	Bore	150	Improved Scoria
52nd St NW	26.8	Bore	150	Improved Scoria
Highway 1804	28.9	Bore	150	Paved Highway
103rd Ave NW	32.5	Bore	150	Improved Scoria
57th St NW	33.4	Bore	150	Improved Scoria
58th ST NW	34.4	Bore	150	Improved Scoria
104th AVE	35.4	Bore	150	Improved Scoria
59th St NW	35.6	Bore	150	Improved Scoria
60th ST NW	36.8	Bore	150	Improved Scoria

Appendix XXI

Inadvertent Returns Contingency Plan

1.0 Project Description

BakkenLink Pipeline LLC (BakkenLink) is proposing to build, own, and operate an approximately 37-mile long pipeline for the transportation of crude oil from the Beaver Lodge receipt point in Williams County, North Dakota to the Dry Creek Terminal in McKenzie County, North Dakota. The connection to the Dry Creek Terminal will establish a connection with the existing BakkenLink Pipeline. The Horizontal Directional Drilling (HDD) water volumes will be used at the crossings listed in Table 1.

TABLE 1. HDD CROSSINGS AND ESTIMATED WATER USEAGE FOR DRILLING PURPOSES

HDD Sections	Approx. MP	Segment length (ft)	Water Volume (gal) Drilling
Lake Sakakawea – North Bluff	25.6	3,050	215,031
Lake Sakakawea – South Bluff	22.01	3,767	265,581
United States Forest Service	20.24	4,183	294,909
Totals		**11,000**	**775,521**

*Table estimates water use for drilling purposes independently of hydrotest. It is possible that water from Hydrotest activities can be reused for use in drilling operations. Table 1 does not account for water reuse.

1.1 Drilling Basics

Horizontal directional drilling is a trenchless pipeline installation technique with the advantage of minimal surface impact, limited to the established entry and exit sites for drilling equipment which can be located outside the environmentally sensitive area. This method of crossing will eliminate any future ground surface disturbance associated with an operating company's required annual maintenance for bank stabilization and depth of cover control typically for an open ditch crossing. This is a technically advanced process requiring skilled operators. Detection of drilling fluid seepage is dependent upon the skill and experience of the drilling crew. For this reason, BakkenLink will contract with firms that specialize in horizontal directional drilling. The entry and exit sites vary in size depending on the diameter of the drill and associated equipment required. No surface ground disturbance by equipment will occur between the entry and exit drill path locations. The typical minimum depth of a drill will be 25 feet below the area of avoidance based on the site-specific design parameters. Pipe with increased wall thickness and abrasion resistant overcoat will be utilized to insure pipeline integrity for the proposed crossing.

Any future maintenance of an HDD crossing if problems occur will result in the existing pipe abandonment and re-drilling the crossing which again minimizes any surface impacts. There is a potential for drilling fluid release during installation, which can be signaled when pressure in the drill hole is not maintained. Minimal consistent loss of drilling fluid typically occurs during the drilling process when layers of loose sand, gravel, or fractured rock are encountered and drilling fluid fills voids in the material. The loss of

returning drilling fluid and a reduction in drilling pressure indicates that seepage is occurring outside of the drill hole. For example, a loss of drilling fluid and an absence of subsurface material would indicate a loss of containment pressure within the hole.

2.0 Drilling Fluid and Drilling Fluid System

The directional drilling process uses drilling fluid to remove the cuttings from the borehole, stabilize the borehole, and act as a coolant and lubricant during the drilling process. The fluid consists primarily of water and bentonite, naturally occurring clay, made up of 1-5 percent active clays, 0-40 percent inert solids and the remainder being water. Drilling fluid is not a hazardous material as it is composed of benign components, however, an inadvertent release will require mitigation measures to reduce the impact to a waterbody or sensitive area.

The drilling fluid is prepared in the mixing tank using both new, recycled, and cleaned drilling fluids. The fluid is pumped at rates of 200 to 1,000 gpm through the center of the drill pipe to the cutters. Return flow is through the annulus created between the wall of the boring and the drill pipe. Cuttings are returned to the entry pit. In the entry pit, the fluid is pumped to fluid processing equipment. Typically, shaker screens, desanders, desilters, and centrifuges remove increasingly finer cuttings from the drilling fluid. The cleaned fluid is recycled to the mixing tank and pumps for reuse in the borehole. The cuttings are disposed of at an approved disposal site.

3.0 Drilling Fluid Release

3.1 Prevention

HDD is typically used to avoid disturbance of sensitive surface features, including waterbodies and wetlands. There is however the potential for surface disturbance through an inadvertent drilling fluid release. Drilling fluid releases are typically caused by pressurization of the drill hole beyond the containment capability of the overburden soil material, which allows the drilling fluid to flow to the ground surface. Releases can be caused by fractures in bedrock or other voids in the geologic strata that allow the fluid to surface even if downhole pressures are low. Providing adequate depth of cover for the installation can substantially reduce the potential for inadvertent releases.

3.1.1 Suitable Material and Adequate Overburden

Prevention of a drilling fluid seepage is a major consideration in determining the profile of the horizontal directional drilled crossing. The primary factors in selecting the pipeline crossing profile include the type of soil and rock material and the depth of cover material. Cohesive soils, such as clays, dense sands, and competent rock are considered ideal materials for horizontal drilling. The depth of adequate overburden is also considered. A minimum depth of cover of 25 feet in competent soils is required to provide a margin of safety against drilling fluid seepage. The areas that present the highest potential for drilling fluid seepage are the drill entry and exit points where the overburden depth is minimal. At the entry and exit points, a pit can be constructed to collect and provide temporary storage for the drilling fluid seepage

until it can be pumped into the drilling system. These pits will be sized adequately to accommodate the maximum volume of drilling fluid that may need to be contained in the pits. Secondary containment of the pits will contain any seepage and minimize any migration of the mud from the work area. This containment system may consist of straw bales and silt fencing around the pit.

3.1.2 Pipeline Geometry

The geometry of the pipeline profile can also affect the potential for drilling fluid seepage. In a profile that forces the pipe to make compound or excessively tight radii turns, downhole pressures can build up, thereby increase the potential for drilling fluid seepage. The profiles for the drilled crossing are intended to minimize this potential, with very smooth and gradual vertical curves. Therefore, the potential for pressure buildup caused by pipeline geometry has been minimized.

3.1.3 Responsibility of Drilling Contractor

The drilling contractor will be responsible for submitting a site specific "Fracture Prevention Plan" to include execution of the directional drilling operation, and actions for detecting and controlling drilling fluid seepage. BakkenLink will review this plan with all relevant government agencies prior to execution for approval and closely supervise the progress and actions of the drilling contractor.

3.2 Detection and Monitoring Procedures

To determine if an inadvertent release has occurred, horizontal directional drilling activities will constantly be monitored on this project, either by the contractor, the Construction Inspector, the Environmental Inspector or any combination of these. Monitoring and sampling procedures will include:

- Inspection along the drill path
- Continuous examination of drilling mud pressures and returns flows
- Periodic status information regarding drilling conditions during the course of drilling activities
- If a wetland release occurs inspection to determine the potential movement of released drilling mud within the wetland will be necessary
- If a wetland release occurs, drilling mud will be collected at the drill entry location for future analysis, as required. If a wetland release occurs, monitoring of the release will be documented by the Environmental Inspector. BakkenLink will keep photographs of release events on record.

4.0 Notification Procedures

If an inadvertent release is discovered, procedures will be taken by the drilling contractor and BakkenLink to contain the release as described below in the Corrective Action section. Procedures for notification of construction management personnel and regulatory agencies are identified in this section. If monitoring indicates a wetland release has occurred or is occurring, the contractor, Construction Inspector, or Environmental Inspector will immediately notify BakkenLink's construction management personnel.

BakkenLink will notify all applicable federal and state agencies immediately upon discovery of an inadvertent wetland release, detailing the location and nature of the release, corrective actions being taken, and whether the release poses any threat to public health and safety.

5.0 Corrective Action

The greatest potential for drilling fluid seepage is during drill entry and exit where the overburden is minimal. To contain and control drilling fluid seepage on land, the contractor will have available equipment and materials onsite, including backhoes or small bulldozers, portable pumps, sand bags, and hay bales. BakkenLink will address an inadvertent release immediately upon discovery. Containment equipment including portable pumps, hand tools, sand, hay/straw bales, silt fencing, and lumber will be readily available and stored at the drilling site. The following measures will be implemented to minimize or prevent further release, contain the release, and clean up the affected area:

5.1 Upland Release

- The contractor will determine and implement any modifications to the drilling technique or composition of drilling fluid (e.g. thickening of mud by increasing bentonite content) to minimize or prevent further releases of drilling mud.
- BakkenLink will place containment structures at the affected area to prevent migration of the release.
- If the amount of the release is large enough to allow collection, the drilling mud released into containment structures will be collected. It will then be returned to the drilling operations, taken to a disposal site by hose or tanker, or filtered through bladder bags (with bags either buried on site or removed for disposal).
- If the amount of the release is not large enough to allow collection, the affected area will be diluted with fresh water and pumped into a vacuum truck or equivalent. Steps will be taken to prevent silt-laden water from flowing into a wetland or waterbody.
- If public health and safety are threatened by an inadvertent release, drilling operations will be shut down until the threat is eliminated.

5.2 **Waterbody Release**

- If a release occurs within a waterbody, BakkenLink will stop work and contact all applicable Federal and State agencies as soon as possible. BakkenLink will notify the applicable state representative for department of environmental quality control if there is a threat to public health and safety and explain whether or not the release can be corrected without incurring additional environmental impact. If necessary, drilling operations will be reduced or suspended to assess the extent of the release and to implement corrective actions.

- If public health and safety are threatened, drilling fluid circulation pumps will be turned off. This measure will be taken as a last resort because of the potential for drill hole collapse resulting from loss of down-hole pressure.
- If monitoring indicates that the intake water quality at downstream user locations is impacted to the extent that it is no longer suitable for treatment, alternative water sources (i.e. trucked or bottled water) will be provided to impacted users.

5.3 Wetland/Riparian Area Release

- The contractor will determine and implement any modifications to the drilling technique or composition of drilling fluid (e.g., thickening of mud by increasing bentonite content) to minimize or prevent further releases of drilling mud.
- If a release occurs within the wetland, reasonable measures, within the limitation of directional drilling technology and contractor's capability, will be taken to re-establish drilling mud circulation.
- BakkenLink will evaluate the release to determine if containment structures are warranted and can effectively contain the release. When making this determination, BakkenLink will also consider if placement of containment structures will cause additional adverse environmental impact.
- Upon completion of the drilling operations, BakkenLink will consult with applicable regulatory agencies to determine any final clean-up requirements for the inadvertent release.
- If public health and safety are threatened by an inadvertent release, drilling operations will be shut down until corrective actions can eliminate the threat. If corrective actions do not prevent the threat, BakkenLink may opt to re-drill the hole along a different alignment after receiving appropriate regulatory approvals. In this case, the following procedures will be implemented to abandon the previous drill hole: To seal the abandoned drill hole, thickened drilling mud will be pumped into the hole as the drill assembly is extracted. At the surface (within approximately 5 feet of the surface) BakkenLink will fill the drill end points with soil and grade the location to the original contour.

5.4 Follow-up

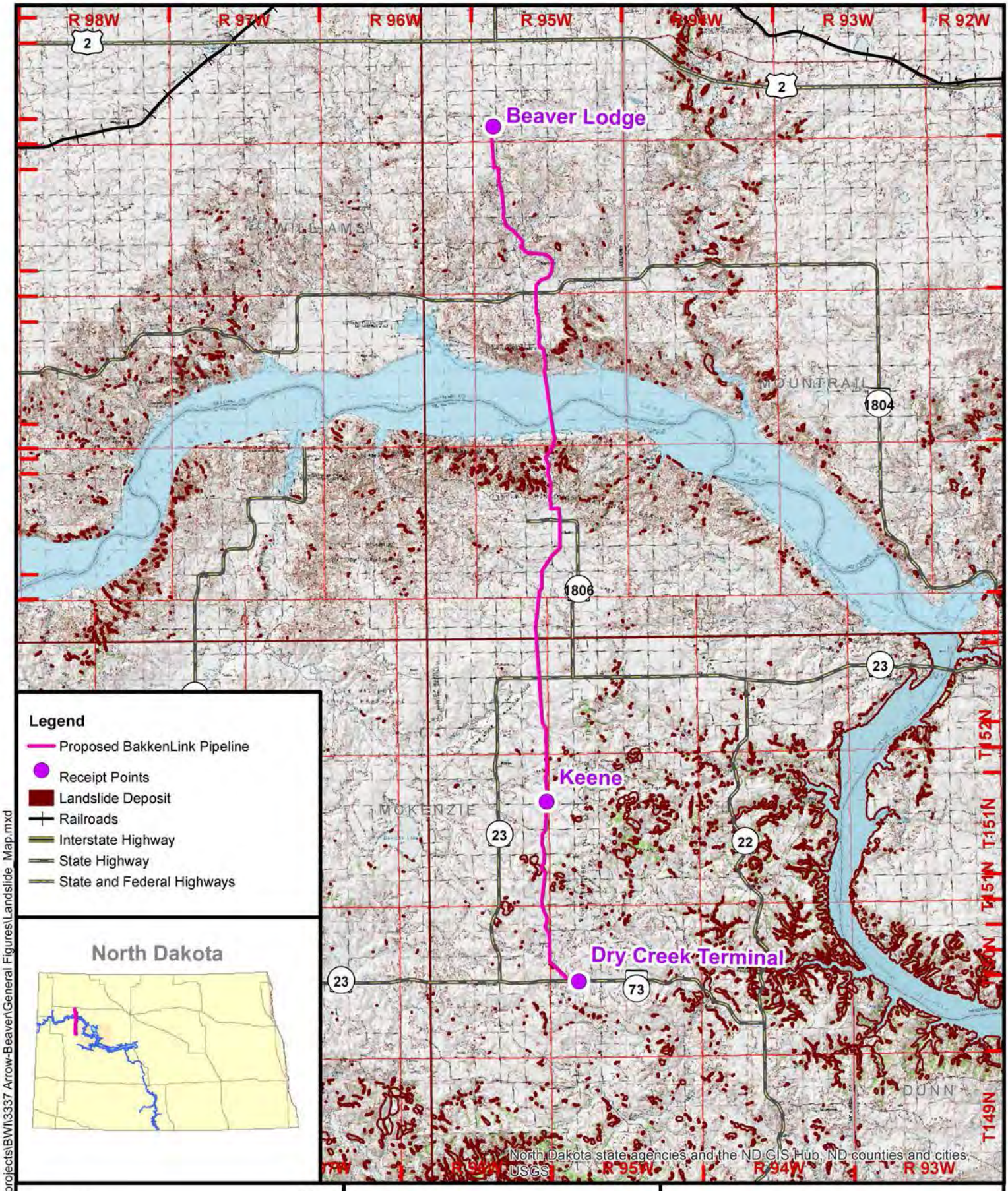
After a drilling fluid seepage has been contained, the drilling contractor and BakkenLink will make every effort to determine the cause of the seepage. After the cause has been determined, measures will be implemented to control the factors causing the seepage and to minimize the chance of recurrence. Developing the corrective measure will be a joint effort of BakkenLink and the drilling contractor and will be site and problem specific. In some cases, the corrective measure may involve a determination that the existing hole encountered a void, which could be bypassed with a slight change in the profile. In other cases, it may be determined that the existing hole encountered a zone of unsatisfactory soil material and the hole may have to be abandoned. If the hole is abandoned, it will be filled with cuttings and drilling fluid.

6.0 Response Equipment

Containment equipment and materials, including lumber for temporary shoring, sandbags, portable pumps, hand tools, silt fence, and hay bales, will be stored within the drilling sites. The drilling contractor will also have heavy equipment such as backhoes that can be utilized to control and clean up drilling fluid seepage. The drilling contractor will be responsible for correctly implementing these devices as soon as an incident is detected.

Appendix XXII

Landslide Map



1:316,800

0 2.5 5 Miles

Basemap: ND GIS Hub, 100k Topographic Map

Carlson McCain
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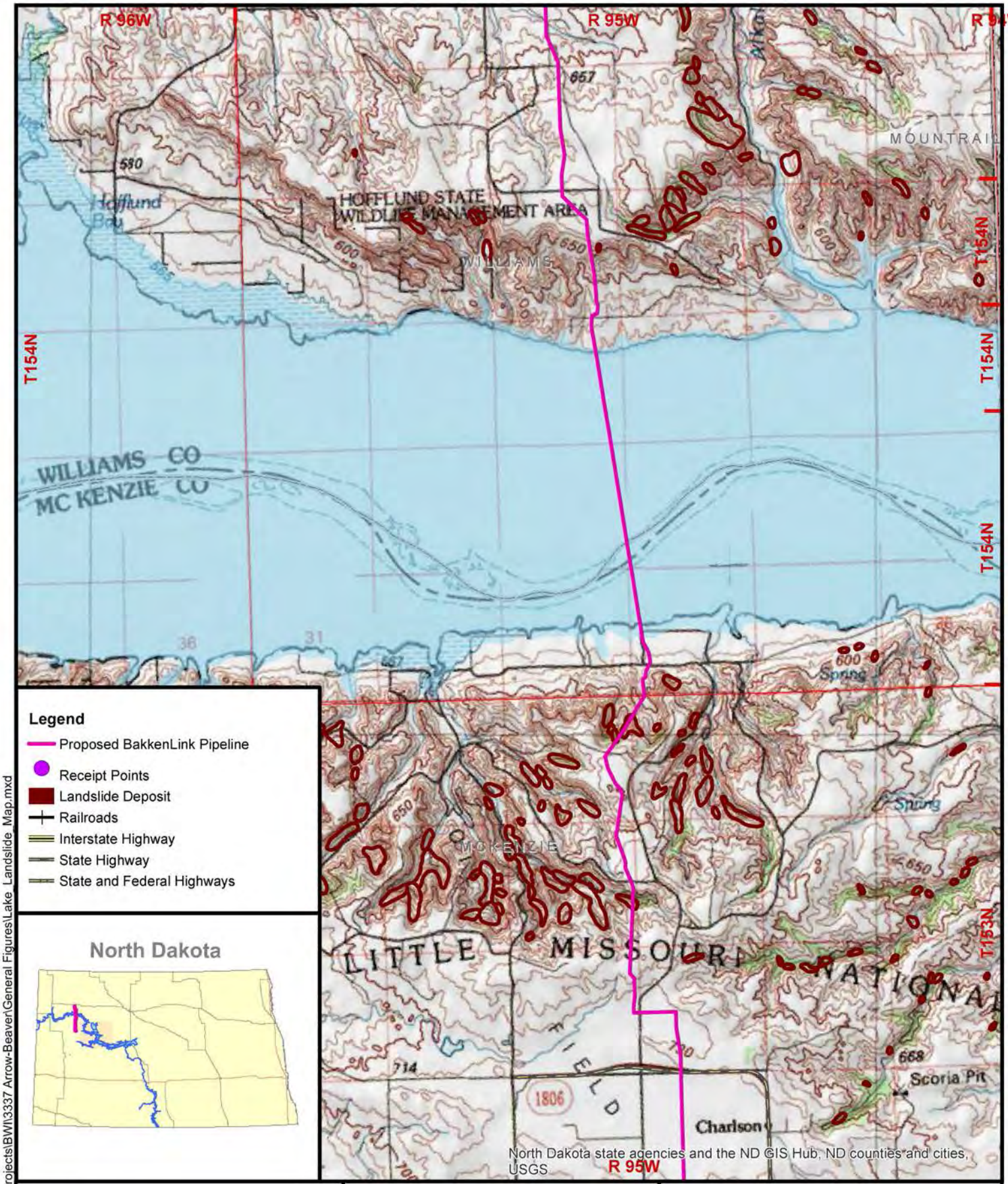
Landslide Map

Project Overview
BakkenLink Pipeline
Dry Creek Terminal to Beaver Lodge

August 2014

R:\projects\BWI\3337 Arrow-Beaver\General Figures\Landslide_Map.mxd



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Landslide Map

Lake Sakakawea Crossing
BakkenLink Pipeline
Dry Creek Terminal to Beaver Lodge

Appendix XXIII

Tree and Shrub Mitigation Specifications

Case No. PU-10-218

Tree and Shrub Mitigation Specifications

Inventory

1. Trees and shrubs anticipated to be cleared, including those that are considered invasive species or noxious weeds (*e.g., Caragana arborescens, Elaeagnus angustifolia, Rhamnus cathartica, Tamarix chinensis, T. parviflora, T. ramosissima, Ulmus pumila*), shall be inventoried before cutting. The inventory shall record the location, number, and species of trees and shrubs.

2. In windbreaks, shelterbelts and other planted areas, trees or shrubs anticipated to be cleared, regardless of size, shall be inventoried for replacement.

3. In native growth areas, trees anticipated to be cleared that are 1 inch diameter at breast height ("dbh") or greater shall be inventoried for replacement.

4. In native growth areas, shrubs anticipated to be cleared in the permanent right-of-way shall be inventoried for replacement.

5. In native growth areas outside the permanent right-of-way, shrubs shall be cut flush with the surface of the ground, taking care to leave the naturally occurring seed bank and root stock intact. If soil disturbance is necessary, the native topsoil shall be preserved and replaced after construction. Shrubs shall be allowed to regenerate naturally where native topsoil is preserved and replaced. Where native topsoil is not preserved and replaced, shrubs anticipated to be cleared shall be inventoried for replacement.

6. In native growth areas, trees and shrubs may be inventoried by actual count or by sampling method that will properly represent the woody

vegetation population. A sampling plan developed by the company, filed with the North Dakota Public Service Commission (NDPSC) and approved prior to the start of construction shall define the sampling method to be used for trees, for tall shrubs and for low shrubs. The data from the sample plots shall be extrapolated to the total acreage of the wooded area to be cleared to determine the species and quantity of trees and shrubs to be replaced.

7. No trees or shrubs would be removed outside the approved construction footprint. Trees and shrubs within the construction footprint (i.e., temporary ROW, additional temporary workspaces, and permanent ROW) would be cleared to allow unimpeded equipment access, storage of materials (i.e., topsoil and trench soil), and for safety reasons.

Clearing for Construction

8. Trees and shrubs shall be selectively cleared, leaving mature trees and shrubs intact where practical.

9. The width of clear cuts through windbreaks, shelterbelts and all other wooded areas shall be limited to 50 feet or less unless otherwise approved by the NDPSC.

10. If the area of trees or shrubs actually cleared differs from the area inventoried, the difference in number of trees and shrubs to be replaced shall be noted on the inventory.

Replacement

11. Prior to tree/shrub replacement, documentation identifying the number and variety of trees removed as well as the mitigation plan for the proposed number, variety, type, location and date of replacement plantings shall be filed with the NSPSC for approval.

12. Tree replacement shall be on a 2 to 1 basis with 2-year-old saplings. Shrub replacement shall be on a 2 to 1 basis with stem cuttings.

13. Trees and shrubs shall be replaced by the same species or similar species suitable for North Dakota growing conditions as recommended by the North Dakota Forest Service.

14. Tree and shrub replacement shall not be conducted within a 20 to 30 foot wide path over the pipeline to facilitate visual inspections of the right-of-way in accordance with U.S. Department of Transportation safety regulations.

15. Landowners shall be given the option of having replacement trees/shrubs planted off the right-of-way on the landowner's property or waiving that requirement in writing and allowing those replacement trees/shrubs to be planted at alternative locations.

16. At the conclusion of the project, documentation identifying the actual number, variety, type, location and date of the replacement plantings shall be filed with the NDPSC.

17. Tree/shrub replacements shall be inspected once a year for three years, on about the anniversary of the plantings, and, on or shortly before October 1 of each year, a report shall be submitted to the NDPSC documenting the condition of replacement planting and any woodlands work completed. If after three years from the anniversary of the plantings the survival rate is less than 75%, the NDPSC may order additional planting(s).

Appendix XXIV

Tree and Shrub Inventory and Sampling Plan

TREE AND SHRUB INVENTORY AND SAMPLING PLAN

Prepared for:

BakkenLink Pipeline
Dry Creek Terminal to Beaver Lodge
PU-10-218

January 16, 2014

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ENVIRONMENTAL • ENGINEERING • LAND SURVEYING

1. Introduction

BakkenLink Pipeline LLC (BakkenLink) proposes to construct, own, and operate approximately 34 miles of 16-inch steel crude oil pipeline extending from the Dry Creek Terminal in McKenzie County, North Dakota to the Beaver Lodge receipt point in Williams County, North Dakota (Case #PU-10-218). BakkenLink will comply with the tree and shrub mitigation specifications as outlined in Appendix A. Specifically, this Plan outlines the process for completing the tree and shrub inventory.

2. Inventory Methods

BakkenLink will inventory trees and shrubs, including those considered invasive species, to be cleared within the ROW easement. Inventories will be documented on standard forms and will include the inventory location, species present, and number of trees and shrubs in the location. An example form is found in Appendix B.

1.1) Planted Areas

In windbreaks, shelterbelts, and other planted areas, trees and shrubs anticipated to be cleared regardless of size will be counted by direct stem count. All trees, regardless of size, will be inventoried for replacement.

In windbreaks, shelterbelts, and other planted areas, shrubs that form colonies (such as buffalo currant, chokecherry, dogwood, plum, pussy willow, sandbar willow, western snowberry, and Woods rose) and that are cut flush with the ground surface and not cleared, so as to leave the naturally occurring seed bank and root stock intact will not be direct stem counted. Instead, the area will be delineated on an aerial photo and indicated on construction drawings to not be cleared or have the ground disturbed. If ground disturbance occurs, BakkenLink will conduct a direct stem count of the disturbance area or estimate the number of stems cleared using a Commission approved sampling estimate method (see Shrub Sampling Method, Appendix C).

1.2) Native Growth Areas

In native growth areas, trees that are one-inch or greater diameter at breast height (DBH) will be inventoried for replacement. Inventories will be conducted using direct counts when feasible. Counts will include native and invasive species.

In high-density woodland areas, a Commission approved sampling method may be used in place of individual counting (see Tree Sampling Method, Appendix D).

In native growth areas, shrubs that form colonies (such as buffalo currant, chokecherry, dogwood, plum, pussy willow, sandbar willow, western snowberry, and Woods rose) and that are cut flush with the ground surface and not cleared, so as to leave the naturally occurring seed bank and root stock intact will not be direct stem counted. Instead, the area will be delineated on an aerial photo and indicated on construction drawings to not be cleared or have the ground disturbed. If ground disturbance occurs, BakkenLink will conduct a direct stem count of the disturbance area or estimate the number of stems cleared using a Commission approved sampling estimate method (see Shrub Sampling Method, Appendix C).

I. Tree Sampling Method

Per the Commission's Tree and Shrub Inventory Specifications (Inventory Specification No. 6 in Appendix A), in high-density woodland areas, BakkenLink proposes the following sampling method for the tree inventory. The dimensions of the entire woodland stand within the ROW will be delineated to determine the area of the woodland. Tree and shrub counts will be made in representative sample site areas within the woodland. Transects will be developed and the circular sample sites placed along the transect. The number of sample sites within a woodland stand will be dependent on woodland size and uniformity. A smaller, more uniform woodland stand would require fewer sample sites than a larger, less uniform woodland stand.

The sample sites will be 0.10 acres (37.24-foot radius circles). A rope 37.24 feet in length will be attached to a central stake and rotated in a circle (Appendix D). Trees and shrubs within the circle will be counted. Tree and shrub density for the entire woodland area within the ROW will be calculated based on the average density from all of the sample locations within the woodland, weighted against the woodland size.

II. Shrub Sampling Method

Per the Commission's Tree and Shrub Inventory Specifications (Inventory Specification No. 6 in Appendix A), in high-density woodland areas, BakkenLink proposes the following sampling method for the shrub inventory. The dimensions of the entire woodland stand within the ROW will be delineated to determine the area of the woodland. Shrub counts will be made in representative sample site areas within the woodland. Transects will be developed and the circular sample sites placed along the transect. The number of sample sites within a woodland stand will be dependent on woodland size and uniformity. A smaller, more uniform woodland stand would require fewer sample sites than a larger, less uniform woodland stand.

The sample sites will be 0.001 acres (3.72-foot radius circles). A rope 3.72 feet in length will be attached to a central stake and rotated in a circle (Appendix C). Shrubs within the circle will be counted. Tree and shrub density for the entire woodland area within the ROW will be calculated based on the average density from all of the sample locations within the woodland, weighted against the woodland size.

Appendix A

Tree and Shrub Mitigation Specifications

Inventory

1. Trees and shrubs anticipated to be cleared, including those that are considered invasive species or noxious weeds (*e.g., Caragana arborescens, Elaeagnus angustifolia, Rhamnus cathartica, Tamarix chinensis, T. parviflora, T. ramosissima, Ulmus pumila*), shall be inventoried before cutting. The inventory shall record the location, number, and species of trees and shrubs.
2. In windbreaks, shelterbelts and other planted areas, trees or shrubs anticipated to be cleared, regardless of size, shall be inventoried for replacement.
3. In native growth areas, trees anticipated to be cleared that are 1 inch diameter at breast height ("dbh") or greater shall be inventoried for replacement.
4. In native growth areas, shrubs anticipated to be cleared in the permanent right-of-way shall be inventoried for replacement.
5. In native growth areas outside the permanent right-of-way, shrubs shall be cut flush with the surface of the ground, taking care to leave the naturally occurring seed bank and root stock intact. If soil disturbance is necessary, the native topsoil shall be preserved and replaced after construction. Shrubs shall be allowed to regenerate naturally where native topsoil is preserved and replaced. Where native topsoil is not preserved and replaced, shrubs anticipated to be cleared shall be inventoried for replacement.
6. In native growth areas, trees and shrubs may be inventoried by actual count or by sampling method that will properly represent the woody vegetation population. A sampling plan developed by the company, filed with the North Dakota Public Service Commission (Commission) and approved prior to the start of construction shall define the sampling method to be used for trees, for tall shrubs and for low shrubs. The data from the sample plots shall be extrapolated to the total acreage of the wooded area to be cleared to determine the species and quantity of trees and shrubs to be replaced.

Clearing for Construction

7. Trees and shrubs shall be selectively cleared, leaving mature trees and shrubs intact where practical.

8. The width of clear cuts through windbreaks, shelterbelts and all other wooded areas shall be limited to 50 feet or less unless otherwise approved by the NDPSC.
9. If the area of trees or shrubs actually cleared differs from the area inventoried, the difference in number of trees and shrubs to be replaced shall be noted on the inventory.

Replacement

10. Prior to tree/shrub replacement, documentation identifying the number and variety of trees removed as well as the mitigation plan for the proposed number, variety, type, location and date of replacement plantings shall be filed with the NSPSC for approval.
11. Tree replacement shall be on a 2 to 1 basis with 2-year-old saplings. Shrub replacement shall be on a 2 to 1 basis with stem cuttings.
12. Trees and shrubs shall be replaced by the same species or similar species suitable for North Dakota growing conditions as recommended by the North Dakota Forest Service.
13. Landowners shall be given the option of having replacement trees/shrubs planted off the right-of-way on the landowner's property or waiving that requirement in writing and allowing those replacement trees/shrubs to be planted at alternative locations.
14. At the conclusion of the project, documentation identifying the actual number, variety, type, location, and date of the replacement plantings shall be filed with the NDPSC.
15. Tree/shrub replacements shall be inspected once a year for three years, on about the anniversary of the plantings, and, on or shortly before October 1 of each year, a report shall be submitted to the NDPSC documenting the condition of replacement planting and any woodlands work completed. If after three years from the anniversary of the plantings the survival rate is less than 75%, the NDPSC may order additional planting(s).

Appendix B

Sampling Form

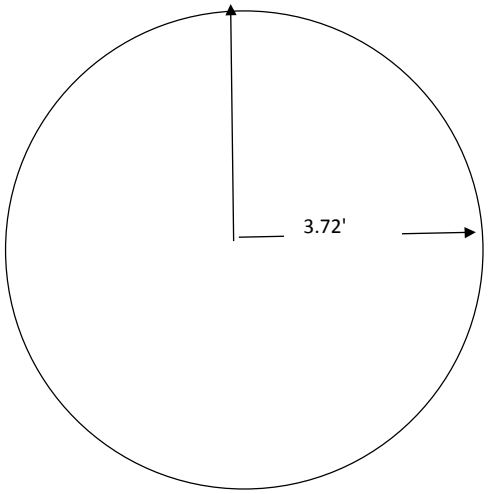
TREE/SHRUB INVENTORY **BakkenLink Pipeline**				
Sampled by:			**Date:**	
Location / Site ID:				
Woodland Type (circle): Native Planted		**Plot Size (circle): 3.72 ft 37.2 ft**		
SPECIES	**Planted**	**Native**		**TOTAL**
	All trees shrubs	**Trees >1”**	**All shrubs**	

Appendix C

Shrub Sampling Method

Sample Plot

- Circular sample plots with a radius of 3.72 feet, or area equivalent to 0.001 acres created with a central stake and rope.
- The rope, 3.72 feet in length, anchored to the central stake and rotated in a circle



Shrub Counts

- Direct stem counts from each plot
- Tallied on work sheet by species

Woodland size

- GPS points taken in the field around boundary
- GIS used to calculate acreage

Calculations

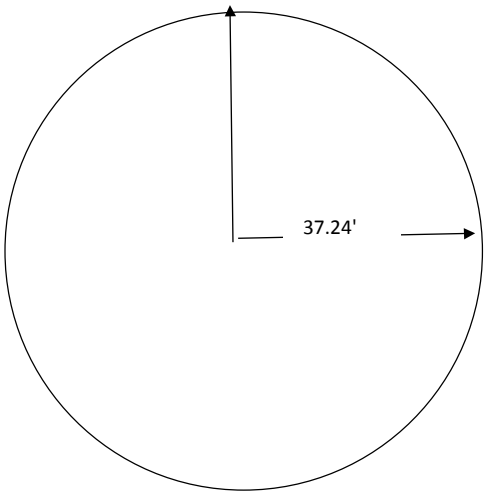
- Average determined from all plots sampled in a woodland area or area is equivalent to stems/0.001 acre
- Converted to a per acre basis (average times 1,000)
- Total number per woodland determined by multiplying average number per acre with woodland size

Appendix D

Tree Sampling Method

Sample Plot

- Circular sample plots with a radius of 37.24 feet, or area equivalent to 0.10 acres created with a central stake and rope.
- The rope, 37.24 feet in length, anchored to the central stake and rotated in a circle



Tree Counts

- Direct stem counts from each sample site
- Tallied on work sheet by species

Woodland size

- GPS points taken in the field around boundary
- GIS used to calculate acreage

Calculations

- Average determined from all plots sampled in a woodland area or area is equivalent to stems/0.10 acre
- Converted to a per acre basis (average times 10)
- Total number per woodland determined by multiplying average number per acre with woodland size

Appendix XXV

USACE SOP #14 – Garrison Project Tree/Vegetation Mitigation

CENWO-OD-GA **September 26, 2011**

MEMORANDUM FOR ALL GARRISON PROJECT EMPLOYEES

SUBJECT: SOP #14 - Garrison Project Tree/Vegetation Mitigation

1. Purpose.
The purpose of this United States Army Corps of Engineers - Garrison Project (USACE) Standard Operating Procedure (SOP) is to control and regulate the indiscriminate or excessive removal, large-scale, clear-cutting and destruction of trees/vegetation and to control, standardize and prevent conditions such as: degradation of sensitive areas or wanton destruction which cause an increase in storm water runoff, sedimentation, soil erosion, loss of wildlife habitat, air or noise pollution or inhibit aquifer recharge or impair the ambiance or physical appearance of the property. The guidance contained in this SOP is designed to limit such adverse impact while not interfering with the right of an entity to appropriately remove trees/vegetation in accordance with the guidance set forth herein below.

2. Applicability.
a. The terms and provisions of this SOP shall apply to real property, in all cases of parcels upon which new construction will take place and/or cases of maintenance or demolition of existing structures.
b. Unless specifically exempted herein, it shall be prohibited for any person to remove or cause to be removed any tree/vegetation, under the circumstances set forth in paragraph a. above, with the trunk diameter breast height (DBH) of two (2) inches or larger (fifty-four (54) inches above the actual ground level) being individually counted and trees smaller than 2 inches and all shrubs/vegetation being clump counted by square foot without first having obtained documented project permission to do so.
c. This SOP shall not be utilized for the purpose of removal of trees by an adjacent landowner for the purpose of View Management.

3. Tree/Vegetation Replacement Plan.
A tree/vegetation replacement plan shall consist of the following:
a. A site plan, survey or plot plan of one (1) inch equals twenty (20) feet or less, showing the location of existing trees/vegetation and clearly marked property boundaries. There shall be a list identifying the number and species of trees/vegetation inventoried. The site plan shall include the legal land survey description.
b. The locations on the parcel where tree/vegetation removal is to take place. Shape files of the location are highly encouraged.
c. The total square footage of the area being utilized.
d. Trees with a DBH of two (2) inches or larger shall be individually counted and trees with a DBH smaller than two (2) inches and all shrubs shall be clump counted by square foot.
e. The total number, by size and species, of existing trees with a DBH of two (2) inches or greater on the parcel.
f. The total number, by size and species, of existing trees with a DBH of two (2) inches or greater, which are to be removed.
g. The total number, by species, of existing trees with a DBH smaller than two (2) inches and all shrubs clump counted by square foot on the parcel.
h. The total number, by species, of existing trees with a DBH smaller than two (2) inches and all shrubs clump counted by square foot which are to be removed.
i. A planting detail for replacement trees/vegetation.

j. All specific plans for replacement of removed trees /vegetation shall be based on the following requirements:

1. The replacement trees/vegetation shall be planted on the property where the trees/vegetation were removed or in a location designated by the USACE.

2. All inventories/ informational documents must be provided to the USACE prior to construction.

3. Should a road be constructed a specific seed mix will have to be applied to the ditches.

4. The use of erosion control methods will be required as needed.

5. Replacement trees must be planted within one year after the applicant's project has been completed.

4. Replacement Tree Value Calculations.

a. Dead and diseased trees as determined by the USACE shall not be included as trees to be replaced.

b. The USACE may elect, in lieu of planting replacement trees, to have the applicant provide compensation (a sum of money for each tree that was damaged or removed.

c. The replacement value of all trees and shrubs that are damaged or removed will be as follows:

Number/Value of Replacement Trees

Size of Tree Removed Inches DBH	Replacement Tree Ratio	Replacement Tree Value
Two, but not more than four (2"-4")	2:1	$100.00
More than four, but less than eight (4"-8")	3:1	$200.00
More than eight, but less than twelve (8"-12")	4:1	$400.00
More than twelve, but less than eighteen (12"-18")	5:1	$500.00
More than eighteen, but less than twenty-four (18"-24")	6:1	$800.00
More than twenty-four (24" +)	7:1	$1000.00
Trees with a DBH smaller than 2" and all Vegetation/shrubs clump counted by square feet	4:1	$200.00

5. Species Requirements.

The approved 'USACE Tree/Vegetation List' contains species or their varieties acceptable for planting on USACE property. The chief objective of the replacement plantings is to enhance habitat for wildlife. Other vegetative species or their varieties not listed may be planted on USACE owned property at USACE discretion, but only desirable vegetation of good appearance, beauty and adaptability that are generally free from injurious insects, diseases or other limitations. Where certain planting sites have been assigned a particular species or variety, only designated species or variety shall be planted on such sites, unless the plan is revised by the USACE.

6. Planting Requirements (Trees)

a. Size - All small deciduous trees and coniferous and their cultivars or varieties shall be in the age classes: 1-2, 2-1, 3-0, or 2-2 with a top height no less than (8) inches. Age class translates to the age of the tree. The number preceding the hyphen relates to the years the tree spent in a seed bed and the number following the hyphen is the years the tree spent in a nursery field. As such, a 2-2 would be a 4 year old tree.

b. Grade - Unless otherwise allowed for specific reasons, all trees shall have comparatively straight trunks, well developed leaders and tops, and the roots should be characteristic of the species. They shall have acceptable balance between top and root. At the time of planting, all trees must be free of mechanical injuries, and other objectionable features that tend to affect the future health, growth, strength, form and beauty of the plant. Replacement stock must be purchased from USDA Plant Hardiness zones 3b and 4a.

c. Location and Spacing - No tree shall be planted closer than ten (10) feet to a utility pole to allow room for line maintenance. Any tree planted under utilities shall not be planted if its eventual height will interfere with said utility lines. Selection of planting site and species will be determined by the USACE. Spacing of trees shall be determined by the USACE in accordance with local conditions; the species, cultivars or varieties used, and their mature height, spread and form. Generally, all large and medium sized trees, at maturity, shall be spaced twelve (12) feet, center-to-center and all small trees shall be spaced a minimum of eight (8) feet, center-to-center.
d. Methods of Planting and Support - Most small, deciduous trees and coniferous and shrubs may be moved bare-rooted unless otherwise indicated. Roots of bare-rooted trees and shrubs must be protected against drying out. All coniferous trees shall be moved balled and burlap. Balled roots should be prevented from drying out at the surface of the ball and they should be protected against freezing. Pits for the planting of bare-root plants shall be at least twelve (12) inches larger in diameter than the diameter of the root system in order to accommodate the roots without crowding. Bare root trees may also be planted in rows utilizing a mechanical tree planter for the planting of large numbers of trees. For balled trees, the pits should be minimum twelve (12) inches larger than the diameter of the ball of soil to allow proper backfill. Plants shall be planted no deeper than previously grown, with due allowance for settling. When the planting is completed, the entire root area shall be thoroughly saturated with water and burlap wrappings shall be cut. Tree trunks shall be suitably wrapped and guyed, or supported in an upright position, according to accepted arboricultural practices. The guys or supports shall be installed so that they will neither girdle or cause serious injury to the tree nor endanger public safety.

7. General Maintenance Requirements.
a. A minimum of 80% of the replacement trees/shrubs/vegetation must be living at the end of 5 growing seasons in order to meet the mitigation requirements.
b. The use of tree fabric greatly increases tree survivability and reduces the amount of moisture needed for survival. The use of tree fabric is recommended, but not required, especially when a large number of trees are being planted it is highly recommended to ensure 80% survival (other wise a minimum of 3 cultivations throughout the summer will be necessary)

8. Penalty for Non-notification.
a. If trees/shrubs are removed without prior approval, the following protocol will be followed:
1. If it can be determined how many trees/shrubs were removed, the trees will be replaced based on the above replacement table.
2. In the event that it is unknown how many trees were removed, the number of trees requiring replacement shall be computed by assuming ten (10) trees greater than twelve (12) inches DBH per half acre of disturbed area were removed.
3. Shrubs, grasses and forbs will be treated similarly at USACE discretion
b. Any person who violates, or fails, or refuses to comply with this SOP, shall be liable to a penalty set forth in the USACE Title 36 Rules and Regulations of not less than two hundred fifty ($250.00) dollars.

Todd J. Lindquist
Operations Project Manager

USACE Tree List

American Linden (*Tilia americana) ---- Jamestown* http://www.ag.ndsu.edu/trees/handbook/th-3-123.pdf)
Balsam Poplar *(Populus balsamifera*) http://plants.usda.gov/java/profile?symbol=POBA2)
Black Hills Spruce *(Picea glauca var. densata)* http://www.ag.ndsu.edu/trees/handbook/th-3-175.pdf
Box Elder *(Acer negundo)* http://plants.usda.gov/java/profile?symbol=ACNE2
Bur Oak *(Quercus macrocarpa)* http://plants.usda.gov/java/profile?symbol=QUMA2
Common Hackberry *(Celtis occidentalis)* http://www.ag.ndsu.edu/trees/handbook/th-3-119.pdf
Colorado Blue Spruce (*Picea pungens)* http://www.ag.ndsu.edu/trees/handbook/th-3-177.pdf
Cottonwood *(Populus)* http://plants.usda.gov/java/profile?symbol=POPUL
Honeylocust *(Gleditstia triacanthos)* http://www.ag.ndsu.edu/trees/handbook/th-3-121.pdf
Laurel Willow *(Salix pentandra)* http://www.ag.ndsu.edu/trees/handbook/th-3-141.pdf
Peachleaf Willow *(Salix amygdaloides* Andersson) http://plants.usda.gov/java/nameSearch
Ponderosa Pine *(Pinus ponderosa)* http://plants.usda.gov/java/profile?symbol=PIPO
Quaking Aspen *(Populus tremuloides)*
http://plants.usda.gov/java/profile?symbol=POTR5&mapType=nativity&photoID=potr5_002_avp.jpg
Rocky Mountain Juniper *(Juniperus scopulorum)*
http://plants.usda.gov/java/profile?symbol=JUSC2&mapType=nativity&photoID=jusc2_001_avp.tif
Sandbar Willow *(Salix interior)* http://www.ag.ndsu.edu/trees/handbook/th-3-65.pdf
Silver Maple *(Acer saccharinum)* http://plants.usda.gov/java/profile?symbol=ACSA2

USACE Shrub List

American Plum *(Prunus Americana)*
http://plants.usda.gov/java/profile?symbol=PRAM&mapType=nativity&photoID=pram_002_ahp.jpg
American Cranberry Bush (*Viburnum trilobum*) http://www.ag.ndsu.edu/trees/handbook/th-3-17.pdf
Black Currant *(Ribes americanum)* http://plants.usda.gov/java/profile?symbol=RIAM2
Common Chokecherry *(Prunus virginiana)*
http://plants.usda.gov/java/profile?symbol=PRVI&mapType=nativity&photoID=prvi_001_avp.jpg
Elderberry *(Sambucus)* http://plants.usda.gov/java/profile?symbol=SAMBU
Freedom Honeysuckle *(Lonicera x 'Freedom')* http://www.ag.ndsu.edu/trees/handbook/th-3-29.pdf
False Indigo (*Amorpha fruticosa)* http://www.ag.ndsu.edu/trees/handbook/th-3-31.pdf
Golden Currant *(Ribes odoratum)* http://www.ag.ndsu.edu/trees/handbook/th-3-19.pdf
Hawthorn *(Crataegus arnoldiana)* http://www.ag.ndsu.edu/trees/handbook/th-3-79.pdf
Juneberry *(Amelanchier alnifolia)*
http://plants.usda.gov/java/profile?symbol=AMAL2&mapType=nativity&photoID=amal2_002_ahp.tif
Redosier Dogwood (*Cornus sericea)* http://www.ag.ndsu.edu/trees/handbook/th-3-21.pdf
Silverberry *(Elaeagnus commutate)*
http://plants.usda.gov/java/profile?symbol=ELCO&mapType=nativity&photoID=elco_001_avp.tif
Silver Buffaloberry *(Shepherdia argentea)*
http://plants.usda.gov/java/profile?symbol=SHAR&mapType=nativity&photoID=shar_001_ahp.tif
Skunkbush Sumac (*Rhus trilobata)*
http://plants.usda.gov/java/profile?symbol=RHTR&mapType=nativity&photoID=rhtr_001_ahp.tif
Smooth Sumac (*Rhus glabra)* http://plants.usda.gov/java/profile?symbol=RHGL
Snowberry *(Symphoricarpos occidentalis)* http://plants.usda.gov/java/profile?symbol=SYOC
Western Sandcherry *(Prunus besseyi*) http://www.ag.ndsu.edu/trees/handbook/th-3-45.pdf
Woods Rose *(Rosa woodsii)* http://plants.usda.gov/java/profile?symbol=ROWO

USACE Grass Species Mix NO. 1	PLS
Canada wild rye	15%
Blue grama (bad river)	20%
June grass	5%
Big bluestem	10%
Little bluestem	25%
Indian grass	5%
Switchgrass	5%
Side oats grama	15%

Seeding dates: May 1 – June 15

USACE Grass Species Mix NO. 2

Species	Variety	Common Name	% of Mix	Actual PLS Mix Po/Acre	Broadcast Actual PLS Lbs/Acre
Grasses Cool Season:					
Agropyron smithii	Rodan	Western wheatgrass	40%	4.00	8.00
Stipa viridula	Lodorm	Green needlegrass	30%	3.00	6.00
Grasses Warm Season					
Calamovilfa longifolia	Goshen	Prairie sandreed	30%	3.00	6.00
Total of All Species			**100%**	10.00	20.00
Cover Crop: 1 of 3	Mandan	Oats or Barley or Canadian Wild Rye		4.00	8.00
Total Pounds per Type				14.00	28.00

Seeding dates: May 1 – June 15

The recommended seeding rate would be 12 lbs PLS/acre if broadcasted or if drilled a seed rate of 8-10 lbs PLS/acre will be used.

Use of Pure Live Seed (PLS) for calculating seed mixtures
All of the seed mixtures in this guide give the rate of pure live seed (PLS) for each species per acre. These rates were derived using three basic figures: percent of each species desired by composition, number of seeds per pound according to species, and total number of PLS per square foot.

The following equation should be used to calculate how much seed is needed to provide the required pounds of PLS needed.

% purity x germination rate % = % PLS
pounds of PLS desired divided by % PLS = Pounds of Seed Required

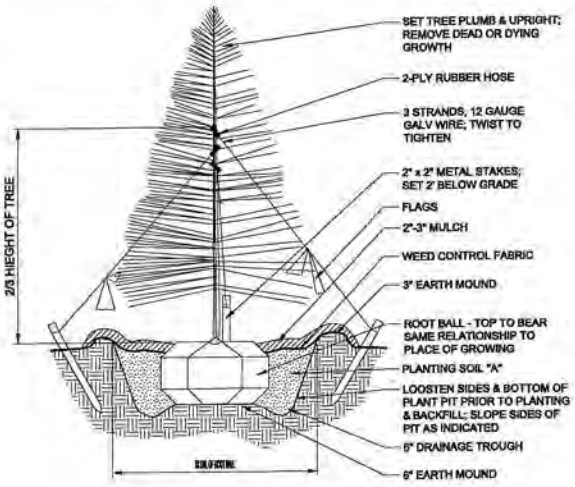
An example of this is: 10 pounds of PLS is required. The given seed lot for this species has a purity of 95% and a germination rate of 85%. How many pounds of seed will be necessary to have 10 PLS?

.95 (purity) X .85 (germination rate) = .81 (% PLS)
10 (required poundage) divided by .81 (%PLS) =12.3
12.3 pounds of seed will be necessary to provide 10 pounds PLS of seed.

USACE Wildflower Species

Purple coneflower (*Ratibida columnifera*)
Upland goldenrod (*Solidago ptarmicoides*)
Wild lupine (*Lupinus perennis*)
White prairie clover (*Petalostemum candidum*)
Fragrant giant hyssop (*Agastache foeniculum*)
Yarrow (*Achillea millefolium*)
Stiff sunflower (*Helianthus rigidus*)
Wild bergamot (*Monarda fistulosa*)
Purple prairie clover (*Petalostemum purpureum*)
Gray goldenrod (*Solidago nemoralis*)

*Any species not included on our approved lists that is considered non-native or invasive will NOT be deemed as an option for replacement or reseeding stock.



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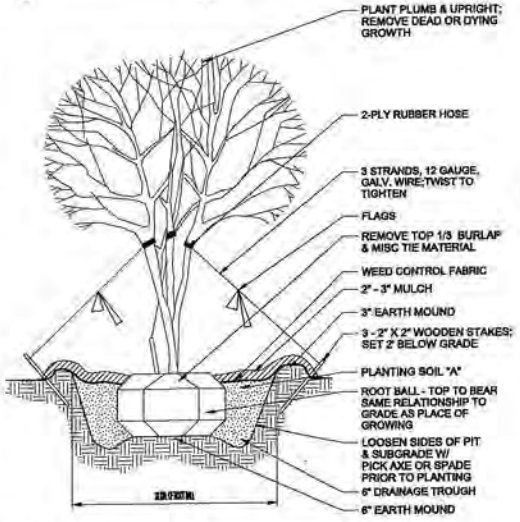

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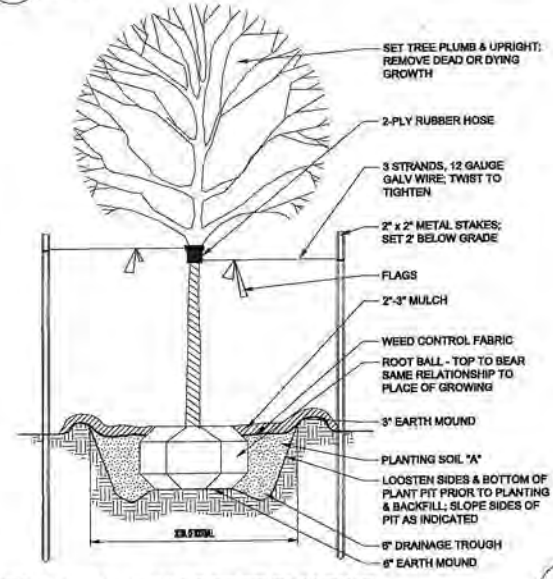

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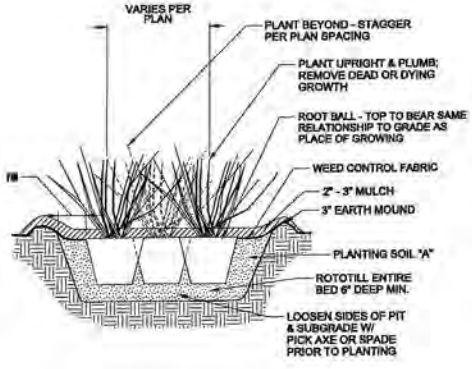

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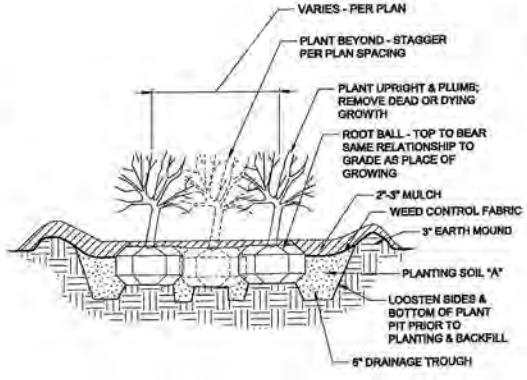

3 DETAIL - SHRUB PLANTING
NO SCALE

US ARMY CORPS OF ENGINEERS
OMAHA DISTRICT

NAME	DESCRIPTION	DATE	APPR.
		APPR. MARC	

DESIGNED BY: XXX
DRAWN BY: XXX
CHKD BY: XXX
SUBMITTED BY:
RECOMMENDED:
APPROVED:
DATE: XX
DSN BY: XXX
DWG BY: XXX
CHKD BY: XXX
SUBMITTED BY:
RECOMMENDED:
APPROVED:
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CONTRACT NO.: XX
FILE NUMBER: XX
PLOT DATE: 3/5/2021
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PLOT SCALE: 1:1 (22 x 34)
REC:

U. S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
OMAHA, NEBRASKA

XXX
XXX
XXX

TYP PLANTING AND SEEDING DETAILS

SHEET IDENTIFICATION NUMBER
X

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Appendix XXVI

Raptor and Prairie Grouse Survey

Raptor and Prairie Grouse Survey

BakkenLink Pipeline
Dry Creek Station to Beaver Lodge
McKenzie and Williams County
Project #3337-01

Prepared for:

BakkenLink Pipeline, LLC

January 16, 2014

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Raptor and Prairie Grouse Survey
BakkenLink Pipeline
Dry Creek Terminal to Beaver Lodge
McKenzie and Williams Counties, ND

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APPENDICES

1.0 INTRODUCTION

Carlson McCain, Inc. conducted a survey for raptor nests and prairie grouse leks (sharp-tail grouse and sage-grouse) for BakkenLink Pipeline LLC (BakkenLink) along the proposed BakkenLink crude oil pipeline system in April 2012 and May 2013. The proposed pipeline system consists of approximately 34 miles of 16-inch steel crude oil pipeline extending from the Dry Creek Terminal in McKenzie County, North Dakota to the Beaver Lodge receipt point in Williams County, North Dakota being developed by an affiliate of BakkenLink. The survey area includes the following counties: McKenzie and Williams in North Dakota.

2.0 BACKGROUND INFORMATION

Records from the North Dakota Game and Fish Department (NDGF), North Dakota Parks and Recreation Department Heritage Inventory (NDPRC), US Fish and Wildlife Service (USFWS), US Forest Service (USFS), and Bureau of Land Management (BLM) were reviewed to determine the locations and status of previously observed and recorded raptor nests and prairie grouse leks.

The majority of the proposed route is located on private land; however, portions of the route are located on State, US Army Corps of Engineers (USACOE), and USFS lands in North Dakota. The USFS and BLM require spring surveys to document active raptor nests and prairie grouse leks on their managed lands. The NDGF and USFWS recommend that raptor and prairie grouse surveys be conducted along the entire route. Surface occupancy and construction timing restrictions may be recommended by these agencies in proximity to active raptor nests and lek locations.

The pipeline crosses varying topography including gently rolling hills, badland inclusions, steep wooded native draws, and level agricultural lands. Large trees and steep clay breaks located along the route provide suitable nesting habitat for migratory raptors. Green ash and American elm are the most common trees in grassland drainages. Cottonwood is common along river systems and streams. Shelterbelts in croplands and near farm residences include several tree species, native and introduced. In North Dakota breeding and nest initiation begins in February and nesting continues through late July or August.

Sharp-tail grouse leks, or dancing grounds, are generally located on rolling to flat native grasslands, with short vegetative height but may also occur on cultivated agricultural lands. Males generally select hilltops, ridges, or flats with a good field of view. Lek locations may be used for several years, but may become abandoned if vegetation structure gets too high. Peak attendance on leks is April to early May. The USFS has set a timing restriction on construction within a 1 mile line of sight radius of active sharp-tailed grouse leks from March 1 – June 15. In addition, there is a no surface occupancy restriction within ¼ mile line of sight of a grouse lek. The restrictions are waved if the lek grounds have been inactive for two previous consecutive breeding seasons.

Currently in North Dakota, the greater-sage grouse's range is limited to the extreme southwest portion of the state. Greater sage-grouse numbers have been in a downward trend since the 1960's due to habitat loss and fragmentation. The survey area is outside the pre-settlement range of the greater sage-grouse and none were observed during the surveys.

The proposed construction activities may affect raptor and migratory bird species through direct mortality, temporary habitat degradation, and/or temporary displacement of individual birds. These impacts are regulated in part through the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), and USFWS Endangered Species Act of 1973.

Under the MBTA and BGEPA, the USFWS recommends pre-construction nest surveys if construction takes place between February 1 and July 15 to avoid disturbance to migratory bird nests. Pre-construction surveys are to take place no more than 5 days in advance of construction. The USFWS

may request to be consulted to determine mitigation measures to avoid disturbance of located nests. Mitigation measures may include applying an avoidance buffer to nest locations or delaying construction in that area until young of the year are fledged.

The USFS has a no surface occupancy (NSO) boundary within line of site of active golden eagle, bald eagle, merlin, ferruginous hawk, peregrine falcon, prairie falcon and burrowing owl nests. The NSO boundary is set at 1-mile for bald eagle and peregrine falcon nests, ½-mile for golden eagle merlin, and ferruginous hawk nests and ¼-mile for prairie falcon and burrowing owl nests. The timing of preconstruction surveys is February 1 through July 31. A known raptor nest must be inactive for each of the previous seven years to waive the NSO restrictions.

3.0 METHODS

An aerial survey for raptor nests was conducted April 13-14th, 2012, in a Piper Super Cub, fixed-wing aircraft with a qualified observer and a pilot. Transects were generally flown ¼-mile each side of the proposed centerline along the entire length of the proposed route, approximately 50-200 feet above the ground surface. Additional areas were surveyed to account for possible changes to the pipeline route. Nests located from the air were revisited and observed from the ground on April 18 2012, to determine or confirm nesting activity. In addition a ground survey for raptors was conducted along the proposed pipeline corridor on May 23, 2013.

Greater sage-grouse and sharp-tail grouse surveys were conducted April 13-14th, 2012, in a Piper Super Cub, fixed-wing aircraft with a qualified observer and a pilot. Parallel transects spaced ¼-mile apart, and 200-300 feet above the ground surface, were flown in a north-south direction, extending two miles from the proposed centerline. The survey was conducted from ½-hour before sunrise till approximately two hours after sunrise.

Ground surveys for sharp-tail and greater sage-grouse leks on USFS lands within one-mile of the route were conducted on May 3, 2013. The survey was conducted from ½-hour before sunrise till approximately two hours after sunrise. Weather conditions at the time of the surveys were favorable for detection (i.e. partly cloudy with light winds of 5-10 mph).

Aerial and ground surveys for raptor nest and grouse leks along the proposed route will be conducted in the spring of 2014.

4.0 RESULTS

4.1 Raptor Nests

Occupied or active raptor nests within one mile of the proposed route observed during the 2012 survey included three red-tailed hawk nests and one Swainson's hawk nest. Occupied or active raptor nests within one mile of the proposed route observed during the 2013 ground survey included two red-tailed hawk nests, two great horned owl nests, and one unidentified tree nest. Active raptor nest and prairie grouse lek locations are depicted on the figures in Appendix A and summarized in Tables 1 and 2.

No active golden or bald eagle nests were located during the survey. Two previously recorded golden eagle nest locations were observed, but no nesting activity was evident during the survey. All other previously recorded nest locations surveyed during this project were not found and are assumed to be destroyed.

4.2 Prairie Grouse

One active sharp-tail grouse lek was found within the surveyed project area (Table 2) in 2012 and 2013. The active grouse lek is located on USFS land in the NE¼SE¼ of Section 4, T153N, R95W.

Table 1. Active raptor nests

Species	Surface Owner	Survey		Location					Distance (ft) from Corridor
		Date	Method	County	SEC	QQ	TWP	RNG	
Swainson's Hawk	Private	April 14, 2012	Aerial	McKenzie	13	NW, SE	150	96	4,700
Swainson's Hawk	Private	April14, 2012	Aerial	Williams	32	NW, SE	155	95	1,500
Red-tailed Hawk	Private	April 14 2012	Aerial	McKenzie	12	NW, SE	151	96	500
Red-tailed Hawk	Private	April 14, 2012	Aerial	McKenzie	12	NW, SE	151	96	600
Red-tailed Hawk	Private	April 14, 2012	Aerial	McKenzie	27	NE, SW	153	95	4,000
Red-tailed Hawk	USFS	April 14, 2012	Aerial	McKenzie	9	NW, NE	153	96	800
Swainson's Hawk	Private	May 23, 2013	Ground	McKenzie	13	NW, SE	150	96	4,700
Red-tailed Hawk	Private	May 23, 2013	Ground	McKenzie	12	NW, SE	151	96	800
Red-tailed Hawk	Private	May 23, 2013	Ground	McKenzie	27	NW, SW	153	95	3,800
Great Horned Owl	Private	May 23, 2013	Ground	McKenzie	20	NE, NE	155	95	1,800
Red-tailed Hawk	Private	May 23, 2013	Ground	Williams	18	SE, NE	155	95	700
Unidentified	Private	May 23, 2013	Ground	Williams	7	SE, NW	155	95	2,300

Table 2. Active prairie grouse leks

Grouse Species	Owner	Survey		Location							Distance (ft) from Corridor
		Date	Type	Attendance	County	SEC	QQ	TWP	RNG	Latitude Longitude	
Sharp-tail Grouse	USFS	Apr 21 2011 May 3, 2012	Aerial Ground	20	McKenzie	4	NE SE	153	95	48.09941 -102.898	200

Appendix A

Figures

Legend

- Receipt Points
- Mileposts
- Proposed BakkenLink Pipeline
- 1/2 Mile Project Buffer
- 1 Mile Project Buffer
- NDGF 2012 Raptor Nests
- NDGF 2012 Grouse Leks

Nest and Lek Status - Spring 2012-2013

- Unoccupied Tree Nest
- Great Horned Owl - Occupied
- Red-tailed Hawk - Occupied
- Swainsons Hawk - Occupied
- Canada Goose - Occupied
- Golden Eagle - Destroyed
- Sharp-tail Grouse - Active Lek

Historical Lek

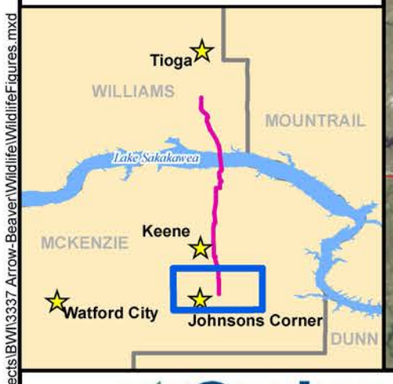
- Sharp-tail Grouse - Not Active

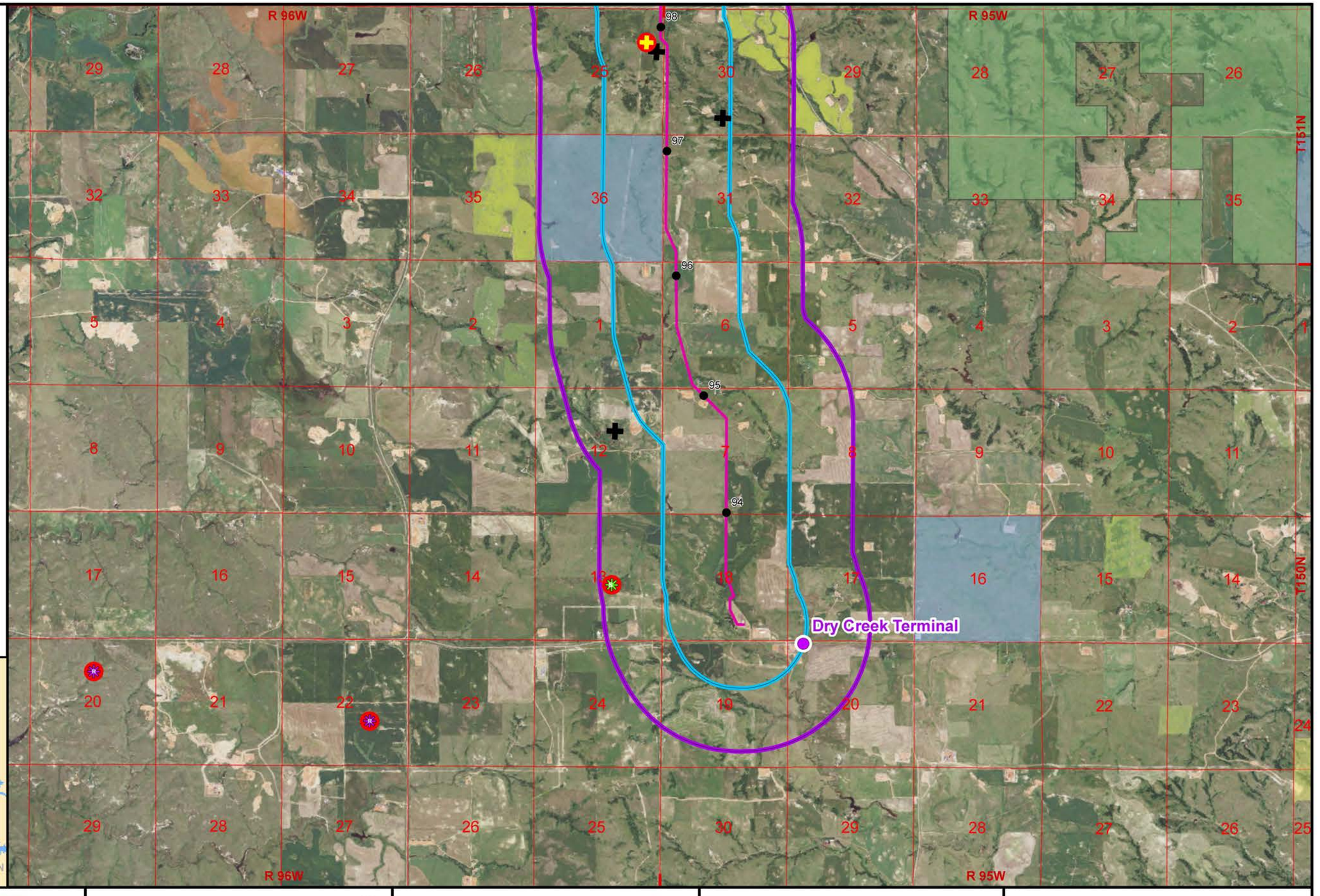
Historical Nests

- Prairie Falcon - Not Found
- Swainson's Hawk - Not Found
- Golden Eagle - Not Found
- Burrowing Owl - Not Found

Surface Ownership

- US Army Corps of Engineers
- BLM
- US Forest Service
- ND Game and Fish WMA
- State
- Sections





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Basemap: ND GIS Hub Aerial Imagery 2012

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BakkenLink Pipeline, LLC

BakkenLink Pipeline
Dry Creek Terminal to Beaver Lodge
North Dakota

Figure 1
Raptor and Prairie Grouse
2012 - 2013 Spring Survey

January 2014 R:\projects\BWI\3337 Arrow-Beaver\Wildlife\WildlifeFigures.mxd

Legend

- Receipt Points
- Mileposts
- Proposed BakkenLink Pipeline
- 1/2 Mile Project Buffer
- 1 Mile Project Buffer
- NDGF 2012 Raptor Nests
- NDGF 2012 Grouse Leks

Nest and Lek Status - Spring 2012-2013

- Unoccupied Tree Nest
- Great Horned Owl - Occupied
- Red-tailed Hawk - Occupied
- Swainsons Hawk - Occupied
- Canada Goose - Occupied
- Golden Eagle - Destroyed
- Sharp-tail Grouse - Active Lek

Historical Lek

- Sharp-tail Grouse - Not Active

Historical Nests

- Prairie Falcon - Not Found
- Swainson's Hawk - Not Found
- Golden Eagle - Not Found
- Burrowing Owl - Not Found

Surface Ownership

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- BLM
- US Forest Service
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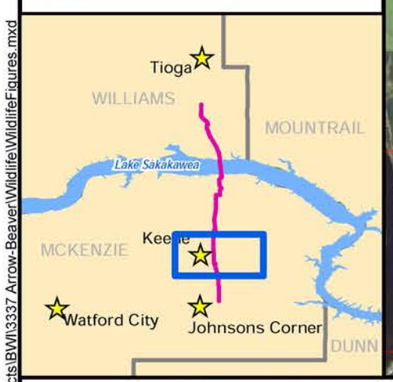

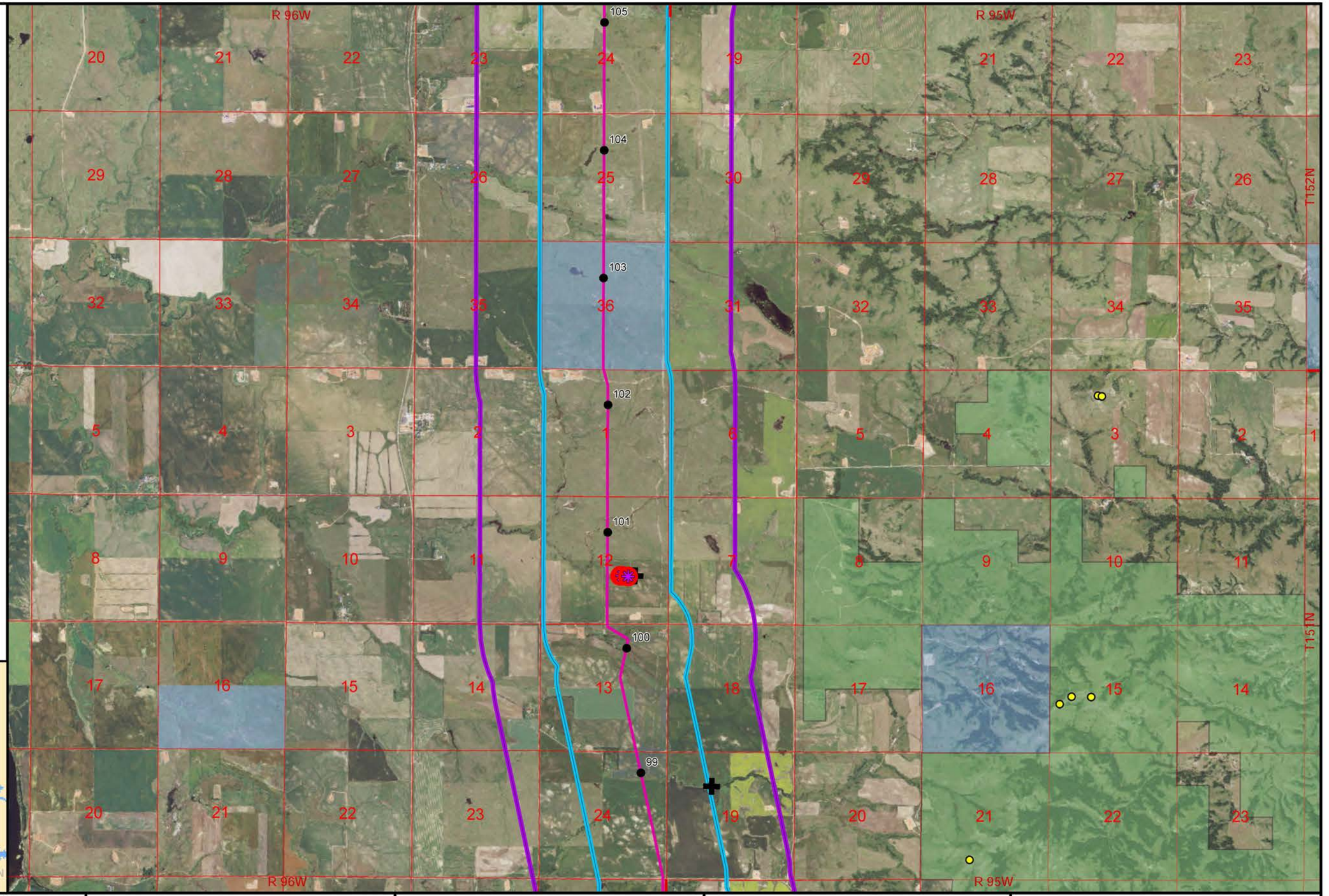

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BakkenLink Pipeline, LLC

BakkenLink Pipeline
Dry Creek Terminal to Beaver Lodge
North Dakota

Figure 2
Raptor and Prairie Grouse
2012 - 2013 Spring Survey

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January 2014

Legend

- Receipt Points
- Mileposts
- Proposed BakkenLink Pipeline
- 1/2 Mile Project Buffer
- 1 Mile Project Buffer
- NDGF 2012 Raptor Nests
- NDGF 2012 Grouse Leks

Nest and Lek Status - Spring 2012-2013

- Unoccupied Tree Nest
- Great Horned Owl - Occupied
- Red-tailed Hawk - Occupied
- Swainsons Hawk - Occupied
- Canada Goose - Occupied
- Golden Eagle - Destroyed
- Sharp-tail Grouse - Active Lek

Historical Lek

- Sharp-tail Grouse - Not Active

Historical Nests

- Prairie Falcon - Not Found
- Swainson's Hawk - Not Found
- Golden Eagle - Not Found
- Burrowing Owl - Not Found

Surface Ownership

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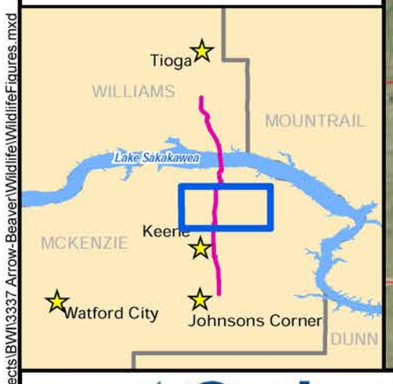
- Sections



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BakkenLink Pipeline, LLC

BakkenLink Pipeline

Dry Creek Terminal to Beaver Lodge
North Dakota

Figure 3

Raptor and Prairie Grouse
2012 - 2013 Spring Survey

Legend

- Receipt Points
- Mileposts
- Proposed BakkenLink Pipeline
- 1/2 Mile Project Buffer
- 1 Mile Project Buffer
- NDGF 2012 Raptor Nests
- NDGF 2012 Grouse Leks

Nest and Lek Status - Spring 2012-2013

- Unoccupied Tree Nest
- Great Horned Owl - Occupied
- Red-tailed Hawk - Occupied
- Swainsons Hawk - Occupied
- Canada Goose - Occupied
- Golden Eagle - Destroyed
- Sharp-tail Grouse - Active Lek

Historical Lek

- Sharp-tail Grouse - Not Active

Historical Nests

- Prairie Falcon - Not Found
- Swainson's Hawk - Not Found
- Golden Eagle - Not Found
- Burrowing Owl - Not Found

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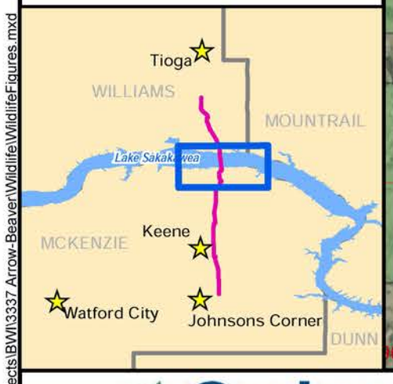

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BakkenLink Pipeline

Dry Creek Terminal to Beaver Lodge
North Dakota

Figure 4

Raptor and Prairie Grouse
2012 - 2013 Spring Survey

Legend

- Receipt Points
- Mileposts
- Proposed BakkenLink Pipeline
- 1/2 Mile Project Buffer
- 1 Mile Project Buffer
- NDGF 2012 Raptor Nests
- NDGF 2012 Grouse Leks

Nest and Lek Status - Spring 2012-2013

- Unoccupied Tree Nest
- Great Horned Owl - Occupied
- Red-tailed Hawk - Occupied
- Swainsons Hawk - Occupied
- Canada Goose - Occupied
- Golden Eagle - Destroyed
- Sharp-tail Grouse - Active Lek

Historical Lek

- Sharp-tail Grouse - Not Active

Historical Nests

- Prairie Falcon - Not Found
- Swainson's Hawk - Not Found
- Golden Eagle - Not Found
- Burrowing Owl - Not Found

Surface Ownership

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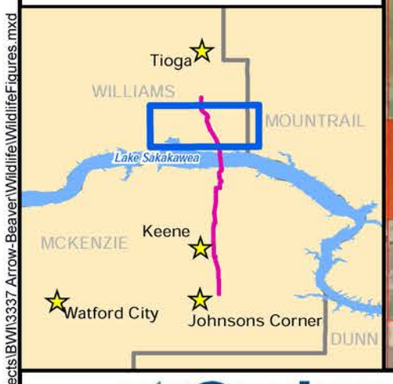

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BakkenLink Pipeline, LLC

BakkenLink Pipeline
Dry Creek Terminal to Beaver Lodge
North Dakota

Figure 5
Raptor and Prairie Grouse
2012 - 2013 Spring Survey

Legend

- Receipt Points
- Mileposts
- Proposed BakkenLink Pipeline
- 1/2 Mile Project Buffer
- 1 Mile Project Buffer
- NDGF 2012 Raptor Nests
- NDGF 2012 Grouse Leks

Nest and Lek Status - Spring 2012-2013

- Unoccupied Tree Nest
- Great Horned Owl - Occupied
- Red-tailed Hawk - Occupied
- Swainsons Hawk - Occupied
- Canada Goose - Occupied
- Golden Eagle - Destroyed
- Sharp-tail Grouse - Active Lek

Historical Lek

- Sharp-tail Grouse - Not Active

Historical Nests

- Prairie Falcon - Not Found
- Swainson's Hawk - Not Found
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Surface Ownership

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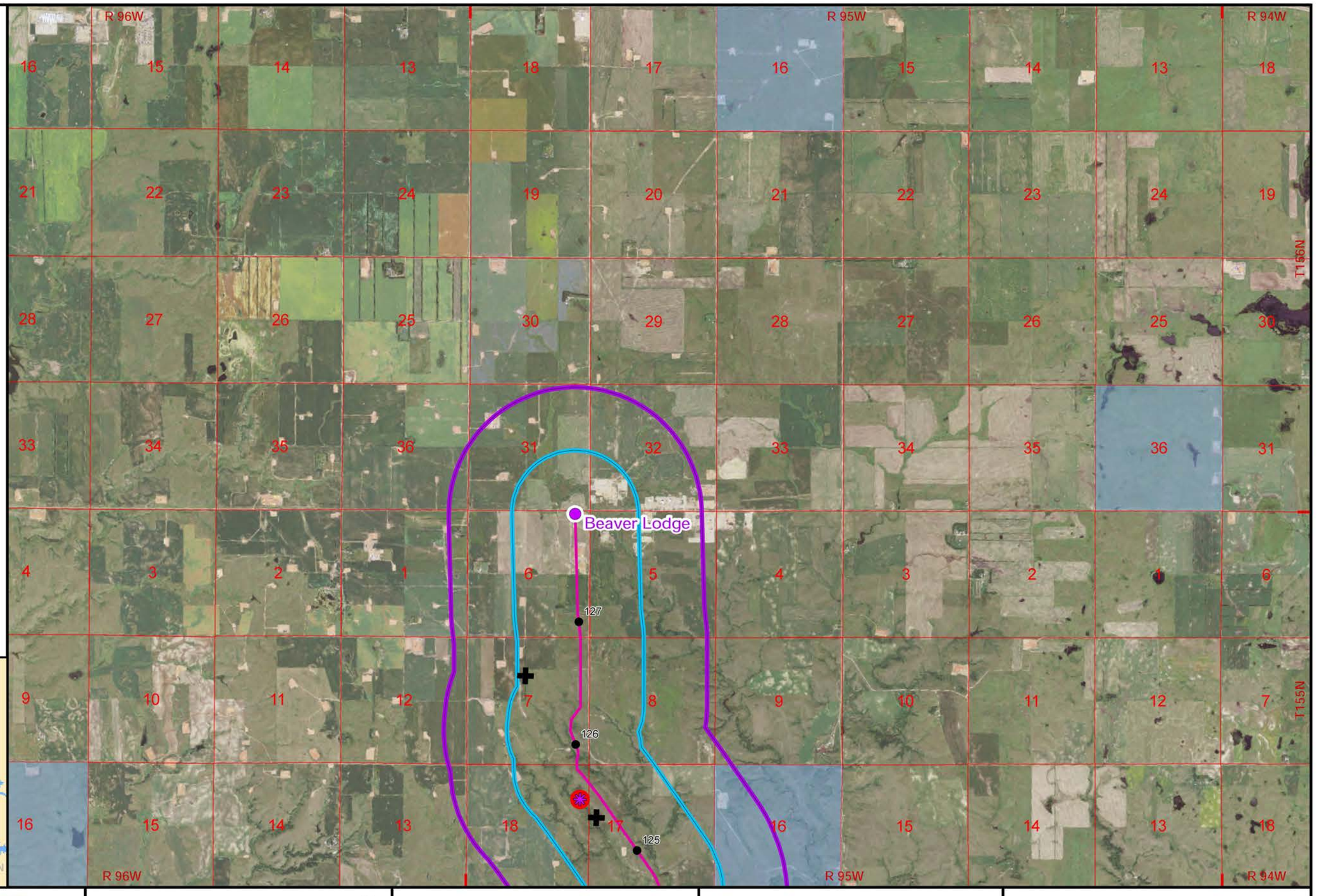
- BLM
- US Forest Service
- ND Game and Fish WMA
- State
- Sections



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BakkenLink Pipeline, LLC

BakkenLink Pipeline

Dry Creek Terminal to Beaver Lodge
North Dakota

Figure 6

Raptor and Prairie Grouse
2012 - 2013 Spring Survey

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Raptor and Prairie Grouse Survey
Spring 2014

BakkenLink Pipeline
Dry Creek Station to Beaver Lodge
McKenzie and Williams County
Project #3337-01

Prepared for:

BakkenLink Pipeline, LLC

June 4, 2014

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BakkenLink Pipeline
Dry Creek Terminal to Beaver Lodge
McKenzie and Williams Counties, ND

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APPENDICES

1.0 INTRODUCTION

Carlson McCain, Inc. conducted a survey for raptor nests and prairie grouse leks (sharp-tail grouse and sage-grouse) for BakkenLink Pipeline, LLC (BakkenLink) along the proposed Phase II of the BakkenLink crude oil pipeline system on May 19-21, 2014. The proposed pipeline system consists of approximately 37 miles of 16-inch steel crude oil pipeline extending from the Dry Creek Terminal in McKenzie County, North Dakota to the Beaver Lodge receipt point in Williams County, North Dakota being developed by an affiliate of BakkenLink. The survey area includes the following counties: McKenzie and Williams in North Dakota.

2.0 BACKGROUND INFORMATION

Records from the North Dakota Game and Fish Department (NDGF), North Dakota Parks and Recreation Department Heritage Inventory (NDPRC), US Fish and Wildlife Service (USFWS), US Forest Service (USFS), and Bureau of Land Management (BLM) were reviewed to determine the locations and status of previously observed and recorded raptor nests and prairie grouse leks. Results of the 2012 and 2013 surveys were also reviewed.

The majority of the proposed route is located on private land; however, portions of the route are located on US Army Corps of Engineers (USACE), USFS lands, and North Dakota Department of Trust lands. The USFS and BLM require spring surveys to document active raptor nests and prairie grouse leks on their managed lands. The NDGF and USFWS recommend that raptor and prairie grouse surveys be conducted along the entire route. Surface occupancy and construction timing restrictions may be recommended by these agencies in proximity to active raptor nests and prairie grouse lek locations.

The pipeline crosses varying topography including gently rolling hills, badland inclusions, steep wooded native draws, and level agricultural lands. Large trees and steep clay breaks located along the route provide suitable nesting habitat for migratory raptors. Green ash and American elm are the most common trees in grassland drainages; whereas, Eastern cottonwood are common along river systems and streams. Shelterbelts in croplands and near farm residences include several native and introduced tree species. In North Dakota breeding and nest initiation begins in February and nesting continues through late July or August.

The proposed construction activities may affect raptor and migratory bird species through direct mortality, temporary habitat degradation, and/or temporary displacement of individual birds. These impacts are regulated in part through the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), and USFWS Endangered Species Act of 1973.

Under the MBTA and BGEPA, the USFWS recommends pre-construction nest surveys if construction takes place between February 1 and July 15 to avoid disturbance to migratory bird nests. Pre-construction surveys are to take place no more than 5 days in advance of construction. The USFWS may request to be consulted to determine mitigation measures to avoid disturbance of located nests. Mitigation measures may include applying an avoidance buffer around nest locations or delaying construction in that area until young of the year are fledged.

The USFS has a no surface occupancy (NSO) boundary within line of site of active golden eagle, bald eagle, merlin, ferruginous hawk, peregrine falcon, prairie falcon and burrowing owl nests. The NSO boundary is set at 1-mile for bald eagle and peregrine falcon nests, ½-mile for golden eagle merlin, and ferruginous hawk nests and ¼-mile for prairie falcon and burrowing owl nests. The timing of preconstruction surveys is February 1 through July 31. A known raptor (previously listed species) nest must be inactive for each of the previous seven years to waive the NSO restrictions.

Sharp-tail grouse leks, or dancing grounds, are generally located on rolling to flat native grasslands with short vegetative height, but may also occur on cultivated agricultural lands. Males generally select hilltops, ridges, or flats with a good field of view. Lek locations may be used for several years, but may become abandoned if vegetation structure gets too high. Peak lek attendance is April to early May. The USFS has set a timing restriction on construction within a 1 mile line of sight radius of active sharp-tailed grouse leks from March 1 – June 15. In addition, there is a no surface occupancy restriction within ¼-mile line of sight of a grouse lek. The restrictions are waved if the lek has been inactive for two previous consecutive breeding seasons.

Currently in North Dakota, the greater-sage grouse's range is limited to the extreme southwest portion of the state. Greater sage-grouse numbers have been in a downward trend since the 1960's due to habitat loss and fragmentation. The survey area is outside the pre-settlement range of the greater sage-grouse and none were observed during the surveys.

3.0 METHODS

An aerial survey for raptor nests and sharp-tail grouse was conducted May 19th and 20th, 2014, in a Cessna 172, fixed-wing aircraft with a qualified wildlife biologist and a pilot. Transects were generally flown ¼-mile each side of the proposed centerline along the entire length of the proposed route. Additional transects were flown ¾-mile each side of the proposed centerline on U.S. Forest Service lands. The survey was conducted approximately 50-200 feet above the ground surface.

Ground surveys for sharp-tail grouse leks on USFS lands within one-mile of the proposed route were conducted on May 21, 2014. Lek locations documented during the aerial survey were visited to confirm activity. Weather conditions at the time of the surveys were favorable for detection (i.e. partly cloudy with light winds of 5-10 mph).

4.0 SURVEY RESULTS

4.1 Raptor

A total of ten raptor nests were documented within one mile of the proposed route during the 2014 survey. Nine of the nests were determined to be occupied or active. The active nests included five red-tailed hawk nests, two great horned owl nests, one golden eagle nest, and one Swainson's hawk nest. Active raptor nests locations are depicted on the figures in Appendix A and summarized in Tables 1.

Three of the active nests were documented during prior surveys conducted along the route. The great horned owl nest located in Section 13, Township (T) 150 North (N), Range (R) 96 West (W), was documented as an active Swainson's hawk nest in 2012. Similarly, the Swainson's hawk nest located in Section 27, T153N, R95W, was recorded as an active Red-tailed hawk nest in 2012. The red-tailed hawk nest located in Section 18, T155N, R95W, was occupied by a red-tail hawk at the time of the 2013 survey. All other previously recorded nest locations surveyed during this project were not found and are assumed to be destroyed.

4.2 Prairie Grouse

One active sharp-tail grouse lek was found within the surveyed project area (Table 2). The active grouse lek is located on USFS land in the NE¼SE¼ of Section 4, T153N, R95W. Currently, the proposed route crosses the lek location. The lek was documented as being active during the both the 2012 and 2013 surveys. The active shape-tail grouse lek location is depicted on the figures in Appendix A and summarized in Tables 2.

Table 1. Raptor Nests

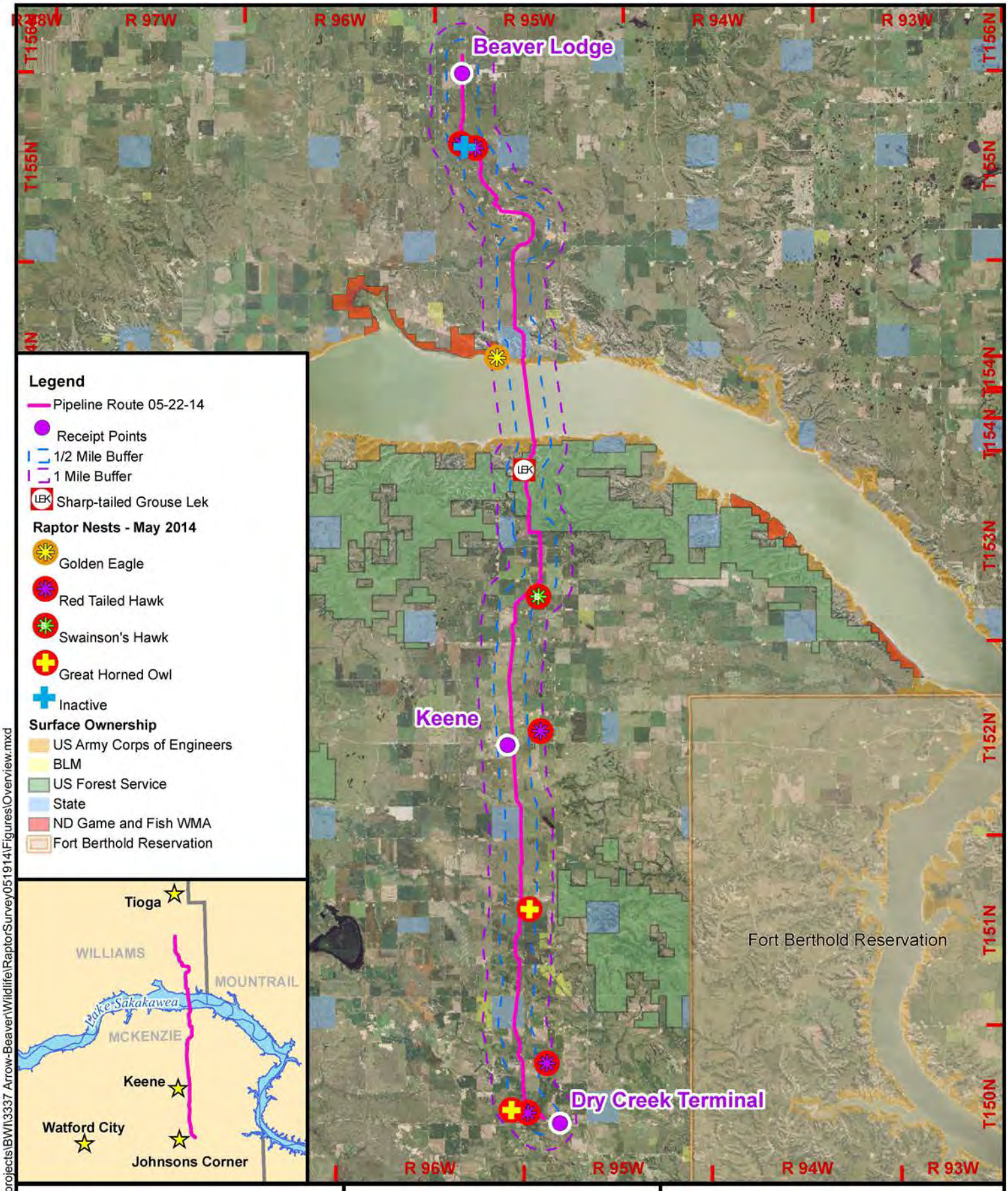
Species	Surface Owner	Survey		Location					Distance (ft) from Corridor
		Date	Method	County	SEC	QQ	TWP	RNG	
Great Horned Owl	Private	May 19, 2014	Aerial	McKenzie	13	NW, SE	150	96	2,900
Red-tailed Hawk	Private	May 19, 2014	Aerial	McKenzie	18	NW, SW	150	95	1,250
Red-tailed Hawk	Private	May 19, 2014	Aerial	McKenzie	7	NE, NE	150	95	4,000
Great Horned Owl	Private	May 19, 2014	Aerial	McKenzie	18	NW, NW	151	95	1,500
Swainson's Hawk	Private	May 19, 2014	Aerial	McKenzie	27	NW, SW	153	95	1,650
Red-tailed Hawk	Private	May 19, 2014	Aerial	McKenzie	18	NW, SE	152	95	4,700
Golden Eagle	NDGF	May 19, 2014	Aerial	Williams	17	SE, SE	154	95	4,250
Red-tailed Hawk	Private	May 19, 2014	Aerial	Williams	18	NE, NE	155	95	1,000
Inactive	Private	May 19, 2014	Aerial	Williams	18	SE, NE	155	95	750
Red-tailed Hawk	Private	May 19, 2014	Aerial	Williams	17	SE, NW	155	95	600

Table 2. Prairie Grouse Lek

Species	Surface Owner	Survey		Location					Distance (ft) from Corridor
		Date	Type	County	SEC	QQ	TWP	RNG	
Sharp-tailed Grouse	USFS	May 21, 2014	Ground	McKenzie	4	NE, SE	153	95	0

Appendix A

Figures



1:253,440

0 2 4 Miles

Basemap: ND GIS Hub Aerial Imagery 2012

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Overview
Raptor and Prairie Grouse
Dry Creek Terminal to Beaver Lodge
BakkenLink Pipeline, LLC

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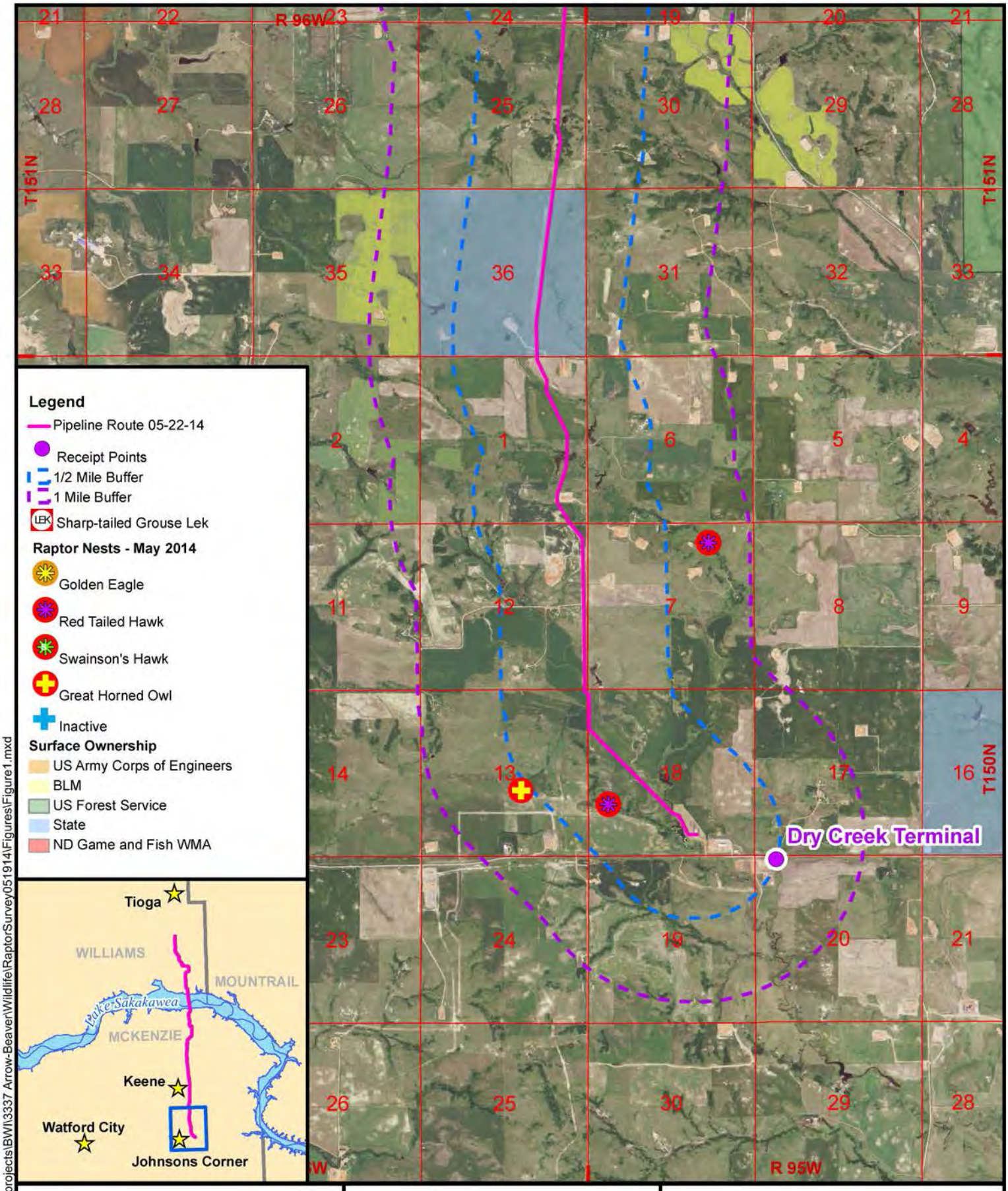
May 2014



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Basemap: ND GIS Hub Aerial Imagery 2012

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Figure 1
Raptor and Prairie Grouse
Dry Creek Terminal to Beaver Lodge
BakkenLink Pipeline, LLC

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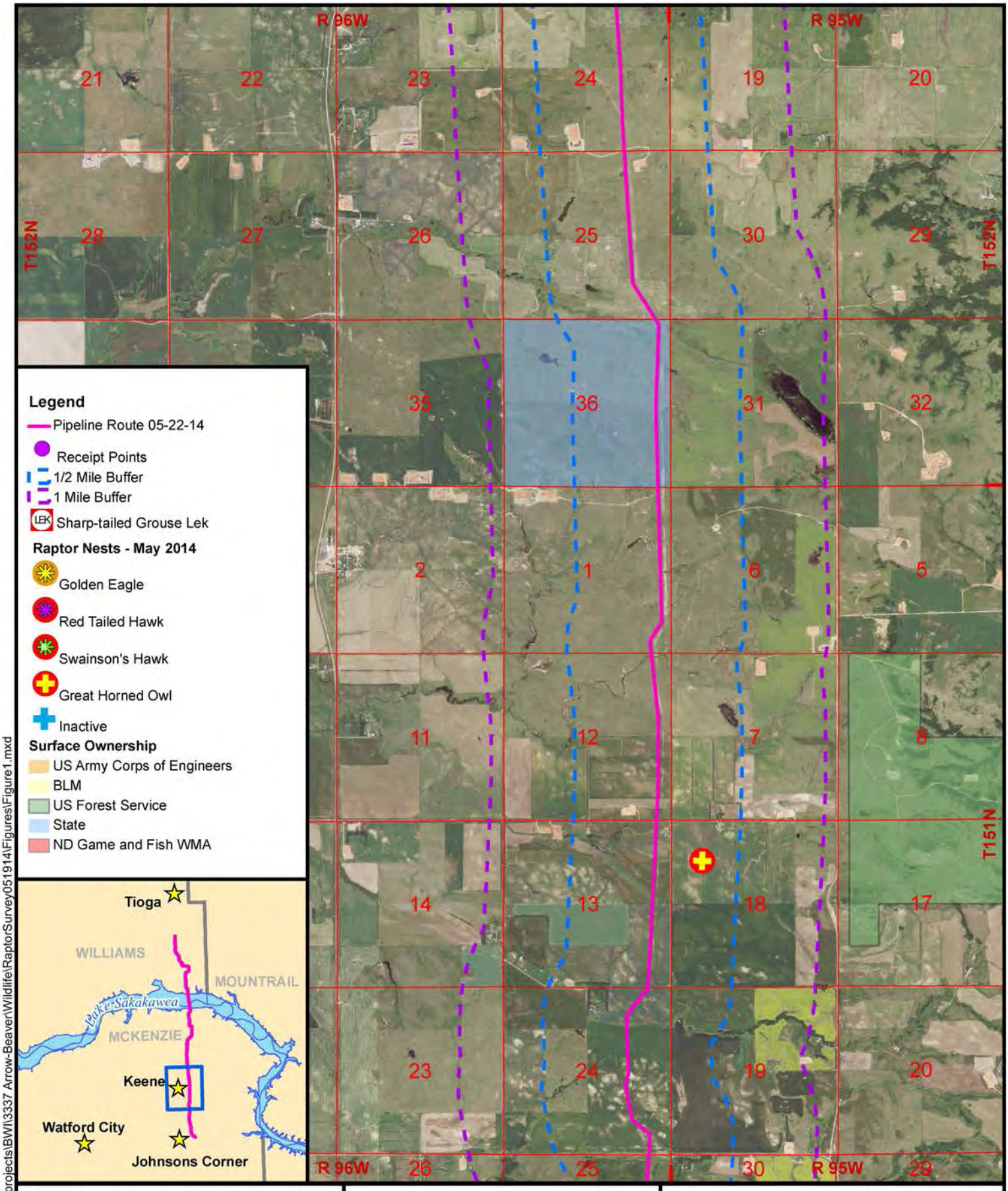
June 2014



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June 2014

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Basemap: ND GIS Hub Aerial Imagery 2012

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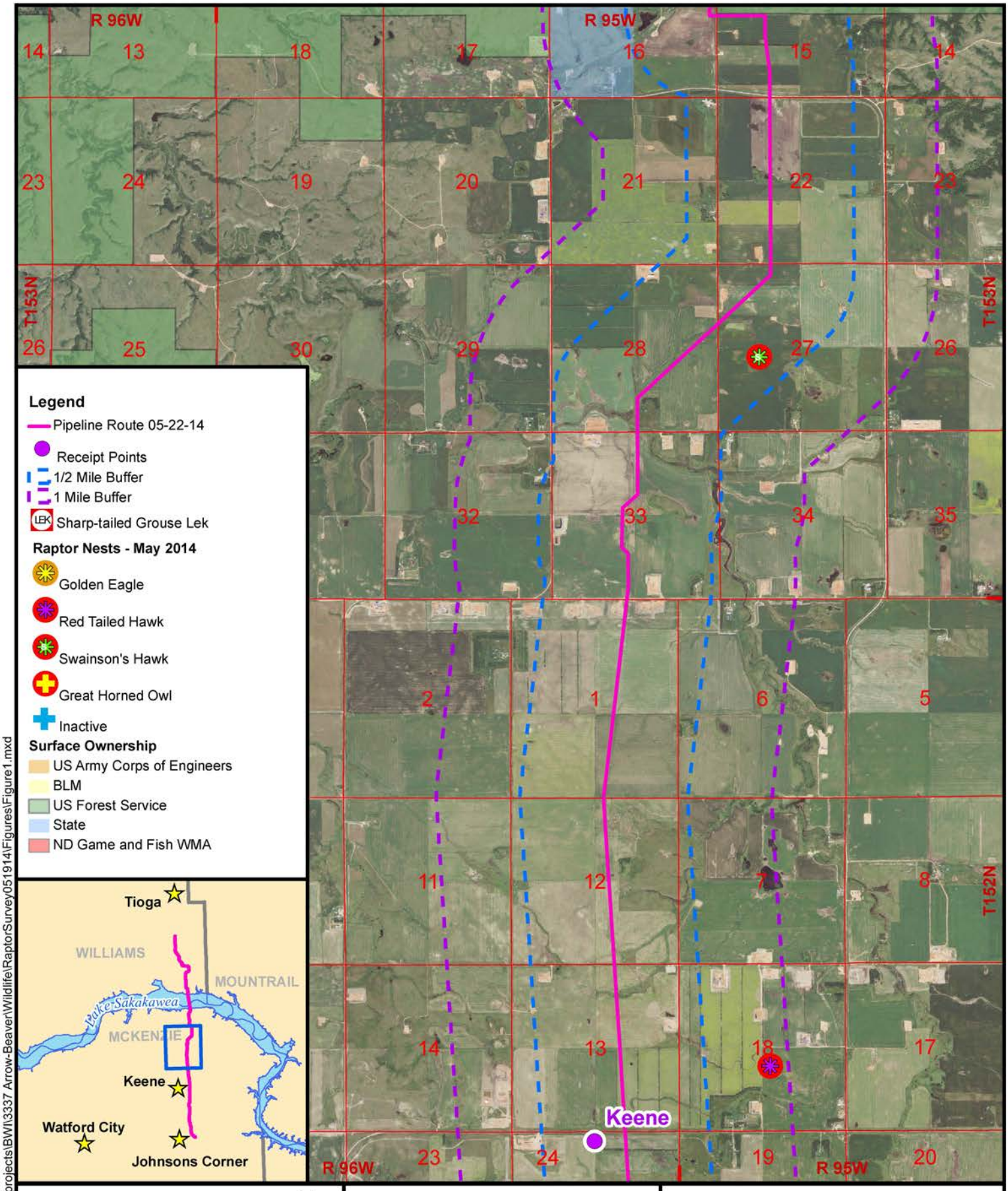
Figure 2
Raptor and Prairie Grouse
Dry Creek Terminal to Beaver Lodge
BakkenLink Pipeline, LLC



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Basemap: ND GIS Hub Aerial Imagery 2012

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Figure 3
Raptor and Prairie Grouse
Dry Creek Terminal to Beaver Lodge
BakkenLink Pipeline, LLC

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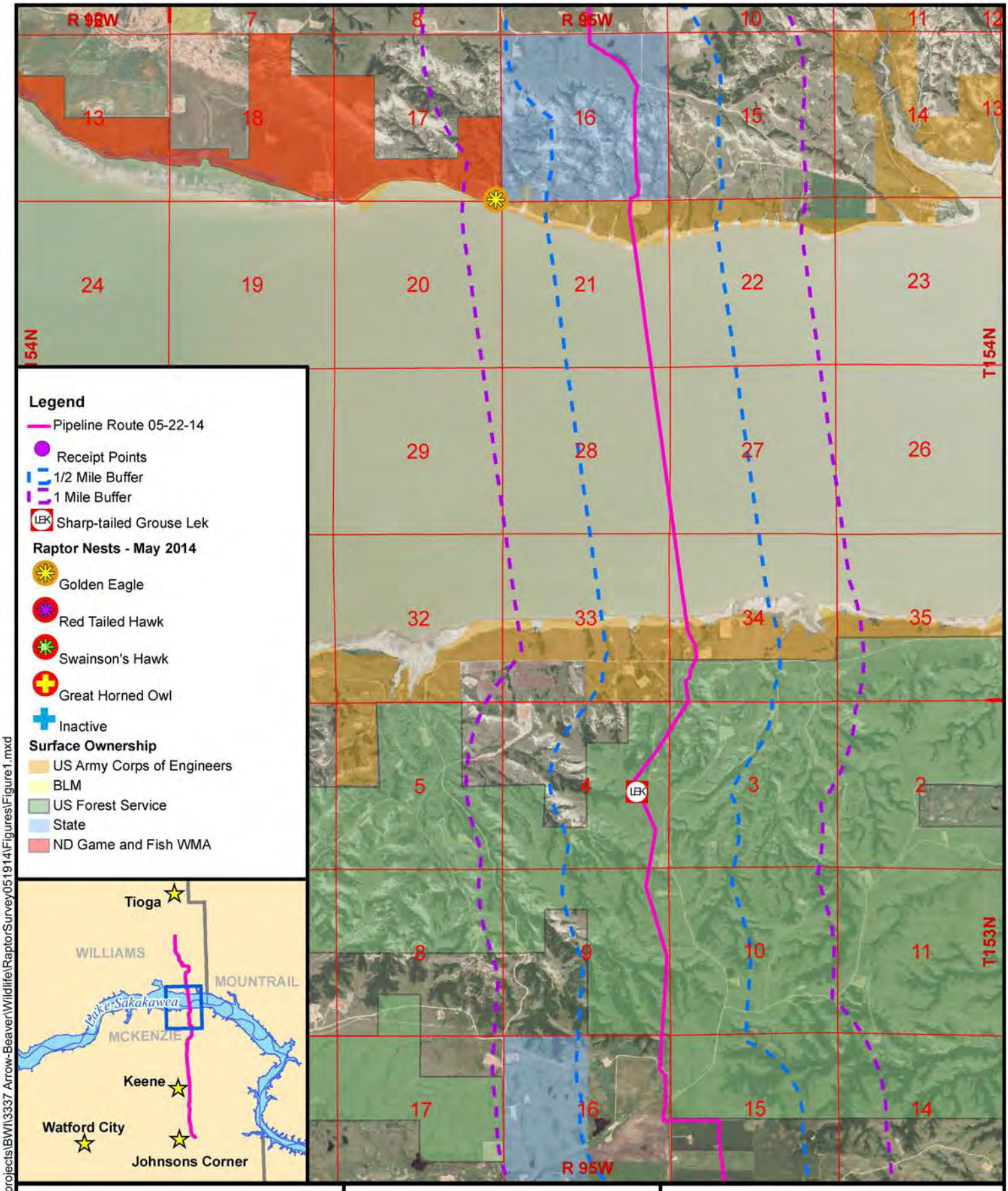
June 2014



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Basemap: ND GIS Hub Aerial Imagery 2012

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Figure 4
Raptor and Prairie Grouse
Dry Creek Terminal to Beaver Lodge
BakkenLink Pipeline, LLC

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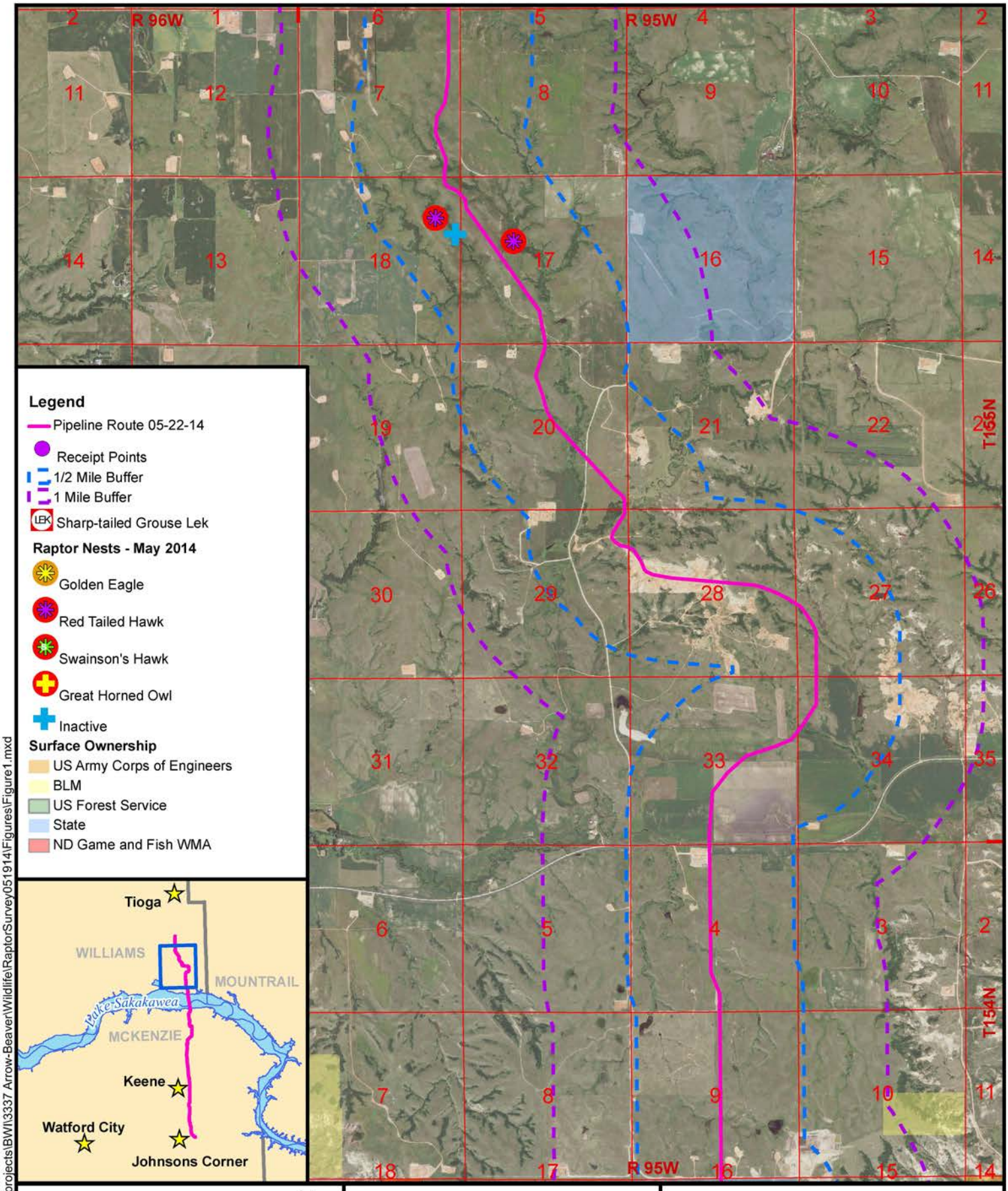
June 2014



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Basemap: ND GIS Hub Aerial Imagery 2012

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Figure 5
Raptor and Prairie Grouse
Dry Creek Terminal to Beaver Lodge
BakkenLink Pipeline, LLC

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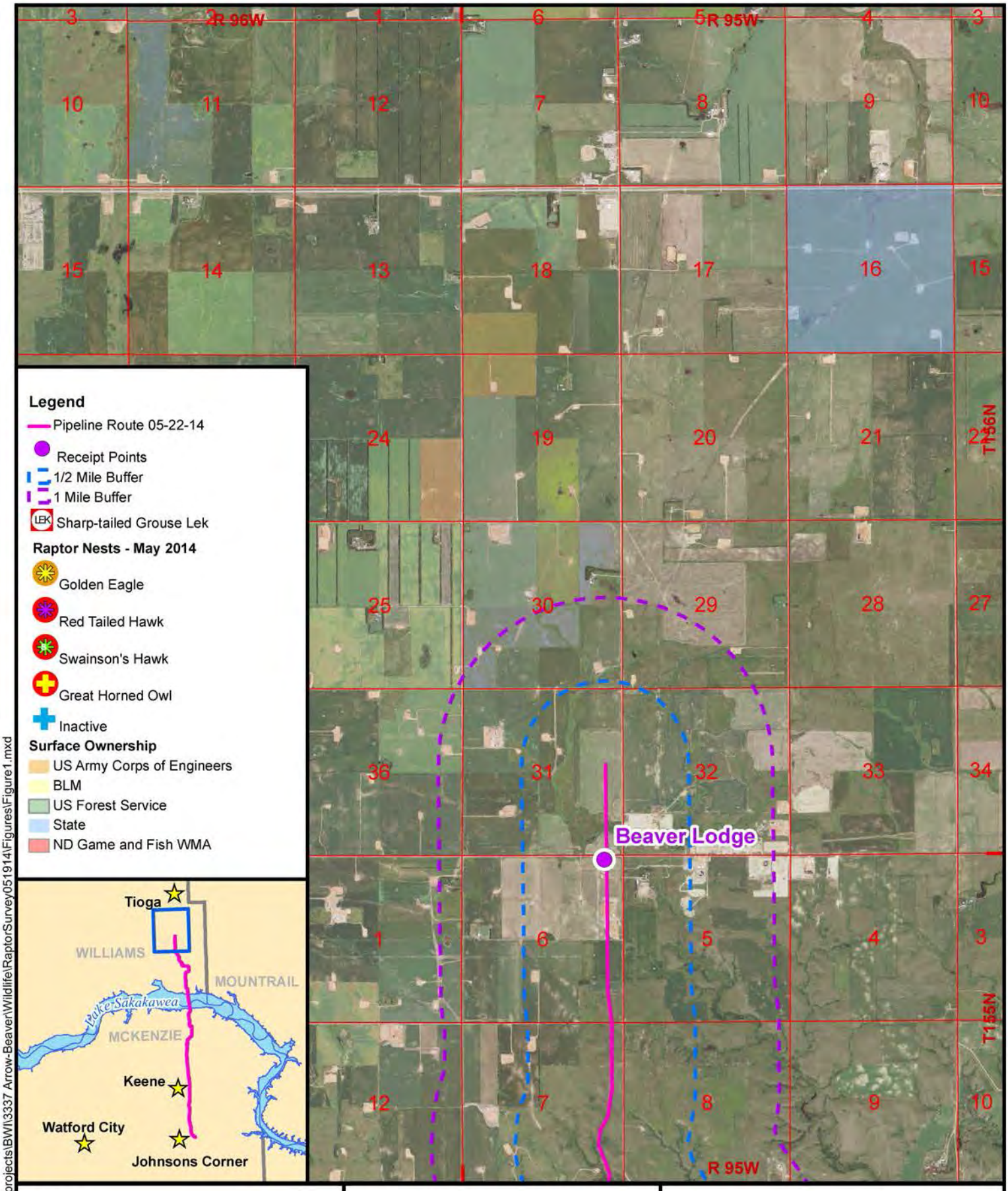
June 2014



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Basemap: ND GIS Hub Aerial Imagery 2012

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Figure 6
Raptor and Prairie Grouse
Dry Creek Terminal to Beaver Lodge
BakkenLink Pipeline, LLC

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June 2014

Appendix XXVII

BakkenLink Noxious Weed Control Plan

Noxious Weed and Aquatic Nuisance Species Control Plan

BakkenLink Pipeline LLC
Dry Creek Terminal to Beaver Lodge

MCKENZIE AND WILLIAMS COUNTIES, NORTH DAKOTA

September 2014

Noxious Weed and Aquatic Nuisance Species Control Plan
BakkenLink Pipeline LLC

TABLE OF CONTENTS

APPENDICES

1.0 Introduction

BakkenLink Pipeline LLC is proposing to build, own, and operate an approximately 37-mile long pipeline (Project) for the transportation of crude oil from existing and proposed truck receipt locations and pipeline gathering receipt stations. The proposed pipeline will be constructed in portions of McKenzie and Williams counties, North Dakota.

The spread of noxious weeds can be a significant issue in construction projects that involve land disturbance. Measures must be taken to prevent the spread of noxious weeds during construction and operation and maintenance (O&M). Earth moving activities and the use of contaminated fill, seed, or erosion control products contribute to the spread of weeds.

Likewise, the spread of Aquatic nuisance species (ANS) is potentially significant from construction in and through multiple water bodies and watersheds. ANS may be spread by using equipment used on/in other water bodies where ANS may attach themselves to the equipment. The pipeline and materials themselves are not a concern, as they will be new materials, manufactured specifically for this project.

Noxious weeds are present along the proposed right-of- way (ROW) (see Section 2.3). The disturbance from construction could introduce new noxious weed species or facilitate the spread of existing populations. It is important to note that much of the area where construction will occur is adjacent to pasture and agricultural lands that are already disturbed from grazing and agricultural land use practices. Disturbed pastures and barren, fallow agricultural fields provide abundant habitat for spreading noxious weed populations.

BakkenLink recognizes that prevention is the most cost-effective approach to noxious weed and ANS management. BakkenLink will assist federal, state, and local agency weed control efforts, comply with preventative requirements, and implement control measures on areas of the Project identified to be of special concern.

1.1 Plan Purpose/Objectives

This Noxious Weed Control Plan (Plan) is intended to address methods to prevent, mitigate, and control the spread of noxious weeds and ANS during construction and O&M of the proposed pipeline. BakkenLink and its contractors will be responsible for implementation of the methods described in this Plan.

BakkenLink will comply with State of North Dakota, County, and federal agency requirements implemented to prevent the spread of noxious weeds and ANS. BakkenLink will implement weed control measures in areas of the Project ROW where noxious weeds have been identified. Monitoring during construction and O&M will include the identification of areas along the ROW where noxious weeds are present. Monitoring will also include an evaluation of the prescribed control measures in their effectiveness of control.

2.0 Noxious Weeds and ANS

2.1 Noxious Weeds

Noxious weeds are opportunistic and often exotic (non-indigenous) plant species that readily invade disturbed areas, often producing monocultures and preventing native plant species from establishing communities. Noxious weeds also degrade agricultural productivity, soil and water, wildlife habitat, and recreational and wilderness values.

The North Dakota Century Code (NDCC) §4.1-47-01(6) defines noxious weeds as any plant propagated by either seed or vegetative parts which is determined by the commissioner, a county weed board, or a city weed board, after consulting with the North Dakota State University Extension Service, to be injurious to public health, crops, livestock, land, or other property. Currently, there are eleven species or species groups (some include more than one species and/or cultivars) in North Dakota (North Dakota Administrative Code §7-06-01-02). Pursuant to NDCC 4.1-47 the control and the spread of noxious and invasive weeds is mandatory, and dissemination of noxious weeds must be prevented.

North Dakota's noxious weed list (see description below) includes:

- Absinth wormwood
- Canada thistle
- Diffuse knapweed
- Leafy spurge
- Musk thistle
- Purple loosestrife
- Russian knapweed
- Spotted knapweed
- Yellow toadflax
- Dalmatian toadflax
- Saltcedar

An identification guide to these and other potentially harmful weeds is included in Appendix A.

McKenzie County has developed a county noxious weed list with additional species that warrant control within their jurisdiction.

McKenzie County's noxious weed list includes:

- Black henbane
- Common burdock
- Houndstongue
- Halogeton
- Baby's breath

2.2 ANS

ANS are aquatic and terrestrial organisms, introduced into new habitats throughout the United States and other areas of the world, that produce harmful impacts on aquatic natural resources in these ecosystems and on the human use of these resources. Control of the spread of ANS is delegated under the noxious weed control laws in North Dakota to the North Dakota Game and Fish Department, which regulations are written in Chapter 30-03 of the North Dakota Administrative Code (NDAC). The North Dakota ANS Management Plan is incorporated into this plan by reference and included as Appendix B.

ANS have not been identified in any of the waterbodies or wetlands along the ROW. However, it is imperative that the prescribed measures identified in the North Dakota ANS Management Plan for cleaning of equipment being transported to the site, and working in or travelling through wetlands and waterbodies, be followed. Wetlands and waterbodies are identified on the construction line drawings. Further information, including lists of wetlands and waterbodies identified by milepost can be found in the Construction Mitigation and Reclamation Plan (CMRP).

2.3 Noxious Weed Inventory

Biological surveys for noxious weeds were conducted during 2014 to determine noxious weed occurrence along the proposed ROW. The surveys focused on a 200-ft wide corridor centered on the Project centerline. Noxious weed locations and the extent of localized populations were delineated and recorded using global positioning system (GPS) equipment. Locations where noxious weeds were present are depicted on the figures in Appendix C. The locations (by milepost) are summarized in Table 2.

Table 2. Noxious weed locations

MP	County	Acres	Species (Common Name)
Dry Creek Terminal to Beaver Lodge			
0.1	McKenzie	0.19	Canada Thistle
0.2	McKenzie	0.04	Canada Thistle
0.2	McKenzie	0.11	Canada Thistle
0.9	McKenzie	0.03	Common Burdock
0.9	McKenzie	0.03	Canada Thistle
0.9	McKenzie	0.04	Canada Thistle
1.2	McKenzie	0.17	Canada Thistle
1.4	McKenzie	0.05	Canada Thistle
2.6	McKenzie	0.03	Common Burdock
2.6	McKenzie	0.03	Canada Thistle
2.6	McKenzie	0.01	Canada Thistle
3.7	McKenzie	0.54	Canada Thistle
3.8	McKenzie	0.03	Canada Thistle
3.8	McKenzie	0.03	Canada Thistle
3.8	McKenzie	0.03	Canada Thistle

MP	County	Acres	Species (Common Name)
3.8	McKenzie	0.01	Canada Thistle
3.9	McKenzie	0.07	Canada Thistle
4.5	McKenzie	0.01	Common Burdock
4.5	McKenzie	0.01	Common Burdock
4.5	McKenzie	0.01	Common Burdock
4.5	McKenzie	1.04	Canada Thistle
5.1	McKenzie	0.04	Canada Thistle
5.1	McKenzie	0.05	Canada Thistle
5.4	McKenzie	0.04	Canada Thistle
5.4	McKenzie	0.01	Common Burdock
7.2	McKenzie	0.01	Black Henbane
7.6	McKenzie	0.01	Canada Thistle
9.1	McKenzie	0.11	Canada Thistle
10.0	McKenzie	4.65	Canada Thistle
10.4	McKenzie	0.23	Canada Thistle
12.2	McKenzie	0.01	Canada Thistle
12.3	McKenzie	0.03	Canada Thistle
12.4	McKenzie	0.01	Canada Thistle
12.4	McKenzie	0.01	Canada Thistle
12.5	McKenzie	0.04	Canada Thistle
12.5	McKenzie	0.01	Canada Thistle
13.4	McKenzie	0.05	Canada Thistle
13.4	McKenzie	0.05	Canada Thistle
15.1	McKenzie	0.15	Canada Thistle
16.7	McKenzie	0.61	Canada Thistle
16.9	McKenzie	0.01	Canada Thistle
17.1	McKenzie	0.01	Canada Thistle
17.6	McKenzie	0.39	Canada Thistle
18.7	McKenzie	0.01	Canada Thistle
20.5	McKenzie	0.01	Canada Thistle
20.7	McKenzie	0.15	Common Burdock
21.0	McKenzie	0.02	Canada Thistle
21.6	McKenzie	0.01	Canada Thistle
23.2	McKenzie	0.01	Canada Thistle
23.2	McKenzie	0.01	Canada Thistle
25.5	Williams	0.01	Canada Thistle
25.5	Williams	0.01	Canada Thistle
25.5	Williams	0.01	Canada Thistle
25.6	Williams	0.10	Canada Thistle
25.6	Williams	0.01	Canada Thistle

MP	County	Acres	Species (Common Name)
25.6	Williams	0.17	Canada Thistle
25.6	Williams	0.14	Canada Thistle
25.6	Williams	0.02	Canada Thistle
25.6	Williams	0.20	Canada Thistle
25.6	Williams	0.12	Canada Thistle
25.6	Williams	0.07	Canada Thistle
25.7	Williams	0.01	Canada Thistle
25.7	Williams	0.04	Leafy Spurge
25.7	Williams	0.01	Canada Thistle
25.7	Williams	0.01	Leafy Spurge
25.7	Williams	0.01	Canada Thistle
25.7	Williams	0.02	Leafy Spurge
25.7	Williams	0.22	Canada Thistle
25.7	Williams	0.01	Leafy Spurge
25.7	Williams	0.61	Canada Thistle
25.8	Williams	0.01	Leafy Spurge
25.8	Williams	0.01	Leafy Spurge
25.8	Williams	0.01	Leafy Spurge
25.8	Williams	0.01	Leafy Spurge
25.8	Williams	0.01	Canada Thistle
25.8	Williams	0.01	Leafy Spurge
25.8	Williams	0.01	Leafy Spurge
25.9	Williams	0.01	Canada Thistle
25.9	Williams	0.01	Canada Thistle
25.9	Williams	0.01	Canada Thistle
26.1	Williams	0.01	Musk Thistle
26.5	Williams	0.01	Leafy Spurge
26.5	Williams	0.02	Leafy Spurge
26.5	Williams	0.04	Leafy Spurge
26.8	Williams	0.01	Leafy Spurge
26.8	Williams	0.42	Leafy Spurge
27.2	Williams	0.12	Canada Thistle
27.9	Williams	0.08	Leafy Spurge
28.1	Williams	0.03	Canada Thistle
30.4	Williams	0.01	Canada Thistle
32.0	Williams	0.11	Canada Thistle
32.1	Williams	0.03	Canada Thistle
32.1	Williams	0.05	Canada Thistle
32.6	Williams	0.07	Canada Thistle
32.6	Williams	0.01	Canada Thistle

MP	County	Acres	Species (Common Name)
32.6	Williams	0.01	Canada Thistle
32.6	Williams	0.01	Canada Thistle
32.7	Williams	0.02	Canada Thistle
32.7	Williams	0.01	Canada Thistle
32.7	Williams	0.01	Canada Thistle
33.0	Williams	0.25	Canada Thistle
33.1	Williams	0.05	Canada Thistle
33.7	Williams	0.03	Canada Thistle
33.7	Williams	0.01	Canada Thistle
33.7	Williams	0.08	Canada Thistle
34.9	Williams	0.01	Leafy Spurge
35.0	Williams	0.11	Canada Thistle
35.0	Williams	0.03	Canada Thistle
35.0	Williams	0.01	Canada Thistle
35.0	Williams	0.01	Canada Thistle
35.0	Williams	0.01	Canada Thistle
35.1	Williams	0.01	Canada Thistle
35.1	Williams	0.01	Canada Thistle
35.1	Williams	0.01	Canada Thistle
35.1	Williams	0.01	Canada Thistle
35.1	Williams	0.01	Canada Thistle
35.2	Williams	0.05	Canada Thistle
35.2	Williams	0.01	Canada Thistle
35.2	Williams	0.01	Canada Thistle
35.2	Williams	0.01	Canada Thistle
35.3	Williams	0.01	Canada Thistle
35.3	Williams	0.01	Canada Thistle
35.4	Williams	0.03	Canada Thistle
35.4	Williams	0.01	Canada Thistle
35.4	Williams	0.07	Canada Thistle
35.4	Williams	0.01	Canada Thistle
36.7	Williams	0.02	Canada Thistle
36.7	Williams	0.01	Canada Thistle
36.7	Williams	0.01	Canada Thistle
36.7	Williams	0.16	Canada Thistle
36.9	Williams	0.60	Canada Thistle
37.4	Williams	0.27	Canada Thistle
37.4	Williams	0.06	Canada Thistle
37.4	Williams	0.01	Canada Thistle
Access Roads			

MP	County	Acres	Species (Common Name)
41st Street	McKenzie	0.02	Canada Thistle
41st Street	McKenzie	0.01	Canada Thistle
41st Street	McKenzie	0.01	Canada Thistle
41st Street	McKenzie	0.02	Canada Thistle
41st Street	McKenzie	0.01	Canada Thistle
41st Street	McKenzie	0.01	Canada Thistle
41st Street	McKenzie	0.01	Canada Thistle
41st Street	McKenzie	0.01	Canada Thistle
41st Street	McKenzie	0.01	Canada Thistle
Moe Access	Williams	0.26	Canada Thistle
Moe Access	Williams	0.23	Canada Thistle
Pipe yards			
Moe pipe yard	Williams	0.06	Canada Thistle
Moe pipe yard	Williams	0.19	Canada Thistle
Moe pipe yard	Williams	0.13	Canada Thistle
Moe pipe yard	Williams	0.10	Canada Thistle

These locations are not the only locations where weeds may be present. The figures and table only depict locations where noxious weeds were present at the time of the 2014 survey(s). Noxious weeds may be present at other locations along the ROW due to their invasive nature and potential for spreading from other areas.

Qualified biological monitors or environmental inspectors will be used to conduct on-site biological monitoring before and during construction. In addition, BakkenLink will provide its Contractors with information and training regarding noxious weed management and identification prior to construction. The contractors will be required to report possible weed populations that have not been recorded prior to disturbing the area.

3.0 Best Management Practices

BakkenLink will implement Best Management Practices (BMPs) for conducting noxious weed and vegetation control where necessary before and after construction. Generally, these include:

- BakkenLink will conduct awareness training to Project personnel regarding identification, prevention, and control methods. No personnel will be allowed to enter the ROW before training.
- Treat or contain weed populations that may be impacted or disturbed by construction activity.
- Use only certified weed-free straw/hay or use fiber roll logs for sediment control.
- Use only certified weed-free straw/hay for mulch.
- Clean all equipment of dirt and vegetation. The contractor shall pressure wash all construction equipment prior to mobilizing/demobilizing from the Project. This includes timber mats, cars, transporting trailers and trucks, and recreational equipment brought on-site.
- Wash, or using an air compressor, blow clean all vehicles (including tires and undercarriage) before leaving weed-infested areas.
- The Contractor shall implement pre-construction treatments such as mowing prior to seed development or herbicide application to areas of noxious weed infestation prior to other clearing, grading, trenching, or other soil disturbing work at locations identified in the construction drawings.
- Minimize ground disturbance and vegetation removal as much as possible or practical.

Further discussion of specific BMPs is included in the following sections.

3.1 Construction Methods

Prior to construction, BakkenLink will mark all areas of the ROW, which contain infestations of noxious, invasive species, or soil-borne pests. Such marking will clearly indicate the limits of the infestation along the ROW. During construction, the Contractor shall clean the tracks, tires, and blades of equipment by hand (track shovel) or compressed air to remove excess soil prior to movement of equipment out of weed or soil-borne pest infested areas or utilize cleaning stations to remove vegetative materials using water under high pressure.

In areas where infestations are identified in the field, the Contractor will stockpile cleared vegetation and salvaged topsoil adjacent to the area from which they were stripped. Gaps in the topsoil stockpile shall be maintained to keep stockpiled topsoil separate from topsoil where infestations are not present. The Contractor will return topsoil and vegetative material from infested sites to the areas from which they were stripped. The Contractor will not be permitted to move soil and vegetative matter outside of the identified area of infestation.

Off-ROW areas related to the Project (construction/storage yards) will be kept weed free. Inspection will be conducted on a regular basis to confirm weeds are not present. Weeds at off-ROW areas will be treated in the same manner as ROW locations.

3.2 Treatment Methods

Noxious weed control measures will be implemented in accordance with existing regulations and jurisdictional land management agencies or landowner agreements. Treatment methods will be based on species-specific and area-specific conditions (e.g., proximity to water, wetlands, riparian areas, or agricultural areas) and time of year. Most noxious weeds identified along the ROW may be treated by herbicide application. Mechanical methods of weed control including mowing, discing, and hand pulling of small, localized and/or isolated infestations of noxious weeds. Mechanical methods may be selected in lieu of herbicide treatment for select locations. Discing will not be applied in native habitat areas.

3.3 USFS-Specific Requirements

The United States Forest Service (USFS) has specific requirements for noxious weed control on USFS managed land. Guidelines provided by the USFS as they pertain to the BakkenLink project are included in Appendix D. These guidelines include:

- USFS Stipulations for Herbicide
- Approved Herbicides for Oil and Gas Used on the Little Missouri National Grasslands
- Noxious Weed Seed Viability Quick Reference Chart
- Pesticide Use Proposal (Form FS-2100-2)
- Pesticide Use Proposal Attachment A, Supplemental Information (DPG-2100-2A)
- Pesticide Application Records/Year End Report

The location of noxious weeds within the pipeline ROW will be reported to the managing USFS field office. The appropriate weed control procedures, including target species, timing of control, method of control, and obtaining the appropriate authorizations will be determined in consultation with USFS personnel.

3.3 Reclamation Methods

Reclamation specific BMPs include:

- Revegetate disturbed areas as soon as possible. Revegetation includes topsoil replacement, planting, seeding, fertilizing, and weed-free mulching as necessary.
- Seeding will be conducted on disturbed areas that have reached final grade or that will remain undisturbed for 30 days.
- Use seed and other plant materials that have been certified as weed free. Seed mixes shall conform to the managing land agency specification(s).
- Use native materials where appropriate and feasible.
- Treat weeds adjacent to newly seeded areas prior to planting and treat planted areas for weeds in the first growing season.

Monitoring will be conducted to assess ROW stability, revegetation progress, and percentage of vegetative cover. Monitoring will assess whether applied treatment methods are effective in controlling weeds and make recommendations for further treatment.

3.4 Post-reclamation Methods

Post-reclamation specific BMPs include:

- Re-vegetate or otherwise prevent the establishment of weeds in the Project ROW and documenting all ground-disturbing operations in noxious weed infested areas.
- Herbicide applications to noxious weed infestation areas after grass species are established.
- Treatment methods other than herbicide application, such as mowing and biological methods, will be considered during the post-reclamation process.

Following pipeline construction, on any construction ROW over which BakkenLink will retain control over the surface use of the land after construction (i.e., valve sites, metering stations, pump stations, etc.), BakkenLink shall provide for weed control to limit the potential for the spread of weeds onto adjacent lands. Any weed control spraying performed by BakkenLink shall be done by a state-licensed pesticide applicator.

3.5 ANS Provisions

Any equipment, including recreational, to be used in water must follow precautions to avoid the introduction of ANS. The Contractor shall implement the provisions of the North Dakota ANS Management Plan (Appendix B). The provisions include, but are not limited to:

- Remove all plants, animals, or fragments of plant or animals.
- Drain all water from motors, pumps, bilges, or other containers. If the equipment has been drained for less than seven (7) days prior to arrival on site, a chemical or hot water treatment sufficient to kill ANS organisms shall be utilized.
- Visually inspect to detect any presence of ANS.
- Equipment to be cleaned and inspected includes transporting trailers and trucks.

4.0 Herbicide Application, Handling, Spills, and Cleanup

4.1 Herbicide Application and Handling

Herbicide treatment of selected areas along the ROW will be carried out where noxious weed species are problematic and form a significant portion of the vegetation community in comparison to adjacent areas. In areas where the occurrence of noxious weeds adjacent to the ROW makes eradication impossible, no herbicide treatment will be applied; however, other weed control methods will be employed.

Only herbicides approved for use within treated lands will be used (permitted by the relevant land management agency). The selected herbicide and application method will be adapted to target only noxious weeds and therefore preserve and retain native plants. If weeds are found near sensitive sites, proper buffers will be used to prevent the spread of herbicides to these areas. The Contractor shall not use herbicides in or within 100 feet of a wetland or waterbody, unless the herbicide is approved for such application. No treatments will occur without prior coordination with and approval of the land managing agency and landowner.

All herbicide applicators will be licensed in the State of North Dakota. Application of herbicides will be suspended during any of the following conditions:

- Wind velocity exceeds ten miles per hour (mph) during application of liquids or 15 mph during application of granular herbicides;
- Snow or ice covers the foliage of noxious weeds; or
- During precipitation events or when precipitation is expected within 24 hours.

Herbicides will be applied using vehicle mounted sprayers (e.g., handgun, boom, and broadjet nozzle injector) mainly in open areas that are readily accessible by vehicle. Hand application methods (e.g. backpack sprayer) that target individual plants will be used to treat small or scattered weed populations in rough terrain. Calibration checks of equipment will be conducted at the beginning of spraying and periodically during that use to ensure that proper application rates are achieved.

Herbicides will be transported to the Project site daily with the following provisions:

- Only the quantity needed for that day's work will be transported;
- All herbicides will be transported in the original container, in a manner that prevents tipping or spilling, and in a compartment isolated from food, clothing, and safety equipment;
- Mixing will be done at equipment/storage yards and at a distance greater than 200 feet from open or flowing water, wetlands, or other sensitive areas. No herbicide will be applied at these areas unless authorized by appropriate regulatory agencies; and
- All herbicide equipment and containers will be inspected for leaks daily.

4.2 Herbicide Spills and Cleanup

All reasonable precautions will be taken to avoid herbicide spills. In the event of a spill, cleanup will be immediate. Contractors will follow the provisions in the Spill Prevention Containment and Countermeasure (SPCC) Plan developed for this Project. Contractors will keep spill kits in their

vehicles and in herbicide storage areas to allow for quick and effective response to spills. Items to keep in the spill kit(s) are:

- Protective clothing and gloves;
- A minimum of 20 pounds of suitable commercial adsorbent and barrier materials;
- Plastic bags and bucket:
- Shovel;
- Fiber brush and screw-in handle;
- Dust Pan;
- Caution tape; and
- Detergent.

Response to an herbicide spill will vary depending on the material spilled and the size and location of the spill. The order of priorities after discovering a spill are to protect the safety of personnel and the public, minimize damage to the environment, and conduct cleanup and remediation activities.

4.3 Spill Reporting

All personnel applying herbicides will have readily available copies of the appropriate material safety data sheets (MSDS) and the herbicide label(s) for the herbicides being used. All herbicide spills will be reported in accordance with applicable laws and requirements. Further information regarding spill response and reporting can be found in the SPCC Plan.

5.0 Monitoring

Monitoring of noxious weeds will be conducted as part of on-going O&M inspections. BakkenLink will maintain ongoing communication with individual landowners, counties, and land management agencies regarding noxious weeds. These parties will also be supplied with BakkenLink contact information to report noxious weeds along the ROW. BakkenLink will maintain operations personnel trained in the identification of noxious weeds, who will contribute to monitoring reports by documenting noxious weeds observed during the normal course of O&M.

Monitoring will continue for a period of three (3) years after any ground disturbance takes place. Monitoring will be conducted on an annual basis, or as needed following a report of an infestation. Known infestation sites will be monitored on an ongoing basis or until noxious weeds at the site are controlled. BakkenLink shall be responsible for reimbursing all reasonable costs incurred by owners of land adjacent to aboveground facilities when the landowners must control weeds on their land that can be reasonably determined to have spread from land occupied by BakkenLink's aboveground facilities.

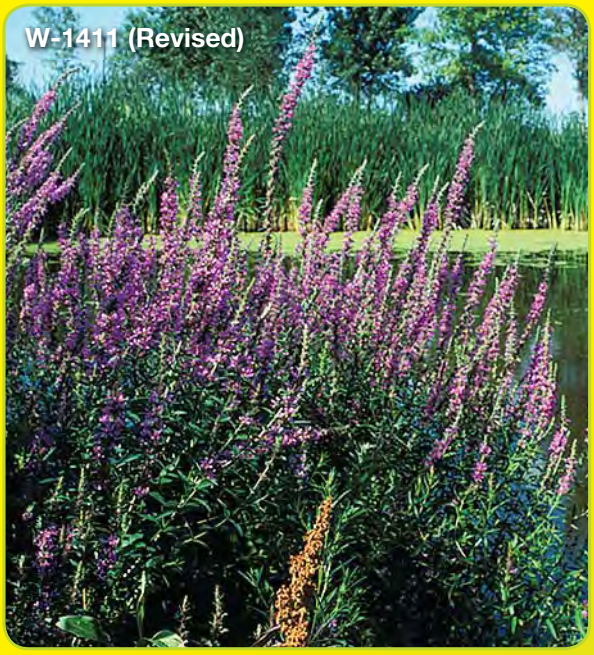
Monitoring records will:

- Identify and evaluate noxious weed conditions in the first and second growing seasons following construction, with particular attention given to any infestations occurring in previously unaffected areas;
- Identify and evaluate locations where additional remedial action or treatment may be required and recommended treatment actions; and
- Record noxious weed control treatments carried out in the reporting period.

Appendix A

Identification and Control of Invasive and Troublesome Weeds in North Dakota

W-1411 (Revised)



Identification and Control of INVASIVE AND TROUBLESOME WEEDS in North Dakota

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This publication was made possible by collaboration of the authors, the North Dakota State University Extension Service and the North Dakota Department of Agriculture, with funding from the U.S. Forest Service for printing. This publication is intended to help land managers properly identify and control noxious and invasive weeds found in the state. The current list of 11 noxious weeds are included, as well as species listed by various counties as noxious. Other species included are either invasive weeds found in bordering states with the potential to move into North Dakota or are commonly misidentified native species that do not require control efforts, such as the native thistles.

Control recommendations are current at publication, but options change rapidly. Before beginning any management program, please consult with your local county Extension agent and/or weed officer for the latest chemical, cultural and biological control recommendations. Chemical control recommendations are updated annually and printed in the "North Dakota Weed Control Guide," Extension publication W-253, and are updated more frequently on the Web at www.ndsu.edu/weeds.

For the latest in biological control options, contact the North Dakota Department of Agriculture and/or the local staff of the U.S Department of Agriculture - Animal and Plant Health Inspection Service in Bismarck.

Photo credits

All photos in the publication are by Rodney G. Lym, North Dakota State University, except as noted below.

Page 8. Black henbane plant, rosette and pineapple-shaped fruit courtesy of Weeds of the West, Tom Whitson, editor.

Flower photograph courtesy of Washington State Noxious Weed Control Board.

Page 10. Photos from Richard Old, XID Services Inc.

Page 14. Common tansy photos courtesy of Celestine Duncan, Weed Management Services, Helena, Mont.

Page 18. Downy brome infestation photo courtesy of Leslie J. Mehrhoff, IPANE.

Panicle photograph courtesy of J.C. Schou, Biopix.dk

Ligule photograph from Virginia Tech Weed Guide.

Page 22. Halogeton photos courtesy of Blake Schaan, North Dakota Department of Agriculture, Bismarck, N.D.

Page. 24. Hoary cress photos from Richard Old, XID Services Inc.

Page 28. Russian knapweed bracts courtesy of Steve Dewey, Utah State University.

Page 30. Spotted and diffuse knapweed bracts courtesy of Steve Dewey, Utah State University.

Page 32. Kochia seedling courtesy of Richard Zollinger, North Dakota State University.

Pages 34 and 36. Insect photos from Biological Control of Leafy Spurge CD, USDA-APHIS and USDA-ARS, TEAM Leafy Spurge's IPM information series No. 1.

Page 50. Marsh sowthistle flower photo from Richard Old, XID Services Inc.

Page 52. St. Johnswort photo courtesy of Corie Lund, Selfridge, N.D.

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Pages 70 and 71. Toadflax photos courtesy of Steve Dewey, Utah State University.

WEEDS

ABSINTH WORMWOOD

(*Artemisia absinthium* L.)

ABSINTH WORMWOOD

State Noxious Weed List: **Yes.**

Absinth wormwood is a member of the sagebrush family, which is easily recognized by the strong sage odor. The plant also is known as American or common wormwood, mugwort or madderwort, and wormwood sage. Unlike other plants in the sagebrush family, absinth wormwood dies back to the root crown each winter, with new shoots emerging each spring. Absinth wormwood is grown in herb gardens for the sage flavor of the leaves. The young flower heads are the source of aromatic oil used to prepare vermouth and absinth. The oil of absinth wormwood is also an active ingredient in antiseptic liniments.

Identification and growth form:

Absinth wormwood is a perennial fragrant forb or herb. The plant commonly grows 3 to 5 feet tall at maturity. Absinth wormwood is woody at the base and regrows from the soil level each spring from a large taproot. Leaves are light to olive green, 2 to 5 inches long and divided two or three times into deeply lobed leaflets. Leaves and stems are covered with fine, silky hairs that give the plant a grayish appearance. Flower stalks appear at each upper leaf node and produce numerous yellow flower heads 1/8 inch in diameter, which appear from late July through mid-August in North Dakota. Each fruit contains one seed, which is less than 1/16 inch long, smooth, flattened and light gray-brown. These small seeds are scattered easily by wind, water and animals, and in hay. Absinth wormwood is a prolific seed producer but also can spread by short roots. The plant is most often found on dry soils, in overgrazed pasture and rangeland, wastelands and roadsides.

Why is this plant a concern?

Absinth wormwood causes economic losses by reducing available forage, tainting the milk of cattle that graze it, and medically as a pollen source for allergies and asthma. Absinth wormwood can reduce forage production severely in pasture and rangeland and is especially troublesome when land is overgrazed. Allergy sufferers should avoid walking through absinth wormwood infestations when the plant is flowering in late July and August.

How do I control this plant?

Chemical. A variety of auxin-type herbicides, including products that contain clopyralid (Stinger, Transline or Curtail), dicamba (various), Milestone (aminopyralid), 2,4-D, Tordon (picloram) and glyphosate (various), will control absinth wormwood. These herbicides should be applied when the plant is at least 12 inches tall and actively growing. Herbicides applied too early in the growing season generally result in poor control. Herbicides applied from late June until mid-August have given better residual control the following growing season than either spring or fall treatments. If a fall treatment is desired, the plants should be mowed in early to midsummer to promote active regrowth and to improve herbicide coverage.

Cultural. Livestock generally will not graze absinth wormwood except in early spring. Mowing and cultivation do not control this weed.

Biological. No biological control agents or pathogens are available for this weed.

BABY'S BREATH

(*Gypsophila paniculata* L.)

BABY'S BREATH

State Noxious Weed List: **No.**

Baby's breath is an ornamental plant of Eurasian origin introduced to the U.S. in the 1800s. The plant is a member of the Pinks or Carnation family and is used by the floral industry as a filler in bouquets. The plant escaped cultivation and now infests pasture and rangeland in several areas of the West.

Identification and growth form:

Baby's breath is a perennial with widely branching stems. The plant often grows to 3 feet tall and is easily identified by the presence of many small white flowers. The leaves occur in pairs of up to 4 inches long and end with a point. The number of leaves decreases with increasing plant height and during flowering. The flowers are small, about 1/8 inch, and generally white and five lobed, often with a purple midstripe. Flowering occurs from late June to late August in North Dakota.

Seeds are black, with two to five contained in capsules, and resemble pepper. The seeds can germinate in 10 to 15 days and plants grow rapidly. Each plant can produce 10,000 or more seeds, which are spread when the branches dry, break off and are moved in the wind similar to Russian thistle and kochia. The plant has a large, deep taproot that allows it to grow well in dry and poor soil conditions.

Why is this plant a concern?

Baby's breath forms dense stands and displaces desirable grasses and forbs. Because of the large taproot and the ability to produce millions of seeds in a small area, this plant is difficult to remove once it has established in an area. Baby's breath has been listed as a noxious weed in several Western states.

How do I control this plant?

Chemical. Baby's breath can be controlled with herbicides that contain metsulfuron (Escort or Ally) applied during the bolt to preflower growth stage.

Cultural. Hand-pulling this weed is not practical because of the large taproot. Baby's breath has not become a problem in cropland that is cultivated.

Biological. No biological control agents or pathogens are available for this weed.

BLACK HENBANE

(*Hyoscyamus niger* L.)

BLACK HENBANE

State Noxious Weed List: **No.**

Black henbane is native to Europe and was cultivated as a medicinal and ornamental plant. In 1670, the plant escaped cultivation in the United States and became sparingly naturalized by 1859. Black henbane has since spread throughout much of the United States, particularly in the Northeast, Midwest and the Rocky Mountains. Two alkaloids in black henbane tissues (hyoscyamine and scopolamine) are useful sedative or anti-spasmodic drugs when used under controlled conditions.

Identification and growth form:

Black henbane is an annual or biennial plant that can range in height from 1 to 3 feet. Rosette leaves are alternate and have petioles almost as long as the leaf blades. Stems of mature plants are erect, leafy, thick, coarse and widely branched. Leaves are alternate, oblong to ovate, coarsely toothed to shallowly lobed and grayish green. The foliage is covered with fine, sticky hairs and has a foul odor. Flowers are funnel-shaped, five-lobed, brownish yellow with dark purple veins, and arranged in long, leafy, spikelike clusters. Fruit of the plant is pineapple shaped, approximately 1 inch long, and contains hundreds of tiny, black seeds.

Seeds germinate and develop a rosette with a large, whitish branched taproot the first growing season. During the second growing season, the plant bolts and flowers from June to August. The plant produces hundreds of seeds from July to October that can remain viable for five years or more.

Why is this plant a concern?

Black henbane contains alkaloids (hyoscyamine, hyoscine or scopolamine, and atropine) that have caused occasional livestock poisoning. The plant is not usually grazed by animals unless more palatable forage is unavailable. All parts of the plant, including the seeds, contain the alkaloids that can be toxic to humans and animals if eaten. Even just smelling the flowers can cause headaches and nausea in some people.

How do I control this plant?

Chemical. Herbicides recommended for black henbane control include 2,4-D, dicamba (various), Tordon (picloram) and glyphosate. Herbicides should be applied prior to flowering to prevent seed production.

Mechanical. Hand pulling, cutting or digging small infestations of black henbane can be effective. Wear gloves and protective clothing when handling these plants. Disking or plowing should be repeated annually because seeds can persist in the soil for an extended period of time.

Biological. No biological control agents or pathogens are available for this weed.

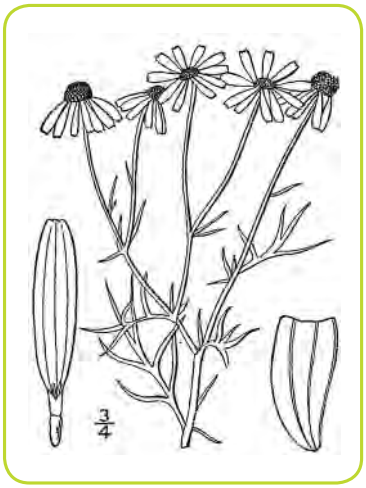
FALSE and SCENTLESS CHAMOMILE

(*Matricaria chamomilla* L. and *Matricaria maritima* L.)

State Noxious Weed List: **No.**

False chamomile (*Matricaria chamomilla* L.) and scentless chamomile (*M. maritima* L.) are members of the aster family and have flowers that resemble the common daisy. Some taxonomists place these plants in the genius *Anthemis*. Both plants are native to Eurasia, are considered naturalized in the northern Great Plains and are common in the region. The most obvious difference between the two species is the pleasant aroma of false chamomile, while, as the name implies, scentless chamomile has very little odor when crushed.

False chamomile



False chamomile
(from NRCS plants database)

Scentless chamomile
(from NRCS plants database)

Scentless chamomile

FALSE and SCENTLESS CHAMOMILE

False chamomile has been used for medicinal purposes for hundreds of years and most often is consumed today as chamomile tea, which reportedly has relaxation benefits. As with many homeopathic medicines, chamomile is credited with curing a variety of aches and illnesses, including soothing and calming of nerves, reducing inflammation and aching muscles, and reducing hay fever, asthma and morning sickness. Today chamomile commonly is found in air fresheners, cosmetics, insect repellents and potpourri.

Identification and growth form:

Both chamomile species are annual herbs and have white daisylike flowers. False chamomile blooms from May through August, and scentless chamomile blooms somewhat later from June through September. Plants grow 6 to 18 inches tall and commonly are found in wet sites, road ditches, old gardens and weedy (waste) areas. Scentless chamomile flowers tend to be larger (1 to 1.5 inches across) than false chamomile (0.5 to 1 inch across). Seeds are approximately 2 millimeters long, dark brown, with three ribs on one side and a broad brown central area on the other. Both plants have very finely divided leaves from 0.75 to 2.3 inches long, but scentless chamomile generally has more leaves and appears more bushy than false chamomile.

Why is this plant a concern?

False chamomile was a candidate for the North Dakota state noxious weed list in the late 1970s and early 1980s because the weed was spreading fast in cropland, especially in the north-central region of the state. Many farmers were concerned because false chamomile was tolerant to all herbicides then available for use in crops. However, with the introduction of Glean (chlorsulfuron), landowners had an effective herbicide for false chamomile control. This plant is listed on several county noxious weed lists. Spring and fall-emerging plants can reduce wheat yields by 20 percent to 60 percent if left unattended. In addition, scentless chamomile has poor nutrition value and is not palatable to livestock.

Several other members of the "daisy" family, including pineapple-weed [*Matricaria matricarioides* (Less.) Porter], oxeye daisy (*Chrysanthemum leucanthemum* L.) and dog fennel or mayweed chamomile (*Anthemis cotula* L.), also can become weedy. Of these species, oxeye daisy has been the most invasive and is included on several state and provincial noxious weed lists.

How do I control these plants?

Chemical. Today, chamomile species can be controlled easily with any sulfonylurea herbicide such as Ally, Cimarron or Escort (metsulfuron) and Telar (chlorsulfuron). Bromoxynil plus MCPA and Tordon (picloram) also provide good chamomile control.

Mechanical. Hand-pulling can be an effective control method in small infestations of chamomile. Mowing early in the growing season or before plants flower will reduce populations but should be repeated often. Shallow tillage is recommended during hot, dry weather.

Biological. Several biological control agents have been researched for scentless chamomile control. The seed-head weevil, *Omphalaplon hookeri,* feeds on developing seeds of the plant, thereby reducing seed production. The stem-boring weevil, *Microplontus edentulous,* feeds on the interior of the stem and produces hollow areas that reduce the vigor of the plant. *Rhopalomyia tripleurospermii,* the scentless chamomile gall midge, forms a gall on the plant, which acts as a nutrient sink that can interrupt and stunt the growth of the plant. Research still is being conducted on these biocontrol agents to predict effectiveness in reducing plant population.

COMMON BURDOCK

[*Arctium minus* (Hill) Bernh.]

COMMON BURDOCK

State Noxious Weed List: **No.**

Common burdock, also referred to as wild rhubarb, is a member of the Asteraceae or sunflower family. Common burdock is native to Europe and now is established throughout much of North America. A tea once was made from the roots to treat gout and rheumatism. The plant is able to spread to new areas by seeds that are found within burs of the plant that cling to hair, fur or clothing of passing animals or people.

Identification and growth form:

Common burdock often is found growing along roadsides and ditch banks and in pastures and waste areas. Burdock is a taprooted biennial that reproduces only by seed. In the first year of growth, the plant forms a rosette of large, heart-shaped, thickly hairy leaves similar to rhubarb. Burdock plants bolt in the second year of growth and grow 3 to 10 feet tall. Leaves of the plant are alternate and large with the broadest leaves located at the base. Leaves are dark green above and whitish green and woolly-hairy beneath with margins that are toothed or wavy. Flowers of the plant are pink, lavender, purple or white and 0.75 inch across. Numerous flower heads present are borne in leaf axils or at the end of branches. The heads are enclosed in a prickly bur that is composed of numerous smooth or woolly bracts that are tipped with hooked spines.

The head, or bur, of the flower breaks off and scatters the seeds. Achenes are gray to brown, mottled, oblong, about 0.25 inch long, flattened and slightly curved. Flowering and seed production occur from July to September. One plant is capable of producing 15,000 to 60,000 seeds.

Why is this plant a concern?

The plant is a host to powdery mildew and root rot that can spread to economically important plants. Burs of common burdock can become entangled in the wool of sheep and significantly damage the quality. Burs also can become entangled in the hair of livestock, allowing seeds to be distributed to new areas. The burs can cause eye disease, mouth sores and skin infections. In addition, milk products may become tainted if the plant is grazed in large quantities.

Common burdock has been used as a medicinal herb; however, the plant has been listed as a poisonous plant due to its diuretic effects. The bristles of the plant also may cause localized allergic reactions for some individuals.

How do I control this plant?

Chemical. Burdock is controlled easily by herbicides such as 2,4-D, dicamba (various) and Escort (metsulfuron). However, the plant usually grows in areas difficult to reach with spray equipment. Herbicides are most effective when applied in the first year during the rosette growth stage of the plant.

Cultural. Hand-pulling or digging can be an effective control method for small infestations if conducted prior to seed production. The plant will not survive in areas that are tilled. Mowing or cutting can eliminate seed production if conducted after the plant has bolted but prior to flowering.

Biological. The burdock moth *Metzneria lappella* Zeller provides some control of seed production. The larvae feed on burdock seed but damage varies greatly from year to year since the number of healthy larvae per bur ranges widely. The adults emerge in late June to early July and have pale brown wings approximately 0.5 inch across.

COMMON TANSY

(*Tanacetum vulgare* L.)

COMMON TANSY

State Noxious Weed List: **No.**

Common tansy, also referred to as garden tansy, golden buttons and bitter buttons, is a member of the Asteraceae or sunflower family. Common tansy is native to Europe and first was introduced to the United States as early as the 1600s as an ornamental plant and for medicinal purposes. The plant contains alkaloids that can be toxic to humans and livestock if consumed in large quantities. However, animals rarely ingest common tansy due to the strong smell of the plant. Illnesses in humans have been reported after hand pulling, suggesting toxins may be absorbed through unprotected skin. Common tansy still is used in some medicines and is listed in the United States Pharmacopoeia as a treatment for colds and fever.

Identification and growth form:

Common tansy is an aromatic perennial forb or herb that commonly grows from 1.5 to 6 feet tall. The plant reproduces both by seed and creeping rootstocks. Roots of the plant are fibrous and produce rhizomes. Stems of the plant are purplish-red. Leaves are alternate, smooth to slightly pubescent, 2 to 10 inches long and 1.5 to 3 inches wide, and deeply divided into numerous narrow, toothed segments that appear fernlike. Glandular dots on the leaves of the plant produce the strong, unique odor of the plant. Flowers of the plant are yellow, 0.25 to 0.5 inch across and buttonlike in flat-topped, dense clusters. Each head is composed of mainly yellow disk flowers that are arranged at the stem top in a flat-top cluster in which the outer flowers bloom first. Flowering typically occurs from July to September. Flower heads turn brown and maintain their shape at seed set. Seeds are yellowish brown with short five-toothed crowns.

Common tansy sometimes is confused with tansy ragwort (*Senecio jacobaea* L.). However, tansy ragwort is nonaromatic, has ray flowers and does not have the sharp, toothed leaves found on common tansy.

Why is this plant a concern?

Common tansy is an aggressive plant that can form dense vegetative colonies on disturbed sites and generally is found on roadsides, fence rows, pastures, vacant lands, stream bank, and waste areas. Disturbances can promote the colonization and spread of the plant. Common tansy reduces overall pasture productivity because the plant displaces desirable grasses and forbs and animals are reluctant to graze it. In addition, unpleasant tasting milk may result when dairy cattle graze the leaves of common tansy. Wildlife habitat also is affected negatively by the plant.

How do I control this plant?

Chemical. Herbicides for common tansy control include Escort (metsulfuron) and Telar (chlorsulfuron). Chaparral (aminopyralid plus metsulfuron) works well when infestations of common tansy also include thistle species. Herbicides may be most effective when applied in the spring during early bud development.

Cultural. Hand-pulling or digging may provide control for small infestations of common tansy if the entire root system is removed. However, gloves and protective clothing should be worn to prevent absorption of toxins through the skin. Mowing can reduce seed production if conducted during the bud stage; however, plants are able to regrow from rootstock.

Biological. No biological agents or pathogens are available for this weed.

DAME'S ROCKET

(*Hesperis matronalis* L.)

Fall rosette

DAME'S ROCKET

State Noxious Weed List: **No.**

Dame's rocket is an escaped ornamental from Eurasia and most often found along roads, streams, near woods and in thickets. The first introductions to North America began in the 1660s and the plant is now considered naturalized. However, infestations have been increasing rapidly in the north-central states.

Identification and growth form:

Dame's rocket is a biennial or occasionally short-term perennial herb in the mustard family. The plant resembles phlox, but has four petals, not five. The plant grows 2 to 4 feet tall; the stems are erect and often branched. Leaves are alternate, lanceolate, sharply toothed and pubescent. Dame's rocket flowers are found from early May through June, fragrant and generally purple but occasionally pink or white. Seeds are produced in long pods typical of the mustard family. Dame's rocket overwinters as a rosette.

Why is this plant a concern?

Even though this common garden flower has been in the U.S. since colonial times, it is now becoming invasive in many areas of the north-central Plains, especially in woody areas. Dame's rocket is in the same family as garlic mustard, an invasive plant that has invaded woody areas and forests in neighboring states such as Minnesota and Wisconsin. Dame's rocket aggressively competes with native species and has been listed as a noxious weed by the USDA.

How do I control this plant?

Chemical. Herbicides used for mustard control in cropland such as MCPA and 2,4-D will kill Dame's rocket and can be used in wooded areas as long as the herbicide is not applied to the tree bark. Typical pasture and rangeland weed control herbicides such as Tordon, dicamba and Transline will not control Dame's rocket.

Cultural. Hand-pulling or digging Dame's rocket is an effective control measure. Seeds remain in the soil for several years, so sites should be revisited each year to keep the plant from reestablishing.

Biological. No biological control agents or pathogens are available for this weed.

DOWNY BROME

(*Bromus tectorum* L.)

DOWNY BROME

State Noxious Weed List: **No.**

Downy brome is native to the Mediterranean region and is thought to have been introduced first near Denver, Colo., as a contaminant in packing material. The plant now is distributed widely throughout North America. Downy brome often is found as a contaminant in grass and crop seed and is difficult to separate from the desirable species.

Identification and growth form:

Downy brome is an annual or winter annual grass that can range in height from 4 to 30 inches. Seedlings are bright green with conspicuously hairy leaves. Stems are erect, slender and glabrous or slightly hairy. Foliage and seed heads of mature plants often change color from green to purple to brown or tan as the plant dries. A single downy brome plant can be comprised of one or two tillers or as many as 20 tillers. Inflorescence is dense, slender, usually drooping, one-sided, and 2 to 6 inches in length. Spikelets are nodding, slender and up to 0.75 inch long. Plants have five to eight florets per spikelet. Long, straight awns are attached to florets that are 3/8 to 5/8 inch long and are usually purple at maturity.

Seedlings germinate in the fall or winter at very high rates as soon as moisture conditions are favorable. Downy brome grows rapidly until late fall when the soil freezes, although above-ground growth may continue during warm or rainy conditions. The root system often will continue to develop throughout the winter. In the spring, the plant develops rapidly and produces heads in late April to early May, flowers within a week and produces seed by mid to late June. Downy brome is a prolific seed producer with production ranging from 25 to 5,000 seeds per plant.

Why is this plant a concern?

Downy brome can thrive in a variety of habitats and the plant quickly displaces desirable plant communities and lowers plant diversity. Downy brome can be a ready fuel source for fires because the plant grows in high densities and dries down very early in the season. Downy brome is palatable to livestock but only for a brief period during the spring and early summer. The seeds have long awns that may cause sores in the mouth and eyes of livestock that graze it and reduce wool values when it attaches to sheep as they walk through an infested area. Downy brome can become especially weedy in winter wheat.

How do I control this plant?

Chemical. Several herbicides, including Everest (flucarbazone), Olympus (propoxycarbazone) and Beyond (imazamox), are labeled for downy brome control in cropland. Plateau (imazapic) applied in the fall will control downy brome in pasture and rangeland.

Mechanical. Hand-pulling small infestations may eliminate current seed production. Disking is often ineffective, unless tilled 4 to 6 inches deep in order to bury seeds and prevent germination. Mowing may reduce plant production but seeds already may be viable and plants may regenerate new culms if conducted during the early growth stage.

Biological. No biological control agents or pathogens are available for this weed.

FIELD BINDWEED

(*Convolvulus arvensis* L.)

State Noxious Weed List: **No.**

Field bindweed (creeping jenny) is a member of the morning glory family and is well-adapted to the North Dakota climate and environment. Field bindweed is a native of Europe and western Asia and was introduced to this country during colonial days when it was referred to as devilgut. Field bindweed primarily is a problem in the dryland farming areas of the Great Plains and Western states. Field bindweed is found in both cropland and pasture and rangeland in North Dakota.

Identification and growth form:

Field bindweed is a long-lived perennial that produces a dense ground cover. The twining stems vary from 1.5 to 6 feet or more in length. Leaf size and shape are variable, but generally the leaves are 1 to 2 inches long, smooth and shaped like an arrowhead. Flowers are funnel-shaped, about 1 inch diameter and white or pink. The flower stalk has two small bracts located 0.5 to 2 inches below the flower. The bracts, along with leaf shape and smaller flower size, distinguish field bindweed from hedge bindweed.

Field bindweed also may be confused with wild buckwheat because of similarities in leaf shape and vining habit. However, wild buckwheat is an annual rather than a perennial and has a very small (about 1/8 inch diameter) greenish-white flower.

Roots of established plants may extend 20 to 30 feet laterally and be excavated as deep as 30 feet below the surface. Buds along the root system can send up shoots that start new plants. The root system contains a large quantity of carbohydrates that provide energy for both above- and below-ground plant growth. Buds located all along the root can send up new shoots or establish a new patch when roots are cut and moved, such as from cultivation.

Seeds of field bindweed vary from dark to brownish gray and are about 1/8 inch long. The fruit is a small, round capsule that contains up to four hard-coated seeds that can remain viable for at least 50 years. Field bindweed produces numerous seed in growing seasons with high temperatures and low rainfall and humidity.

Field bindweed can be spread by seed, root fragments carried by farm implements, infested soil adhering to the roots of nursery stock, root growth from infested areas and by animals.

FIELD BINDWEED

Why is this plant a concern?

Field bindweed has a deep root system that competes with crop plants for water and nutrients. Vines climb on plants and shade crops, cause lodging of small grains and make harvesting difficult by clogging machinery. Dense field bindweed infestations may reduce crop yields by 50 percent to 60 percent. Land infested with field bindweed is reduced in value.

How do I control this plant?

Established field bindweed is difficult to control. An effective control program should prevent seed production, kill roots and root buds, and prevent infestation by seedlings. This plant is very persistent and a successful control program must be more persistent.

The best control of field bindweed is obtained with a combination of cultivation, selective herbicides, and competitive crops or forage grasses.

Chemical. Long-term control of field bindweed from herbicides depends on movement of a sufficient amount of herbicide through the root system to kill the roots and root buds. This requires use of systemic (movement throughout the plant) herbicides. Examples of herbicides that will reduce field bindweed infestations are products that contain dicamba (various), Paramount (quinclorac), Tordon (picloram) and glyphosate (various).

Successful control of field bindweed requires a long-term management program. A herbicide applied once never will eliminate established stands; rather, several re-treatments are required to control field bindweed and keep it suppressed. Because of long seed viability and tremendous food reserves stored in the roots, repeated chemical and/or mechanical control measures must be used.

Herbicides should be applied when field bindweed is growing actively and stems are at least 12 inches long. Herbicide performance can vary greatly due to environmental conditions in which the plants have been exposed. Plants growing under moisture or heat stress usually have smaller leaves with a thicker cuticle and slower biological processes than plants growing in more favorable conditions. As plant stress increases, herbicide uptake and translocation decreases, which in turn decreases herbicide performance. This is the reason why field bindweed is harder to control in the more semiarid area of central and western North Dakota than in the eastern region.

Cultural. Intensive cultivation controls newly emerged seedlings, may kill young field bindweed infestations and contributes to control of established stands. Timely cultivations deplete the root reserves of established plants and stimulate dormant seeds to germinate.

Intensive cultivation alone is not practical because crops cannot be grown during the tillage period, and repeated tillage exposes the soil to erosion. However, applying herbicides in combination with cultivation has been successful in reducing both field bindweed infestations and the number of tillage operations.

Biological. Two non-native insects have been released to control field bindweed with very minimal success. The bindweed gall mite *(Aceria malherbae)* is microscopic in size and feeding by nymphs causes galling of field bindweed stems. The larvae of the bindweed moth *(Tyta luctuosa)* feed at night on field bindweed flowers and leaves. Several native insects occasionally feed on this weed but damage to the plant has not been long-lived. No insect has been released to feed on field bindweed roots, which would be the most likely method of success in controlling this weed.

HALOGETON

[*Halogeton glomeratus* (M. Bieb.) C. A. Mey.]

HALOGETON

State Noxious Weed List: **No.**

Halogeton is a poisonous, noxious weed introduced from Eurasia and first was reported in Nevada in 1934. Since then it has spread to millions of acres in the western U.S., especially in range and wildlands. This plant often is found in alkaline soils and semiarid regions, particularly when the areas have been disturbed by overgrazing, off-road vehicles, new roads and similar disturbances. Halogeton was reported in North Dakota for the first time in 2009, but because of the size of the infestations, it likely has been in the state for some time.

Identification and growth form:

Halogeton is an annual weed in the goosefoot family and grows from a only a few inches to more than 24 inches tall, depending on location and moisture. Each plant has about five main stems that grow out and then up from the crown, branching out similarly to Russian thistle, which this plant resembles. The blue-green leaves are small and sausage-shaped, and have a short bristle or spine at the end. The flowers are found in the leaf axils, greenish and not showey. Even though the plant is an annual, the taproot can grow nearly 2 feet down and out from the crown. Mature plants have red stems. The brown-black seeds are contained in a bracted pouch that often are mistaken for flowers and give the plant a "wooly" appearance at maturity. Halogeton produces as many as 75 seeds per inch of stem and seeds are viable from one year (early season production) to more than 10 years (developed after mid-August).

Why is this plant a concern?

Halogeton contains soluble sodium oxalates that are poisonous to sheep and cattle. The plant is not palatable when green but may be consumed in toxic quantities in late summer, fall and winter. Dried plants may contain 30 to 40 percent sodium oxalate, and the lethal dose for an adult sheep is reached when the animal consumes 0.3 to 0.5 percent of total body weight in a short time. Cattle are not likely to eat enough to be poisoned unless feed is short. Sheep can develop a tolerance to halogeton through time and consume this weed without illness if foliage from other plants is also part of the diet.

How do I control this plant?

Chemical. 2,4-D will control plants if applied very early in the spring prior to flowering. Escort (metsulfuron) is very effective and can be applied throughout the growing season. Plateau (imazapic) also will control this weed and can be applied both pre- and post-emergence. Spike (tebuthiuron) provides total vegetation control for several years and may be desirable for use on railroad ballast and oil field locations, where halogeton often is found.

Cultural. Halogeton is an early invader of disturbed sites. Avoid overgrazing an area and reseed disturbed sites to native grasses and forbs to prevent halogeton from becoming established. Halogeton competes poorly with established perennial vegetation.

Biological. No biological control agents or pathogens are available for this weed.

HOARY CRESS

[*Cardaria draba* (L.) Desv.]

HOARY CRESS

State Noxious Weed List: **No.**

Hoary cress (also called whitetop) is native to the Balkan Peninsula, Armenia, Turkey, Israel, Syria, Iraq and Iran. The plant is widely introduced and naturalized throughout Europe and all other continents. Hoary cress first was introduced to the United States at Long Island, N.Y., in 1862 through a ship's ballast or contaminated seed.

Identification and growth form:

Hoary cress is a deep-rooted perennial forb that can grow up to 2 feet tall. Stems of the plant are erect, branching above, glabrous or slightly to densely pubescent below, and appear gray. Hoary cress has both basal and stem leaves. Basal leaves have scattered to dense pubescence, are irregularly toothed to entire and taper to a short stalk that attaches to the crown of the plant near the ground. Middle and upper stem leaves are sparsely pubescent, have two lobes clasping the stem and are grayish green. Flowers of the plant are white, four-petaled and borne on slender stalks. Seed capsules are shaped like an inverted heart and usually contain two seeds. The seeds are oval or round at one end, narrow to a blunt point at the other and reddish-brown.

Seedlings of hoary cress germinate in the fall and overwinter as rosettes. The perennial root system is established the following spring and consists of vertical and lateral roots. Both root types can produce adventitious buds that develop into rhizomes and new shoots. Plants flower from May to June and begin producing seeds by July. A single plant can produce between 1,200 and 4,800 seeds each year, with a single flowering stem capable of producing as many as 850 seeds. Seeds can remain viable in the soil for approximately three years.

Why is this plant a concern?

Hoary cress is an aggressive plant that can form dense monocultures on disturbed land. Disturbances such as grazing, cultivation and especially irrigation can promote the colonization and spread of the plant. Hoary cress can displace native plant species, thereby reducing biodiversity and forage production. Whitetop contains glucosinolates that can be toxic to cattle but livestock only graze hoary cress in the spring if more palatable forage is not available.

How do I control this plant?

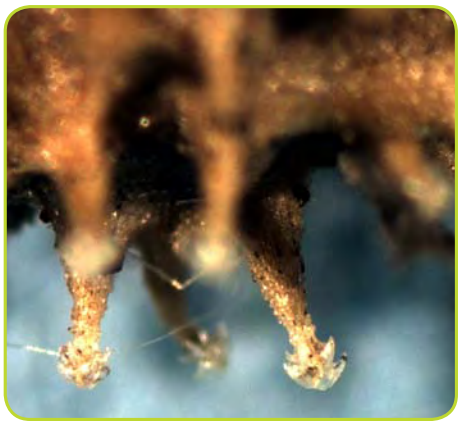
Chemical. Hoary cress is in the mustard family so herbicides commonly used to control mustards generally work well on this weed. Escort or Ally (metsulfuron), Oust or Telar (chlorsulfuron), MCPA and 2,4-D have been used to control the plant. However, timing of herbicide application is important and should be done in early spring or in the fall after seed germination.

Mechanical. Digging can provide control for small infestations of hoary cress if the entire root system is removed. Hand-pulling generally is not effective because the root system may not be entirely removed. Cultivation is the major factor for the spread of the plant because root fragments that are left behind can produce new plants. Cultivation can eradicate plants if cultivations are repeated frequently throughout the growing season for a period of two to four years.

Biological. No biological control agents or pathogens are available for this weed.

HOUNDSTONGUE

(*Cynoglossum officinale* L.)



HOUNDSTONGUE

State Noxious Weed List: **No.**

Houndstongue is a biennial poisonous herb that is native to Eurasia. The plant is a member of the Borage family, which includes more commonly known plants such as Virginia Bluebells, Forget-Me-Nots and the fiddlenecks. Houndstongue commonly is found in disturbed areas, including roadsides, trails, and in pasture and woodlands following soil disturbance or overgrazing.

Identification and growth form:

Houndstongue is a biennial that forms a rosette the first year of growth and bolts and flowers the second season. The plant only reproduces from seed, but can spread great distances because the barbs on the nutlets cling to clothing, machinery and animals. The leaves are oblong, very pubescent and rough, which resembles a hound's tongue. Plants bolt during early summer, the second year of growth, to a height of 1 to 4 feet and flower in mid-June. The flowers are small, arranged in clusters and not showy. Flower color ranges from red to burgundy. Each flower produces three to four nutlets, which are flat and tear-drop shaped with a very hard seed coat and numerous barbs. Plants generally are found along trails and roadsides, on the edge of wooded areas and in disturbed habitats. Infestations often establish near areas where cattle and other livestock rub against something such as fence posts and trees or shrubs.

Why is this plant a concern?

Houndstongue tends to be a nuisance weed rather than a noxious plant unless infestations grow to become large patches. The nutlets often become imbedded in the wool or hair of livestock, which can cause a loss of value of the wool and/or increase costs to remove the burs. Eye damage can occur if burs become embedded in the eye or eyelids. The burs can be problematic for hikers, hunters and fishermen and also to their pets.

Houndstongue contains alkaloids that are especially toxic to cattle and horses. The plant is rarely eaten in the green state; however, animals will eat the dried plant in hay. Sheep are more resistant to the pyrrolizidine alkaloids than other livestock, while horses, especially when confined to small areas infested with houndstongue, are more likely to ingest toxic levels. Fatal liver disease in horses occurred following two weeks of feeding hay with as little as 6 percent houndstongue.

How do I control this plant?

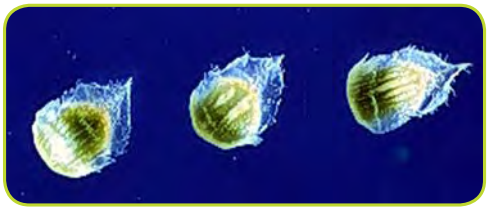
Prevention is the best method to keep houndstongue from invading North Dakota. Use only certified weed seed-free hay and eradicate new infestations before the plant can spread.

Chemical. Escort (metsulfuron) is very effective for controlling houndstongue and can be applied throughout the growing season. First-year houndstongue rosettes are easily controlled with 2,4-D applied from late May to mid-June. Second-year plants are much less susceptible to 2,4-D. Plateau (imazapic) at high rates will control houndstongue both pre- and post-emergence, but grass injury, especially to the cool season species is likely when Plateau is applied at the maximum rate.

Biological. A root weevil, *Mogulones cruciger,* has been released for control of houndstongue in Canada. The insect has become well-established in Alberta and has greatly reduced the houndstongue infestation in that province. However, this biological control agent has not been approved for release in the U.S. Several other insects are being evaluated for biological control of houndstongue, including a seed weevil *(M. borraginis),* a stem weevil *(M. trisignatus),* a root beetle *(Longitarsus quadriguttatus)* and a root fly *(Cheilosia pasquorum);* however, initial results are not nearly as promising as those of the root weevil.

RUSSIAN KNAPWEED

[*Acroptilon repens* (L.) DC.] syn. (*Centaurea repens* L.)



RUSSIAN KNAPWEED

State Noxious Weed List: **Yes.**

Russian knapweed is the most widespread of the knapweeds in North Dakota. It also is the only perennial of the noxious knapweeds and is the most difficult to control. Russian knapweed often is found in poorly drained and saline/alkaline soils with supplemental water sources such as rivers and streams. This persistent weed often is found in southwestern North Dakota, but increasingly infestations have been found statewide. Russian knapweed grows especially well in areas with supplemental water sources such as the Little Missouri and Heart rivers in North Dakota.

Identification and growth form:

Russian knapweed is a long-lived, deep-rooted perennial with growth characteristics similar to Canada thistle. The weed emerges in the spring from roots and grows to 2 to 3 feet tall and is shrublike with spreading branches. Once established, Russian knapweed spreads mainly by underground root stocks as seed production is limited compared with other knapweed species. The leaves are alternate and lobed lower on the plant while upper leaves are entire. Flowering occurs from June to September and flowers vary from light pink to lavender. The stems die back to the soil surface each year.

Two key characteristics distinguish Russian knapweed from spotted and diffuse knapweed. First, the flowers have rounded bracts with transparent tips that are quite different in appearance than the dark bracts of spotted and diffuse knapweed. Second, the root of this perennial is dark brown to black, scaly as if the plant had been burned, and can grow to depths of greater than 20 feet. The flowers of Russian knapweed vary from light pink to lavender.

Why is this plant a concern?

Russian knapweed can spread rapidly and is very competitive with native species. Russian knapweed will reduce forage production to near zero as the site often becomes a monoculture. Russian knapweed also will infest roadsides, pasture and rangeland and is the only knapweed in the state that causes significant losses in cropland.

How do I control this plant?

Russian knapweed is one of the most difficult perennial weeds to control. If the plant is found in cropland, then a combination of cultivation and herbicide treatments will suppress the plant. However, herbicides at labeled rates for cropland use will not control Russian knapweed.

Chemical. Tordon (picloram) is one of the most effective herbicides used for Russian knapweed control. The best control is obtained when picloram is applied following several hard frosts (mid-October). Russian knapweed plants may be dormant with gray stems and no leaves, but control the following spring is nearly 100 percent. Application in mid-September or during flowering in midsummer provides shorter-term control than late applications. Other herbicides used for Russian knapweed control include Escort (metsulfuron) and Milestone (aminopyralid).

Cultural. Livestock generally will not graze Russian knapweed. Mowing and cultivation do not control this weed.

Biological. Exploration and evaluation of biocontrol agents for Russian knapweed are in progress.

SPOTTED and DIFFUSE KNAPWEED

[*Centaurea stoebe* spp. *micranthos* (Gugler) Hyek] and (*C. diffusa* Lam.)

Diffuse knapweed flower with spiny bracts

Spotted and diffuse knapweed

Spotted knapweed flower with black bracts

SPOTTED and DIFFUSE KNAPWEED

State Noxious Weed List: **Yes.** (both species).

The knapweeds are one of the most rapidly spreading invasive species in the western U.S. Knapweeds already infest more acreage than leafy spurge in Montana and Minnesota, and have been found in more than 25 counties in North Dakota. Knapweeds are related to thistles and can spread even faster. For instance, spotted knapweed infested approximately 25 acres in eight North Dakota counties in 1984 and had spread to more than 1,000 acres in 14 counties by 1997. Aggressive control programs have kept the infestation at approximately 1,200 acres since then, but more than half the counties in the state now have spotted knapweed infestations. Diffuse knapweed can spread as quickly as spotted knapweed but has been kept in check in North Dakota and infests less than 300 acres.

Identification and growth form:

Both are short-lived perennials or sometimes biennial plants reproducing solely by seed. Seed remains viable in the soil five years or more, so infestations may occur a number of years after vegetative plants have been eliminated. The seeds can germinate from spring through early fall. Seedlings emerging in the fall often overwinter as a rosette of leaves, resuming growth again in the spring. The plants grow 2 to 4 feet tall with one or more stems. The leaves are pale green and 3 to 4 inches long. Rosette leaves are deeply lobed. The physical appearance of these two knapweed species is similar, except diffuse knapweed is generally shorter and more highly branched. Plants flower from early July through August and produce 1,000 or more seeds per plant.

These species are distinguished by the bracts below the flower. Spotted knapweed has stiff, black-tipped bracts while diffuse knapweed has a rigid terminal spine about one-third of an inch long with four to five pairs of shorter, lateral spines (crablike). If the plant is not flowering, search for last season's flower stalk and identify the plant based on the flower bracts. Both species have pink to light purple and occasionally white flowers.

Why is this plant a concern?

Spotted and diffuse knapweed are aggressive, introduced weed species that rapidly invade pasture, rangeland and fallow land and cause a serious decline in forage and crop production. Spotted knapweed has few natural enemies and is not preferred by livestock as forage. Knapweed infestations in North Dakota largely can be traced to seed or hay brought in from neighboring states. Researchers in Montana have observed that spotted knapweed may remain in a confined location for several years and then spread rapidly to adjacent areas. Controlling spotted and diffuse knapweed plants when they are first observed and monitoring the site for several years to prevent reinfestation from seed are important

How do I control these plants?

Chemical and Cultural. Spotted and diffuse knapweed confined to small, well-defined areas should be pulled by hand or treated with a herbicide as soon as detected to avoid spread of the weed. First, all visible knapweed plants should be removed and destroyed by burning or mulching. Then the areas should be treated with a herbicide to prevent reinfestation from seedlings. The most effective herbicides for spotted and diffuse knapweed control include Milestone (aminopyralid), Tordon (picloram) and dicamba (various). Treat an extra 10 to 15 feet around the knapweed patches to control seedlings. A careful follow-up program is necessary to control missed plants and seedlings. Many attempts to control knapweed have failed because follow-up treatments were not applied.

Biological. In general, the knapweed infestations are small enough that herbicide and hand removal are the best and most cost-effective treatments in North Dakota. Biological control agents have been introduced in neighboring states to control spotted knapweed with limited success.

KOCHIA

(*Kochia scoparia* L.)

KOCHIA

State Noxious Weed List: **No.**

Kochia, also referred to as fireweed, summer-cypress or Mexican firebush, is a member of the Chenopodiaceae or goosefoot family. Kochia is native to Eurasia and was introduced to the United States in the early 1900s as an ornamental. Kochia is palatable to livestock and has good forage quality when grazed early in the season. Kochia sometimes is referred to as tumbleweed.

Identification and growth:

Kochia is a taprooted annual forb that typically grows from 1 to 6 feet tall. Stems of the plant are erect and spreading, much branched from the base and usually soft-hairy, but occasionally smooth. Stems are usually yellowish-green to green and often turn red with maturity. Leaves of the plant are alternate, lance-shaped and 0.5 to 2 inches long and have fringed hairs on the margins. The upper surface of the leaf is usually smooth and the lower surface usually is covered with soft hairs. Kochia flowers are inconspicuous and greenish and form short, dense, terminal, bracted spikes. Flowering generally occurs from July to September.

Kochia reproduces only by seed with more than 14,000 seeds produced per plant. Seeds are oval or egg shaped, dull brown, slightly ribbed and dispersed in the fall when the plant becomes a tumbleweed. Seeds germinate in the spring and have little or no seedbank viability and either germinate or decay in one year.

Why is this plant a concern?

Although kochia has been grown as a drought-resistant forage and may have reclamation value on disturbed land, the plant is a serious cropland weed. Kochia is an exceptionally competitive weed and a few uncontrolled plants can cause severe yield losses. Kochia is highly adaptable and can be found on pasture, rangeland, road sides, ditch banks, wastelands and cultivated fields.

Kochia can contain high nitrate levels and is toxic if overgrazed. Nitrate poisoning in livestock causes bloat and photosensitization. Toxic substances identified within the plant include saponins, alkaloids, nitrates and oxalates. Kochia is a main contributor to fall hay fever sufferers.

How do I control this plant?

Chemical. Kochia has become resistant to several commonly used herbicides. ALS herbicides provide good kochia control unless resistant populations are present. Tank-mixing ALS herbicides with other broadleaf herbicides with differing modes of action is required to reduce the risk of resistant kochia becoming established. Starane (fluoxypyr) provides excellent control of ALS-, triazine- and dicamba-resistant kochia. Dicamba plus MCPA or bromoxynil plus MCPA will control small kochia plants. In many fields, 2,4-D and MCPA no longer control kochia due to repeated use and near eradication of susceptible kochia biotypes.

Mechanical. Early tillage in the spring provides good control when conducted during the seedling stage of the plant. Mowing kochia prior to flowering reduces seed production but may not kill the plant.

Biological. No biological agents or pathogens are available for this weed.

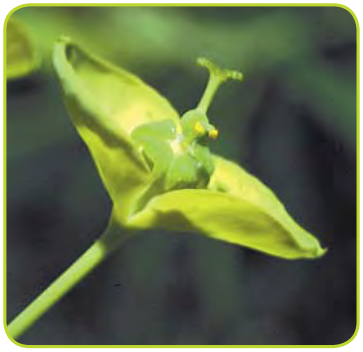
LEAFY SPURGE

(*Euphorbia esula* L.)

State Noxious Weed List: **Yes.**

Leafy spurge was once the most difficult noxious weed to control in North Dakota and infests all 53 counties. Scientists at the North Dakota Agricultural College (NDAC) recognized leafy spurge could be a problem soon after it was first identified in the state, growing along a Fargo street in 1909. However, the plant was not added to the state noxious weed list until 1935, when leafy spurge was found growing in all but 10 counties. The largest single infestation at that time was estimated to be 193 acres in Foster County.

Latex is found in all plant parts



True flower

Leafy spurge gall

Aphthona lacertosa

Aphthona nigriscutis

LEAFY SPURGE

Despite several control programs led by the State Agriculture Department and the Agriculture Extension Service, leafy spurge doubled in acreage every 10 years, reaching nearly 1.8 million acres in the 1980s. A coordinated integrated program of biological, chemical and cultural methods directly led to the first-ever reports of a decline in leafy spurge infestation in the state in the 1990s.

Identification and growth form:

Leafy spurge is a long-lived perennial that normally grows 2 to 3 feet tall from a woody crown from below the soil surface. Each crown area produces several upright stems, giving the plant a clumplike appearance. The plant bears numerous linear-shaped leaves with smooth margins. The leaves have a characteristic bluish-green color but turn yellow or reddish orange in the fall. Stems originating from crown buds and roots begin growth in late April, making leafy spurge one of the first plants to emerge in the spring. The early and rapid growth gives leafy spurge a competitive advantage over crop and pasture plants. All parts of the plant contain a milky juice called latex, which is a useful identifying characteristic.

Leafy spurge produces a flat-topped cluster of yellowish-green petal-like structures called bracts, which surround the true flowers. The showy, yellow bracts appear in late May and early June, giving the plant the appearance of "blooming." However, the true flowers, which are small and green, do not develop until mid-June. Spring-applied herbicides are more effective on plants with developing true flower parts than on plants with developed bracts but undeveloped flowers.

Seeds are borne in pods, which contain three gray-brown, oblong, smooth seeds. After the seed has matured, the seed pods burst explosively and throw seeds up to 15 feet from the parent plant. An average of 140 seeds is produced per stem, and seeds may remain viable in the soil at least eight years.

Leafy spurge seeds may germinate to re-establish infestations where total control of leafy spurge tops and roots has been achieved. The peak period of germination is late May and early June, but seeds can germinate and seedlings become established throughout the growing season. Leafy spurge seedlings have a remarkable capacity for vegetative reproduction and can reproduce vegetatively within seven to 10 days after emergence. Seedlings typically do not flower during the first year.

The root system of leafy spurge is extensive and consists of numerous coarse and fine roots that occupy a large volume of soil. Roots are most abundant in the upper foot of soil, but some roots can extend to a depth of 15 feet or more. The roots are woody and durable in structure, with numerous buds capable of producing new shoots. The root system contains a large nutrient reserve capable of sustaining the plant for years.

Why is this plant a concern?

Leafy spurge infestations may have more than 200 stems per square yard in sandy soil and even higher densities in heavy clay soil. Patches of leafy spurge usually spread vegetatively from 1 to 3 feet per year and form dense stands that crowd out other plants by shading and competing for moisture and nutrients. Forage production may be reduced to 20 percent or less and most native plants are eliminated because they cannot out-compete this weed.

Leafy spurge contains a toxic substance that, when consumed by livestock, is an irritant, emetic and purgative. It causes scours and weakness in cattle and may result in death. The toxin has produced inflammation and loss of hair on the feet of horses from freshly mowed stubble during haying and has caused mortality of sheep that grazed leafy spurge exclusively. However, sheep and goats will graze leafy spurge as a portion of their diet and can be used as a form of cultural control. Animals will eat dried plants in hay, but many livestock, particularly cattle, avoid eating live plants

LEAFY SPURGE

Aphthona larvae

Longhorned beetle larvae

Leafy spurge hawkmoth

How do I control this plant?

Leafy spurge control must be considered a long-term management program. Generally, less than 6 inches of the root system is destroyed regardless if the control method is biological, chemical or cultural. Research at North Dakota State University has shown that more of the root system is killed when a combination of control methods are used, compared with any method used alone.

Chemical. Proper timing of herbicide applications is essential for good leafy spurge control. Leafy spurge is most susceptible to dicamba (Banvel and other trade names), Paramount (quinclorac) or Tordon (picloram) applied either when the true flowers and seeds are developing in June or after the stems have developed new fall regrowth in early to mid-September. Plateau (imazapic), fall-applied, provides better long-term control and less grass injury than spring or summer treatments. Combinations of Tordon plus Plateau or Tordon plus Plateau plus 2,4-D applied in June provide improved leafy spurge control compared with Tordon plus 2,4-D or Plateau applied alone in June. The Tordon plus Plateau combination is not recommended for use in the fall.

The combination of Tordon plus Overdrive also will improve leafy spurge control compared with Tordon used alone. Overdrive contains dicamba plus difluenzopyr, which is an anti-auxin compound that often improves broadleaf weed control when applied with auxinlike herbicides such as Tordon, dicamba and 2,4-D.

Glyphosate (various) applied for leafy spurge control has a different optimum application timing than the auxin herbicides (2,4-D, dicamba, picloram and quinclorac) or Plateau. Glyphosate is most effective for leafy spurge control when applied either after seed filling in midsummer or after fall regrowth has begun but before a killing frost. Glyphosate alone applied during spring growth stages generally provides poor long-term control.

Grazing. Sheep and goats provide an alternative for controlling leafy spurge top growth in pasture and rangeland. Grazing alone will not eradicate leafy spurge but will reduce the infestation, slow the spread of the weed and allow grasses to be grazed by cattle and horses. Grazing should be started early in the spring when the plant first emerges. On large infestations, pastures should be divided so animals can be rotated regularly and the entire infestation grazed in a timely manner.

Sheep and goats are best suited to control leafy spurge on large infestations or along waterways and tree areas where chemical control is restricted or cost is prohibitive and/or where success with biological control agents has been minimal.

Leafy spurge provides good forage value and compares favorably with widely used regional forages such as alfalfa (*Medicago sativa* L.), smooth brome (*Bromus inermis* Leyss.) and crested wheatgrass (*Agropyron desertorum* Fischer ex Link). Before moving animals to a leafy spurge-free area, they should be contained for three to five days so viable seed can pass through the digestive system.

Biological. Biological control of leafy spurge was initiated in the mid-1980s. To date, 10 species of insects have been released in North Dakota for control of leafy spurge, and six have become established. Four of the six established insects are flea beetles (*Aphthona* spp.), which have reduced the leafy spurge density more than any other agent.

LEAFY SPURGE

The first flea beetle released in North Dakota was *Aphthona flava* Guill in 1986. This flea beetle has established at only a few sites in the state and occurs at densities too low to be effective. In 1988, a mixed population of *Aphthona czwalinae* Weise and *Aphthona lacertosa* Rosenhauer were released near Valley City, N.D. By 1995, the majority (greater than 90 percent) of this mixed population was *A. lacertosa.* Two additional flea beetles, *Aphthona cyparissiae* Koch and *Aphthona nigriscutis* Foudras, were released the following year. *A. lacertosa* and *A. nigriscutis* were established in almost every county in North Dakota by 1996 and have become the major biocontrol agents used for leafy spurge control.

Although *Aphthona* spp. adults feed on leafy spurge foliage, the major damage to the plant occurs when the larvae feed on the roots. Larvae feed on both the fine feeder roots used by the plant to absorb water and nutrients and the storage tissue of the root crown. This feeding both destroys root tissue directly and causes the plant to be more susceptible to other methods of control, such as herbicides and infection from soil borne pathogens.

Research at North Dakota State University found flea beetle establishment was best on silt loam, silt clay loam, clay loam and clay soils with an organic matter content of 6 percent to 9.5 percent. Flea beetles were least productive in fine sand to loamy fine sand soils with an organic matter content of 1 percent to 3 percent. In addition, the release area needs to be well-drained and not subject to frequent prolonged flooding or standing water, which will kill the larvae. Generally, flea beetles have not been very successful in controlling leafy spurge growing along waterways, in shaded areas or in very sandy soil.

The *Spurgia esulae* gall midge causes stem tip galls on leafy spurge, thereby decreasing seed production. It has been most successful near wooded areas. However, a second control method was needed to reduce the original leafy spurge infestation and to prevent spread from roots. A stem-boring beetle, *Oberea erythrocephala* Shrank, has been released and established in North Dakota in the 1980s, but to date, the population never has increased to sufficient numbers to decrease leafy spurge. The spurge hawkmoth (*Hyles euphorbiae* L.), a foliar feeder, was introduced in the 1970s but generally has not survived and when it did survive, control was too late in the growing season to be very useful.

Limitations to biological control. Although flea beetles have become established throughout North Dakota, they have not been successful in all environments. To date, approximately 30 percent of the releases have established and the leafy spurge stem density has been reduced. In another 30 percent of the releases, the insects have become established but the population density is too low to be effective. In the remaining releases, flea beetles have not established.

Cultural. Cultural control of leafy spurge includes properly timed cultivation and/or planting of competitive grass species. Cultural methods that only control leafy spurge top growth include mowing and fire. All cultural control methods are more successful when combined with herbicide treatments than when used alone.

Leafy spurge infestations must be controlled with herbicides such as glyphosate prior to seeding grass species. Some perennial grass species that have competed effectively to provide leafy spurge control include: Bozoisky Russian wildrye [*Psathyrostachys juncea* (Fisch.) Nevski] and Luna pubescent wheatgrass [*Elytrigia intermedia* (Host) Beauv.], Rebound smooth brome (*Bromus inermis* Leyss.) and Rodan western wheatgrass (*Pascopyrum smithii* Rydb.). They are examples of grass species that can compete relatively well with leafy spurge. Not only were the grasses very competitive with leafy spurge, but they also provided high yields and good nutritive value for grazing. Grazing following grass establishment should be limited and conducted at the proper growth stage of the grasses or leafy spurge will re-infest the seeded area rapidly.

Mowing and burning have been ineffective for reducing leafy spurge infestations, but may result in uniform regrowth that allows a more timely herbicide treatment. Also, mowing will reduce seed production if repeated every two to four weeks during the growing season.

COMMON MILKWEED and SHOWY MILKWEED

(*Asclepias syriaca* L. and *Asclepias speciosa* Torr.)

Common milkweed

Common milkweed flower

Monarch butterfly larvae

Showy milkweed flower

COMMON MILKWEED and SHOWY MILKWEED

State Noxious Weeds List: **No.**

Common and showy milkweed are native to North America. Both species are robust, fleshy perennial plants that flourish in orchards, waste places and along roadsides. Milkweed has been used for medicinal, industrial, decorative and even for food purposes, despite having some degree of toxicity. Milkweed is best known as a primary food source for the monarch butterfly.

Identification and growth form:

As the common name implies, both species contain a thick, white, milky latex throughout the plant. Flowers are arranged in clusters at the top of the plant and are pink to white. Common milkweed flowers are held in tighter clusters and are more pink than white compared with showy milkweed. Showy milkweed flowers also have long lobes that stand upright, which are not found on common milkweed. Both species grow 2 to 4 feet tall and have large opposite leaves 3 to 5 inches wide and 6 to 10 inches long, which are covered with fine pubescence. These perennial plants have shallow fibrous roots. Milkweed grows over a wide range of soil moisture conditions, but can become dense under medium or high moisture levels.

Seed pods are 3 to 5 inches long and contain dozens of flat, reddish-brown seeds with tufts of hairs that allow the seed to travel long distances in the wind. An established market exists for milkweed seed floss as a nonallergenic fill to replace imported duck and goose down in comforters and for seed sales in prairie restorations and butterfly gardens. Most commercial milkweed supplies still are collected from the wild.

Why is this plant a concern?

Common milkweed can be aggressive in cropland areas given the right conditions. Reasons for the increase in milkweed densities in cropland include spread by the extensive root system, farmers using less tillage, several years of high rainfall and tolerance to most commonly used herbicides. Given the opportunity to spread and become established, common milkweed is extremely difficult to control.

How do I control these plants?

Since milkweed plants are native and a major food source for the monarch and other butterfly species, control is discouraged. However, if the plant becomes established in cropland, crop yield loss may occur and control would be warranted.

Chemical. Tordon (picloram) plus 2,4-D at high rates will reduce milkweed density but cannot be used in cropland. Glyphosate will suppress milkweed temporarily in cropland while Express (tribenuron) can be applied with 2,4-D plus dicamba for spot treatment.

Cultural. Cultivation will reduce milkweed species in cropland but care must be taken not to spread the roots to noninfested areas.

Biological. Monarch butterfly larvae feed heavily on milkweed and often remove a majority of the leaves on a plant.

ORANGE HAWKWEED

(*Hieracium aurantiacum* L.)

ORANGE HAWKWEED

State Noxious Weed List: **No.**

Orange hawkweed is native to northern and central regions of Europe. The plant first was introduced in North America in Vermont in 1875 as an ornamental. Orange hawkweed escaped from landscape plantings, gardens and cemeteries and now occurs throughout the eastern seaboard, into the Midwest, extending west to Minnesota and Iowa and south to Virginia and North Carolina, and has been steadily spreading to the West. Orange hawkweed is described as the worst weed problem in the northern Minnesota Iron Range and has become a major weed problem in the Pacific Northwest.

Identification and growth form:

Orange hawkweed is a herbaceous perennial that contains a milky sap and commonly grows up to 12 inches tall. In the vegetative stage, the plant appears as a basal rosette with many hairy leaves. Leaves are 4 to 6 inches long, dark green above, light green beneath, narrow and spatula-shaped. Each rosette is capable of producing 10 to 30 flower stems. Stems of the plant have short, stiff hairs and may have one to three small, clasping leaves located below the midpoint of the stem.

Orange hawkweed produces between five and 30 red-orange flower heads that are 0.5 to 0.75 inch diameter. Flower heads are arranged in a flat-topped cluster. Orange hawkweed seeds are tiny and black, and have a tawny tuft of bristles on the flattened end. The plant spreads primarily vegetatively through runners (like strawberries) and rhizomes and to new sites by seed.

Why is this plant a concern?

Orange hawkweed is an aggressive species that quickly can develop into large, dense patches, thus reducing native plant communities. The plant colonizes rapidly, forming a solid mat of rosettes. Orange hawkweed may have allelopathic effects on neighboring plants.

How do I control this plant?

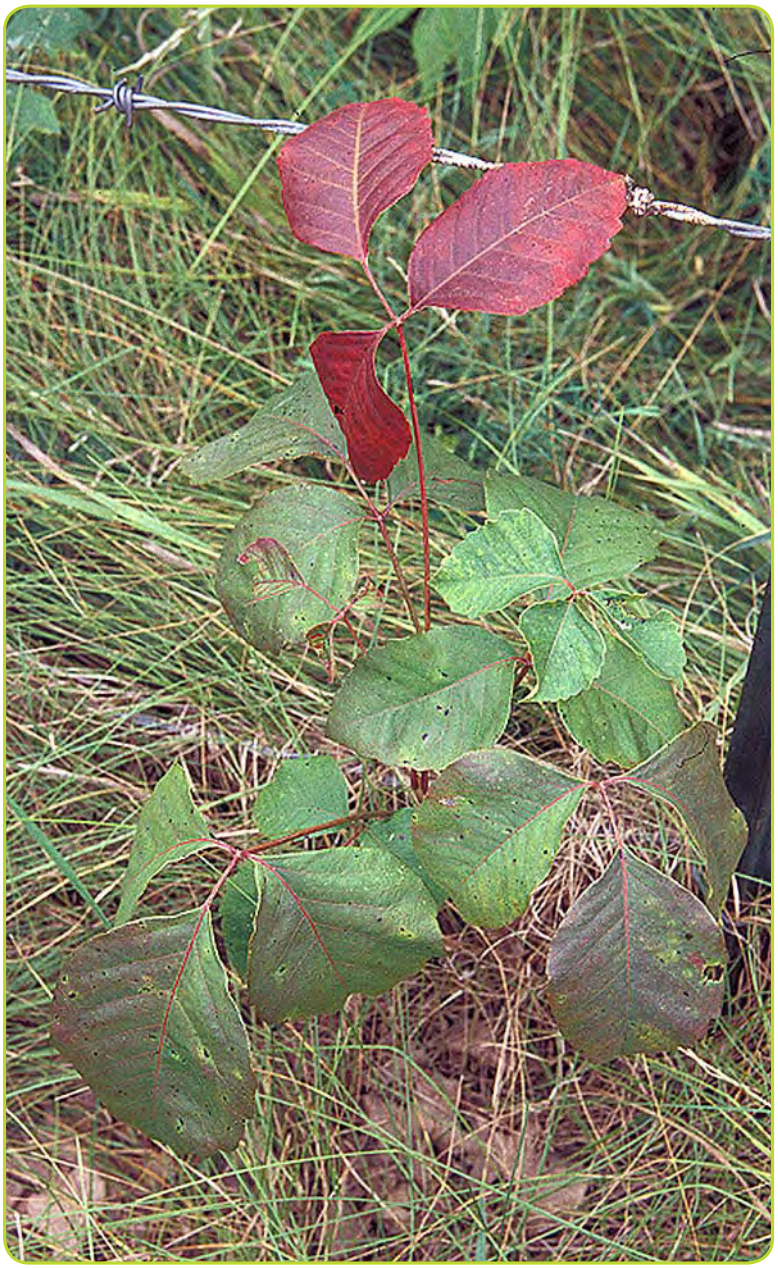
Chemical. Orange hawkweed can be controlled with Tordon (picloram), products that contain clopyralid (Curtail, Stinger, Transline), Milestone (aminopyralid) or dicamba plus 2,4-D. Monitor infested areas for several years to control new seedlings.

Mechanical. Pulling or digging is not recommended unless the infestation only consists of a few plants because digging stimulates the growth of new plants from rhizomes, stolons and fragmented roots.

Biological. No biological control agents or pathogens are available for this weed.

POISON IVY

[*Toxiodendron rydbergii* (Small ex Rydb.) Greene]



POISON IVY

State Noxious Weed List: **No.**

Poison ivy is a native species commonly found in wooded areas and in brushy areas, especially those along streams or lakes. It can grow as a small shrub or vine and is found in North America from Canada to Mexico. The first published records of poison ivy in North America date back to the 1600s. A similar plant called poison oak *(T. diversiloba)* is found only in states along the Pacific coast.

Identification and growth form:

Poison ivy is a perennial native small shrub that spreads by both rhizomes and seeds. The leaves are alternate with trifoliate leaflets. Remember the rhyme: Leaves of three — let it be! The leaves are shiny green in the spring and turn yellow and deep red in the fall. The flowers grow in axillary panicles, are yellow-green and not showy. The fruit is globed shaped, resembling small pumpkins, and turns yellow or light brown when mature.

Why is this plant a concern?

The "poison" in this plant is from a white oil called urushiol found in the phloem that causes an allergic contact dermatitis in about 85 percent of the population. Plants retain urusiol even after desiccation and smoke from burning poison ivy can carry the oil. The reaction is to the oil, not the plant itself, so one can react by touching objects that have come in contact with the plant, such as tools, and when removing footwear. Since it is an allergic reaction, people not sensitive to poison ivy can become sensitized through time.

How do I control this plant?

The best control is avoidance, but if the plant is found close to walking trails, near a home or in your favorite fishing area, herbicides that contain triclopyr such as Garlon are very effective.

PURPLE LOOSESTRIFE

(*Lythrum salicaria* L.)

State Noxious Weed List: **Yes.**

Purple loosestrife, a beautiful garden plant with an aggressive nature, first was introduced into North America in the early 1800s. The plant was sold in North Dakota by its genus name, *Lythrum,* for at least 50 years. Lythrum plants were brought to North Dakota for flower gardens because of their striking color, ease of growth, winter hardiness and lack of insect or disease problems. The garden varieties of purple loosestrife were sold by many cultivar names, including Morden Pink, Dropmore Purple and Morden Gleam. These garden cultivars were thought to be sterile but now have been shown to cross-pollinate with the wild *Lythrum* type and sometimes with other *Lythrum* cultivars.

Identification and growth form:

Purple loosestrife is a rhizomatous perennial forb. Wild infestations are associated with moist or marshy sites. The stems are erect (1.5 to 8 or more feet tall) and four to six angled, and can be smooth or pubescent with few branches. Leaves are simple (0.75 to 4 inches long, 0.2 to 0.5 inch wide), entire, and can be opposite or whorled.

The most identifiable characteristic of purple loosestrife is the striking rose to purple flowers. The flowers are

Galerucella spp. feeding on leaves

PURPLE LOOSESTRIFE

arranged on a spike, which can be a few inches to 3 feet long. Each flower has five to seven petals arising from a cylindrical green tube. The plant usually flowers from early July to mid-September in North Dakota. The seed capsule is two-celled and contains many very small seeds (1 millimeter long or less). The roots become thick and woody in mature plants. The aerial shoots die in the fall and new shoots arise the following spring from buds at the top of the root crown. Although the root crown expands and produces more shoots each year, the maximum growth of the root crown diameter is limited to about 20 inches.

Spread of purple loosestrife is primarily by seed, but the plant also can spread vegetatively from stem cuttings. Research at NDSU has shown that seed viability of purple loosestrife growing in North Dakota wetlands ranged from 50 percent to 100 percent. With approximately 2.7 million seeds produced per plant, purple loosestrife has the potential to spread rapidly once established in an area.

Why is this plant a concern?

The most destructive impact of purple loosestrife invasions is on the ecology of aquatic sites. Purple loosestrife forms dense monotypic stands as it displaces native wetland plants. Under optimum conditions, a small, isolated group of purple loosestrife plants can spread to cover aquatic sites in just one growing season. When purple loosestrife replaces native vegetation, it also can displace wildlife. Waterfowl, especially ducks, avoid wetlands that have become dominated with purple loosestrife. In addition, overall waterfowl production decreases as suitable nesting habitat is eliminated. The plant's growth is generally too compact to offer cover, and cover may be as crucial to wildlife as food.

SALTCEDAR

(*Tamarix* spp.)

SALTCEDAR

State Noxious Weed List: **Yes.**

Saltcedar is the common name for several introduced species of shrubs or small trees, including *Tamarix chinensis, T. parviflora* and *T. ramosissima.* Saltcedar is native to Eurasia and first was introduced into the U.S. to reclaim eroded areas and prevent further loss of stream banks, primarily in the southwest. Saltcedar has been sold in the horticultural industry, primarily for its wide adaptability and pink flowers. Saltcedar became established in North Dakota as escapes from ornamental plantings or from seed floating along rivers.

Identification and growth form:

Saltcedar is a shrubby bush or tree that can range in size from 5 to 20 feet tall. The bark is a reddish brown, especially on younger branches. The leaves are small and flat and resemble evergreen shrubs such as arborvitae. Flowers are pink to white and five-petaled, and appear from mid to late summer. The seeds are extremely tiny and similar in size and color to pepper. Each seed has a pappus, which allows it to float long distances in water or move in the wind. Seeds are short-lived and usually germinate within a few months after dispersal.

Once saltcedar seed germinates, it can grow rapidly to a small flowering shrub in one to two years. The plant is deciduous and very hardy, and horticultural varieties are advertised to grow "in sun or shade, and in wet or dry areas" from USDA hardiness zones 2 to 7. The plant quickly establishes a long, woody taproot to support a voracious thirst for water. The root system is capable of producing many new shoots if the top growth is removed by mechanical control methods or fire.

Why is this plant a concern?

Saltcedar can become a monoculture quickly along lakes and waterways. In the early morning and evening, moisture with high salt content is exuded from the foliage, causing the soil to become saline. Saltcedar can choke waterways and even has dried up entire lakes. Native riparian species are quickly displaced by saltcedar, which in turn causes displacement of native birds and animals that generally do not feed on the leaves or eat the saltcedar seeds. Saltcedar, even in the seedling stage, will tolerate short-term flooding and can establish away from waterways when seeds are washed in during flooding. Once established, the plants can become so thick cattle will not graze the area.

How do I control this plant?

Prevention is the best method to keep saltcedar from invading North Dakota wetlands and wildlands. Scouting along waterways and removal of ornamental plantings have been effective in reducing the spread of saltcedar in North Dakota.

Chemical. Arsenal (imazapyr) is the most widely used herbicide to control saltcedar. Arsenal also can be applied with a glyphosate formulation labeled for use in water. Do not remove saltcedar top growth for three years following herbicide application or resprouting will occur. Garlon (triclopyr) has been effective when applied in the spring or late fall.

Cultural. Control methods such as burning or bulldozing have not been successful.

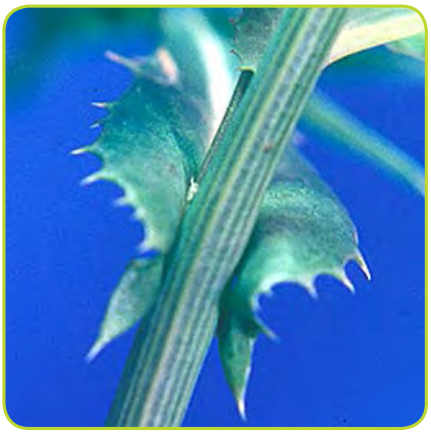
Biological. The leaf beetle *Diorhabda elongata* Brullé defoliates the leaves of saltcedar. This insect feeds on the leaves of saltcedar and slowly reduces plant vigor. However, it has not been consistently successful in reducing saltcedar infestations. This insect has not been released in North Dakota because of the small size of the plants and low infestation level in the state.

ANNUAL AND SPINY SOWTHISTLE

[*Sonchus oleraceus* L. and *Sonchus asper* (L.) Hill]

Annual sowthistle

Spiny sowthistle



ANNUAL AND SPINY SOWTHISTLE

State Noxious Weeds List: **No.**

These sowthistle species are from Europe and now are established widely in the region. The plants often are mistaken for perennial sowthistle. However, perennial sowthistle has a creeping perennial root system and larger and longer leaves, and grows 4 to 6 feet tall. Annual and spiny sowthistle often are found along roadsides and in waste areas, gardens and cultivated fields.

Identification and growth form:

Annual and spiny sowthistle are both annuals and differ primarily in leaf form. Spiny sowthistle, as the name implies, has sharp, stiff prickles along the stem and leaves. Leaves clasp the stem with rounded basal lobes (auricles) that resemble a ram's horn. Annual sowthistle leaves are deeply toothed lower on the plant but progressively less so on the upper stem and auricles are distinctly pointed. Both species have yellow flowers, borne on a long vaselike involucre, with several in a cluster. Annual and spiny sowthistle contain a milky latex and both grow from a small taproot. Spiny sowthistle has slightly larger flower heads (0.5 to 1 inch across) compared with annual sowthistle (0.25 to 0.75 inch). The seeds for both are flattened with three to five ribs. Both species grow 2 to 4 feet tall.

Why is this plant a concern?

These annual sowthistle species can become competitive in cropland, but otherwise are more nuisance species than invasive. Because annual and spiny sowthistle often are found in waste areas and heavily used ground, such as parking lots and trails, they can be an indicator that land is being overgrazed or otherwise abused when these species start to appear in pasture and hay land.

How do I control these plants?

Annual and perennial sowthistle species are not true thistles and control options differ between these weed families.

Chemical. Products that contain metsulfuron such as Escort or Ally are very effective in controlling sowthistle species. Commonly used herbicides for Canada thistle control such as Milestone (aminopyralid), Tordon (picloram) and dicamba (various) are less effective and require higher use rates.

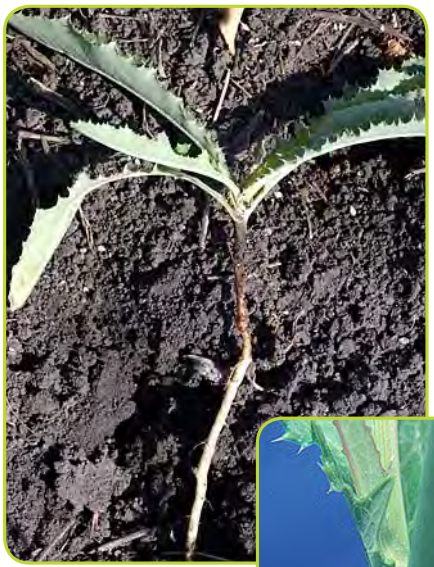
Cultural. Cultivation will control annual sowthistle species in cropland.

Biological. No biological control agents or pathogens are available for these weeds.

PERENNIAL and MARSH SOWTHISTLE

[*Sonchus arvensis* L. and
Sonchus arvensis ssp. *uliginosus* (Bieb.) Nyman]

Marsh sowthistle flower



Perennial sowthistle

PERENNIAL and MARSH SOWTHISTLE

State Noxious Weed List: **No.**

Perennial sowthistle was introduced from Europe and placed on the state noxious weed list in 1935 when it became a severe problem, especially in the northwestern part of the state. The weed subsequently was removed from the list in 1999 after revised farming practices and new herbicides had severely reduced the infested acreage. Most sowthistle infestations in North Dakota are annual not perennial species.

Identification and growth form:

Marsh sowthistle is a subspecies of perennial sowthistle and thus the plants are very similar in form and growth habit. Both species have bright yellow flowers similar to dandelion, but perennial sowthistle flower bracts are covered with gland-tipped hairs, while marsh sowthistle has smooth flower bracts. Both weeds have an extensive creeping root system. Leaves are lobed below, but less so above and have prickles on the margin and are 4 to 10 inches long (longer than the annual species). Generally, perennial sowthistle has fewer but larger flowers (1 to 1.5 inches across) than the annual species and end in a terminal cluster. Some taxonomists consider marsh a separate species from perennial sowthistle; others consider it a subspecies. Both contain latex and grow from 1.5 to 6 feet in height. Seeds are dark brown, with prominent ridges and have a tuft of white pappus or bristles.

Sowthistle generally flowers from July through September. Seed production is highly variable, but typically averages 30 seeds per flower head. Seed viability is relatively low for sowthistle and seeds usually do not survive longer than a year.

Perennial and marsh sowthistle can tolerate variable environments and can adapt well to wet areas with little soil disturbance. The plant commonly is found in cultivated areas, ditches, meadows, waste areas, sloughs, woods, lawns, roadsides, beaches, along rivers and lake shores. Sowthistle is adapted to many soil types, but seems to prefer low, fine-textured loam soils.

Why is this plant a concern?

Perennial and marsh sowthistle can displace native plant communities by invading disturbed areas and undisturbed natural habitats. Sowthistle can cause reduced crop yields, and lead to increased cultivation and herbicide costs.

How do I control these plants?

Annual and perennial sowthistle species are not true thistles and control options differ between these weed families.

Chemical. Products that contain metsulfuron such as Escort and Ally or Express (tribenuron) are very effective in controlling perennial sowthistle species. Preharvest applications of glyphosate and products that contain clopyralid or glufosinate will reduce perennial sowthistle. Tordon (picloram) and Milestone (aminopyralid) will control sowthistle species in noncropland.

Cultural. Cultivation will reduce perennial sowthistle species in cropland but care must be taken not to spread the roots to noninfested areas.

Biological. No biological control agents or pathogens are available for these weeds. Insects can be observed on the flower heads of these plants, especially perennial sowthistle, but they are feeding on sticky residue from the glands on the flower bracts, which does not harm the plant.

ST. JOHNSWORT

(*Hypericum perforatum* L.)

State Noxious Weed List: **No.**

St. Johnswort, also referred to as Klamath weed, is native to Europe, North Africa and parts of Asia and first was introduced to the United States in the late 1600s for ornamental and medicinal purposes. St. Johnswort is sold as an antidepressant, often in the form of tea. However, St. Johnswort is also well-known to cause photosensitizing in man and animals. Numerous cultivated hybrids are available.

Identification and growth form:

St. Johnswort is a taprooted perennial herb that typically grows 1 to 5 feet tall. Stems are multi-branched, smooth, reddish and woody at the base. The leaves are opposite, entire, linear to oblong with in-rolled edges and 3/8 to 1 inch long. The leaves are dark green above and light green below and dotted with tiny, translucent glands. The "spotted leaf" appearance is a key characteristic for identification.

St. Johnswort has opaque spots on the leaves

ST. JOHNSWORT

Flowers of the plant are yellow, starlike with five petals and 0.5 to 1 inch in diameter, with tiny black dots on the margins. Petals are twice as long as the sepals and numerous stamens arranged in three groups are apparent. The seeds are egg-shaped and are held within a three-valved capsule that bursts at maturity. Seeds are tiny, dark brown, 3/64 inch long, somewhat cylindrical, slightly pointed at the ends and coarsely pitted.

St. Johnswort spreads both by underground and above-ground creeping stems, and by seed. Annual seed production ranges from 15,000 to 33,000 up to 100,000 with a small percentage germinating and reaching maturity. Seeds may remain viable in the soil for up to 10 years. Germination occurs during the warm summer months; however, seedlings may require several years to reach reproductive maturity. Basal foliage that has overwintered may begin to bolt during early March and by early April, older plants will have produced floral shoots. Flowering generally occurs from May through September and may be dependant on soil moisture.

Why is this plant a concern?

Glands found on the plant produce oils that contain hypericin, a phototoxin. Once the plant is consumed, animals become overly sensitive to sunlight, which results in dermatitis, an inflammation of the mucus membranes causing itching, swelling, blisters and open sores. All growth stages of the plant are toxic, including dried plants in hay. Poisoning or hypericism has been reported in cattle, horses, sheep and goats, with symptoms detectable within two to 21 days following ingestion of the plant. Light-haired or unpigmented skin areas such as the mouth, nose, ears and hooves are the most sensitive.

Livestock that suffer from hypericism generally lose weight, are difficult to manage and possess reduced market value. Affected animals usually recover once consumption of St. Johnswort is stopped. St. Johnswort has become popular as an herbal stimulant and will induce photosensitivity in some people.

How do I control this plant?

Chemical. A variety of herbicides can be applied for St. Johnswort control and are most effective when applied to seedlings and young plants. Tordon (picloram) or glyphosate (various) are most effective when applied in the spring. Escort (metsulfuron) also will control St. Johnswort effectively. Herbicide treatments are most successful if applied at bud stage before flowering occurs and late in the fall when the plant is going dormant. Repeated applications often are required to achieve adequate management.

Mechanical. Hand-pulling or digging may be effective on small and isolated infestations if repeated several times per season and if conducted prior to flowering and seed production. In larger infestations, lateral roots of older plants left behind can give rise to new plants.

Biological. Several biological agents have been introduced into the United States for St. Johnswort control since the mid-1940s. The Klamath weed beetle *(Chrysolina quadrigemina)* was one of the first highly successful biological control insects introduced into North America. This insect is credited with controlling St. Johnswort on millions of acres in California and the Pacific Northwest.

However, the Klamath weed beetle has not been successful in all areas St. Johnswort occurs, so other agents have been introduced. The root-boring beetle *Agrilus hyperici* and the leaf bud gall-forming midge *Zeuxidiplosis giardi* have become established but the effectiveness has been quite variable. More recently, a St. Johnswort foliage- and flower-feeding moth, *Aplocera plagiata,* has been released and established in the northwestern United States.

BULL THISTLE

[*Cirsium vulgare* (Savi) Tenore]

BULL THISTLE

State Noxious Weed List: **No.**

Bull thistle is the least serious of the introduced thistles in North Dakota. Native Americans used bull thistle to treat hemorrhoids, which they likely learned from French fur trappers. Bull thistle often is referred to as edible. Many plant parts from the root to the flower are eaten. The flower petals are used as chewing gum.

Identification and growth form:

Bull thistle is a biennial that grows from a flat rosette of leaves the first year to a flowering stem the second year, often 5 feet or more in height. Plants are multibranched; stems have purple veins and are winged. The plant appears bushy rather than the candelabra appearance of plumeless or Canada thistle. A distinguishing characteristic of bull thistle is the leaves. Leaf margins are deeply toothed and toothed again (double dentate) with prominent stiff spines. The leaf surface has a distinct center vein with slight prickly hairs above and cottony pubescence below. The stems are very pubescent with dark purple veins. The rosettes of bull thistle are very pubescent with deeply lobed leaves and dark purple ribs.

Bull thistle flower heads usually are found singularly at the end of each stem branch. The flowers are gumdrop shaped, large (2 to 3 inches tall), with long, stiff, yellow-tipped spines. Bull thistle flowers from July to September, which is somewhat later than other thistles in the region. The flowers are generally purple but rarely a white form is observed. Achenes are 0.1 to 0.15 inch long, glossy light brown to pale yellow or white with narrow dark brown stripes and favored by birds.

Why is this plant a concern?

Bull thistle occurs in all 48 contiguous states and most of Canada, but is designated noxious in only a few states. Bull thistle generally is found growing singularly or in small patches in the northern and eastern counties of the state. The large size and showy flowers of the plant makes it quite noticeable in pasture and rangeland, but it has little economic or ecological consequence.

How do I control this plant?

Bull thistle seldom reaches high enough densities to warrant treatment.

Chemical. Fall is the preferred time for applying herbicides for bull thistle control. Fall treatment allows more time for herbicide application than in the spring and thistle control is generally best with fall treatments. Seedlings that emerge in summer after tillage or previous herbicide applications will not bolt but remain in the rosette stage. Bull thistles are most susceptible to herbicides in the rosette form.

Bull thistles can be controlled effectively with Milestone (aminopyralid), clopyralid (Stinger, Transline or Curtai), Tordon (picloram), or dicamba (various) or dicamba plus diflufenzopyr (Overdrive). Products that contain metsulfuron (Escort, Cimarron Max, others) will control bull thistles in the spring and will eliminate seed production when applied in the bolting to bud growth stages.

Cultural. Cultivation or hand-digging the rosette prior to bolting will kill the plant and prevent seed-set.

Biological. No biological control agents or pathogens are available for this weed.

CANADA THISTLE

(*Cirsium arvense* L.)

Female flower

Male flower

CANADA THISTLE

State Noxious Weed List: **Yes.**

Canada thistle was introduced in North America as a seed contaminant in both French and British colonies. The first legislation to control the weed was passed by Vermont in 1795. Canada thistle has the dubious distinction of being one of three weeds listed in 1885 by Dakota Territory as required of "every person" to be destroyed. The native distribution of Canada thistle includes Europe, North Africa and central Asia. It also is found in China and Japan and has spread so extensively that it is difficult to distinguish the plant's original native range. Canada thistle is considered to be naturalized in the northern Great Plains

Identification and growth form:

Canada thistle is a long-lived perennial that usually grows 2 to 3 feet tall and bears alternate, dark green leaves that vary in size. The leaves are oblong, usually deeply cut, and have spiny, toothed edges. Canada thistle has small (3/4 inch diameter), compact flower heads that appear on the upper stems.

Canada thistle has been classified into several varieties. Within these varieties are many ecotypes, which differ in growth characteristics, response to day length, and susceptibility to herbicides and cultivation. For example, leaf shape, head structure, and the number and size of spines can differ with ecotypes. Canada thistle requires a 14- to 16-hour photoperiod to bolt and flower (April 19 to Aug. 22 in North Dakota). Flower color can range from purple to light lavender or even white. Stem color also can differ from green to lavender.

Flowering occurs from June to September. Male and female flowers are produced on different plants, so cross-pollination is necessary for seed production. Flowers produce from 40 to 80 seeds per head, which can move long distances, although most seed remain in the head until winter and eventually germinate nearby.

The smooth, light brown seeds (achenes) have a conical point and are loosely attached to a tannish pappus at the tip, which aids in seed dispersal by wind. Seeds mature rapidly and are able to germinate within eight to 10 days after pollination. Canada thistle overwinters in the rosette growth stage.

Canada thistle has an extensive underground root system that may penetrate the soil to a depth of 10 feet or more and grow laterally 12 to 15 feet per year. Root buds occur randomly along the roots and initiate new shoots whenever environmental conditions are favorable. Root segments as small as 0.6 inch can initiate shoot growth and become established. Canada thistle is adapted to a wide range of soils, but it produces deeper roots in clay or muck soils than in sand, gravel or limestone soils.

Root bud development can occur nearly anytime during the growing season, but is greatest when soil temperatures are warm, air temperatures are cool and the photoperiod shortens to 13 hours. These conditions generally are found during the fall growing season. Therefore, more Canada thistle root-bud development occurs in the fall than any other time of the year. Canada thistle grows best in the northern regions of North America where temperature and rainfall are moderate. Growth ceases when temperatures exceed 85 degrees for extended periods.

Why is this plant a concern?

Canada thistle has the potential to form dense infestations rapidly through vegetative reproduction, and the spread of these clones may continue indefinitely, crowding out and displacing native grasses and forbs through shading, competition and possibly allelopathy. Canada thistle spread can change structure and species composition of natural areas and reduce plant and animal diversity. Infestations of Canada thistle may contribute to the elimination of endangered and/or endemic plant species. In wildlands, Canada thistle has the potential to increase fire frequency and perhaps severity as a result of its abundant and readily ignited litter and flammable above-ground biomass.

Canada thistle can reduce yield of many crops severely. Yield losses are directly proportional to the density and patchiness of the infestation, with more than $40 million annually lost in production in North Dakota alone. Wheat is a poor competitor and Canada thistle infestations often increase in a continuous-wheat farming program. Canada thistle also can be a severe problem in corn and soybean grown in rotation, with greater losses in soybean than corn.

CANADA THISTLE

How do I control this plant?

Canada thistle is the only thistle in North Dakota that has become a cropland pest. Control strategies differ for Canada thistle in cropland compared with pasture, range and wildland.

Chemical. *Cropland.* The best approach to Canada thistle control in cropland should include an in-crop herbicide treatment to suppress Canada thistle growth, minimize crop yield losses and prepare the thistle for a fall postharvest treatment. Preharvest and fall-applied treatments provide the most effective long-term control. The best herbicide to use will vary depending on crop rotation. However, the control program must be uninterrupted for two to three years if the infestation is to be reduced.

Glyphosate (various trade names) can be used to control Canada thistle in glyphosate-resistant crops. In-crop applications will not kill established thistle stands. However, when used as part of an overall management program, glyphosate can reduce infestations.

Herbicides that can be used for Canada thistle growing in small grains include 2,4-D, MCPA, dicamba (various trade names), products that contain clopyralid (various trade names) and products that include tribinuron. Products containing clopyralid will control Canada thistle in flax, sugar beet and corn. Canada thistle may be suppressed in corn with products containing dicamba, while Basagran (bentazon) can be used in soybean. A second application is required 10 to 14 days after the first for satisfactory suppression.

Pasture, range and wildlands. Herbicides that control Canada thistle in noncropland include products that contain clopyralid (various), Tordon (picloram), dicamba (various) dicamba plus diflufenzopyr (Overdrive), and Milestone (aminopyralid). Control is greatest when applied to Canada thistle at the early bud growth stage (early summer) or in the fall to plants in the rosette form. These herbicides applied at low rates may be the most cost-effective method for controlling dense infestations that require broadcast application. Re-treatment will be necessary for several years to obtain long-term control.

Cultural. *Cropland.* Canada thistle roots are much less winter hardy then many other perennial weeds and timely cultivation actually can increase winter kill. Soil temperatures of 20 degrees or colder can reduce Canada thistle regrowth from roots by more than 50 percent. Following crop harvest, cultivate fields before the Canada thistle is 3 inches tall and repeat before regrowth reaches 3 inches tall until freeze-up. This method has the combined advantage of decreasing carbohydrate root reserves and the bare ground from the tillage will lead to colder soil temperatures, which increases winter-kill.

An option for Canada thistle in row crops and fallow that includes both tillage and herbicides is known as the rosette technique. The objective is to prevent the plants from bolting by using tillage and/or herbicide treatments until the day length is less than 15 hours, the photoperiod required for most Canada thistle plants to bolt. The thistles then will regrow as rosettes only. Research at North Dakota State University has found herbicide absorption and translocation to the roots of Canada thistle is greater when applied to the rosette growth stage than when applied to bolted plants, making fall treatment of rosettes the most cost-effective method for long-term Canada thistle control.

The rosette technique for Canada thistle control in fallow includes the use of tillage and fall-applied herbicides, while control in row crops includes in-crop herbicide treatments, tillage and fall-applied herbicides. Periodic tillage in fallow is used to control Canada thistle shoots and other weeds until late July, when the day length is less than 15 hours. Herbicides used for Canada thistle control, such as glyphosate or clopyralid, then are applied to rosettes in late

September or early October. Research at NDSU has found that cultivation until late June prevented more than 90 percent of Canada thistle from bolting in corn and soybean.

Pasture, range, and wildlands. Repeated mowing will reduce Canada thistle infestations. Mow whenever the plants are in the early bud growth stage to prevent seed-set. Several mowings a year are needed because plant populations vary in maturity. Mow as close to the surface as possible. If plants are cut above the terminal bud before the stems elongate, they likely will regrow. Mowing before the flowers start showing color is important because plants mowed after that likely will produce some viable seed. Mowing for several years will reduce the root vitality of Canada thistle and will prevent seed production, reducing the seed reserve. Mowing should be combined with a chemical control program for best results.

Controlled burns often are used to help restore wildlands to a more natural plant community. Contrary to popular thought, research at North Dakota State University found that fall prescribed burns did not cause a long-term increase in Canada thistle density; rather, Canada thistle emerged earlier in the burned compared with the nonburned areas. The effect was short-lived and Canada thistle densities were similar regardless of burn treatment the second growing season after the burn. Also, no differences in Canada thistle control occurred when herbicides were used alone or combined with a prescribed burn.

Biological. Two biological control agents have been introduced for Canada thistle control, and a third was introduced accidentally. To date, none have been effective at reducing the weed on a large scale. The most widespread insect is *Ceutorhynchus litura* weevil, which first was released in North Dakota in the 1970s. The larvae feed on the underground parts of Canada thistle for a short time but infestations generally are not reduced. One may take advantage of the early season stress on Canada thistle from *C. litura* feeding by using additional control methods such as mowing or applying herbicides. In addition, natural soil pathogens may become more destructive due to multiple entry sites established by the insect. However, do not expect these insects alone to reduce a Canada thistle infestation.

A gall-producing fly, *Urophora cardui*, causes meristematic galls but does little long-term damage to the perennial thistle. The Canada thistle bud weevil *Larinus planus* was an accidental introduction into North America. The insect feeds on developing flowers to prevent seed production. Although *L. planus* can survive under a wide range of climates, it has not reduced established Canada thistle stands.

The painted lady butterfly *(Vanessa cardui)* can be a very effective biological control agent but only on an intermittent basis. Larvae of the butterfly feed on Canada thistle plants and can eliminate an infestation. However, the insect generally is found only in southern states such as Arizona and New Mexico and will build up populations large enough to migrate north only once every eight to 11 years. The insect will migrate north as far as Canada and those fortunate enough to reside within the migratory pathway will see a dramatic decrease in the Canada thistle population. Unfortunately, the insect feeds on many plants, including crops such as soybean and sunflower, and is not a candidate for long-term biological control of Canada thistle.

A native pathogen, *Pseudomonas syringae* pv. *tagetis* (Pst), causes the top of Canada thistle plants to turn yellow to white. This pathogen may release a toxin into the phloem of Canada thistle and kill the plant. The pathogen is most widespread during wet periods. Attempts to produce this pathogen as a commercial biocide have not been successful.

FLODMAN THISTLE

[*Cirsium flodmanii* (Rydb.) Arthur]

FLODMAN THISTLE

State Noxious Weed List: **No.**

Flodman thistle is a native species found from Saskatchewan and Manitoba to Iowa and Colorado. This thistle is a food source for a variety of insect and bird species. The stems of Flodman thistle can be peeled and eaten and were part of the Native American diet.

Identification and growth form:

Flodman thistle is a deep-rooted perennial and usually grows 3 to 4 feet tall. The leaves are shiny green on top with slight pubescence and are white and very pubescent below, alternate, rigid and deeply lobed. Each lobe has three points, one of which sticks out at nearly right angles, giving a flipping appearance, which is helpful to tell this plant from the often similar appearing wavyleaf thistle.

The rosettes are often 4 to 6 inches in diameter with oblong or lanceolate leaves that vary from deeply lobed to nearly complete. The leaves are green to gray and especially pubescent below. The flowers are deep purple to pink, rarely white, tube shaped and approximately 1 inch long. The flower heads have a strong yellow spine and a sticky secretion that attracts and catches insects. Flodman thistle usually flowers from mid-July through September in North Dakota. The achenes are about 0.1 to 0.15 inch long and oval, and vary from tan to brown and have a conspicuous yellow collar.

Why is this plant a concern?

Flodman thistle is more competitive than most other native species and has the potential to infest large areas. It is tolerant to high salt concentration in soil but not as tolerant as Canada thistle. Although it grows best under moist conditions as most thistles do, it can survive under drought conditions, which gives it a competitive advantage on semiarid rangeland.

How do I control this plant?

Native thistle species such as Flodman thistle seldom become weedy because of the variety of insects and birds that feed on the plant and several pathogens that cause a variety of diseases. However, of the native thistles found in the region, Flodman thistle is one that can form dense colonies, especially in dry years.

Herbicides that are effective for controlling Flodman thistle in noncropland include products that contain clopyralid (various), Tordon (picloram), dicamba (various), Overdrive (dicamba plus diflufenzopyr) and Milestone (aminopyralid). Control is greatest when applied to thistle at the early bud growth stage (early summer) or in the fall to plants in the rosette form. Herbicide treatment will not be necessary if one allows the native pests to build in population and reduce this thistle through time. Flodman thistle has not been a problem weed in cropland.

MUSK THISTLE

(*Carduus nutans* L.)

State Noxious Weed List: **Yes.**

Musk thistle is the most common biennial invasive thistle in North Dakota. Musk thistle is native in southern Europe and western Asia and was introduced into North America in the early 1900s. Two subspecies that differ in flower size and pubescence occur in North Dakota.

Identification and growth form:

Musk thistle likely is the most easily identified invasive thistle in North Dakota, yet many people confuse this plant with either bull thistle or plumeless thistle. Musk thistle often grows in excess of 6 feet tall, has very large flowers that tend to droop, and the flower has very characteristic brown bracts that resemble a pine cone. The flowers usually are deep rose, solitary and very large, ranging from 1.5 to 3 inches in diameter. Rosettes are dark green with a light green midrib, usually smooth and lacking pubescence and often grow 2 feet or more in diameter.

Musk thistle stems are usually very branched with spiny wings; however, the wings are interrupted and not complete along the stem as with bull or plumeless thistle. The leaves are oblong to lanceolate and lobed with slender spines along the margin. They generally have little pubescence underneath, which helps distinguish musk thistle from plumeless thistle. However, the subspecies *C. nutans macrocephalus* (Desf.) has very pubescent leaves.

Musk thistle flowers from July to late September. The average musk thistle plant produces in excess of 10,000 seeds per plant and, under favorable conditions, may produce 120,000 seeds per plant. Seed germination

MUSK THISTLE

averages 30 percent. The seed generally germinates in the summer and fall, and the plant overwinters as a rosette. The following spring, the plant resumes vegetative growth, bolts and flowers. After setting seed, the plant dies, thereby completing the life cycle. Occasionally biennial thistles have winter annual, annual or short-lived perennial characteristics.

Why is this plant a concern?

Musk thistle tends to invade overgrazed or otherwise disturbed pastures, rangeland, roadsides and waste areas. Movement into cropland is generally from nearby noncropland or roadsides. Musk thistle spreads rapidly and can form very dense stands that crowd out desirable forages and native species.

How do I control this plant?

Since biennial plants such as musk thistle reproduce only from seed, the key to a successful management program is to control the plants before flowering.

Chemical. Fall is the preferred time for applying herbicides for biennial thistle control. Fall treatment allows more time for herbicide application than in the spring and thistle control is generally best with fall treatments. Seedlings that emerge in summer after tillage or previous herbicide applications will not bolt but remain in the rosette stage. Biennial thistles are most susceptible to herbicides in the rosette form.

Biennial thistles can be controlled effectively with Milestone (aminopyralid), Stinger, Transline or Curtail (clopyralid), Tordon (picloram), or dicamba (various) or dicamba plus diflufenzopyr (Overdrive). Products that contain metsulfuron (Escort, Cimarron Max, others) will control biennial thistles in the spring and will eliminate seed production when applied in the bolting to bud growth stages.

Cultural. Repeated mowing will reduce musk thistle infestations. Mow whenever the plants are in the early bud growth stage to prevent seed-set. Several mowings a year are needed because plant populations vary in maturity. Mow as close to the surface as possible. Plants should be cut below the terminal bud before the stem elongates or the weed will regrow. Mowing before the flowers start showing color is important because plants mowed after that likely will produce some viable seed. Mowing should be combined with a chemical control program for best results.

Biennial thistles do not survive under crop rotation since they cannot tolerate tillage or crop competition. Planting infested areas to any crop will eliminate biennial thistles.

Biological. The seed weevil *Rhinocyllus conicus* was introduced from Eurasia to control musk thistle by reducing seed production. Larvae develop in the flower head and consume the seed as it develops. The weevils can reduce seed production by nearly 80 percent, but they are attracted more to earlier blooming rather than to later blooming flowers. The late-season flowers produce seeds with little damage from the weevil, which sustains the musk thistle population. Building a high enough population of insects to greatly reduce seed production takes five to 10 years. These insects first were introduced into North Dakota in the early 1970s. *R. conicus* is not specific to musk thistle and has been found feeding on other invasive thistles, such as Canada thistle. However, this insect also feeds on native thistles, including several that are on the protected or endangered species list.

The thistle crown weevil *(Trichosirocalus horridus)* was introduced into North America from Europe in the mid-1970s. Larvae of this insect feed on the growing tip as the musk thistle rosette bolts. While seldom effective by itself, it does help control musk thistle when combined with *Rhinocyllus conicus.* Feeding by *T. horridus* larvae on musk thistle growing tips causes the plant to produce multiple shoots. The resulting flower heads are reduced in size and produce fewer seeds, and the increased number of flower heads results in an increased population of *R. conicus*.

PLUMELESS THISTLE

(*Carduus acanthoides* L.)

PLUMELESS THISTLE

State Noxious Weed List: **No.**

Plumeless thistle first was introduced into North America in the 1870s along the East Coast as a contaminant in ship ballast. Plumeless thistle is one of the most common invasive thistles in the mid-Atlantic and upper Midwestern states. Although found as far west as Washington state, it is less common than musk and bull thistle and is not listed on the North Dakota state noxious weed list.

Identification and growth form:

Plumeless thistle is a winter annual or biennial and generally is found only in eastern North Dakota. Plumeless thistle tends to be shorter than other noxious biennial thistles and generally reaches 1 to 4 feet tall. The stems are winged and very branched, giving the plant a candelabrum appearance. The wings are very spiny and are continuous along the stem and not interrupted as musk thistle. The leaves are deeply lobed, narrower than musk thistle and very pubescent underneath. Each lobe has one to three very sharp marginal spines. Flower heads are small (0.5 to 1 inch) but very numerous and pink to purple or very rarely white. The bracts are very narrow and resemble spines. The heads can be singular or in clusters of two to five. The achenes are small, gray to light brown with a distinct, light apical collar and slightly curved.

Rosettes of plumeless thistle resemble musk thistle rosettes, but are more deeply lobed and much more pubescent. Plumeless thistle rosettes have wavy leaves with yellow spines along the white leaf margins and resemble holly. The plant bolts and flowers in late April to early May.

Why is this plant a concern?

Plumeless thistle can become very weedy and form dense colonies, especially along waterways, ditches and roadsides in summers following wet falls. Plumeless thistle seldom is found in cultivated fields, even when infestations are nearby in roadsides or pastures. The numerous spiny branches make walking through infestations by people or grazing by animals very difficult.

How do I control this plant?

Chemical. Fall is the preferred time for applying herbicides for plumeless thistle control. Fall treatment allows more time for herbicide application than in the spring and thistle control is generally best with fall treatments. Seedlings that emerge in summer after tillage or previous herbicide applications will not bolt but remain in the rosette stage. Plumeless thistles are most susceptible to herbicides in the rosette form.

Plumeless thistles can be controlled effectively with Milestone (aminopyralid), Stinger, Transline or Curtail (clopyralid), Tordon (picloram), or dicamba (various) or dicamba plus diflufenzopyr (Overdrive). Products that contain metsulfuron (Escort, Cimarron Max, others) will control biennial thistles in the spring and will eliminate seed production when applied in the bolting to bud growth stages.

Cultural. Repeated mowing will reduce plumeless thistle population but must be done prior to flowering or viable seed will be produced. Plumeless thistle will not survive tillage operations used in cropland.

Biological. Both *Rhinocyllus conicus* and *Trichosirocalus horridus,* which were released for musk thistle control, attack plumeless thistle.

SCOTCH THISTLE

(*Onopordum acannthium* L.)

SCOTCH THISTLE

State Noxious Weed List: **No.**

Scotch thistle is a native of Eurasia and has become naturalized in portions of western North America. Scotch thistle can thrive in well-drained, sandy or stony soils. The plant occurs in pastures, croplands, rangelands, roadsides and construction sites but prefers disturbed areas and sites near ditches. Scotch thistle has regal stature. During the reign of Malcolm I of Scotland, Norsemen attempted to capture the Staines Castle by wading across the moat in their bare feet, only to find the moat dry and overgrown with thistle. The painful cries by the warriors roused the castle guards and the Norsemen were defeated. To commemorate this victory, the flower became the emblem of Scotland.

Identification and growth form:

Scotch thistle is a biennial herb that can grow up to 12 feet tall. Stems of the plant are hairy or cottony, and have broad, spiny wings. Leaves are large, spiny and covered with fine, dense hairs that give Scotch thistle a grayish-green, cottony appearance. Upper leaves are alternate and have prominent triangular lobes that occur on the margins. Lobes of the leaf end with a prominent, sharp, green to white spines.

Flower heads are terminal, numerous and 1 to 2 inches in diameter. Flowers are pale purple to red and subtended with a series of overlapping bracts tipped with a spine. Seeds are oblong to obovate, four-angled, deep brown to black, about 3/16 of an inch long and wrinkled. Plants can produce 70 to more than 300 flower heads that can produce 100 to 200 seeds per head. Therefore, a single plant can produce 8,400 to 40,000 seeds. Seed viability can range from one to more than16 years, depending on seed burial depth.

Why is this plant a concern?

Scotch thistle is an aggressive species that can out-compete and decrease desirable forage. The plant also can degrade wildlife habitats and recreational areas. Scotch thistle infestations can become impenetrable, thorny barriers that severely limit land use by wildlife, livestock and man.

How do I control this plant?

Scotch thistle reproduces solely through seed production. Seeds generally germinate in late fall but germination can occur anytime throughout the year.

Chemical. Scotch thistle can be controlled effectively with Milestone (aminopyralid), Stinger, Transline or Curtail (clopyralid), Tordon (picloram), or dicamba (various) or Overdrive (dicamba plus diflufenzopyr). Products that contain metsulfuron (Escort, Cimarron Max, others) will control biennial thistles in the spring and will eliminate seed production when applied in the bolting to bud growth stages.

Mechanical. Hand-pulling small infestations of Scotch thistle can be an effective control method. Mowing prior to seed dispersal may limit the amount of seed available for germination. However, if the plant is cut after flowers begin to show color, viable seed may still be dispersed.

Biological. Research on biological control agents for Scotch thistle is in progress. *Lixus cardui* Olivier (Coleoptera: Curculionidae), a weevil from Europe, first was used by Australian researchers to control Scotch thistle. However, host-specificity testing needs to be researched further to ensure that native thistles are not affected by the release of this agent in North America.

WAVYLEAF THISTLE

[*Cirsium undulatum* (Nutt.) Spreng.]

WAVYLEAF THISTLE

State Noxious Weed List: **No.**

Wavyleaf thistle is a native species and is common in western North Dakota. Various Native American tribes used wavyleaf thistle to treat gonorrhea and syphilis. The remedy involved drinking a tea made from the plant and then elevating the body temperature to induce sweating. A tea also was made from the roots to treat diabetes and stomachache. The roots were boiled and used in soup.

Identification and growth form:

Wavyleaf thistle is a perennial native plant that often is confused with Flodman thistle. Wavyleaf thistle tends to flower from July to September, often a week or two earlier than Flodman thistle. Wavyleaf thistle tends to be more spiny and the leaves less deeply lobed than Flodman thistle. Also, wavyleaf thistle is found in well-drained soils, generally in drier locations than those occupied by Flodman thistle. Wavyleaf thistle grows 3 to 4 feet tall and often is associated with sagebrush communities and rangeland but is less common in moist meadows.

The leaves of wavyleaf are alternate and tipped with yellow spines. The leaves are very pubescent, giving the plant a gray cast, and are less deeply lobed than Flodman thistle. Leaves are strongly undulated or wavy, which gives the plant its common name. The stem of wavyleaf thistle is very pubescent and generally thicker than Flodman thistle. Rosette leaves are also very wavy and gray in appearance.

The flowers are most often pink or purple, but there is a white-flowered form, *f. album* Farwell. The flowers are usually more than 2 inches in diameter, with globe-shaped heads. The yellow spines on the heads lack the sticky secretion found on Flodman thistle. The achenes are brown without a lighter apical band or with only a very narrow lighter margin.

Wavyleaf thistle is a larger plant than Flodman thistle. Generally Flodman thistle is more common than wavyleaf in eastern North Dakota, but wavyleaf gradually becomes the predominant species in the central and western portions of the state.

Why is this plant a concern?

Generally wavyleaf thistle is kept in check by native insects and birds that feed on the plant as well as native pathogens that reduce plant vigor and growth. Wavyleaf has become a problem when the plant spreads beyond its normal range, such as the Pacific coast. Otherwise this plant does not warrant control efforts.

DALMATIAN TOADFLAX and YELLOW TOADFLAX

(*Linaria genistifolia* ssp. *dalmatica* (L.) Maire & Petitm. and *Linaria vulgaris* Mill.)

Dalmatian toadflax

Dalmatian toadflax has broad heart-shaped leaves

DALMATIAN TOADFLAX and YELLOW TOADFLAX

Yellow toadflax

Yellow toadflax has narrow linnear leaves

Yellow toadflax flowers have orange throats

DALMATIAN TOADFLAX and YELLOW TOADFLAX

State Noxious Weed List:
Dalmatian toadflax: **Yes.**
Yellow toadflax: **Yes.**

Both Dalmatian and yellow toadflax are escaped perennial ornamental plants that were introduced in the mid-1800s. Dalmatian toadflax is native to the Mediterranean region, specifically the Dalmatian Coast of Croatia, while yellow toadflax is from Eurasia. Yellow toadflax first was recorded in North Dakota by H.L. Bolley from a collection made in Fargo and described as "most abundant in Barnes County" in the 1940s by O.A. Stevens. The first record of Dalmatian toadflax is from Walhalla in Pembina County in 1937 by Stevens.

The toadflaxes are most likely to be found along highways, railroad tracks and other transportation or communication lines, or anywhere livestock is brought into the state. Often the origins of an infested area can be traced back to an escape from an ornamental planting. Dalmatian toadflax has been reported only as small patches in a few counties, generally in the western part of North Dakota. However, yellow toadflax has been found in many counties across the state and is on the verge of becoming a major problem for land managers in North Dakota.

Identification and growth form:

Dalmatian and yellow toadflax are members of the snapdragon family and thus easily recognizable by the bright yellow flowers, which have swollen corolla tubes that flare into two "lips" with an orange throat (yellow toadflax) and long spur. The flowers are 1 to 1.5 inches long with many flowers on a raceme. Both species have an extensive creeping rhizomatous root system that spreads like leafy spurge. The most distinctive difference between the species is that Dalmatian toadflax has broad, heart-shaped leaves that clasp a woody stem, whereas yellow toadflax has narrow, linear leaves with a narrow stem.

The plants begin regrowth from the roots as soon as the soil warms in early spring. Toadflax flowers from late June through August in North Dakota and single plants may produce more than 500,000 seeds that are dispersed by wind, rain, wildlife, and movement of forage and livestock. The seed is disk-shaped, 0.08 inch in diameter and dark brown to black, and often have irregular papery wings. Seed dispersal begins a few weeks after flowering and continues into winter. The roots of a single plant can extend 10 feet and give rise to daughter plants every few inches.

Why are these plants a concern?

The toadflax species are aggressive and will displace forage in pastureland and native species in wildland. Yellow toadflax can be mildly poisonous to livestock that graze it. Although the toadflaxes may be slow to establish, once plants take root, control is very difficult since most herbicides are ineffective.

Dalmatian toadflax seedlings are relatively poor competitors with grass species, but once established, the weed can become extremely invasive, especially on dryland sites, disturbed areas and roadsides. Yellow toadflax is adapted to more moist sites than Dalmatian toadflax and often is found in pasture, meadows and ditches.

DALMATIAN TOADFLAX and YELLOW TOADFLAX

How do I control these plants?

Prevention is the best method to keep Dalmatian and yellow toadflax from invading North Dakota pasture, rangeland and wildlands. Herbicides can be effective but require repeated treatments at high rates.

Chemical. Tordon (picloram), Plateau (imazapic) and Telar (chlorsulfuron) will control Dalmatian toadflax when applied at maximum use rates during flowering or late fall. No herbicide is labeled for yellow toadflax control, but research at North Dakota State University has found that a combination treatment of Tordon plus Overdrive (dicamba plus diflufenzopyr) applied in late fall will reduce yellow toadflax infestations for at least two years. See the latest edition of the "North Dakota Weed Control Guide" for application rate and timing recommendations.

Cultural. The long-term use of proper stocking rates to maintain competitive forage species has helped reduce the spread of toadflax into grazing lands. Burning is not effective because soil temperatures do not get high enough to kill the roots. Burning even may have a detrimental effect and cause an increase in the number of stems due to reduced cover.

Biological. Several insects have been introduced for toadflax control. The stem-boring weevil *Mecinus janthinus* has been the most successful and can reduce Dalmatian toadflax stands relatively quickly. *M. janthinus* larvae mine in Dalmatian toadflax stems, which slowly causes the plants to wilt and die. Repeated attempts to establish *M. janthinus* on yellow toadflax in North Dakota have failed, likely because the larvae cannot survive in the much narrower diameter stem of yellow compared with Dalmatian toadflax.

YELLOW STARTHISTLE

(*Centaurea solstitialis* L.)

State Noxious Weed List: **No.**

Yellow starthistle is an extremely invasive, fast-spreading member of the knapweed family and native of the Mediterranean region. Yellow starthistle first was collected in North Dakota in Grand Forks County in 1964 and was added to the state noxious weed list in 1999 after plants were observed in several newly seeded CRP fields. Yellow starthistle infests more than 15 million acres

YELLOW STARTHISTLE

in California and has displaced leafy spurge as the most invasive weed found in Idaho. Yellow starthistle presently has been found in the neighboring states of Montana, South Dakota and Minnesota.

Identification and growth form:

Yellow starthistle is an annual that often grows 3 feet or more tall and is branched with winged stems. Each stem terminates in bright yellow flowers with needlelike straw-colored bracts often up to 2 inches long. Lower leaves are deeply lobed while upper leaves are entire. Both stems and leaves are covered with pubescent hairs that give the plant a grayish appearance. Yellow starthistle reproduces (and thus spreads) only by seed. A single plant can produce as many as 150,000 seeds, of which 90 percent or more are viable and can remain dormant in the soil for a few years. Most yellow starthistle seeds are plumed and disperse when mature. However, some seeds are plumeless and stay in the flower head until winter storms disperse them in blowing snow. Yellow starthistle has a long tap root similar to spotted knapweed or dandelion.

Yellow starthistle seeds can germinate either in the fall following cool rains and overwinter as a rosette or in the spring after snowmelt. Yellow starthistle begins to bolt in late May to early June. Flowering starts in early to mid-July, similar to Canada thistle. Yellow starthistle often can go unnoticed until the plant begins to flower, but once the bright yellow, dandelionlike flowers bloom, the plant is easily detected. Flowering continues until mid to late August, then the plant dries to a straw color, the seeds mature and the cycle repeats.

Why is this plant a concern?

Livestock and wildlife will not graze where yellow starthistle grows because of the sharp spines around the flower. Yellow starthistle is adapted to a wide variety of environments and will out-compete most native plants for nutrients and moisture, reducing both native wildlife and plant diversity. Yellow starthistle can cause "chewing disease" in horses, which is a lethal neurological disorder. However, to present symptoms, such as the inability to eat or drink, stiff or trembling legs and a stiff, swollen, "frozen" face, a horse must eat an amount nearly equivalent to its body weight.

How do I control this plant?

Prevention is the best method to keep yellow starthistle from invading North Dakota cropland, rangeland and wildlands. Yellow starthistle is most likely to be found in recently seeded pastures or CRP fields; along highways, railroad tracks and other transportation or communication lines; or anywhere livestock is brought into the state. Previous infestations in the state can be traced to contaminated grass seed, including those used in CRP and contaminated hay, and from movement of out-of-state livestock and vehicles into North Dakota.

Chemical. The most effective herbicides for yellow starthistle control include Milestone (aminopyralid), Tordon (picloram) and dicamba (various). Treat an extra 10 to 15 feet around the infestations to control seedlings. A careful follow-up program is necessary to control missed plants and seedlings.

Cultural. Grazing, mowing, burning, cultivation and maintaining competitive forages can be used in conjunction with herbicides to keep yellow starthistle from establishing in North Dakota. Hand-pulling is also effective for control of this annual weed.

Biological. Biological control is in the research and implementation stage in states with large acreage of yellow starthistle such as California. However, biological control is not recommended in North Dakota because of the limited yellow starthistle acreage.

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Appendix B

North Dakota ANS Management Plan

North Dakota

STATEWIDE

AQUATIC NUISANCE SPECIES (ANS) MANAGEMENT PLAN

Bighead
Asian Carp

Common Carp

Rudd

Curlyleaf Pondweed

New Zealand
Brown Mud snail

Eloda

Protecting our aquatic resources for the future through education and responsible actions by the public, and the public officials entrusted to manage North Dakota's aquatic resources!

Goby

Zebra
Mussel

Prepared by
Lynn R Schlueter, principle author
Special Project Biologist
North Dakota Game and Fish Department

Eurasian
Watermilfoil

Ruffe

Spiny Water Flea

North Dakota

STATEWIDE

AQUATIC NUISANCE SPECIES (ANS) MANAGEMENT PLAN

Protecting our aquatic resources for the future through education and responsible actions by the public, and the public officials entrusted to manage North Dakota's aquatic resources!

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North Dakota Game and Fish Department

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APPENDICIES

Attachments:

2004 PROGRESS REPORT OF THE NORTH DAKOTA AQUATIC NUISANCE SPECIES MANAGEMENT PROGRAM by LR Schlueter, Special Project Biologist, North Dakota Game and Fish Department, Devils Lake, ND.

ACKNOWLEDGEMENTS

This plan was prepared with support from North Dakota state government agencies and universities, federal agencies, Western Governor's Association, tribal entities, and numerous private parties, companies, interested parties, and concerned citizens. The plan is the result of those individuals and concerned parties wanting to protect North Dakota from aquatic nuisance species.

EXECUTIVE SUMMARY

NORTH DAKOTA'S STATEWIDE AQUATIC NUISANCE SPECIES (ANS) MANAGEMENT PLAN

Each year more aquatic nuisance plants and animals enter the United States, and established populations are making their way closer to North Dakota. So far, North Dakota has a limited number of aquatic nuisance species (ANS), and then only in few isolated locations. ANS infestations affect more than just anglers, boaters and hunters, they have a negative influence on cities, power companies, water transfer projects, and landowners. In short, ANS impacts anything and anyone dependent on surface water. It is easy to understand the problem by picturing the fallout from noxious plants such as leafy spurge, musk thistle, and Canada thistle have had on agriculture. This is the same issue, but under the water's surface rather than on the land. North Dakota's natural resources will not be alone in feeling the impacts of ANS. If, for example, North Dakota was infested with zebra mussels, the cost for additional maintenance and monitoring for water intake facilities is estimated at $383,000 per year per intake, and $787,000 for each power plant cooling tower. These O/M costs will be passed on to the consumer. ANS infestations will affect communities and businesses relying on water-based recreation such as boating, hunting, and fishing. A 10 percent reduction in visits to North Dakota can equate to a loss of $3.2 million in direct hunting and fishing expenditures in the local economies. Water transfer and water pipeline projects can be blocked because of ANS concerns or operated only with expensive treatment facilities added to the intakes. Minnesota has spent approximately $1 million annually in its ANS control projects without eliminating the problems. ANS equates to irreparable damage to North Dakota's economics and its natural resources.

Aquatic nuisance species arrive in our state because of recreational, commercial, and consumer activities. There is increased interstate travel for recreation, which means more people, boats, and other equipment used in ANS infested waters are coming to North Dakota. Also, increased commercial importation of aquatic species is occurring in the pet trade, water gardens, and landscaping means it is easier for a noxious species to enter commercial markets and become widely distributed. The global market now provides a pathway for new noxious species to find their way to our doorsteps with a credit card, a phone call, and it can be delivered the next day to your doorstep.

The saying, "An ounce of prevention is worth a pound of cure," is a dramatic truism with ANS. The most important lesson learned from the experiences of other states is the wisdom that prevention is much more effective and much cheaper. Prevention requires intense and effective public education, developing partnerships, voluntary actions, and organization among state agencies. To date, most of North Dakota's ANS prevention and control efforts have been loosely organized and under funded.

North Dakota natural resource managers are slowly becoming more aware of this management challenge and are trying to address portions of the problem that fall under

their jurisdictions. The problem is that there is no clear authority or single agency charged with managing ANS problems. Most management efforts have focused on reacting to isolated infestations, not a comprehensive set of strategies to prevent the introduction of the problem(s). The current situation is much like a family that has a very basic insurance policy with limited coverage for catastrophic events. While some things are covered, there are many risks that are not, or can only be handled after extensive paperwork and a long wait which may prove fatal. Some of North Dakota's ANS problems are covered by existing state activities and funding, but there are many that are not. Most state agencies have only reacted to infestations that have become well established. The problem is a lack of coordination of ANS activities across public and private sectors, limited reach of projects that legitimately fall under current state agency mandates, and a lack of funding to allow consistent actions to protect North Dakota's natural resource. North Dakota is "under-insured" for the many different ANS risks it is facing.

The North Dakota Aquatic Invasive Nuisance Species Management Plan (ND-Plan) intends to:

- Form an advisory board, or Aquatic Invasive Species Committee (AISC), to North Dakota Game and Fish Department's Director to coordinate ANS prevention and control activities, and encourage state agencies and the private sector to become involved in ANS prevention and response;

- Develop a list of ANS that cannot be brought into or transported within North Dakota;

- Organize educational and outreach efforts for public and private sectors, and use a targeted audience approach to marketing ANS prevention;

- Monitor waters at high risk for ANS, and determine the pathways of high risk for importation of ANS into or within the state;

- Develop a monitoring program for early detection and rapid response to control a pioneering infestation;

- Inspect recreational boats, commercial vessels, and construction equipment used in aquatic situations, and determine owner/operator ANS precautions and awareness;

- Recommend legislative solutions that can help protect North Dakota's human and natural resource communities from ANS damage;

- Make North Dakota eligible for federal matching funds and a method(s) to prioritize funding of ANS prevention and control projects, leverage these funds with local communities, private entities, and governmental agencies; and

- Improve collaboration between national, regional, state, and local ANS prevention efforts.

The ND-Plan relies on state agencies and non-governmental partners working together to prevent or control ANS infestation and these groups having “ownership” in the outcome of ANS prevention in North Dakota. A cooperative effort is our best deterrent. This statewide management plan is based on all of us working to keep ANS from impacting our state.

INTRODUCTION

What are ANS?

Aquatic nuisance species (ANS) are nonindigenous, obligate aquatic plants or animals that threaten economic stability, human health, native or desirable species, or the ecological health of the state's waters. ANS infestations have negative impacts on commerce, agriculture, aquaculture, recreation, or just about any activity dependent on the state's waters. When noxious plants and animals are introduced, they can quickly become a problem as the new environments lack natural controls such as diseases and predators which allow colonizing populations to rapidly expand. The negative effects of ANS to native and desirable aquatic resources are difficult to measure, but those consequences are real and dramatic. In a recent study, invasive species, which include ANS, are imposing an economic burden of $137 billion per year in the United States (Pimentel et al., 1999). North Dakota's agriculture sector is already aware of the impacts of noxious species such as leafy spurge and various nonnative thistles. ANS are just the aquatic version of this problem, but they are able to impact any sector that relies on North Dakota's surface waters.

What is our situation?

North Dakota is a prairie state where water is often scarce. ANS invasions create risk to domestic, municipal, agricultural, and industrial supplies, and to recreational water use. Compromising water supplies threatens North Dakota cities and rural communities, disrupts economies, and damages natural resources.

Much of North Dakota's municipal water supplies are from rivers, reservoirs, and lakes. These resources are in jeopardy from ANS infestations. Imagine these supplies becoming fouled with a nuisance species such as zebra mussels. These animals clog water intakes, increasing annual maintenance costs for the consumer. When they die in large numbers, their shells litter beaches, and the smell of decay is in the air and water. When there is a large die-off, the dead mussels create a nuisance and human health risk – especially to potable water supplies. These die-offs disrupt recreation and reduce waterfront property values. By filtering plankton from the water, zebra mussels reduce desirable fish and wildlife through competition and the reallocation of trophic energies. In addition, waste from zebra mussels foul bottom substrates, greatly modifying habitats which further reduce desirable and native species.

Are there risks of zebra mussels becoming established in North Dakota? The reality is that zebra mussels are moving closer to North Dakota each year. In their wake, ANS have caused significant economic problems, ecosystem impacts, damaged natural resources, and spawned new social problems. The nearest infestation to North Dakota is less than 150 miles to the east in Lake Ossawinnamakee in Minnesota. An ounce of prevention is a good investment when dealing with ANS (Leung, et al., 2002).

The monies spent on prevention are much less than the cost of dealing with an ANS infestation.

There are five important points to consider for ANS prevention: 1) ANS are currently in isolated locations in North Dakota and there only three species in the state; 2) risks are real, are devastating, and ANS are closing in on North Dakota's borders; 3) prevention of ANS is more practical, more effective, and less expensive than control efforts, which are seldom successful (Leung, et al., 2002); 4) negative impacts will occur to all those who depend on water; and 5) additional and dedicated funds are needed to expand and improve North Dakota's ANS prevention efforts.

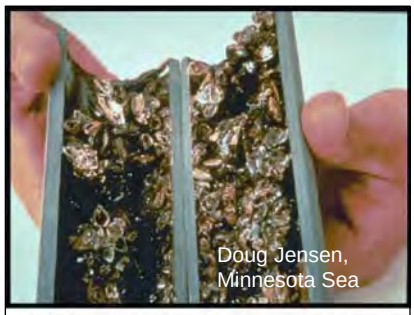
What is at risk?

While North Dakota has been lucky so far with having few ANS infestations (USGS, 2000), the long-term threat is apparent. Examples of the immediate economic and environmental risks include:

- Outdoor Recreation: Outdoor recreation is important to North Dakota's economy, contributing $4.7 million in 2001 from hunting and fishing alone (Bangsund and Leistritz, 2003). Nonresident anglers spent $31.9 million dollars in North Dakota in 2001-2002. If an ANS infestation reduces visitation by even a modest amount (say 10 percent) it would mean a significant loss of revenue to the state (about $3.2 million in this example). Salmon fishing in Lake Sakakawea supports approximately 13,000 angler days per year, which equates to a value of $1.8 million dollars annually (Power, 2004). The salmon population could be reduced by whirling disease, a viral pathogen found in states to the west.

Boat fouled with Eurasian milfoil.

- Water Users: Several North Dakota industries, all major cities, and many rural water pipelines rely on surface water supplies. An industrial water user has only to look to our neighbors to the east and the problems they are having, and then think about the risk to our state. ANS bivalve infestations in the Midwest and eastern part of the United States are costing $1 billion annually (Khalanski, 1997). In the upper Midwest, a medium-sized city spends about $383,000 per year per water intake (Jensen, 2004). To clean ANS from power

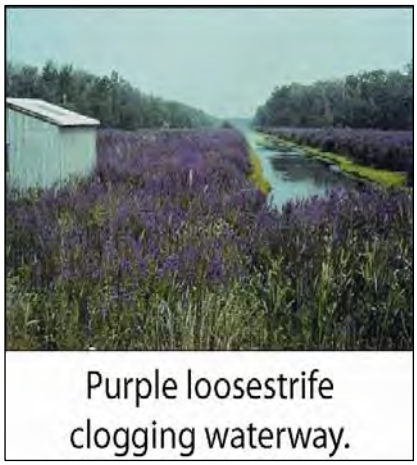


Zebra mussels clogging an industrial pipe.

cooling towers, the annual cost is nearly $787,000 per site (Jensen, 2004).

- Agriculture: Water flows in canals and irrigation pump intakes are clogged by Brazilian elodea (WASHINGTON DEPARTMENT of EOCOLOGY, 2004). This plant also creates problems for boaters and anglers. Heavy growth will displace native plants, and waterfowl production is curtailed in infested lakes and rivers. The same statements are true about the effects of Eurasian watermilfoil on water uses.

- Natural Resources: Even a modest zebra mussel infestation can reduce desirable fish populations by about 35 percent (Schlueter, 2004). Hetersporia spp. (a micosporidan) has been found in Minnesota and Wisconsin waters for about 15 years, affecting fish species such as fathead minnows, walleye, yellow perch, largemouth bass and channel catfish. In 1944, purple loosestrife was found in a few isolated locations along the Red River near Lockport, Manitoba, but now has invaded and displaced native species in thousands of acres of wetlands (Manitoba Purple Loosestrife Project, 2002).


Purple loosestrife clogging waterway.

- Property Values: People will pay more to live next to water, but lakefront property values in Pennsylvania dropped approximately 15 percent where Eurasian watermilfoil infestations occurred. The reductions in county property tax revenues were offset by increased tax rates on other items. Environmental and economic problems caused by the dense growth of these weeds include impairment of water-based recreation, navigation and flood

Eurasian water milfoil damaging waterfront property.

control, degradation of water quality and fish and wildlife habitat, and accelerated filling of lakes and reservoirs. Eurasian water milfoil is found within 150 miles of North Dakota's borders (Exotic Species Program, 2004).

- Un-infested waterbodies: As ANS are moved to new areas, the cost to control the problem also increases. Minnesota's first Eurasian water milfoil infestation was reported in 1987. This ANS spread because control efforts were not quickly put into place. Minnesota now has Eurasian watermilfoil in 152 lakes, reservoirs, streams and rivers (Exotic Species Program, 2004). It is estimated that Minnesota spends approximately $1 million annually to control Eurasian watermilfoil. Yet the problem has not been eliminated at this spending level. Movement of ANS into or within North Dakota will likely create similar costs. This means money and manpower reallocated from other recreational projects.

Who manages ANS?

States are in the lead. Most states have noxious weed laws and some level of management on other deleterious species. For ANS prevention and control efforts, the state's governmental agencies have become the focal point for managing ANS inside their borders. States are developing ANS management plans to coordinate different activities, setting priorities for intelligently allocating scarce resources, and creating adaptable management systems to meet changing needs.

Federal government is involved. The introduction and spread of ANS across state and international borders continues even though the problems – damage to ecosystems, degradation of natural resources, increased socio-economic costs to water users, and other impacts – are well known (Lassuy, 1994). As a result, the federal government has taken an active interest. In 1990, the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) began providing federal funds to implement states' ANS management plans. While programs created by this national legislation were initially directed at the Great Lakes region, the reauthorization of NANPCA in 1996 as the National Invasive Species Act (NISA) established a national goal of preventing the introduction and spread of ANS in all states. The NISA allowed for the development of various federal programs such as "Protect Your Waters", 100th Meridian Initiative, and others.

NISA contained language that encouraged states to develop their own management plans which were feasible, contained cost-effective management practices and measures that could be implemented by a state to prevent and control ANS infestations in an environmentally sound way. Approval of North Dakota's statewide ANS management plan (ND-Plan) will make federal funds available to North Dakota for its ANS prevention efforts; see National Invasive Species Act of 1996 (see Appendix A). Federal agencies, like the Department of the Interior, are to ensure that American Indian resources and federal lands are properly managed, protected, and conserved, including protection from ANS damage. Those federal agencies managing ANS on agency and tribal lands provide policy reviews and other technical services such as education and act as a liaison on ANS issues. This makes federal agencies and Indian tribes important partners in a state's ANS management efforts.

There is regional cooperation. Various regions of the United States have come to realize that one state's problem is really a problem that affects other states. It is easy for North Dakota to imagine this by considering that an ANS infestation in the Missouri River or the Mississippi River will not stop at a state's borders. In response to the ANS threat, the Western Governor's Association has been supportive of the Western Regional Panel and 100th Meridian Initiative. Both of these federal groups have been tasked with limiting the introduction, spread and impacts of ANS into western North America. Both groups are a combination of public and private sector participants working together to protect western water resources from ANS.

History of management in North Dakota. ANS problems in North Dakota have long been recognized by state and federal agencies and the private sector. Efforts to control ANS have been funded as an extra project, with some funds moved from other internal sources or from available federal funding sources. The North Dakota Game and Fish Department began working with the U.S. Fish and Wildlife ANS-Task Force, 100th Meridian, and Western Governors' Regional Panel in the mid-1990s to secure funds that were utilized in forming partnerships with other North Dakota natural resource agencies for ANS education and prevention activities. These funds were used to provide signs at boat ramps in North Dakota Department of Parks and Recreation areas and in areas operated by the U.S. Army Corps of Engineers (COE). Publications by the North Dakota Tourism Department contained educational information and were provided to individuals, both residents and nonresidents, requesting information about North Dakota. Posters to increase ANS awareness were developed and placed in bait shops, sporting goods stores, boat dealerships and at local chamber of commerce offices. Monitoring of waterbodies for ANS infestations was done by North Dakota Game and Fish Department field staff and COE staff. ANS impacts to North Dakota's resources and to long-term operational and maintenance impacts were discussed with the North Dakota Department of Health, State Water Commission, U.S. Fish and Wildlife Service-Fisheries Assistance Operation and Bureau of Reclamation. Local water resource boards were provided with information on ANS impacts to water management projects. Contracts with universities for studies on boaters' points of origin and travel destinations, comparison of ANS lifecycle requirements to conditions in North Dakota waters, and ANS precautions the boaters had done were vital to develop risk analysis reports. Those agencies, which issue permits for water projects, understand the importance of taking proactive steps and have begun to modify their permitting systems and operational procedures to include provisions to prevent ANS introductions.

It is difficult to track all of the ANS prevention expenditures in North Dakota to date. The North Dakota Game and Fish Department has spent $125,000 over the last five years. Monies spent by other agencies have not been tracked, and is extremely difficult to estimate. It is believed that their efforts were the result of funding the North Dakota Game and Fish Department and it's forming partnership with others. A number of partnerships developed which provided information to targeted audiences in order to inform the private sector of ANS impacts, and promote coordinated ANS prevention or monitoring activities. The partnership allowed a limited budget to cover more activities and reach a large number of people, private entities and state agencies.

STATE AUTHORITIES, REGULATIONS, AND PROGRAMS

In North Dakota, many state agencies have authority and regulatory roles in managing natural resources. While many agencies have some authority to regulate or preventing ANS, all public agencies have an ethical responsibility to prevent damage to North Dakota's resources and to act in the best interest of North Dakota's citizens. As a historical prospective, North Dakota's legislature has not recognize a single agency as the sole responsibility to regulate ANS. North Dakota's legislature could designate an agency to be the lead, but at this time there is no centralized authority or management structure that exists to coordinate ANS activities in North Dakota.

The authorities and regulations of various state agencies are summarized below (see Appendix B for an extensive listing of North Dakota Century Codes for various state agencies).

DEPARTMENT OF AGRICULTURE

The Commissioner of Agriculture or the commissioner's authorized representative, with the assistance of the North Dakota State University Extension Service, has powers over the management, control and eradication of pests, noxious weeds, rodent and insect management and the use and application of pesticides. Their primary function is to provide technical expertise to county weed boards and to provide funding for various weed control activities.

The Plant Pests Act [North Dakota Century Code: 4-33-01 through 4-33-12] provides the Department of Agriculture the power to suppress, control or eradicate the spread of plant pests in the state. The commissioner may temporarily quarantine areas that he believes necessary to prevent the spread of plant pests for up to 90 days without a public hearing, or longer with a public hearing. The commissioner is empowered to conduct a reasonable inspection of any premises or property within the state with a warrant issued by District Court or consent of the owner and may stop and inspect any means of transport or conveyance within the state if he has probable cause to believe it to contain or carry a plant pest or host.

The North Dakota Noxious Weed Control Act [North Dakota Century Code: 63-01.1-01 through 63-01.1-17] provides that the Agriculture Commissioner, working in conjunction with county weed boards and county weed officers, the authority for control, maintenance, and eradication of noxious weeds and pests throughout the state. The commissioner, after consultation with the North Dakota State University Extension Service, shall compile and keep current a list of noxious weeds and provide local authorities with information and a program for the control or eradication of noxious weeds. The act provides the Highway Patrol, sheriffs, and other law enforcement officers the power to stop and inspect vehicles suspected of transporting noxious weeds within the state, to prevent the dissemination of noxious weeds on highways, airways or waterways.

GAME AND FISH DEPARTMENT

The North Dakota Game and Fish Department [North Dakota Century Code: 20.1-02-01 through 20.1-02-28] provides the Director with the authority to regulate the importation, introduction and transplanting of fish, fish eggs, and other aquatic animals into state waters. The act provides that one must have a permit issued by the Director before introducing any fish or fish eggs into public waters, and the fish or fish eggs must be inspected for disease.

The Fish, Frog, and Turtle Regulation Act [North Dakota Century Code: 20.1-06-01 through 20.1-06-17] provides the Director with the power to remove and dispose of fish deemed undesirable. The Director may adopt rules governing the operation of private fish hatcheries, introduction and release of fish into the state, and the supervision of live bait wholesalers. Department rules prohibit the dumping of minnow buckets or any other container into public waters. [NDAC 30-04-04-05].

STATE DEPARTMENT OF HEALTH

The State Water Pollution Control Board, which includes the Director of the North Dakota Game and Fish Department, through the State Department of Health and with cooperation of the State Water Commission [North Dakota Century Code: 61-28-01 through 61-28-08] maintains and improves water quality of the state, formulates and issues standards of water quality, and provides for a system to classify North Dakota's waters [NDAC 33-16-02.1-04, 09]. The agency is to require the proper maintenance and operation of sewage and industrial waste systems to protect present and future use of such waters for, among other reasons, the propagation of fish and aquatic life and wildlife.

STATE WATER COMMISSION AND STATE ENGINEER

The Water Commission Act [North Dakota Century Code: 61-02-01 through 61-02-76] provides for the establishment of a State Water Commission, which has general authority over all surface and subsurface water within the state. This includes authority over water projects, which includes recreational use or wildlife conservation. The Commission appoints the state engineer. Anyone who wants to divert or appropriate water within the state must get a permit issued by the state engineer, unless the use is for domestic, livestock or for fish, wildlife (including purposes of propagating, sustaining fish and wildlife resources, and for the development and maintenance of water areas) or other recreational need [North Dakota Century Code: 61-04-01.1 through 61-04-32]. The state engineer does have the authority to control and supervise all water and wildlife conservation projects and wildlife reservations. [North Dakota Century Code: 61-15-03].

WATER RESOURCE DISTRICT ACT

This is the only agency with the power to order the removal of aquatic weeds and pests [North Dakota Century Code: 61-16.1-01 through 61-16.1-63]. Water Resource Boards have the power to manage water resources within their districts and order or initiate legal action to compel a person, user or controller of any bridge, or culvert to remove any weeds, shrubbery or other debris which hinders or decreases the flow of the water.

HIGHWAY PATROL AND OTHER LAW ENFORCEMENT

Statutes concerning the enforcement of laws regarding pests, pesticides, noxious weed control, weed control, and game and fish generally require other law enforcement agencies within the state to aide and assist in the enforcement of laws and regulations in these areas.

FEDERAL AUTHORITIES AND REGULATIONS

No single federal agency has clear authority over all aspects of ANS management. Many federal agencies have programs and responsibilities that address aspects of the problem such as importation, interstate transportation, exclusion, control, and eradication (see Appendix C). Federal activities on ANS management are coordinated through the National Aquatic Nuisance Species Task Force and Executive Order (EO) 13112, which requires all federal agencies to collaborate in developing a national invasive species management plan that will include terrestrial and aquatic species.

Executive Order 13112 on Invasive Species

President Clinton signed Executive Order (EO) 13112 on Invasive Species (64 Fed. Reg. 6183, Feb. 8, 1999), on February 3, 1999. The EO seeks to prevent the introduction of invasive species, provide for their control, and minimize their impacts through better coordination of federal agency efforts under a National Invasive Species Management Plan. The Order directs all federal agencies to address invasive species concerns, as well as refrain from actions likely to increase invasive species problems. The National Invasive Species Management Plan was finalized on January 18, 2001. The Plan can be found on the Council website at www.invasivespecies.gov. See Appendix D for full details on EO 13112.

Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA; Title I of P. No.101-646, 16 U.S.C. 4701 et seq.)

This Act established a federal program to prevent the introduction of, and to control the spread of, introduced ANS and the brown tree snake. The U.S. Fish and Wildlife Service, U.S. Coast Guard, Environmental Protection Agency, Army Corps of Engineers, and the National Oceanic and Atmospheric Administration share responsibilities for implementing this effort. They act cooperatively as members of an Aquatic Nuisance Species Task Force. The mandate is prevention, monitoring, and control with these activities supported by research and education. The Task Force conducts studies and reports to Congress:

- to assess whether ANS threaten the ecological characteristics and economic uses of U.S. waters other than the Great Lakes;

- to identify and evaluate approaches for reducing the risk of adverse consequences associated with intentional introduction of aquatic organisms.

Under NANPCA, state governors are authorized to submit comprehensive management plans to the Task Force for approval, which identifies areas or activities for which technical and financial assistance is needed. Grants are authorized to states for implementing approved management plans, with a maximum federal share of 75 percent of the cost of each comprehensive management plan. The state (or non-federal) contribution is 25 percent of total program costs.

National Invasive Species Act (NISA; No.104-332)

In 1996, NISA amended NANPCA to mandate regulations to prevent the introduction and spread of ANS into the Great Lakes through ballast water and other vessel operations. The act authorized funding for research on aquatic nuisance species prevention and control in the Chesapeake Bay, Gulf of Mexico, Pacific Coast, Atlantic Coast, and San Francisco Bay-Delta Estuary.

In addition, NISA required a ballast water management program to demonstrate technologies and practices to prevent aquatic nonindigenous species from being introduced into and spread through ballast water in U.S. waters. It modified: (1) the composition and research priorities of the Aquatic Nuisance Species Task Force; and (2) zebra mussel demonstration program requirements. See Appendix A for full details on NISA.

PROBLEMS AND CONCERNS

How do they get around? – The need for pathway management. Nineteen pathways for ANS to enter North Dakota has been described (Leitch and Tenamoc, 2001). It is recognized that the RISK ASSESSMENT FOR THE INTRODUCTION AND ESTABLISHMENT OF AQUATIC NUISANCE SPECIES IN NORTH DAKOTA (Brooks and Schlueter), the lists of ANS in other states or provinces, and travel patterns need to be periodically updated. The combing of such information will provide a reasonable risk assessment of each recognized ANS and its likely pathway.

Those areas which are believed to be the likely sources of ANS importation or movement will be a primary target, but educational efforts will continue on a broad approach as not to miss a source of ANS movement. Understanding the pathways allows prevention, education, and outreach efforts or other reasonable and effective prevention practices (REPPs) to focus on actual problems.

Effectively managing the risk of ANS will focus on prevention rather than attempting to control the problem after it is found in North Dakota. The spread of ANS to inland waters has many pathways. The first pathway of concern is from ANS hitchhiking, where organisms catch a free ride on aquatic recreational equipment, such as boats, trailers, and sporting equipment, from one waterbody to another. ANS hitchhikers can be moved into North Dakota or moved among North Dakota waterbodies. From the angler surveys conducted on North Dakota waters, it was found that the number of nonresident anglers has increased in recent years. Many of these anglers are coming from areas known to have ANS infestations, and some visitors have neglected to take ANS precautions to rid their equipment of ANS hitchhikers. To compound the problem, North Dakotans visit other states where ANS abound and could bring ANS back to North Dakota on their boats or equipment.

Another pathway is through commercial ventures, like the importation of live fishbaits, importing exotic fishes for aquariums, and importing exotics for aesthetic purposes such as aquatic gardens, landscaping and for food. In 2003-2004, exotic aquatic plants were observed for sale in local plant nurseries and home improvement centers in North Dakota. North Dakota Game and Fish Department staff checked and found that many of these plants were on the various lists of nonindigenous species or on the U.S. Department of Agriculture's Noxious Plant list. But since current North Dakota regulations did not list them as a noxious plant, no action could be taken. The concern is that these nursery plants can be released, accidentally or intentionally, into the wild and create ANS problems in the state's waters. The two classic examples of ornamental plants that become problems are purple loosestrife and salt cedar. Both are on the state's Department of Agriculture's noxious plant list, but can still be found in some commercial plant nurseries and via the internet sales. Both plant species now occur in the wild in many areas of North Dakota. The prodigy of "domesticated" plants or animals can easily escape or be released into the wild, become an established infestation, and cause significant problems.

The following is a general listing of ANS pathways in North Dakota:

- via watercourse or watershed connections such as ditches, channels, natural overland flows in high water events, and in streams and rivers;
- on or in recreational boats or equipment used for angling, hunting, boating, or vessels used in construction in aquatic situations;
- use of undesirable species or ANS as live fish baits and the disposal of unwanted baits in improper locations;
- commercial ventures, which includes aquaculture, pet industry, plant nurseries, landscaping and food markets, that utilize a live product,

service industry such as hunting lodges or fishing guides, and fish bait industry;
- natural carriers, such as seeds in bird feathers and animal fur, seeds or eggs stuck on muddy feet, or attached to another plant or animal;
- commercial vessels and construction equipment used in aquatic situations; and
- importation of plants or animals for personal enjoyment, as status symbols, ornamental use, and similar uses.

Bioterrorism is a concern and will not be considered to be a typical introduction pathway for ANS. Bioterrorism is a clandestine act meant to damage the region's natural resources, sabotage in its purest form.

Why are ANS moved from their native ranges? Three interrelated factors create conditions suitable for the spread of ANS:

1) Human demand. Consumer demand for live plants or animals used in human consumption, for display in gardens and aquariums, aesthetic pleasures, and commercial ventures (i.e., live food market, aquaculture, captive breeding);

2) Increased travel and trade avenues. This occurs when individuals have more discretionary money, a great deal of leisure time, and are willing to travel greater distances to enjoy their leisure, sightsee, and recreate. The increased distances people travel correlates to the likelihood they'll come in contact with an ANS. The increased ease of international trade (i.e., air mail delivery of species ordered over the Internet) also makes it possible for exotic species to effortlessly find their way to North Dakota;

3) Lack of citizen and private enterprise knowledge or apathy about taking the proper precautions. Mankind is often the unwitting and unknowing agent of unwanted movement of ANS. Individuals and businesses are unaware of ANS problems, but lack of knowledge is very concerning when one realizes the amount of the information that has been provided in different sources such as popular periodicals, television, radio, and newspapers. A greater concern is that individuals are aware of the problem, but are not taking the precautions needed to prevent ANS movement. It is not hard to imagine that some individuals are just not willing to take precautions as they assume the problem is inevitable or they just do not care about the consequences of ANS infestations; and

Establishment of new populations in new areas that create problems – Not all species cause problems in new locations.

The importation of an ANS to a new area does not always result in a new population being formed. As with any species, the introduced ANS must find compatible conditions in the new location. An easy example is those ANS that are from tropical regions, they will not survive in North Dakota's harsh winter climate. Suitable

biological conditions for the exotic animal or plant must be present in its new location or it will not survive. The introduced specie(s) must find an unfilled niche it can utilize. In addition, the new area must not have biological controls such as predators, diseases, etc., which overwhelm a new species that has no adaptations to their attacks. In the event that three controls are not in place, the introduced species survive, prosper, and can create problems. When the new specie out-competes a native or desirable species, it then becomes a problem and creates a rapid change in ecological conditions where it is established. As ecological interactions are common, impacts to secondary species can and do occur from the sudden change in the ecosystem.

The problem is from species from regions with similar weather and water conditions as North Dakota. These species are likely to survive and thrive in North Dakota. As with any new population, the number of individuals slowly increases until they reach a threshold level. At this point, there will be a rapid population expansion. While the new population is slowly building, genetic selection or shifting is occurring, those individuals which are best adapted to the new conditions prosper and multiply. A species' adaptation allows some introduced species to dominate in the new environment and out-compete other species. In many instances, the new species can interbreed with a closely related species. The resulting hybrid can be more of a problem than the original species.

The newly introduced populations are the most susceptible to control efforts – when they are below the threshold level for high expansion rates. To have effective control measures, the population must be found in this critical stage. When the species has passed this point, has begun to spread to new areas, it is now considered as common place, then it is basically uncontrollable. Once a population is well established, controlling or eliminating the established ANS population is impractical.

Who is in charge? – The need for agency coordination. While many government and private entities have some form of ANS responsibility, there is not a comprehensive and coordinated management capacity, nor is there a focus on effective prevention efforts. A new, robust vision of cooperation and deterrence will be required to meet the uncharted risks that ANS present to North Dakota. The many different laws, regulations, and policies with partial impact on ANS need to be woven into a comprehensive and cooperative program to protect the state's aquatic resources, and domestic, agricultural, and industrial water supplies.

The proposed program needs to be based on reasonable and effective prevention practices (REPPs) that meets North Dakota's needs. Examples of such increased activities for agencies and entities where REPPs or ANS prevention should be include:

- State Water Commission permits for construction of water transfer projects, water pipelines, water retention structures, water intake devices or similar activities where ANS introduction or spread could occur.

- Department of Health permits for water projects where the discharge of waters or the transfer of water between basins that present an ANS risk.

- Department of Agriculture to expand its inspection/monitoring of plant nurseries or garden centers for ANS plants and enforce appropriate ANS regulations on sales of aquatic plants.

- Game and Fish Department to ensure that imported species such as baitfish or fish for aquaculture or stocking are ANS free or not from areas with ANS infestations; continue inspecting bait wholesalers and retailers for ANS; work with the pet trade industry in implementing ANS prevention protocols; and enforce ANS regulations on transporting aquatic vegetation or organisms.

- Tourism and Commerce Department to provide information on ANS ecologic and economic risks, and the need for prevention in its trade publications, economic development information, and other educational materials.

- County Extension Agency to provide information on alternative water garden plants, which do not pose ANS risks.

- Department of Parks and Recreation to include information on ANS concerns, ANS introduction from park visitors, and enforce such ANS regulations on transporting aquatic vegetation or organisms.

- Department of Transportation to inspect large boats hauled by commercial carriers when they pass through ports of entry or at weigh stations, and enforce appropriate ANS regulations on the movement of aquatic plants and organisms.

- Water Boards or Natural Resource Boards to review water management permits to ensure ANS introductions will not occur and include ANS prevention protocols for equipment brought into an area. To quarantine waters, if needed, to prevent the spread of ANS to other waters.

- Municipal water users, lake owner associations, irrigation districts or conservancy districts would inform their groups of the impacts from ANS infestations, the costs to users associated to control or manage the problem, and the need to take action before ANS problem(s) becomes established and cannot be controlled.

The including of REPPs into agency responsibilities will only enhance existing duties and agency mandates to protect North Dakota's environmental and economic resources. While ANS problems are considered new for many agencies, ANS must be viewed as another problem that will negatively impact our state's future. ANS prevention must become a part of agency concerns, which means agencies must forgo the role of reacting only when there is a well-established problem. To prevent ANS

infestations and their problems, a strong, proactive, coordinated effort must be made among state agencies.

Preventing ANS introductions is the responsible action for the local and state agencies. We, entities representing the best interests of North Dakota citizens, who are involved with or entrusted with management of North Dakota's natural resources and economic viability, must be involved. To not become involved is to give up the trust and faith, and the responsibility that the public has given public agencies.

Involvement of the private sector. Success with a new set of coordinated activities from the government, especially to educate the public and business community, will require participation by those private-sector parties who have a stake in preventing ANS damage. While agencies frequently interact with the public, they do not do so nearly as often as the private-sector. Consequently, a large segment of those who will be impacted by ANS are not being reached. Some commercial activities such as water gardening, exotic pet importing, and the live fish bait industry, are at-risk pathways for introducing deleterious species. The power industry which supplies electricity for lights at work, television sets at home, and the computers in schools will have to pass higher operational costs on to their customers. These two examples show how ANS can have impacts to those not active in outdoor recreation.

Businesses must be willingly involved in ANS prevention to implement the best management practices for their industry, and in so doing, complement the limited reach of regulations. Industries are natural partners to create an environment where prevention can reap benefits for the expenditure side of their operations.

Partnerships are critical to the programs outcome. Outdoor recreators and the private sector must buy-in to taking preventive precautions to ensure their resources for the future. It is the three-way partnership between the public, private businesses, and state agencies which will allow for effective ANS prevention activities to be done. North Dakotans who will be impacted by ANS must willingly agree to prevention efforts and work for such efforts.

Any ANS prevention program can be successful if those impacted are willing to help. There are three major advantages to the partnership: 1) willingness of all affected parties to be involved; 2) increased levels of direct communications on the problem between all affected parties, finding realistic solutions, and understand the solutions' impacts on affected parties; and 3) leveraging a limited budget with matching dollars and in-kind services. Item number 3 will require the expenditure of funds on the best avenues to communicate problems to the public and private sectors which have the best results for ANS prevention.

WESTERN REGIONAL PANEL RECOMMENDATIONS ON STATE ACTIONS TO IMPROVE REGIONAL CAPACITY FOR MANAGING AQUATIC INVASIVE SPECIES

The Western Regional Panel (WRP) was formed to promote a cooperative regional response to the threat of ANS among member states. States have broad authorities and resources that are critically needed to combat invasive species. ANS impact states economically and environmentally. The WRP is attempting to assist member states by recommending actions that will reduce the risk of ANS for each state and the western region as a whole. The WRP encourages member states to implement actions to reduce the risk from ANS to the region. The following recommendations have been reviewed and approved by the WRP members.

I. Actions to build state capacity for managing aquatic invasive species.

1. Appoint a state Aquatic Nuisance Species Coordinator (ANS-Coordinator – Every state has multiple agencies, authorities and information sources that can be used to implement a wide variety of aquatic invasive species management programs. A coordinator is needed to integrate these efforts into an efficient, unified response, and to serve as an identifiable lead contact for the state on aquatic invasive species issues and related aquatic issues.

2. Establish state Aquatic Invasive Species Committees (AISC) – The challenges caused by invasive species can be so diverse, extensive and long-term that they require consistent attention over time by the full range of agencies that serve the affected public. A coordinating committee, especially if established through legislation, has the greatest ability to provide a stable long-term forum for key stakeholders to address ANS problems.

3. Create state ANS management plans – North Dakota statewide ANS management plans (ND-Plan) will be a well thought out, effective, action strategy that creates consensus and support from partners within the state and, when approved by the national Aquatic Nuisance Species Task Force, will make a state eligible for federal funding.

4. Appoint a representative to the WRP and provide the resources needed for participation – The problems caused by ANS cannot be solved by any one state or entity. International, national, regional, state and local initiatives are needed to affect meaningful solutions. Participating in the WRP panel provides members access to new, creative ideas, and facilitates coordination among state efforts and national and international programs. Informed state actions are better able to implement effective programs that are consistent with federal law.

II. Actions to improve state authorities and increase funding for implementation:

1. Provide a long-term, stable source of state funding that can be used as a match for federal funding to implement state ANS management programs. Some states have already implemented aquatic ANS management programs that are supported by fees, license revenues, or general fund dollars. Federal funding by itself is insufficient to address the problem, but it can serve as a catalyst for leveraging limited state funds. Each state should consider their various funding options and strive to secure long-term funding for ANS management.

2. Implement programs to prevent the spread of invasive species via boating as well as other pathways. The spread of ANS among fresh water lakes and rivers, coastal estuaries, and nearshore marine waters can be greatly reduced by implementing state prevention programs. These programs should have adequate funding for boater education and inspection programs, along with the authority to make the transporting of nonindigenous aquatic organisms on recreational or commercial boats illegal.

    a. Survey trailered recreational boats according to the 100th Meridian Initiative Guidelines. The 100th Meridian Initiative has a standard survey form which can be found at www.100thmeridian.org. The survey information shows the regions boats are coming from such as areas where there is ANS infestations, travel routes, and destinations. Western states can estimate where ANS infestations are likely to come from. This information, in a searchable database, can help focus educational activities along specific pathways.

3. Create a state early detection and rapid response plan with clear authority and funding to quickly respond to new invasions and new pathways for invasion. The WRP has created a model rapid response plan that should make it easier for each of our member states to create and implement state specific response plans.

4. Provide state authority to designate waters that contain ANS as “Infested Waters” and implement management actions to control the existing population and prevent its spread. It is not feasible to eradicate some invasive species populations if they become firmly established before control action is begun. Control of invasive species in certain waterbodies can become a long-term management commitment. The designation of “Infested Waters” (or any other special state designation) can allow managers to quantify the problem while implementing education, containment and control programs to limit the damages and long-term expense.

5. Implement a nonnative species classification program that may allow for the beneficial use of some nonnative species while screening out potentially invasive species prior to importation or release. The intentional importation and release of nonnative species has led to the introduction of numerous invasive species. New federal and state programs are needed to screen out harmful invasive species prior to importation or release. Screening programs can reduce the impact of invasive species while allowing for their beneficial uses.

THE OBJECTIVES AND STRATEGIES OF THE NORTH DAKOTA AQUATIC NUISANCE SPECIES STATEWIDE MANAGEMENT PLAN

The goal of the North Dakota ANS Management Plan is to:

Prevent the harmful ecological, economic, and social impacts from ANS being introduced into or spread within North Dakota.

This goal will be achieved through implementation of eight principle objectives and their associated strategies. For each objective, the action narrative addresses the concerns which must be accomplished. The strategies contain a list of potential actions that will provide the needed ANS prevention and information to make sound decisions. The Aquatic Invasive Nuisance Species Coordinator (ANS-Coordinator) and Aquatic Invasive Species Committee (AISC) will have work to together to ensure coordinated ANS prevention efforts across governmental and private sectors. If there has been some work on a particular strategy component, that effort will be identified in the attached 2004 PROGRESS REPORT- NORTH DAKOTA AQUATIC NUISANCE SPECIES (ANS) MANAGEMENT PROGRAM.

It is understood that the strategies contain a wide list of tasks needed to be accomplished, but many of these actions will be worked on over an extended time frame. It will be necessary to prioritize which strategies are to be accomplished based on authorities and funding, and which strategy will provide the best outcome and results in ANS prevention. Staffing is provided by the legislature, state agencies or entities, the federal government, and/or private sources. The prioritized strategies are identified in the Budget Section.

There are many different strategies to undertake for the effective prevention of ANS into North Dakota. Some strategies are interdependent on other sections of the ND-Plan and can only be undertaken if precursors are accomplished or in progress. Other strategies are independent and can be undertaken as needed or when an opportunity presents itself. The strategies and their order of listing doesn't represent when they will or need to be accomplished.

It is not possible to envision or address all potential ANS invaders, their impacts, and possible constraints. It is important to realize that contingencies may develop quickly to address a problem. Consequently, these management actions are intended to be adaptable to changing circumstances and, necessarily, the high priority items from this list are among the first to be implemented.

The time frame of the ND-Plan is five years, and is broken down into five one-year segments for budgeting purposes. It is envisioned that the ND-Plan will continue beyond five-years. A new ND-Plan will be written to update the accomplishments of strategies listed in this management program, based on experiences and new knowledge gained in the state and across the nation. Periodic updating of the ND-Plan will allow adjustment to changes in public attitudes, new ANS problems, and opportunities. It is safe to say that ANS problems will not subside and ANS efforts will be needed into the future under a framework of continuous improvement of the ND-Plan.

OBJECTIVE 1: COORDINATION OF AQUATIC NUISANCE SPECIES ACTIVITIES AND PREPARING/IMPLEMENTING A COMPREHENSIVE MANAGEMENT PLAN.

Problem Addressed: There is no clear authority or agency charged with managing ANS problems in North Dakota. Most management activities focus on isolated problems and not comprehensive strategies to prevent or control ANS. The lack of coordination on ANS activities, limited oversight from various agencies, and lack of funding has allowed only a few ANS to become established in North Dakota. There are no effective plans in place to manage the risk(s) from existing or new ANS introductions.

Action: Develop a management plan that defines plant or animal species considered as ANS, include defined tasks and activities, and the authorities and resources to undertake effective prevention and management of ANS. Form an advisory board to the Director of the North Dakota Game and Fish Department to deal with ANS issues. Its purpose will be to serve as the focal point for communicating with, devising these continuous improvements, and making recommendations to government and the private sector. The make-up of the advisory committee will reflect the needs for ANS prevention and will be fluid with appointed seated-members, reappointments or new entities, on a rotational time frame. The AISC will also have standing-delegates which can be involved in decision making, but have not voting privileges on issues nor will be financially reimbursed for their activities. The advisory board will be chaired by a coordinator from the North Dakota Game and Fish Department.

Current agencies with activities or designated for future activities: Department of Agriculture, Game and Fish Department, Department of Health, Department of Parks and Recreation, State Water Commission, Department of Tourism, Natural Resource and Conservation Service, U.S. Fish and Wildlife Service, Department of Transportation

Strategy 1A: Coordination of ANS activities for all ANS management programs and activities within North Dakota through development of the Aquatic Invasive Species Committee.

1A1. The North Dakota Game and Fish Department will designate an Aquatic Species Coordinator (ANS-Coordinator or coordinator) and support this position with federal ANS Task Force funds and matching state funds. The coordinator will encourage communication between governmental entities, public, and private sector, provide information, archive appropriate ANS information, and provide the public with needed information for them to make responsible decisions. – Status: PARTIALLY COMPLETED – see 2004 Progress Report (attached)

1A2. The coordinator will identify key personnel in governmental, tribal, private, and the public sector with ANS responsibilities. These individuals will be invited to form the Aquatic Invasive Species Committee (AISC) to oversee ANS activities. The coordinator will be the chairperson of this advisory committee. The AISC will work to ensure that the ANS strategy is coherent and consistent throughout North Dakota. The AISC will develop ANS assessment guidelines as needed for local governments and cooperating entities. – Status: COMPLETED – see 2004 Progress Report (attached)

Strategy 1B: Prepare and implement a comprehensive statewide ANS management plan.

1B1. AISC will prepare a comprehensive, statewide ANS management plan for North Dakota (ND-Plan). The ND-Plan is to be reviewed by technical advisors and others prior to its submission to the North Dakota Governor's office. – Status: PARTIALLY COMPLETED – see 2004 Progress Report (attached)

1B2. Encourage water users, such as municipal, industrial, irrigation, lake associations and others, to become involved in the AISC's efforts to prevent the importation of ANS as such infestations could have a financial burden on them which will be passed on to their customers. – Status: PARTIALLY COMPLETED, ON-GOING EFFORT – see 2004 Progress Report (attached)

1B3. The state plan will allow for coordinating North Dakota ANS prevention efforts with those being done at a local level, in the region such as the efforts outlined in Montana's and Iowa's state plan and Minnesota's Sea Grant work, and on a national scale. – Status: PARTIALLY COMPLETED, ON-GOING EFFORT – see 2004 Progress Report (attached)

Strategy 1C: Participate in and support regional, federal, and international efforts to control ANS.

1C1. The coordinator will participate in the Aquatic Nuisance Species Task Forces' Western Regional Panel, 100th Meridian Project, Missouri Interstate Cooperative Resource Association-ANS Panel, and coordinate with Canadian

provinces and neighboring states on ANS issues. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS – see 2004 Progress Report (attached)

Strategy 1D: Develop partnerships and funding sources to leverage state and federal funds with nonfederal funds to increase ANS prevention efforts that will be undertaken.

1D1. Create stable funding sources for ANS management in North Dakota by seeking federal funding from the NANPCA Act as part of the North Dakota Plan. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS – see 2004 Progress Report (attached)

1D2. Develop partnerships with state and federal agencies, private enterprise, and the public to leverage existing funding sources to undertake additional ANS prevention and eradication efforts. Partnerships to fund ANS prevention information with local entities will create a buy-in for ANS prevention with those groups and an ownership in preventing ANS importation. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS – see 2004 Progress Report (attached)

Strategy 1E: Review and evaluate state efforts in addressing ANS.

1E1. Update the state ANS plan as needed, with annual progress reports and a five-year program report. – Status: PARTIALLY COMPLETED, ON-GOING EFFORT – see 2004 Progress Report (attached)

OBJECTIVE 2: PREVENT THE INTRODUCTION OF AQUATIC NUISANCE SPECIES INTO NORTH DAKOTA.

Problem Addressed: There are many pathways by which injurious plants and animals arrive in North Dakota. ANS species are often intentionally imported to provide perceived benefits such as sport fishing opportunities, bait for angling, erosion control, food, aesthetic enjoyment, and so on. These species are accidentally released or escape from holding facilities into the wild. Unintentional ANS introductions can occur as humans, through recreation, industrial development, or commerce carry ANS hitchhikers (e.g., zebra mussels on barges, camouflage on duck boats, etc.). ANS established in neighboring states and Canada may disperse into North Dakota by natural means.

There are limited programs that review and regulate the aquatic species movement into North Dakota. The pathways by which ANS can be unintentionally transported into or within North Dakota need to be defined to allow prioritizing management in the highest risk pathways. The components creating this problem include lack of funding for additional staff to inspect and monitor importation of aquatic species.

Action: Determine which pathways function as major and minor conduits for ANS into North Dakota. Create a list of which species that represent aquatic invasive organisms which will create problems for North Dakota. Take appropriate actions to prevent the introduction of ANS along the identified pathways.

Current agencies with activities or designated for future activities: Department of Agriculture, Game and Fish Department, Department of Parks and Recreation, Universities, 100th Meridian Group, Pacific States Marine Fisheries Commission, County Extension Service, Western Regional Panel, and US Fish and Wildlife Service

Strategy 2A: Research and address pathways of introduction.

2A1. Describe the potential pathways through which ANS can enter North Dakota via recreational, commercial, esthetic, and illegal pathways, and include judgments of the risks of introduction from specific pathways. – Status: PARTIALLY COMPLETED, ON-GOING EFFORT – see 2004 Progress Report (attached)

2A2. Estimate the potential for ANS introduction for each pathway by conducting a risk analysis for each specific pathway or pathways in combination. – Status: ON-GOING EFFORT – see 2004 Progress Report (attached)

Strategy 2B: Prevention of ANS along determined pathways of introduction.

2B1. Continue to educate relevant public and private groups identified in 2A1 and 2A2 as likely sources of ANS importation. – Status: PARTIALLY COMPLETED, ON-GOING EFFORT - see 2004 Progress Report (attached)

2B2. Educate the retailers and wholesalers of aquatic products of problems associated with the importation of ANS and their likely release into the wild. – Status: PARTIALLY COMPLETED, ON-GOING EFFORT - see 2004 Progress Report (attached)

2B3. Implement the HACCP (Hazard Analysis and Critical Control Point) training program for appropriate field and survey personnel for all Divisions of the North Dakota Game and Fish Department. Institute HACCP for fish brought into the state by or for state or federal fish hatcheries. – Status: PARTIALLY COMPLETED, ON-GOING EFFORT - see 2004 Progress Report (attached)

2B4. Work with fishing tournament officials to ensure boats and equipment undergo ANS prevention protocols. – Status: PARTIALLY COMPLETED, ON-GOING - see 2004 Progress Report (attached)

Strategy 2C: Increase enforcement awareness of existing laws, controlling the transportation, propagation, sale, collection, possession, importation, purchase, cultivation, distribution, and introduction of ANS.

2C1. Increase the priority of enforcing ANS regulations.

2C2. Educate enforcement personnel about ANS impacts to natural resources, to identify ANS, and the need to enforce ANS regulations.

2C3. Distribute information on ANS laws to businesses that import or sell aquatic plants and animals.

2C4. Publicize the penalties for the intentional introduction of any nonindigenous species to North Dakota's waters.

Strategy 2D: Prohibit, control, or permit the importation of non-indigenous aquatic species based upon their invasive potential.

2D1. Develop a non-indigenous species list for North Dakota. – Status: COMPLETED – see 2004 Progress Report (attached)

2D2. Develop an ANS list from the 2D1's list of species that are of high concern to North Dakota and develop preferred management strategies for dealing with these as listed by priority class. – Status: COMPLETED, TO BE REVIEWED AS REQUIRED – see 2004 Progress Report (attached)

2D3. Develop a North Dakota list of ANS that cannot be imported, moved, possessed or sold within North Dakota. Provide that information to the North Dakota Legislature for review and concurrence. – Status: COMPLETED, TO BE REVIEWED AS REQUIRED – see 2004 Progress Report (attached)

Strategy 2E: Promote legislation and regulatory rules that establishes or increases the state's authority to control the introduction of new species.

2E1. Establish the authority to detain and require cleaning of any vehicle, vessel or such equipment used in aquatic construction containing or infested with ANS that is being transported into North Dakota.

2E2. Increase the ability of the State to regulate the importation of aquatic plants, animals or other organisms where existing authorities are limited.

2E3. Establish the authority to quarantine waters to prevent ANS from spreading and to contain ANS for eradication.

2E4. Require that aquatic species imported by wholesalers or retailers to be free of ANS and/or originate from ANS free areas.

2E5. Require that fish imported for hatchery use or as fishbait be disease free or collected from areas free of ANS. Periodically review the status of ANS in areas that fish or live fishbait is collected or reared. Continue North Dakota's moratorium on importation from areas that have ANS infestations. – Status: ON-GOING EFFORT - see 2004 Progress Report (attached)

Strategy 2F: Research the potential to develop a list of aquatic species that can be imported into North Dakota as they pose no known potential for becoming an ANS based on species or genus characteristics, review the history of other introductions outside a species home range, inter/intra ecological impacts, and actual demand or need for a species introduction.

2F1. Research existing federal or other states' databases for appropriate information on exotic species that pose little or no danger of becoming an ANS. Compile a list (import list) of flora and fauna which will are unlikely to cause problems if introduced into state or region waters.

OBJECTIVE 3: DETECT A PIONEERING AQUATIC NUISANCE SPECIES AND MONITOR EXISTING POPULATIONS OF AQUATIC NUISANCE SPECIES.

Problem Addressed: Affordable and effective eradication and control requires that infestations of ANS be discovered early in their pioneering stage of infestation. The extent of the newly discovered infestation must be quickly determined so appropriate action can be taken. Currently, most state agency workers do not routinely look for new species or ANS problems when they are at state waters, inspecting water treatment facilities, monitoring a commercial venture, or doing routine sampling. Explicit ANS monitoring effort will require additional staff time or the reprioritization of existing work and funding.

North Dakota lacks an organized information and species identification infrastructure for suspect species to be quickly identified. Thus, "problem" species cannot be readily confirmed by field staff or individuals doing routine inspections. Control measures cannot be taken in a timely manner.

Action: Create a way for government personnel, private-sector field staff, and trained volunteers to report (use of standardized forms) suspected ANS species while they are visiting a waterbody or commercial venture. These efforts would include documenting uninfested waters to compare to future occurrence and the spread of ANS. Create a mechanism for recording and archiving information on ANS monitoring activities, infestations found, and ANS expansion in infested sites.

Current agencies with activities or designated for future activities: Department of Agriculture, Game and Fish Department, Department of Parks and Recreation, Universities, Department of Health, US Fish and Wildlife Service, United States Army Corps of Engineers, Bureau of Reclamation, US Coast Guard, Department of Health, State Water Commission, Disaster and Emergency Response, Weed Boards, Water Boards, and private individuals

Strategy 3A: Implement a monitoring and early detection program.

3A1. Encourage and train appropriate agency personnel to identify ANS, develop and implement a monitoring and reporting program for ANS in North Dakota waters.

3A2. Conduct an annual monitoring of high-risk waters and monitor other waters. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS – see 2004 Progress Report (attached)

3A3. Place colonization substrates (traps) in areas likely to be infested with zebra mussels or provide traps to other agencies or individuals. In addition, inspect for zebra mussels on boat docks or buoy lines removed from the waters. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS – see 2004 Progress Report (attached)

3A4. Conduct zebra mussel larval tows in areas that are likely to be colonized by adults and have those samples processed by a laboratory.

Strategy 3B: Develop an early response mechanism to deal with detected and potential invasive species.

3B1. Implement a Rapid Response Plan. – Status: COMPLETED, TO BE REVISED AS NEEDED – see 2004 Progress Report (attached)

3B2. Conduct periodic reviews of North Dakota's Rapid Response Plan to determine if ANS species of concern are included and update as needed.

3B3. Create a network of expertise to rapidly and accurately verify suspected new invasive species.

3B4. Include these efforts as part of North Dakota's Disaster and Emergency response activities to avert bio-terrorism on the state's natural resources.

Strategy 3C: Train volunteers to assist with monitoring public waters for ANS infestations.

3C1. Develop a program to recruit and train volunteers to monitor selected public waters, and report their findings to appropriate authorities.

OBJECTIVE 4: EDUCATIONAL CAMPAIGN TO PREVENT THE SPREAD OF AQUATIC NUISANCE SPECIES.

Problem Addressed: To effectively prevent ANS introduction into or movement within North Dakota, there must be strong outreach efforts to various targeted audiences with appropriate and factual information. The audiences are: 1) resident anglers and hunters; 2) nonresident anglers and hunters; 3) non-consumptive outdoor recreators; 4) water users, e.g., municipal water intakes, irrigators, power production, etc.; 5) tourism, both on a state and local level; 6) state agencies and entities such as the State Water Commission, Department of Agriculture, Department of Health, Water Resource Boards, Game and Fish Department, Department of Tourism, Department of Parks and Recreation, etc.; 7) private and public entities; 8) commercial ventures; and 9) youth programs.

Each targeted audiences' message must and will be tailored to produce the desired effect which is that they willingly accept or take ANS prevention efforts. This use of market-based outreach requires an understanding of the target audiences' values and needs, and how to best reach that audience with the information. This market-based outreach to a targeted audience is a departure from typical information

dissemination provided by state agencies. In addition, ANS prevention is a proactive concerted effort(s) rather than reactionary to a problem's appearance. This requires that the targeted audience understands the long term impacts of ANS on their activities.

The sectors mentioned above will need to realize that they have ownership in the outcome of ANS infestations. It is important that individuals or groups realize that ANS prevention will not always be done by someone else.

Action: Create a "market based" information and education capability that identifies the target audience or audiences, formulate messages and information specifically for the targeted market groups, and utilize appropriate educational instruments to deliver these messages.

Current agencies with activities or designated for future activities: Department of Agriculture, Game and Fish Department, US Fish and Wildlife Service, US Army Corps of Engineers, Coast Guard, Department of Parks and Recreation, Department of Tourism, County Extension Service, Natural Resources Conservation Service, State Water Commission

Strategy 4A: Educate resident anglers and hunters about ANS prevention protocols by providing focused information in the best avenues of dissemination.

4A1. Identify the key message, the best format to deliver the information, and where to best deliver the message to this group. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS - see 2004 Progress Report (attached)

4A2. Provide information and education (e.g., signs, posters, kiosks, banners, newspaper articles, articles in periodicals, on radio and television spots, and similar venues) on ANS risks and prevention protocols as found in 4A1. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS - see 2004 Progress Report (attached)

4A3. Determine the level of ANS awareness and precautions used. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS – see 2004 Progress Report (attached)

4A4. Provide the list of ANS and of waters with problems to this group. Promote media reporting on ANS and the importance of management.

Strategy 4B: Educate nonresident anglers and hunters of ANS prevention protocols by providing focused information in the best avenues of dissemination.

4B1. Identify the key message, the best format to deliver the information, and where to best deliver that message to this group. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS – see 2004 Progress Report (attached)

4B2. Provide information and education (e.g., newspaper articles, articles in periodicals, in tourism publications, on radio and television spots, and similar venues) on ANS risks and prevention protocols as found in 4B1. – Status:

PARTIALLY COMPLETED, ON-GOING EFFORTS – see 2004 Progress Report (attached)

4B3. Determine the level of ANS awareness and precautions used. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS – see 2004 Progress Report (attached)

4B4. Provide the list of ANS and waters with problems to this group. Promote media reporting on ANS and the importance of management.

Strategy 4C: Educate non-consumptive outdoor recreators of ANS, the need to prevent the problems, and disseminate information in the best form and venue.

4C1. Identify the key message, the best format to deliver the information, and where to best deliver the message to this group. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS – see 2004 Progress Report (attached)

4C2. Provide ANS prevention information (e.g., newspaper articles, articles in periodicals, in publications, on radio and television spots, and similar venues) to those identified in 4C1.

4C3. Provide the list of ANS and waters with problems to this group. Promote media reporting on ANS and the importance of management.

Strategy 4D: Educate water users of ANS problems, the need to prevent the introduction or spread of the problem, and how to best provide that message.

4D1. Determine where the different water users such as developers, manufactures, irrigators, municipal facilities, etc. can be reached and in what form should the ANS message be delivered to be understood. – Status: PARTIALLY COMPLETED, ON-GOING EFFORT - see 2004 Progress Report (attached)

4D2. Provide information and education (e.g., articles in trade periodicals, direct mailings or letters, and similar venues) on ANS risks and prevention protocols to those identified in 4D1.

4D3. Provide the list of ANS and waters with problems to this group. Promote media reporting on ANS and the importance of management.

Strategy 4E: Provide tourism promotion groups, including state and local efforts which include guides and outfitters, fishing tournament promoters, etc., the information about the impacts of ANS, how ANS are moved into or within the state.

4E1. Determine which North Dakota groups are promoting tourism, what ANS prevention information should be provided in their publications or information packets.

4E2. Determine these groups willingness to provide additional information on ANS prevention methods. – Status: ON-GOING EFFORT - see 2004 Progress Report (attached)

Strategy 4F: Develop communication with public and private entities, such as the Garrison Conservancy District, water pipeline cooperatives, etc., about the potential impacts of ANS to their operation, the need for a cooperative approach to prevention, and heightened staff awareness.

4F1. Determine the level of awareness that these groups have regarding potential ANS problems and what ANS prevention and monitoring is currently being done**.**– Status: PARTIALLY COMPLETED, ON-GOING EFFORTS - see 2004 Progress Report (attached)

4F2. Provide information and education on ANS risks and prevention protocols to the various public and private entities.

4F3. Continue to communicate the value of ANS prevention as opposed to controlling infestations.

Strategy 4G: Educate the commercial sector such as plant nurseries, pet trade, landscaping operations, home improvement centers, aquaculture, fish rearing and bait collection, and similar groups, about ANS impacts, and how their actions can prevent the spread and introduction of ANS.

4G1. Determine the ANS awareness of the various groups mentioned above.

4G2. Develop and distribute information on ANS prevention.

Strategy 4H: Educate juveniles about ANS prevention protocols and the problems posed.

4H1. Establish an educational campaign, targeting fourth-graders to eighth-graders of the problems ANS cause.

4H2. Provide educational materials for the classroom.

OBJECTIVE 5: INSPECTIONS OF RECREATIONAL BOATS, COMMERCIAL VESSELS, AND EQUIPMENT USED IN AQUATIC SITUATIONS.

Problem Addressed: ANS can be carried into or within North Dakota on or in boats used for fishing, hunting, or pleasure, work and on construction equipment used in aquatic situations. Special construction equipment such as barges, tugs, large water pumps, and backhoes are frequently brought into North Dakota. This equipment may have been used in waters infested with ANS. Inspection of these boats, vessels, and equipment for ANS have not routinely been conducted or are ANS precautions routinely performed prior to launching or use of these carriers of ANS. The boats', vessels', and equipments' owners are often not aware of the problem or understand what ANS precautions should be undertaken. The inspections would allow for tracking where the carrier was last used, ANS precautions performed, and the owner's awareness of the problem.

Action: Inspect boats, vessels, and equipment for ANS hitchhikers prior to launching. This inspection will be an opportunity to educate the owners or operators about ANS problems and precautions. Recreational boats could be inspected at boat ramps as part of angler creel surveys or as a specific project such as a university or group interested in conservation. The numbers of commercial vessels or equipment used in aquatic situations brought into North Dakota is limited, but pose a unique situation as they would need to be inspected. These vessels need to be free of ANS prior to launching in North Dakota waters. Permits for construction need to contain provisions that require equipment to be free of ANS and made available for inspection by trained individuals prior to its use.

Current agencies with activities or designated for future activities: Department of Agriculture, Game and Fish Department, Department of Parks and Recreation, Universities, Department of Health, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Bureau of Reclamation, U.S. Coast Guard, Department of Health, State Water Commission, Disaster and Emergency Response, local weed boards and water boards, and private individuals

Strategy 5A: Implement an inspection program for boats used for fishing, hunting, or pleasure, vessels used in commerce, and equipment used in aquatic construction situations.

5A1. Develop and implement boat inspections at boat ramps to determine if ANS is present, where the boat has been, where the boat will be used, and the owner/operators awareness of ANS problems and prevention. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS - see 2004 Progress Report (attached)

5A2. Provide technical assistance to conservation organizations, volunteer groups such as scouting troops, 4-H, or wildlife clubs that wish to inspect and survey boaters at specific locations.

Strategy 5B: Implement an inspection program for vessels used during construction in aquatic situations.

5B1. Develop and implement requirements as provided in permits that vessels such as barges, tugs, work boats, tenders, or similar vessels be required to be ANS free prior to being launched or used on or in North Dakota's waters. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS - see 2004 Progress Report (attached)

5B2. Provide technical assistance to permitting agencies such as the Army Corps of Engineers, Department of Health, State Water Commission, water boards, and other agencies or entities that issue permits for construction on inspection protocols.

5B3. Owner/operator survey during the inspection will determine where the vessel has been, where the vessel will be used, and the owner/operators awareness of ANS problems and prevention.

Strategy 5C: Implement an inspection program for equipment used in construction in aquatic situations.

5C1. Develop and implement requirements as provided in permits that equipment used in aquatic situations are required to be ANS free prior to their being launched or used on or in North Dakota's waters. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS - see 2004 Progress Report (attached)

5C2. Provide technical assistance to permitting agencies such as Army Corps of Engineers, Department of Health, State Water Commission, water boards, and other agencies or entities that issue permits for construction on inspection protocols.

5C3. Owner/operator survey during the inspection will determine where the equipment was last used, where the equipment will be used, and the owner/operators awareness of ANS problems and prevention.

OBJECTIVE 6: WHERE FEASIBLE, CONTROL AND ERADICATE PIONEERING OR ESTABLISHED AQUATIC NUISANCE SPECIES THAT HAVE SIGNIFICANT IMPACTS ON NATIVE OR DESIRABLE SPECIES.

Problem Addressed: Well-established ANS populations are the most likely to be noticed and are the most difficult to address. ANS infestations are best controlled in the early stages of initial infestations. Usually, it is too late or too expensive to eradicate an invasive species once it has reached the threshold level where rapid expansion is occurring. While the common management solution for a well-established ANS infestation is learning to live with the problem. The public and the resource agency or field biologist is just willing to accept the loss of aquatic resources. This is not the preferred nor is it the professional approach to natural resource management. The resource and economic impacts outweigh the funds required to eradicate a new infestation.

The key to any eradication is to identify the problem early, cooperation among all involved parties, and take needed, effective steps to eliminate the problem. No single

agency or other entity is responsible for developing a comprehensive eradication and control plan to quickly and effectively deal with initial ANS infestations.

Action: Provide technical and planning support for the existing management infrastructure in North Dakota.

Current agencies with activities or designated for future activities: Department of Agriculture, Game and Fish Department, Department of Parks and Recreation, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Department of Health, State Water Commission, water boards, weed boards

Strategy 6A: Control known nuisance populations where economically and technically feasible.

6A1. Develop and implement aquatic nuisance weed management plans.
6A2. Develop and implement aquatic nuisance animal management plans.
6A3. Provide technical assistance to watershed councils, conservation districts, irrigation districts, lake associations, and other groups for development of management plans. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS - see 2004 Progress Report (attached)

OBJECTIVE 7: INFORM THE POLICY MAKERS ABOUT THE RISKS AND IMPACTS OF AQUATIC NUISANCE SPECIES.

Problem Addressed: Lawmakers must be informed about the negative impact of ANS to North Dakota's resources and that ANS problems will affect all North Dakotans. Inform legislators about the shortcomings of current laws and agency mandates. Provide interested legislators the framework of ANS laws to protect and conserve the state's resources.

Action: Provide concise and in-depth information to those who will be making decisions on ANS problems and formulating legislation on ANS control.

Current agencies with activities or designated for future activities: Game and Fish Department, Pacific States Marine Fisheries Commission, U.S. Forest Service, North Dakota State University, Extension Service, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, PPL North Dakota

Strategy 7A: Educate public officials about the problems of ANS and how ANS are spread.

7A1. Create media presentations and accompanying information on ANS concerns, impacts, and the need for proactive prevention efforts. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS - see 2004 Progress Report (attached)

7A2. Provide interested law makers pertinent points to be considered in crafting legislation to prevent the introduction or spread of ANS. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS - see 2004 Progress Report (attached)

OBJECTIVE 8: INCREASE THE AQUATIC NUISANCE SPECIES KNOWLEDGE BASE AND DISSEMINATE THAT KNOWLEDGE IN NORTH DAKOTA THROUGH COMPILING DATA, CONDUCTING RESEARCH, AND INFORMATIONAL PUBLICATIONS.

Problem Addressed: Little is known about the extent and magnitude of the ANS problems in North Dakota. In fact, there may be many nonindigenous species in North Dakota than are not recognized. Information and research is needed to quantify and clarify the effects that ANS are having or would have in North Dakota. The explicit threats to North Dakota posed by specific ANS and the mechanism responsible for transferring those organisms are not well documented. The ability to quickly and effectively respond to new ANS is hindered because quick access to information on taxonomy, management or eradication methods is not readily available. Managers lack quick access to knowledge about eradication and control methods.

Action: Complete monitoring of North Dakota waters to determine what ANS are present. Provide a technical and information infrastructure for managers to easily access.

Current agencies with activities or designated for future activities: Game and Fish Department, North Dakota State University, University of North Dakota, U.S. Fish and Wildlife Service, Pacific States Marine Fisheries Commission, Department of Agriculture

Strategy 8A: Research ANS for their impact on biota utilizing regional efforts and literature searches.

8A1. Develop a better understanding of life histories and the impacts of introduced aquatic plants and animals.

8A2. Evaluate the potential for aquarium and live food fish to serve as vectors of disease and parasites to native fish populations.

Strategy 8B: Research management alternatives for their effect on ANS and native species.

8B1. Investigate the relationship between human-induced disturbance of aquatic and riparian systems and ANS invasion, establishment, and impacts.

8B2. Investigate and develop or adapt existing traditional methods of managing problems to meet the challenges of ANS.

8B3. Compile a set of recommended and acceptable eradication and control methods for high risk species.

Strategy 8C: Facilitate the collection and dispersal of information, research, and data on ANS in North Dakota.

8C1. Create a central repository for reference materials and a central data base on ANS infestations. – Status: PARTIALLY COMPLETED, ON-GOING EFFORTS - see 2004 Progress Report (attached)

8C2. Maintain a list of taxonomic experts for ANS identification.

The objectives and strategies make up the core of North Dakota's statewide aquatic species management plan. The strategies are to be accomplished by the coordinator and AISC. Completion of these strategies will protect and conserve the state's public aquatic resources from degradation by ANS.

PUBLIC INVOLVMENT

North Dakota's aquatic resources are at risk from ANS and it is the public who has the greatest stake in any outcome and they will be the most affected by an infestation. It is important the public and private sectors understand the problems and impacts to them caused by ANS. This understanding can only come about with effective communication on ANS problems, what solutions exist, and the impacts from ANS solutions to all affected parties. Communication must be two-way and meaningful, which will result in impacted parties having ownership of solutions. It will be the responsibility of the agencies and entities that make up the AISC to communicate with groups they traditionally work with. These groups can use their established lines of communication to provide the quickest dissemination of information. The same lines of communication will be used to impacted groups to communicate with the AISC about problems and their solutions. It is important that the AISC includes a mix of state agencies, private entities, and the public sector. The AISC being a blend of groups and individuals will allow for the greatest public spectrum to be informed in the most efficient manner.

The AISC meetings will be open to the public, the public will be encouraged to attend those meetings, and all reports of those proceedings will be open to the public. Individuals' comments recorded during angler surveys will be another source of public input for the AISC. There will be a strong, continuous effort to have the public involved in AISC meetings and the direction that ANS prevention efforts are taking.

The public involvement will create the public's ownership and buy-in to ANS solutions resulting in achieving the desired results. Desired results can simply be stated as preventing ANS infestation in North Dakota and a continuation of the aquatic resources currently being enjoyed. To this end, the public must accept and participate in the solutions to stop the spread of ANS.

PRIORITIZING OBJECTIVES' STRATEGIES FOR

There must be a decision if: 1) each strategy will receive the same effort of man-power, time, and monies; 2) only focusing on the strategy(s) with the highest likelihood of completion; 3) do the strategy(s) with the best cost to likely prevention ratio; or 4) there be a balanced approach. The balanced approach is a combination of focusing on areas of high risk for a reasonable expenditure of man-power and monies, but an effort to address all likely avenues of ANS transfer. This balance method will be used in North Dakota's ANS prevention efforts. The prioritized strategies for North Dakota's balanced ANS prevention efforts are summarized below.

1. Designation of an Aquatic Nuisance Species coordinator (ANS-Coordinator) for the North Dakota Game and Fish Department. The position will be funded partially from federal ANS grants and matching monies. The coordinator will be responsible for the implementation of other objectives and strategies as funds are made available.

2. The ANS-Coordinator will develop the format and membership of the Aquatic Invasive Species Committee (AISC) which is an advisory board to the North Dakota Game and Fish Department's ANS prevention efforts. AISC will work with the ANS-Coordinator for ANS prevention, monitoring, enforcement, and research efforts undertaken by various state, public entities, and private organizations. Following the ND-Plan will allow for collaboration between local, regional, and national ANS prevention efforts.

3. The coordinator and AISC will work with state entities, private organizations, and impacted parties to heighten the awareness of ANS problems and the need to take proactive precautions before problems develop. Those entities with regulatory authorities will be encouraged to become involved by including prudent, reasonable, and practical prevention protocols for the importation or spread of ANS into or within the state.

4. The AISC, with the input of qualified individuals from state entities and impacted organizations, will develop a list of ANS for consideration by the Director of the North Dakota Game and Fish Department. The Director will establish North Dakota's list of ANS which will be reviewed annually.

5. Agencies will continue educational efforts to inform the public and the private sector of ecological and economical impacts resulting from ANS infestations. Agencies will increase outreach efforts in nontraditional venues like retail and service industries, municipal water plants, power generation facilities, and commercial ventures (i.e., pet trade, plant nurseries, live fish bait wholesalers and retailers, aquaculture, etc.). Outreach will include increased use of the media, with messages directed at target audiences. Also, promotional items will be used to encourage compliance with ANS prevention protocols. It will

take reoccurring educational messages placed in different formats, but having the same theme to provide the desired results of ANS prevention. The messages must give individuals and entities their ownership in solving the problem. The ANS prevention campaign is a combination of educating those who will be impacted, reinforcing the prevention message, using the right tools to achieve the desired results of education and compliance, and having the funds to accomplish these efforts.

6. Continue with the current monitoring efforts of North Dakota waters and the inclusion of questions in periodic angler/boater surveys at select waterbodies or in statewide questionnaires from individuals selected from a pool of fishing and hunting license holders. Expand monitoring efforts to include cooperating agencies and volunteers.

7. Continue to interview North Dakotans and nonresidents to determine their knowledge of ANS problems and awareness of prevention methods. These direct individual contacts will be part of routine surveys at select waterbodies and from a pool of names of resident and nonresident license holders.

8. Inspect boats used for fishing, hunting, pleasure, commercial vessels, and construction equipment if ANS are present. Provide verbiage to agencies or entities that issue construction permits to allow for the coordinator to inspect vessels or equipment used in aquatic situations.

9. Provide information and advice to the governor, the governor's cabinet, legislators, local governments, tribal governments, and members of the judicial system about ANS risks, prevention and management options. Providing technical support for modifications to laws and promulgation regulations that can help protect North Dakota from ANS damages.

10. Provide matching funds for partnerships between government and private sector such as angling clubs, chambers of commerce and tourism, power companies, and other groups that will be impacted by ANS, to increase collaboration on ANS prevention and management projects. The matching funds will allow for local groups to secure educational materials and to provide materials to targeted audiences.

11. Provide education for law enforcement institutions and solicit their cooperation to enforce existing laws and regulations. This need for enforcement may require some new legislation that deals with ANS problems and provides enforcement groups with the necessary authority to deal with ANS prevention and management.

BUDGETING

The funds used by the AISC and coordinator will be a combination of federal funds via the U.S. Fish and Wildlife Service's ANS Task Force or other federal funding resources, government grants (e.g., from the Western Regional Panel), funds provided as in-kind money or services by the North Dakota Game and Fish Department, other state agencies, or other entities (e.g., grants from Fish American Foundation, public trusts, or endowments). ANS efforts will require partnerships between state and federal agencies, public, and private interests where each bears part of the costs of preventing ANS infestations.

The proposed budget is based on being a reasonable initial funding. The ANS-Coordinator and AISC will focus efforts and money on those strategies that have been identified in the ND-Plan. Those areas identified in the ND-Plan are those known to provide the greatest level of ANS prevention and provide education on ANS problems in North Dakota. Table 1 summarizes the budget required for undertaking and completing these high priority strategies of the ND-Plan.

The budget is estimated at $225,000 per biennium ($125,000 annually) with 10 percent of the funding held in contingency by the coordinator. The ANS-Coordinator will utilize the contingency fund to cover unexpected expenses, activities of opportunity such as advertising at trade shows, educational seminars, and unknown events, which will benefit ANS prevention.

Implementation of these strategies is based on the ND-Plan being accepted and funding provided by the U.S. Fish and Wildlife Service's ANS-Task Force and appropriations made available and dedicated to ANS prevention by the North Dakota Legislature. Additional information on the budget, by topic and by year, can be found in Appendix E and includes a listing of what budgets and staffing will be needed by the ANS-Coordinator, AISC, and various state agencies, to conduct ANS prevention activities. When the ND-Plan is in place, it is likely that various agencies will request ANS funds for their agency activities associated with or in conducting ANS prevention activities.

North Dakota governor's approval of the ND-Plan is a necessary precursor for application for federal matching funds. The ND-Plan and the funding of those ANS prevention activities is based on receiving sufficient federal funds to accomplish the strategies outlined in this document.

Table 1. Annual budget required to complete selected Strategies from the ND-Plan that best utilize limited funding.

	Time Frame				
	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
	01 JUL 05 to 30 JUN 06	*01 JUL 06 to 30 JUN 07*	*01 JUL 07 to 30 JUN 08*	*01 JUL 08 to 30 JUN 09*	*01 JUL 09 to 30 JUN 10*
Overall man-yr	1.59	1.59	1.59	1.59	1.59

Accumulative Salaries	$60,150	$60,150	$60,150	$60,150	$60,150
Education: Field Staff and Law Enforcement of various agencies	$2,750	$1,750	$1,750	$1,750	$1,750
Educational Materials	$6,000	$500	$500	$500	$5,000
Mass Media	$14,500	$14,500	$14,500	$14,500	$14,500
Data Collection	$750	$750	$750	$750	$750
Signs	$2,250	$250	$250	$2,250	$1,000
Contracts	$7,500	$17,500	$17,500	$20,000	$5,000
Grants	$7,000	$7,000	$7,000	$7,000	$7,000
Promotional	$5,000	$5,000	$500	$500	$1,500
Meetings	$7,500	$7,500	$7,500	$7,500	$7,500
Monitoring Equipment	$500	$1,000	$1,000	$250	$250
Overall Funding and Strategy Implementation Costs	***$113,900***	***$115,900***	***$111,400***	***$115,150***	***$104,400***

* North Dakota Game and Fish Department, Department of Agriculture, North Dakota Department of Transportation, North Dakota Department of Parks and Recreational, Tribal resource management departments, Department of Health, State Water Commission, Natural Resource Boards, Water Boards, Irrigations or Conservancy Districts, city park boards, and similar agencies or entities

PROMOTING DEVELOPMENT OF AQUATIC NUISANCE SPECIES REGULATIONS

Part of AISC's role is to be a source of information and advice for North Dakota lawmakers. The information provided to North Dakota's Legislators will include both the environmental impacts of ANS, and the negative economic and quality-of-life consequences of ANS infestations. Legislators will be provided the concepts that will improve or provide authorities for ANS prevention, authorize funding for implementing management strategies – all with the intent of focusing first on prevention rather than reactive management once ANS problems become established. The goal is for state agencies with resource responsibilities to undertake ANS prevention as a part of their duties.

North Dakota represents a unique aspect for ANS management because of six factors: 1) the state has a small number of residents; 2) government entities have and do work well together to accomplish needed tasks; 3) environmental conditions preclude many ANS problems; 4) few ANS problems are already established; 5) private and commercial sectors are locally operated; and 6) the state's residents place a high value on outdoor recreational resources. In addition, North Dakota has begun the process of determining vectors of ANS importation, which allows focus on immediate problems of high-risk ANS introduction pathways. With these factors in mind, the ND-Plan will reflect those needs for North Dakota.

State agencies and entities have the authority and are responsible for the best management of the state's resources. The agencies are bound by the burden of "Public Trust.," which is not to allow damage to the resources they are to protect and to the state's other resources at the benefit of their mission. These agencies need to include involvement in ANS prevention and management as part of their efforts.

An example of issues needing attention by North Dakota's Legislature is provided in Appendix F. The following issues should be considered in ANS legislation and development of ANS regulations:

- Provide that agencies/entities that have a stake in the protection of the state's aquatic resources to be tasked with:
  - North Dakota Game and Fish Department should organize and chair the Aquatic Invasive Species Committee, and this group be recognized as the state's ANS coordinating mechanism, and to provide advisory services for state agencies, private entities, and the public sector.
  - Develop the list of aquatic species, plants, animals, and pathogens that are aquatic threats to North Dakota, and that these species should not be brought into or moved within North Dakota,
  - Provide the listing of those waters which have ANS infestations and provide protocols to prevent the spread of the problem.

- Provide agencies authorities/responsibilities/guidance for the following:
  - North Dakota Game and Fish to apply for available funding from state, federal or private sources for ANS activities.
  - State agencies should provide for reasonable and effective prevention protocols (REPPs) for ANS – examples are:
    - ✓ Department of Health's construction or water permits;
    - ✓ State Water Commission's construction permits, water projects, or water storage permits; and
    - ✓ Natural Resource Boards and Water Resource Boards in drainage or water course clean-out, and for the quarantining of waterbodies when ANS are present.
  - Department of Agriculture to include ANS inspections as part of their plant nursery and garden center inspections and enforce ANS regulations.
  - North Dakota Game and Fish Department to provide regulations on ANS prevention from the importation in baits, live fish used for rearing, stocking, or sale in the pet trade, fish transported into or within the state on or in boats, trailers, equipment or vehicles, associated inspections and enforcement of regulations.
  - Department of Parks and Recreation shall include ANS educational signs and materials in their published literature, and enforce ANS regulations on the movement of ANS into or within state lands.
  - Department of Tourism to include ANS educational material in literature on North Dakota's aquatic resources.

- Department of Transportation and State Highway Patrol include ANS prevention in their vehicle inspections and enforce ANS regulations.
- All agencies and other entities receiving public funds include ANS educational messages on their aquatic-oriented educational material.

- The Legislature should provide to state agencies:
  - Expanded authorities for agencies and entities involved in the management of North Dakota's resources to include ANS prevention and management.
  - Regulations promulgated to prevent ANS movement into or within the state.
  - Provide for a system of fines/legal forfeitures to make ANS infractions as a Class B misdemeanor.
  - Recognize the need for the coordinator and AISC as an advisory board to conduct ANS education/prevention for the state's aquatic resources

The preceding items can serve as a base for constructing North Dakota's regulations to prevent the importation and spread of ANS.

NORTH DAKOTA STATEWIDE ANS MANAGEMENT PLAN

The ND-Plan is a very reasonable approach to address ANS challenges facing North Dakota and its citizens. The North Dakota Game and Fish Department will organize the Aquatic Invasive Species Committee (AISC) and a designee from within the North Dakota Game and Fish will serve as coordinator for ANS prevention efforts. The AISC will be made up of public and private sectors, and of inter-agency staff, and be responsible to all North Dakotans and to all of North Dakota's needs. Appendix G provides a listing of those agencies or entities and individuals that make up the ad hoc AISC committee which developed the North Dakota statewide aquatic nuisance species management plan (ND-Plan). This group should become the nucleolus for the AISC as they can continue ANS prevention efforts.

The ND-Plan will be effective as it will be responsive to public, agency or entity input, and natural resource involvement. The AISC will be a clearing house to provide information to others or the collection of information and input to make informed decisions on ANS prevention. Appendix H provides a summary of the information flow for the AISC. Appendix I contains the details on the two-way communication that agencies and entities will be responsible, with affected parties and organizations that they typically work with. The use of the various agencies for communication utilizes established lines of communication and the knowledge of specific needs of impacted or affected parties. Two-way communication is critical for the ND-Plan to provide for effective prevention of ANS and for educational needs.

The ND-Plan was developed through a series of meetings by the AISC, public meetings, and review of existing information on other states' ANS plans, and other information. See Appendix J for additional information on the meetings held to develop the ND-Plan. The public was made aware of the ND-Plan during the North Dakota

Game and Fish Department's eight advisory board meetings held in fall of 2004. The public comment period began in early November of 2004. The public comment period was 44 days and closed on December 14, 2004. In addition to the public, private and public organizations and entities, and state agencies were encouraged to comment on the ND-Plan. If individuals or organizations provided information after that date, it was included as part of the record of comments. A summary of the comments provided by the public and other agencies to the coordinator is provided in Appendix K.

The ND-Plan was reviewed by ANS coordinators from various states, and individuals from federal and state agencies. See Appendix L for additional information on this group. The comments and advice of this group allowed the ND-Plan to be complete in design and scope of need and work. The comments by the public and private sector were limited, but the technical review teams agreed with the intent and form of the ND-Plan. See Appendix M for additional details from the technical review committee.

It is important that the ND-Plan contain sufficient foresight to meet any likely needs to manage against ANS. As part of managing against ANS, the ANS which pose the highest likelihood of impacting North Dakota were used in designing the ND-Plan. The ANS species which are felt most likely to become established and have the greatest impact to North Dakota are listed in Appendix N. Species listed here were taken from a document which outlines ANS potential and problems which North Dakota is likely to experience.

The number of problematic nonindigenous species in North Dakota is small; three fish species – common carp, grass crap, and goldfish – one invertebrate – rusty crayfish – and three plant species – curlyleaf pondweed, Eurasian watermilfoil, and purple loosestrife (a terrestrial plant and is managed as such). It is important that North Dakota keeps the number of ANS, both as species and points of infestation, low to protect the public's natural resources, and provide stability for the economic viability of the state. Appendix O provides a list of nonindigenous species found in North Dakota and lists those species which are to be considered as candidates for listing as ANS in North Dakota.

The guiding principle the ND-Plan focuses on is prevention is better and cheaper than dealing with an infestation. Prevention must include educating the traditional outdoor recreators such as boaters, hunters, anglers, and general water users such as municipalities, rural water lines, power production, cities, and the general public about the impacts of ANS. The ND-Plan's strategies are based on reaching a target audience with effective outreach that ends in ANS prevention protocols being undertaken voluntarily. Monitoring activities and determination of the ANS pathways will define where additional ANS prevention efforts are required. The ND-Plan is an efficient use of available funding to achieve the best outcome; prevention of ANS importation or movement within the state. The ANS regulations, which could be adopted for North Dakota, are simple, enforceable, and effective. The ND-Plan allows for collaboration with other states and federal ANS prevention activities.

The problems and activities needed to eliminate ANS are of importance in preparing the ND-Plan. Appendix P is the North Dakota Rapid Response Plan. This plan outlines how North Dakota will deal with an ANS infestation in the state or a location of primary concern. It is critical the newly detected ANS infestation be dealt with in a timely and effective manner. The planning must be done in advance so those involved with elimination efforts will have their tasks already identified.

The ND-Plan's objectives and strategies outline the major efforts in North Dakota ANS prevention efforts. Those needs are scaled to be accomplishable by the coordinator, AISC, and impacted parties. The ND-Plan is meant to be flexible, as one area is accomplished and goals reached, new items will be placed on the list of projects to be completed. The ND-Plan is meant to move forward with successful completion of projects, but will include some redundant issues to reinforce ANS prevention and updating precautions.

North Dakota agencies are already actively involved in ANS prevention efforts. It is important that these initial ANS prevention efforts are not diminished as any setback will cause future ANS prevention to be more difficult to achieve. The funding for these efforts need to continue and to be increased. The combination of federal and state funds and resources will allow for ANS prevention activities to continue at their current rate.

The ND-Plan is based on the recommendations for developing a statewide management plan that was provided by WRP, ANS-Task Force, and reflects the needs for North Dakota. The ND-Plan is a reasonable approach for ANS prevention and the ANS-Task Force should readily approve this plan. The management plan allows for oversight of activities, evaluation of the effectiveness of those activities, and reporting of findings. Midcourse corrections will be made when and if necessary to allow strategies to be accomplished.

It is understood that the program will need to continue as long as there are threats to North Dakota's aquatic resources. The initial program will have to be modified to address new situations and problems as they are identified.

PROGRAM MONITORING AND EVALUATION

The evaluation of any project is important to understand if the strategies are being accomplished and if the efforts to prevent ANS infestations are providing needed results. A key component in evaluations will be to determine public and private sector awareness of ANS problems. An important point is to understand what precautions these groups are using, where they are acquiring ANS prevention protocols, and what protocols they are using and are willing to use. An additional method of evaluating ANS prevention is to determine the establishment of new ANS in North Dakota and the spread of ANS populations now existing in North Dakota. The comparison of data set

over time will allow for agencies to understand what efforts have provided the best results in preventing ANS movement into or within the state.

GLOSSARY

Accidental introduction: Any introduction of nonindigenous aquatic species that occurs as the result of activities other than the purposeful or intentional introduction of the species involved, such as the transportation of nonindigenous species in ballast water or in water used to transport fish, mollusks, or crustaceans for aquaculture or other purposes.

ANS - aquatic nuisance species: A plant or animal species outside of its native range that threatens the diversity or abundance of native species, the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters, and cause negative economic or ecological impacts

Biocontrol: The use of living organisms, such as predators, parasites, and pathogens to control pest insects, weeds, or diseases.

Bio-fouling: The accumulation of living organisms in places where they are not wanted and in sufficient quantities that they cause management problems or unacceptable deleterious impacts.

Commercial venture: Those efforts by individuals to set up and operate a business or industry for profit, i.e., power production, fish rearing, irrigation districts, water diversions, plant nurseries, pet stores, bait dealers, food markets or restaurants dealing in live animals or plants, or similar ventures for gain of individuals or groups.

Control: Eradicating, suppressing, reducing, or managing invasive species populations, preventing the spread of invasive species from areas where they are present, and taking steps such as restoration of native species and habitats to reduce the effects of invasive species, and to prevent further invasions.

Ecological integrity: The extent to which an ecosystem has been altered by human behavior; an ecosystem with minimal impact from human activity has a high level of integrity; an ecosystem that has been substantially altered by human activity has a low level of integrity.

Eradicate: The act or process of eliminating aquatic nuisance species.

Exotic: Any species or other variable biological material that enters an ecosystem beyond its historic range which is on a continental scale, including such organisms transferred from one ecosystem to another.

Intentional introduction: All or part of the process by which a nonindigenous species is purposefully introduced into a new area.

Invasive: A species that thrives and becomes established in a non-historical location or in a new location where it was not previously found, often to the determent of

species which were there before or to the negative impact of desirable species or native species in the new areas or to the ecosystem and habitats.

Nonindigenous species: Any species or other variable biological material that enters an ecosystem beyond its historic range which is typically the same region, including such organisms transferred to a new location on purpose, but these species may not have an injurious impact on the ecosystem or negative inter species relationships.

Pathogen: Any microbe or other organism that causes disease.

Pioneer infestation: A small ANS colony that has spread to a new area from an established colony.

Priority species: Any ANS that is considered to be a significant threat to North Dakota waters and is recommended for immediate or continued management action to minimize or eliminate their impact.

Watershed: An entire drainage basin including all living and nonliving components.

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Appendix A: **Section 1204 of the National Invasive Species Act of 1996**

SEC. 1204. STATE AQUATIC NUISANCE SPECIES MANAGEMENT PLANS.

(a)STATE OR INTERSTATE INVASIVE SPECIES MANAGEMENT PLANS.—

(1) IN GENERAL -- After providing notice and opportunity for public comment, the Governor of each State may prepare and submit, or the Governors of the States and the governments of Indian Tribes involved in an interstate organization, may jointly prepare and submit—

(A) a comprehensive management plan to the Task Force for approval which identifies those areas or activities within the State or within the interstate region involved, other than those related to public facilities, for which technical, enforcement, or financial assistance (or any combination thereof) is needed to eliminate or reduce the environmental, public health, and safety risk associated with aquatic nuisance species, particularly the zebra mussel; and

(B) a public facility management plan to the Assistant Secretary for approval which is limited solely to identifying those public facilities within the State or within the interstate region involved for which technical and financial assistance is needed to reduce infestations of zebra mussels.

(2) CONTENT -- Each plan shall, to the extent possible, identify the management practices and measures that will be undertaken to reduce infestations of aquatic nuisance species. Each plan shall—

(A) identify and describe State and local programs for environmentally sound prevention and control of the target aquatic nuisance species;

(B) identify Federal activities that may be needed for environmentally sound prevention and control of aquatic nuisance species and a description of the manner in which those activities should be coordinated with State and local government activities;

(C) identify any authority that the State (or any State or Indian Tribe involved in the interstate organization) does not have at the time of the development of the plan that may be necessary for the State (or any State or Indian Tribe involved in the interstate organization) protect public health, property, and the environment from harm by aquatic nuisance species; and

(D) a schedule of implementing the plan, including a schedule of annual objectives, and enabling legislation.

(3) CONSULTATION —

(A)In developing and implementing a management plan, the State or interstate organization should, to the maximum extent practicable, involve local governments

and regional entities, Indian Tribes, and public and private organizations that have expertise in the control of aquatic nuisance species.

(B) Upon the request of a State or the appropriate official of an interstate organization, the Task Force or the Assistant Secretary, as appropriate under paragraph (1), may provide technical assistance in developing and implementing a management plan.

(4) PLAN APPROVAL -- Within 90 days after the submission of a management plan, the Task Force or the Assistant Secretary in consultation with the Task Force, as appropriate under paragraph (1), shall review the proposed plan and approve it if it meets the requirements of this subsection or return the plan to the Governor or the interstate organization with recommended modifications.

(b)GRANT PROGRAM —

(1) STATE GRANTS -- The Director may, at the recommendation of the Task Force, make grants to States with management plans approved under subsection (a) for the implementation of those plans.

(2) APPLICATION -- An application for a grant under this subsection shall include an identification and description of the best management practices and measures which the State proposes to utilize in implementing an approved management plan with any Federal assistance to be provided under the grant.

(3) FEDERAL SHARE —

(A) The Federal share of the cost of each comprehensive management plan implemented with Federal assistance under this section in any fiscal year shall not exceed 75 percent of the cost incurred by the State in implementing such management program and the non–Federal share of such costs shall be provided from non–Federal sources.

(B) The Federal share of the cost of each public facility management plan implemented with Federal assistance under this section in any fiscal year shall not exceed 50 percent of the cost incurred by the State in implementing such management program and the non–Federal share of such costs shall be provided from non–Federal sources.

(4) ADMINISTRATIVE COSTS -- For the purposes of this section, administrative costs for activities and programs carried out with a grant in any fiscal year shall not exceed 5 percent of the amount of the grant in that year.

(5) IN–KIND CONTRIBUTIONS -- In addition to cash outlays and payments, in–kind contributions of property or personnel services by non–Federal interests for

activities under this section may be used for the non–Federal share of the cost of those activities.

(c) ENFORCEMENT ASSISTANCE -- Upon request of a State or Indian Tribe, the Director or Under Secretary, to the extent allowable by law and in a manner consistent with section 141 of title 14, United States Code, may provide assistance to a State or Indian Tribe in enforcing an approved State or interstate invasive species management plan.

Appendix B: **Authorities and Regulations Provided by the State of North Dakota.**

STATE OF NORTH DAKOTA AUTHORITIES AND REGULATIONS

North Dakota has a number of state agencies, which have statutory and regulatory authority over the management of pests and aquatic nuisance species. No single agency has complete authority, but the agencies should work together to resolve problems that will impact the State's resources. This section describes existing authorities related to ANS and the management and control of ANS. The complete set of Century Codes can be found at http://www.state.nd.us/lr/information/statutes/cent-code.html and should be reviewed in addition to the information provided here.

Although none of these agencies listed below have the express power to regulate aquatic nuisance species, the inherent doctrine of "Public Trust" would allow them act in the best interest of the State of North Dakota and for the resident's of the state.

DEPARTMENT OF AGRICULTURE

Key items: powers over the management, control and eradication of pests, noxious weeds, rodent and insect management and the use and application or storage of pesticides; control, maintenance, and eradication of noxious weeds and pests throughout the state, shall compile and keep current a list of noxious weeds and provide local authorities with information and a program with funding for the control or eradication of noxious weeds, enforcement of provisions by Highway Patrol, sheriffs, and other law enforcement officers within the state to prevent the dissemination of noxious weeds on highways, airways or waterways.

GAME AND FISH DEPARTMENT

Key items: authority to regulate the importation, introduction and transplanting of fish, fish eggs and other aquatic animals in to the waters of the state, issue permits for introduce any fish or fish egg into the public waters and the fish or fish eggs must be inspected for disease; the power to remove and dispose of fish deemed undesirable to the best interest of the public; rules for release of fish into the state, and the supervision of live bait wholesalers

STATE DEPARTMENT OF HEALTH

Key items: includes the director of the Game and Fish Department, through the State Department of Health with cooperation of the State Water Commission; protect the present and future use of such waters for, among other reasons, the propagation of fish and aquatic life and wildlife.

STATE WATER COMMISSION AND STATE ENGINEER

Key items: includes authority over projects involving recreational use or wildlife conservation; permit issued by the state engineer, unless the use is for domestic, livestock or for fish, wildlife (including purposes of propagating, sustaining fish and wildlife resources, and for the development and maintenance of water areas) or other recreational need; the authority to control and supervise all water and wildlife

conservation projects and wildlife reservations; the is the Water Resource District Act has express power to order the removal of weeds and pests that hinder waterflows

HIGHWAY PATROL AND OTHER LAW ENFORCEMENT

Key items: enforcement of laws regarding pests, pesticides, noxious weed control, weed control, and game and fish generally require other law enforcement agencies within the state to aide and assist in the enforcement of laws and regulations

DEPARTMENT OF AGRICULTURE

The Commissioner of Agriculture or the commissioner's authorized representative with the assistance of the North Dakota State University extension service has broad powers over the management, control and eradication of pests, noxious weeds, rodent and insect management and the use and application of pesticides.

CHAPTER 4-33 PLANT PESTS

4-33-01. Definitions. In this chapter, unless the context or subject matter otherwise requires:

1. "Certificate" means a document issued or authorized by the commissioner indicating that a regulated article is not contaminated with a pest.

2. "Commissioner" means the commissioner of agriculture or the commissioner's authorized representative.

3. "Host" means any plant or plant product upon which a pest is dependent for completion of any portion of its life cycle.

4. "Infested" means actually infested or infected with a pest or so exposed to infestation that it would be reasonable to believe that an infestation exists.

5. "Move" means to ship, offer for shipment, receive for transportation, carry, or otherwise transport, move, or allow to be moved.

6. "Permit" means a document issued or authorized by the commissioner to provide for the movement of regulated articles to restricted destinations for limited handling, utilization, or processing.

7. "Person" means any individual, corporation, company, society, or association, or other business entity.

8. "Pest" means any invertebrate animal, pathogen, parasitic plant, or similar organism which can cause damage to a plant or part thereof or any processed, manufactured, or other product of plants.

9. "Phytosanitary certificate" means an international document issued or authorized by the commissioner stating that a plant or plant product is considered free from quarantine

pests and practically free from injurious pests and that they are considered to conform with the current phytosanitary regulations of the importing country.

10. “Plant” means agronomic field crops, horticultural crops, and native and tame grasses used for livestock production.

11. “Regulated article” means any article of any character as described in the quarantine carrying or capable of carrying the plant pest against which the quarantine is directed.

Source: S.L. 1969, ch. 89, § 1; 1975, ch. 62, § 1; 1983, ch. 104, § 1; 1987, ch. 90, § 1.

4-33-04. Authority for plant quarantine. The commissioner is authorized to quarantine this state or any portion thereof when he determines that such action is necessary to prevent or retard the spread of a pest within or from this state and to quarantine any other state or portion thereof whenever he determines that a pest exists therein and that such action is necessary to prevent or retard its spread into this state. Before promulgating his determination that a quarantine is necessary, the commissioner shall, after due notice to interested parties, hold a public hearing under such rules as he shall promulgate, at which hearing any interested party may appear and be heard either in person or by attorney, provided, the commissioner may impose a temporary quarantine for a period not to exceed ninety days during which time a public hearing, as provided herein, must be held if it appears that a quarantine for more than the ninety-day period will be necessary to prevent or retard the spread of the pest. The commissioner shall give notice of the establishment of the quarantine in such newspapers in the quarantined area as he may select. The commissioner may limit the application of the quarantine to the infested portion of the quarantined area and appropriate environs, to be known as the regulated area, and may, without further hearing, extend the regulated area to include additional portions of the quarantined area upon publication of a notice to that effect in such newspapers in the quarantined area as he may select or by direct written notice to those concerned.

Following establishment of the quarantine, no person may move any regulated article described in the quarantine or move the pest against which the quarantine is established, within, from, into, or through this state contrary to regulations promulgated by the commissioner. Notice of the regulations must be published in such newspapers in the quarantined area as the commissioner may select.

The regulations may restrict the movement of the pest and any regulated articles from the quarantined or regulated area in this state into or through other parts of this state or other states and from the quarantined or regulated area in other states into or through this state and shall impose such inspection, disinfection, certification, or permit and other requirements as the commissioner deems necessary to effectuate the purposes of this
chapter.

Source: S.L. 1969, ch. 89, § 4.

4-33-05. Authority for abatement and emergency measures. When ever the commissioner finds any article that is infested or reasonably believed to be infested or a host or pest exists on any premise or is in transit in this state, he may, upon giving notice to the owner or his agent in possession thereof, seize, quarantine, treat, or otherwise dispose of such pest, host, or article in such manner as the commissioner deems necessary
to suppress, control, eradicate, or to prevent or retard the spread of a pest, or the commissioner may order such owner or agent to so treat or otherwise dispose of the pest, host, or article. Where large areas or metropolitan areas, involving many people, are to be treated, notice may be by means of newspaper, radio, or other news media. Such notice must prominently appear, at least ten days prior to treatment, in at least three issues of a daily paper having local coverage.

Source: S.L. 1969, ch. 89, § 5.

4-33-06. Authority for inspections — Warrants. To effectuate the purposes of this chapter, the commissioner may with a warrant or the consent of the owner make reasonable inspection of any premises in this state and any property therein or thereon and may without a warrant with the assistance of any law enforcement agency provided for in this code stop and inspect, in a reasonable manner, any means of conveyance moving within this state upon probable cause to believe it contains or carries any pest, host, or other article subject to this chapter, and may make any other reasonable inspection of any premises or means of conveyance for which under the Constitution of the United States and the Constitution of North Dakota, no warrant is required.

The appropriate district courts in this state may issue warrants for such inspections upon a showing by the commissioner that there is probable cause to believe that there exists in or on the property to be inspected a pest, host, or other article subject to this chapter.

Source: S.L. 1969, ch. 89 sec. 6; 1991,
Ch. 326, sec. 2

PESTICIDE ACT

4-35-01. Title. This chapter must be known as the “North Dakota Pesticide Act of 1975”.

Source: S.L. 1975, ch. 63, § 1. Cross-References.
Insecticide, Fungicide, and Rodenticide Act of 1947,
see ch. 19-18.

4-35-02. Creation of pesticide control board. There is hereby created the pesticide control board, hereinafter also called the “board”, consisting of the commissioner of agriculture, the director of the cooperative extension division of the North Dakota state university of agriculture and applied science, and the director of the agricultural experiment station at North Dakota state university of agriculture and applied science. The commissioner of agriculture must be chairman of the board and is responsible for
the enforcement of this chapter. The board shall meet at the call of the chair. The members of the board must be compensated for their expenses in performing their duties under this chapter at the same rate as other state officials and the board’s expenses must be paid from funds provided for the administration of this chapter to the commissioner of agriculture. The board may act through the office of the commissioner of agriculture, and
one person on the commissioner’s staff may be specifically responsible to, or act as the state-level agent of, the board.

Source: S.L. 1975, ch. 63, § 2.

4-35-03. Enforcing agency. This chapter must be administered by the pesticide control board, hereinafter referred to as the “board”.

Source: S.L. 1975, ch. 63, § 3.

4-35-05. Definitions. As used in this chapter:

9. “Environment” includes water, air, land, and all plants and man and other animals living therein, and the interrelationships which exist among these.

17. “Person” means any individual, partnership, association, fiduciary, corporation, or any organized group of persons, whether or not incorporated.

18. “Pest” means:

a. Any insect, snail, slug, rodent, nematode, fungus, weed; or

b. Any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism, except viruses, bacteria, or other micro-organisms on or in living man or other living animals which are annoying or otherwise injurious or harmful to agriculture, health, and the environment.

19. “Pesticide” means:

a. Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest; and

b. Any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

27. “Unreasonable adverse effects on the environment” means any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide.

28. “Weed” means any plant which grows where not wanted.

29. “Wildlife” means all living things that are neither human, domesticated, nor, as defined in this chapter, pests, including, but not limited to, mammals, birds, and aquatic life.

Source: S.L. 1975, ch. 63, § 5; 1983, ch. 82, § 7; 1985, ch. 103, § 4

4-35-06. Pesticide control board to administer chapter and adopt regulations.

1. The pesticide control board shall administer the provisions of this chapter and has authority to issue regulations in conformance with provisions of chapter 28-32 to carry out the provisions of this chapter. Such regulations may prescribe methods to be used in the application of pesticides. Where the board finds that such regulations are necessary to carry out the purpose and intent of this chapter, such regulations may relate to the time, place, manner, methods, materials, and amounts and concentrations, in connection with the application of the pesticide, and may restrict or prohibit use of pesticides in designated areas during specified periods of time and shall encompass all reasonable factors which the board deems necessary to prevent damage or injury by drift or misapplication to:

a. Plants, including forage plants, on adjacent or nearby lands.

b. Wildlife in the adjoining or nearby areas.

c. Fish and other aquatic life in waters in proximity to the area to be treated.

d. Persons, animals, or beneficial insects. In issuing such regulations, the board shall give consideration to pertinent research findings and recommendations of other agencies of this state, the federal government, or other reliable sources.

NOXIOUS WEED CONTROL

63-01.1-01. Control and eradication of noxious weeds. It shall be the duty of every person in charge of or in possession of land in this state, whether as landowner, lessee, renter, or tenant, under statutory authority or otherwise, to eradicate or to control the spread of noxious weeds on those lands.

Source: S.L. 1971, ch. 594, § 1; 1981, ch. 638, § 1.

63-01.1-02. Definitions. As used in this chapter:

1. “Board member area” means a geographical area within the county from which a member of the weed board is appointed.

2. “Commissioner” means the agriculture commissioner or the commissioner’s designee.

3. “Control” means to prevent the spread of any noxious weed, designated by the commissioner or other control authority, by seed or any other propagating part or, if authorized, to suppress, eradicate, or prevent or retard the spread of a pest.

4. “Control authority” means the commissioner, the county weed board, and, pursuant to the county weed board’s authorization, the county weed control officer.

5. “County weed board” means members of the board of each county as appointed pursuant to section 63-01.1-04.

6. “County weed control officer” means the person designated by the county weed board to be responsible for the operation and enforcement of this chapter within each county.

7. “Eradicate” or “eradication” means to destroy a plant or, if authorized, a pest so that it is not viable.

8. “Landowner” means any owner of federal, state, municipal, or private land, under statutory authority or otherwise. The term does not include a lessee, renter, tenant, operator, or an owner of any easement or right of way.

9. “Noxious weed” means any plant propagated by either seed or vegetative parts which is determined by the commissioner after consulting with the North Dakota state university extension service, or a county weed board after consulting with the county extension agent, to be injurious to public health, crops, livestock, land, or other property.

10. “Operator” means the person chiefly responsible for the farming or other operations being performed on the land, whether for self benefit, or for the benefit of the landowner or another.

11. “Person” means any individual, partnership, firm, corporation, limited liability company, company, society, association, the state, or any department, agency,

or subdivision thereof, or any other entity which occupies or owns land or which causes noxious weed seeds or propagating parts to be disseminated or transported in this state.

12. “Pest” means any pest defined in section 4-33-01 and includes a prairie dog.

13. “Township road” means a public road that is an improved road, constructed, maintained, graded, and drained by the township, or county in the case of an unorganized township. A township road includes a street in an unincorporated townsite and does not necessarily have to be surfaced. A sodded road is not a township road. In order for a section line to be a township road it must be graded and drained and be an improved maintained road. A township road is a public road that is not designated as part of a county, state, or federal-aid road system and is not located in an incorporated city.

Source: S.L. 1971, ch. 594, § 1; 1979, ch. 651, § 1; 1981, ch. 638, § 2; 1983, ch. 693, § 1; 1993, ch. 54, § 106; 1993, ch. 610, § 1; 1995, ch. 603, § 1.

63-01.1-03. State weed control authority — Agriculture com missioner — Powers and duties.

1. The duty of enforcing this chapter and carrying out its provisions and intent is vested in the commissioner. The commissioner shall cooperate with other weed control authorities.

2. The commissioner shall determine which weeds are noxious for the purposes of a state list of noxious weeds after consulting with the North Dakota state university extension service and shall compile and keep current a list of noxious weeds.

3. The commissioner shall outline procedures, prepare and supply official notices, posters, report forms, and other documents needed in carrying out this chapter. The commissioner shall supply these documents to weed control officers, county, township, and city authorities, and others as needed to carry out an effective weed control program or, if authorized, pest control program. The commissioner shall prepare notices or posters including the noxious weed list, rules, dates for controlling, and other compliance requirements for printing in official newspapers or for posting at least annually.

4. The commissioner shall cooperate with the county weed board, county weed control officers, highway patrol officers, county sheriffs, and others in enforcing this chapter. The commissioner shall also encourage the North Dakota state university extension service to disseminate information and to conduct educational campaigns with

respect to eradication and control of noxious weeds or, if authorized, pests.

5. The commissioner upon receiving a written complaint shall immediately refer the complaint to the proper weed control officer or control authority.

6. The commissioner shall encourage the cooperation of agencies of both the federal and state governments in furtherance of the purposes of this chapter.

7. The commissioner may adopt rules to carry out the intent of this chapter.

8. The commissioner may require operational or program reports from weed control authorities or weed control officers regarding weed control progress and activity in the state and, if authorized, pest control progress and activity in the state.

9. The commissioner shall call an annual meeting of all weed control officers, either statewide or by areas, to review the intent, operation, procedures, and accomplishments under this chapter and may also request the North Dakota state university extension service or others to present educational information on weed control practices or, if authorized, pest control practices. Weed control authority members must be invited to attend meetings called pursuant to this subsection.

Source: S.L. 1971, ch. 594, § 1; 1979, ch. 651, § 2; 1981, ch. 638, § 3; 1993, ch. 610, § 2.

63-01.1-03.1. County weed board — Jurisdiction. All land within the boundaries of North Dakota, including all federal, state, private, and municipally owned lands, is included in the county weed board's jurisdiction within the county in which the land is located.

Source: S.L. 1981, ch. 638, § 4.

63-01.1-12. Preventing dissemination of noxious weeds.

1. To prevent the dissemination of noxious weeds by machinery; trucks, harvesting, or other farm equipment, or during transportation of plants, forage, screenings, dirt, and other articles which may be transported by any means, the commissioner shall, from time to time, publish a list of the possible methods of disseminating the propagating parts of such weeds.

2. All operators of tillage, seeding, and harvesting equipment shall be required to clean such equipment to prevent the spread of noxious weeds by seed or other propagating parts prior to moving such equipment on public highways, airways, waterways, or by any other means of conveyance, public or otherwise. Trucks or trailers transporting grain screenings shall be constructed

and covered so as to prevent weed seed dissemination. Scattering and dumping on land or in water of any material containing noxious weed seeds or propagating parts is prohibited unless such material has been processed or treated or is buried sufficiently deep to destroy seeds and other propagating parts.

Source: S.L. 1971, ch. 594, § 1; 1979, ch. 651, § 7.

63-01.1-12.1. Quarantine period — Materials or farm products and area defined.

1. Whenever the commissioner~ the county weed board, or anyone authorized thereby finds any area of the state to be infested with noxious weeds, and it is established that materials or farm products from that area are liable to spread noxious weeds into other areas to the injury of others, the commissioner shall, without unnecessary delay, declare a quarantine against the area to prevent the transfer of materials or farm products from the quarantined area. When it is ascertained that noxious weeds are likely to be introduced into this state by the importation of materials or farm products, the commissioner shall declare a quarantine against the importation of those materials or farm products.

2. The commissioner shall declare an individual county quarantine when requested by resolution adopted by a two-thirds majority of the county weed board of the county in which the quarantine is to be declared.

3. For the purposes of this section, “area~ means a geographical section of land as identified by the commissioner, which may include cities and counties or any portion of a city or county; “farm products” means all crops, crop products, plants or portions thereof, but shall not mean livestock; and “materials” means gravel or other sub-
stances that can be transported over a state highway.

Source: S.L. 1981, ch. 638, § 18; 1993, ch. 610, § 9.

63-01.1-12.2. Noxious weed certification — Gravel and sand pits and hay land.

1. The commissioner, after consultation with the North Dakota state university extension service, may adopt rules for certifying that gravel, scoria, or sand surface mining operations and land producing hay for sale or for resale are not contaminated with noxious weeds. The rules must identify the extent noxious weeds are allowed with certification.

2. The county weed board, after consultation with the North Dakota state university extension service, may certify gravel, scotia, or sand surface mining operations and land producing hay for sale or for resale as not contaminated with noxious weeds.

NORTH DAKOTA GAME AND FISH DEPARTMENT

The North Dakota Game and Fish Department is to regulate the importation, introduction and transplanting of fish, fish eggs and other aquatic animals in to the waters of the state. The act provides that one must have a permit issued by the director before one can introduce any fish or fish egg into the public waters and the fish or fish eggs must be inspected for disease. In addition, the Game and Fish Department has the power to remove and dispose of fish deemed undesirable to the best interest of the public. The director may adopt rules governing the operation of private fish hatcheries, the introduction and release of fish into the state, and the supervision of live bait wholesalers. Department rules prohibit the dumping of minnow buckets or any other container into the public waters of the state.

GAME AND FISH DEPARTMENT

20.1-02-04. Duties of director. The director shall:

1. Maintain an office in Bismarck.

2. Adopt rules necessary to the conduct of the department.

3. Keep an accurate record of all the transactions and expenditures of the department and submit a biennial report to the governor and the secretary of state in accordance with section 54-06-04.

4. Enforce state laws involving wildlife.

5. Collect and distribute statistics and information germane to this title and publish information and reports, including a monthly bulletin, for the education of the public in conservation matters.

6. Examine all waters of the state and, wherever suitable waters are found, arrange to plant, stock, or deposit available fish, spawn, or fry

7. Cooperate with the United States fish and wildlife service, or any other appropriate federal agency, and make applications for fish, spawn, and fry, to apportion and deposit in waters of the state.

8. Cooperate with and assist clubs and individuals in stocking the waters of this state with fish.

9. Remove or take from any public waters containing a surplus of fish any reasonable quantity of fish for stocking other public waters, hatching or propagating purposes, or exchange with other states and countries.

10. Control, construct, mark, designate, manage, and have charge of all state fish hatcheries, state game farms, game refuges, and game reserves owned, leased, or controlled for the propagation and protection of game birds, game animals, and fish.

11. Supervise the breeding, propagation, capture, distribution, and preservation of game birds, game animals, and fish as the director deems advisable.

12. Adopt rules necessary for carrying out section 20.1-10-01 and these rules have the force of law after one publication in the daily newspapers of this state.

13. Provide the necessary blank forms for making applications for licenses of all kinds and distribute them among those authorized to sell licenses.

14. Keep a record of all permits issued for the purpose of propagation and domestication of game birds or protected animals.

Source: S.L. 1973, ch. 202, § 9; 1973, ch. 403, § 15; 1975, ch. 466, § 16; 1991, ch. 231, § 12; 1991, ch. 232, § 4; 1995, ch. 350, § 15.

20.1-02-05. Powers of director. The director may:

1. Fix the salaries and the necessary travel and other expenses of department personnel subject to law and legislative appropriations.

2. Employ any part-time personnel necessary to run the director's office and remove the employees at will. Salaries and necessary traveling and other expenses of these appointees must be authorized, audited, and paid in the same manner as salaries and expenses of state officers.

3. Accept from any person, or gather, or purchase, fish, spawn, or fry, for distribution in state waters.

4. Take alive at any time, under the director's personal supervision or under the personal supervision of any of the director's bonded appointees, any birds or animals for propagation purposes or for exchange with other states and foreign countries for game birds and animals of other species.

5. Order additional protection for any fish with an open season when, after investigation, the director finds danger of extinction, undue depletion in any waters, or to aid in the propagation and protection of immature fish, by prescribing how, how many, where, and when the fish may be taken. The orders have the force of law.

6. Take or cause to be taken at any time from any state public waters any suckers, carp, or pickerel.

7. With the governor's approval, purchase, lease, or condemn real estate, when it is required to carry out this title, and sell it when it is no longer required, in the name of the state.

8. Lease up to ninety-nine years any department land, for the purpose of development and improvement, to any nonprofit corporation, upon consideration of specified improvements to be made by the corporation and other improvements the department and the corporation may agree upon. The lease must provide that all funds received by the corporation through lease of the property be expended upon the leased premises for development and improvements. The corporation has the authority, subject to approval by the director, to sublease the premises for cabin sites and other recreational purposes. Upon termination of the lease, the leased property, together with all improvements, reverts to the department.

9. With the governor's approval, enter into agreements with the bureau of reclamation for the management of lands in the Heart Butte area acquired by the bureau for the construction of dams on lakes or streams. Revenues derived from the management of these lands or received from any federal agency for expenditure upon these lands may not be commingled with other game and fish funds, but must be deposited by the director in a separate account. These funds are hereby appropriated for expenditure for purposes as may be agreed upon by the bureau of reclamation, the United States fish and wildlife service, the national park service, and the director. The authority herein granted is effective only until the lands are resold to the former landowners by the bureau of reclamation.

10. Secure specimens of game birds, animals, and fish for breeding purposes by purchase or otherwise and by exchange with the game commissions or state game wardens of other states or countries.

11. Issue special permits to shoot wildlife from a stationary motor vehicle upon application from individuals who are physically unable to walk for purposes of hunting or taking wildlife or who have lost the use of an arm at or below the elbow. The application must be accompanied by a physician's statement verifying the person's condition, and if used to hunt on lands controlled by the board of university and school lands, must designate the land on which the individual intends to hunt. The permittee must have permission from the lessee and the commissioner of university and school lands to hunt on lands controlled by the board of university and school lands. A permit issued under this subsection allows the permittee to drive, or to be driven, onto any land for the purposes of hunting wildlife, except that neither any other passenger within the vehicle nor the driver, if someone other than the permittee, may be a hunter, unless the other person is also a permittee. Provided, however, that if the land is privately owned and if the permittee is not going to drive or be driven along an established road or trail, the

permittee must first obtain the consent of the owner or lessee to hunt on the land in the manner provided in this title.

12. Issue to any person, who is a paraplegic or who has lost the use of one or both arms, a special permit to hunt game with a crossbow if that person otherwise complies with and qualifies under the licensing and other provisions of this title.

13. Issue any resident license prescribed by this title to a person who has come to the state with a bona fide intention of becoming a resident, even though that person has not been a resident of this state for the required time period immediately preceding the application for the license, or to any person who is a member of the United States armed
forces and who is within the state on duty or leave, or to any employee of the United States fish and wildlife service or the conservation department of any state or province of Canada in the state to advise or consult with the department. No license may be issued under this subsection unless an affidavit of a bona fide resident, setting forth the actual conditions, accompanies the application. This subsection does not apply to lottery permits, except that the director shall issue a resident deer hunting license to any resident of this state who is a member of the United States armed forces stationed outside this state and who shows proof of North Dakota residence and who pays the appropriate licensing fee. A deer license issued to a member of the United States armed forces under
this subsection must be issued without being subject to the lottery for deer hunting licenses.

14. Adopt rules, and issue permits for the transporting or introducing of fish, fish eggs, small game, big game, or fur-bearers after determining that the fish, fish eggs, birds, or animals have been properly inspected for disease, and that the transplanting or introduction will be in compliance with state laws and rules. No person may trans plant or introduce any fish or fish eggs into any of the public waters of this state, or transplant or introduce any species of small game, big game, or fur-bearers into this state without obtaining a permit from the director.

15. Pursuant to section 4-01-17.1, cooperate with the agriculture commissioner, the United States fish and wildlife service, and other agencies in the destruction of predatory animals, destructive birds, and injurious field rodents. The director is hereby authorized to adopt rules in accordance with organized and systematic plans of the department of the interior for the destruction of these birds and animals. The director may determine the necessity and issue permits and rules and regulations therefor for the operation and use of
private aircraft to assist in the destruction of the above birds and animals and aid in the administration or protection of land, water, wildlife, livestock, domesticated animals, human life, or crops.

16. Exercise authority to establish programs and rules and administer state and federal funds provided to the state for the preservation and management of resident

species determined by the director to be threatened or endangered species of wildlife. The authority exercised must be in compliance with the Endangered Species Act of 1973,
Public Law 93-205. Any person who violates rules established under this subsection is guilty of a class B misdemeanor.

17. Subject to chapter 28-32, adopt rules for the licensing of guides or outfitters and may require records and reports as the director determines necessary. The director may, after due hearing as provided in chapter 28-32, revoke or refuse to renew the license of a person who violates the rules or fails to provide the records and reports.

18. Provide for the funding of a private land habitat and access improvement program with moneys derived from the interest earned on the game and fish fund and habitat restoration stamp fees. The director shall place these funds in a special fund called the “game and fish department private land habitat and access improvement fund”.

19. Carry out a private land habitat and access improvement program by:

a. Entering into cost-sharing, habitat enhancement, and access agreements with landowners or agencies working on private land to help defray all or a portion of their share of local, state, or federally sponsored conservation practices considered beneficial
to fish and wildlife.

20.1-02-15. Police powers of director, deputy director, and bonded appointees of director. The director, deputy director, and any bonded appointees of the director have the power:

1. Of a peace officer for the purpose of enforcing this title and any other state laws or rules relating to wildlife.

2. To make arrests upon view and without warrant for any violation, committed in that person’s presence, of this title and any other state laws or rules relating to wildlife.

3. To regulate dealers in green furs, propagation or possession of live protected wildlife, taxidermists, shooting preserves, guides and outfitters, commercial fishing operations, private fish hatcheries, and commercial bait vendors. In the regulation of these licensed activities, the premises used to conduct the business and records required by law must be open for inspection at reasonable hours by game and fish law enforcement officers.

20.1-02-15.1. Additional powers of director, deputy director, chief game wardens, or district game wardens. The director, deputy director, chief game wardens,

or district game wardens have the power of a peace officer in the following circumstances:

1. To enforce state laws and rules on any game refuge, game manage ment area or other land or water owned, leased, or managed by the department.

2. When responding to requests from other law enforcement agencies or officers for aid and assistance. For the purposes of this subsection, a request from a law enforcement agency or officer means only a request for assistance as to a particular and singular violation or suspicion of violation of law, and does not constitute a continuous request for assistance outside the purview of enforcement of the provisions of this title.

3. The powers and duties conferred are supplemental to other powers and duties conferred upon the director, deputy director, chief game wardens, or district game wardens and do not constitute an obligation beyond the regular course of duty of those officers.

4. To enforce chapter 20.1-15.

5. To enforce chapter 20.1-13.1.

6. To enforce chapter 39-24.1. This section may not be construed to limit the powers or duties of any peace officer within this state.

Source: S.L. 1979, ch. 300, § 1; 1991

FISH, FROG, AND TURTLE REGULATIONS

20.1-06-05. Removing undesirable fish. The director, any person authorized by the director, or anyone contracting with the director, may kill or take fish from waters of this state in any manner prescribed by the director when in the director's judgment it is in the best interest of public fishing. All such fish must be disposed of at the director's discretion. Money derived from the disposal must be deposited in the state treasury and credited to the game and fish fund. All money received and expended must be itemized, and written records thereof must be kept in the director's office. Any person desiring to contract with the director to take such fish, as determined by the director, from the waters of this state, by means of not more than five hoop-nets or traps, not more than five setlines of ten hooks, or not more than one hundred feet [30.48 meters] of seine, must be awarded the contract upon payment of the appropriate fee. These contracts may not specify the disposition of the fish.

Source: S.L. 1973, ch. 202, § 13; 1989, ch. 116, § 3; 1991, ch. 231, § 54.

20.1-06-12. Regulations governing private fish hatcheries. Any person operating a private fish hatchery is not subject to fishing seasons, limits, legal size restrictions, or other methods of taking fish as provided in any governor's proclamation. The director may adopt rules governing the operation of private fish hatcheries. No license is required of any person for taking fish by angling at a licensed private fish hatchery operated in accordance with the rules of the director. The hatchery operator shall furnish to each person taking fish a written certificate in the form the director prescribes, giving the number and description of the fish taken and other information as the director requires, whereupon the fish may be possessed, shipped, or transported within the state in like manner as fish taken by residents under a license. The director shall issue an annual
license to operate the hatchery during a calendar year or a portion of a year upon application and payment of the appropriate fee by the owner or operator. The license may be suspended for noncompliance with the director's regulations.

So~Ce: S.L. 1973, ch. 202, § 13; 1991,

20.1-06-13. Property rights — Fish wild by nature. Any person, firm, corporation, or limited liability company raising and owning any lawfully possessed fish, wild by nature, has the same property rights therein as enjoyed by owners of domestic fish. They are, however, subject to all rules adopted by the director regarding the introduction and release into the state of the fish, as provided in subsection 14 of section 20.1-02-05.

Source: S.L. 1973, ch. 202, § 13; 1991, ch.
231, § 58; 1993, ch. 54, § 106.

20.1-06-14. Minnow bait wholesalers and retailers — License. The director shall adopt rules to control and supervise the operations of minnow or other live bait wholesalers. The director shall issue a license to each wholesaler when the wholesaler has complied with the director's rules and has paid the appropriate annual license fee. The director shall also issue a minnow or other live bait retailer's license to any person upon payment of the appropriate license fee. No person may sell minnows or other live bait at
wholesale or retail without first obtaining the appropriate license. The director may require each retailer or wholesaler to submit reports as the director may deem necessary.

Source: S.L. 1973, ch. 202, § 13; 1991, ch.
231, § 59.

20.1-06-15. Fishways at dams. Any person owning, erecting, managing, or controlling any dam or other obstruction across any river, creek, or stream within or forming the boundary of this state, at the director's direction, shall construct and keep in

good repair, a durable and efficient fishway in the manner, shape, and size as the director may direct. Upon failure to construct or maintain the fishway, after giving the person ten days' notice, the director may construct or repair the fishway and recover the costs from the person owning, erecting, managing, or controlling the dam or obstruction. No person may construct any fishway without the approval of the director.

Source: S.L. 1973, ch. 202, § 13; 1991

STATE WATER COMMISSION AND STATE ENGINEER

The Water Commission Act has general authority over all surface and sub-service water within the state and includes authority over projects involving recreational use or wildlife conservation. Anyone who wants to divert or appropriate water within the state must get a permit issued by the state engineer, unless the use is for domestic, livestock or for fish, wildlife (including purposes of propagating, sustaining fish and wildlife resources, and for the development and maintenance of water areas) or other recreational need. The state engineer does have the authority to control and supervise all water and wildlife conservation projects and wildlife reservations.

WATER COMMISSION

61-02-01. Water conservation, flood control, management, and development declared a public purpose. It is hereby declared that the general welfare and the protection of the lives, health, property, and the rights of all the people of this state require that the conservation, management, development and control of waters in this state, public or private, navigable or unnavigable, surface or subsurface, the control of floods, and the management of the atmospheric resources, involve and necessitate the exercise of the sovereign powers of this state and are affected with and concern a public purpose. It is declared further that any and all exercise of sovereign powers of this state in investigating, constructing, maintaining, regulating, supervising, and controlling any system of works involving such subject matter embraces and concerns a single object, and that the state water commission in the exercise of its powers, and in the performance of all its official duties, shall be considered and construed to be performing a
governmental function for the benefit, welfare, and prosperity of all the people of this state.

Source: S.L. 1937, ch. 255, § 1; 1939, ch.256,
§ 1; R.C. 1943, § 61-0201; S.L. 1983.

61-02-01.1. Statewide water development program. The legislative assembly finds that there is a critical need to develop a comprehensive statewide water development program. The state water commission shall develop and implement a comprehensive statewide water development program. The commission shall design the program to serve the long-term water resource needs of the state and its people and

to protect the state's current usage of, and the state's claim to, its proper share of Missouri River water.

Source: S.L. 1997, ch. 25, § 9.

61-02-02. Definitions. In this chapter, unless the context or subject matter otherwise requires:

1. "Commission" shall mean the state water commission.

2. "Cost of works" shall include:

a. The cost of construction, the cost of all lands, property rights, water rights, easements, and franchises acquired which are deemed necessary for such construction;

b. The cost of all water rights acquired or exercised by the commission in connection with such works;

c. The cost of all machinery and equipment, financing charges, interest prior to and during construction and for a period not exceeding three years after the completion of construction;

d. The cost of engineering and legal expenses, plans, specifications, surveys, estimates of cost, and other expenses necessary or incident to determining the feasibility or practicability of any project;

e. Administrative expenses;

f. The construction of the works and the placing of the same in operation; and

g. Such other expenses as may be necessary or incident to the financing authorized in this chapter, including, but not limited to, funding of debt service, repair and replacement reserves, capitalized interest, and the payment of bond issuance costs.

3. "Owner" shall include all individuals, associations, corporations, limited liability companies, districts, municipalities, and other political subdivisions of this state having any title or interest in any properties, rights, water rights, easements, or franchises to be acquired.

4. "Project" shall mean any one of the works defined in subsection 5, or any combination of such works, which are physically connected or jointly managed and operated as a single unit.

5. "Works" shall be deemed to include:

a. All property rights, easements, and franchises relating thereto and deemed necessary or convenient for their operation;

b. All water rights acquired and exercised by the commission in connection with such works;

c. All means of conserving and distributing water, including without limiting the generality of the foregoing two subdivisions, reservoirs, dams, diversion canals, distributing canals, channels, lateral ditches, pumping units, mains, pipelines, treatment plants, and waterworks systems; and

d. All works for the conservation, control, development, storage, treatment, distribution, and utilization of water including, without limiting the generality of the foregoing subdivisions, works for the purpose of irrigation, flood control, watering stock, supplying water for public, domestic, industrial, and recreational use, fire protection, and the draining of lands injured or in danger of injury as a result of such water utilization.

61-02-14. Powers and duties of the commission. The commission shall have full and complete power, authority, and general jurisdiction:

1. To investigate, plan, regulate, undertake, construct, establish, maintain, control, operate, and supervise all works, dams, and projects, public and private, which in its judgment may be necessary or advisable:

a. To control the low-water flow of streams in the state.

b. To impound water for the improvement of municipal, industrial, and rural water supplies.

c. To control and regulate floodfiow in the streams of the state to minimize the damage of such floodwaters.

d. To conserve and develop the waters within the natural watershed areas of the state and, subject to vested rights, to divert the waters within a watershed area to another watershed area and the waters of any river, lake, or stream into another river, lake, or
stream.

e. To improve the channels of the streams for more efficient transportation of the available water in the streams.

f. To provide sufficient water flow for the abatement of stream pollution.

g. To develop, restore, and stabilize the waters of the state for domestic, agricultural, and municipal needs, irrigation, flood control, recreation, and wildlife

conservation, by the construction and maintenance of dams, reservoirs, and diversion canals.

Source: S.L. 1937, ch. 255, § 13; 1939, ch. 256, § 13; R.C. 1943, § 61-0226; S.L. 1983, cli. 676, § 12.

61-02-28. Plans, investigations, and surveys concerning use of waters — Special powers of commission. The commission may make plans, investigations, and surveys concerning the use of any and all waters, either within or without this state, for purposes of establishing, maintaining, operating, controlling, and regulating systems of irrigation, municipal, domestic, industrial, recreational, and fish and wildlife works and projects in connection therewith within the state. The commission shall have all necessary powers of purchasing, selling, leasing, and assigning in accordance with chapter 6 1-04, rights and interests in the use or in the appropriation of waters for which it has filed a declaration of intent pursuant to section 61-02-30, or obtained a conditional water permit for projects or works and shall possess full authority and jurisdiction to exercise and assert actual control over the corpus of all of such waters, and to regulate the diversion thereof subject to rules and methods prescribed by the commission. This power and authority shall include full right to contract and agree with any person, association, agency, or entity concerning water rights held by such person, association, agency, or entity through which the commission maybe given full authority and jurisdiction over such water and water rights. In connection therewith the commission may coordinate subordinate, supplement, and act jointly or subordinately with the United States, and any agency or department thereof, covering or concerning any federal project affecting water use, works, or projects in connection therewith.

Source: S.L. 1937, ch. 255, § 15; 1939, ch. 256, § 15; R.C. 1943, § 61-0228; S.L. 1963, ch. 417, § 11; 1983, ch. 676, § 14.

STATE ENGINEER

61-03-01. State engineer — Appointment — Qualifications —Term — Salary — Engaging in private practice. A state engineer shall be appointed by the state water commission. Such engineer shall be a technically qualified and experienced hydraulic engineer and also shall be an experienced irrigation engineer. The state engineer shall serve as secretary and chief engineer of the commission. Such engineer shall hold the office for such term as the commission may determine, and the commission shall fix the state engineer’s salary and shall allow the state engineer’s actual and necessary traveling expenses while away from the office in the discharge of official duties. The state engineer shall not engage in private practice but shall devote all of the state engineer’s time to the duties and requirements of the office.

APPROPRIATION OF WATER

61-04-01.1. Definitions. In this chapter, unless the context or subject matter otherwise requires:

1. “Beneficial use” means a use of water for a purpose consistent with the best interests of the people of the state.

2. “Commission” means the state water commission.

4. “Fish, wildlife, and recreation” means the use of water for the purposes of propagating and sustaining fish and wildlife resources and for the development and maintenance of water areas necessary for outdoor recreation activities.

61-04-02. Permit for beneficial use of water required. Any person, before commencing any construction for the purpose of appropriating waters of the state or before taking waters of the state from any constructed works, shall first secure a water permit from the state engineer unless such construction or taking froni such constructed works is for domestic or livestock purposes or for fish, wildlife, and other recreational uses or unless otherwise provided by law. However, immediately upon completing any constructed works for domestic or livestock purposes or for fish, wildlife, and other recreational uses the water user shall noti~ the state engineer of the location and acre-feet [1233.48 cubic meters] capacity of such constructed works, dams, or dugouts. Regardless of proposed use, however, all water and who filed written comments may file additional written comments with the state engineer or request a hearing on the application, or both. A request for a hearing must be made in writing and must state with particularity how the person would be aggrieved by the decision and the issues and facts to be presented at the hearing. If a request for a hearing is not made, the state engineer shall consider the additional comments, if any are submitted, and issue a final decision. If a request for a hearing is made, or if the state engineer determines a hearing is necessary to obtain additional information to evaluate the application or to receive public input, the state engineer shall designate a time and place for the hearing and serve a copy of the notice of hearing upon the applicant and any person who filed written comments. Service must be made in the manner allowed for service under the North Dakota Rules of Civil Procedure at least twenty days before the hearing. If two or more municipal or public use water facilities request the hearing to be held locally, the state engineer shall hold the hearing in the county seat of the county in which the proposed water appropriation site is located.

Source: Si. 1999, ch. 537, § 2; 2003,

61-04-06. Criteria for issuance of permit. The state engineer shall issue a permit if the state engineer finds all of the following:

1. The rights of a prior appropriator will not be unduly affected.

2. The proposed means of diversion or construction are adequate.

3. The proposed use of water is beneficial.

4. The proposed appropriation is in the public interest. In determining the public interest, the state engineer shall consider all of the following:

a. The benefit to the applicant resulting from the proposed appropriation.

b. The effect of the economic activity resulting from the proposed appropriation.

c. The effect on fish and game resources and public recreational opportunities.

d. The effect of loss of alternate uses of water that might be made within a reasonable time if not precluded or hindered by the proposed appropriation. Harm to other persons resulting from the proposed appropriation.

e. The intent and ability of the applicant to complete the appropriation. Subsection 1 of section 28-32-38 does not apply to water permit application proceedings unless a request for a hearing is made. If an application is approved, the state engineer shall issue a conditional water permit allowing the applicant to appropriate water. Provided, however, the commission may, by resolution, reserve unto itself final approval authority over any specific water permit in excess of five thousand acre-feet [6167409.19 cubic meters]. The state engineer may cause a certified transcript to be prepared for any hearing conducted pursuant to this section. The costs for the original and up to nine copies of the transcript must be paid by the applicant.

Source: S.L. 1905, cli. 34, § 22; R.C. 1905, § 7625; C.L. 1913, § 8256; R.C. 1943, § 61-0406; S.L. 1961, cli. 378, § 3; 1965, ch. 447, § 6; 1977, cli. 569, § 10; 1983, cli. 678, § 2; 1993, ch. 596, § 2; 1999, cli. 537, § 3; 2001, ch. 293, § 34.

61-04-06.1. Preference in granting permits. When there are competing applications for water from the same source, and the source is insufficient to supply all applicants, the state engineer shall adhere to the following order of priority:

1. Domestic use.

2. Municipal use.

3. Livestock use.

4. Irrigation use.

5. Industrial use.

6. Fish, wildlife, and other outdoor recreational uses.

Water Resource Districts

Water Resource Boards have the power to manage water resources with their district and order or initiate legal action to compel a person, user or controller of any bridge, or culvert to remove any weeds, shrubbery or other debris which hinders or decreases the flow of the water.

This is the only agency empowered with the express power to order the removal of weeds and pests form North Dakota's waters.

CREATION OF WATER RESOURCE
DISTRICTS — BOARDS

61-16-06. Order creating water resource district. A certified copy of the order creating a water resource district shall be filed with the county auditor of each county within the district. A like copy of the order shall be filed with the secretary of state. The secretary of state shall issue to the state water commission a certificate, bearing the seal of the state, of the due organization of the district, and shall file a copy of the certificate and the commission's order creating the district. The secretary of state's certificate, or a copy authenticated by the secretary of state, shall be prima facie evidence of the organization of the district. This new district shall be, and is hereby declared to be, a governmental agency, and a body politic and corporate with the authority to exercise the powers specified in this chapter, or which may be reasonably implied to exercise such powers. The commission's order shall specify the name or number by which a district shall be known.

61-16.1-09. Powers of water resource board. Each water resource board shall have the power and authority to:

1. Sue and be sued in the name of the district.

2. Exercise the power of eminent domain in the manner provided by title 32 for the purpose of acquiring and securing any rights, titles, interests, estates, or easements necessary or proper to carry out the duties imposed by this chapter, and particularly to acquire the necessary rights in land for the construction of dams, flood control projects, and other water conservation, distribution, and supply works of any nature and to permit the flooding of lands, and to secure the right of access to such dams and other devices and the right of public access to any waters impounded thereby. Provided, however, that when the interest sought to be acquired is a right of way for any project authorized in this chapter for which federal funds have been appropriated, the district, after making a written offer to purchase the right of way and

depositing the amount of the offer with the clerk of the district court of the county wherein the right of way is located, may thereupon take immediate possession of the right of way, as authorized by section 16 of article I of the Constitution of North Dakota. Within thirty days after notice has been given in writing to the landowner by the clerk of the district court that a deposit has been made for the taking of a right of way as authorized in this subsection, the owner of the property taken may appeal to the district court by serving a notice of appeal upon the acquiring agency, and the matter must be tried at the next regular or special term of court with a jury unless a jury be waived, in the manner prescribed for trials under chapter 32-15.

3. Accept funds and property or other assistance, financial or otherwise, from federal, state, and other public or private sources for the purposes of aiding the construction or maintenance of water conservation, distribution, and flood control projects; and cooperate and contract with the state or federal government, or any department or agency thereof, or any municipality within the district, in furnishing assurances and meeting local cooperation requirements of any project involving control, conservation, distribution, and use of water.

4. Procure the services of engineers and other technical experts, and employ an attorney or attorneys to assist, advise, and act for it in its proceedings.

5. Plan, locate, relocate, construct, reconstruct, modify, maintain, repair, and control all dams and water conservation and management devices of every nature and water channels, and to control and regulate the same and all reservoirs, artificial lakes, and other water storage devices within the district.

6. Maintain and control the water levels and the flow of water in the bodies of water and streams involved in water conservation and flood control projects within the district and regulate streams, channels, or watercourses and the flow of water therein by changing, widening, deepening, or straightening the same, or otherwise improving the use and capacity thereof.

7. Regulate and control water for the prevention of floods and flood damages by deepening, widening, straightening, or diking the channels or floodplains of any stream or watercourse within the district, and construct reservoirs or other structures to impound and regulate such waters.

8. Make rules and regulations concerning the management, control, regulation, and conservation of waters and prevent the pollution, contamination, or other misuse of the water resources, streams, or bodies of water included within the district.

9. Do all things reasonably necessary and proper to preserve the benefits to be derived from the conservation, control, and regulation of the water resources of this state.

10. Construct, operate, and maintain recreational facilities, including beaches, swimming areas, boat docking and landing facilities, toilets, wells, picnic tables, trash receptacles, and parking areas, and to establish and enforce rules and regulations for the use thereof.

14. Authorize and issue warrants to finance construction of water conservation and flood control projects, assess benefited property for part or all of the cost of such projects, and require appropriations and tax levies to maintain sinking funds for construction warrants on a cash basis at all times.

16. Order or initiate appropriate legal action to compel the entity responsible for the maintenance and repair of any bridge or culvert to remove from under, within, and around such bridge or culvert all dirt, rocks, weeds, brush, shrubbery other debris, and any artificial block which hinders or decreases the flow of water through such bridge or culvert.

STATE DEPARTMENT OF HEALTH

The State Water Pollution Control Board, which includes the director of the Game and Fish Department, through the State Department of Health with cooperation of the State Water Commission to maintain and improve the water quality of the state, to formulate and issue standards of water quality and classifications of water and require the proper maintenance and operation of sewage and industrial waste systems to protect the present and future use of such waters for, among other reasons, the propagation of fish and aquatic life and wildlife.

CONTROL, PREVENTION, AND ABATEMENT OF POLLUTION OF SURFACE WATERS

61-28-02. Definitions. As used in this chapter, unless the context otherwise requires:

1. “Board” means the state water pollution control board.

2. “Department” means the state department of health.

3. “Discharge” means the addition of any waste to state waters from any point source.

7. “Pollution” means the manmade or man-induced alteration of the physical, chemical, biological, or radiological integrity of any waters of the state.

10. “Wastes” means all substances which cause or tend to cause pollution of any waters of the state, including dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials,

radiological materials, heat, wrecked or discarded equipment, rock, sand, and cellar dirt and industrial, municipal, and agricultural pollution discharged into any waters of the state.

11. "Waters of the state" means all waters within the jurisdiction of this state including all streams, lakes, ponds, impounding reservoirs, marshes, watercourses, waterways, and all other bodies or accumulations of water on or under the surface of the earth, natural or artificial, public or private, situated wholly or partly within or bordering upon the state, except those private waters that do not combine or effect a junction with natural surface or underground waters just defined.

61-28-04. Powers and duties. The department shall have and may exercise the following powers and duties:

1. To exercise general supervision of the administration and enforcement of this chapter and all rules and regulations and orders promulgated thereunder.

2. To develop comprehensive programs for the prevention, control, and abatement of new or existing pollution of the waters of the state.

3. To advise, consult, and cooperate with other agencies of the state, the federal government, other states and interstate agencies, and with affected groups, political subdivisions, and industries in furtherance of the purposes of this chapter.

4. To accept and administer loans and grants from the federal government and from other sources, public or private, for carrying out any of its functions, which loans and grants shall not be expended for other than the purposes for which provided.

5. To encourage, participate in, or conduct studies, investigations, research, and demonstrations relating to water pollution and causes, prevention, control, and abatement thereof as it may deem advisable and necessary for the discharge of its duties under this chapter.

6. To collect and disseminate information relating to water pollution and the prevention, control, and abatement thereof.

7. To issue, modify or revoke orders:

a. Prohibiting or abating discharges of wastes into the waters of the state.

10. To require proper maintenance and operation of disposal systems:

a. Have the power to require the owner or operator of any point source to:

(1) Establish and maintain records.

(2) Prepare and submit a report.

(3) Install, use, and maintain monitoring equipment or methods, including, where appropriate, biological monitoring methods.

(4) Sample effluents.

(5) Provide such other information as the department may reasonably require.

b. Have the right of entry, upon or through any premises in which an effluent source is located, or in which any records required to be maintained pursuant to subdivision a are located. Such power may be exercised by authorized agents, representatives, and employees of the department.

c. Have the power to have access to and copy any records, inspect any monitoring equipment or method required under subdivision a, or to sample any effluents being discharged into the waters of the state.

11. To exercise all incidental powers necessary to carry out the purposes of this chapter.

14. To establish and modify, jointly with the state water commission, the classification of all waters in accordance with their present and future most beneficial uses.

15. The department, with the cooperation of the state water commission, shall formulate and issue standards of water quality and classification of water according to its most beneficial uses. Such standards of quality shall be such as to protect the public health and welfare and the present and prospective future use of such waters for public water supplies, propagation of fish and aquatic life and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses.

APPENDIX OF ADMINISTRATIVE CODE

NORTH DAKOTA ADMINISTRATIVE CODE
TITLE 7. AGRICULTURE, COMMISSIONER OF
ARTICLE 7-01. GENERAL ADMINISTRATION
CHAPTER 7-01-01. ORGANIZATION OF DEPARTMENT
Current through Supplement 300 (June 1, 2004)

7-01-01-01. Organization and functions of the department of agriculture.

1. Organization of department.

a. History. The department of agriculture was originally part of the department of agriculture and labor, established by section 12 of article V of the Constitution of North Da..~jt~ approved in 1889. In the years following its creation, the department served primarily as an agency for the collection of statistics related to crop yields, labor forces, and other agricultural statistics. In 1965 a constitutional amendment was approved by the voters which provided for a separate department of labor, making the department of agriculture and labor simply the department of agriculture and creating a new department of labor.

b. Commissioner of agriculture. The office of commissioner of agriculture is an elected position. The commissioner, elected for a four-year term, is responsible for the determination of policies for operation of the department; dissemination of information concerning agricultural issues to the governor, members of the legislative assembly and the public; assumption of a leadership role in formulating policies affecting the direction of the state's agricultural industry; and advocacy for farmers' needs on the state and national levels. The commissioner or the commissioner's designee serves on numerous boards and commissions.

c. Divisions. The department is organized into these divisions with a director in charge of each division:

(1) Apiary.
(2) Dairy/Poultry.
(3) Livestock.
(4) Marketing.
(5) Pesticide.
(6) Plant protection.
(7) Agricultural mediation service.

2. Functions of the divisions.

a. Apiary division. The apiary division is responsible for the annual licensure of beekeepers, as well as the inspection, certification, and regulation of bees and equipment for purposes of disease control. The division also enforces applicable laws and regulations.

b. Dairy/Poultry division.

(1) The dairy division is responsible for the promotion of the state dairy industry. It regulates the production, processing, and handling of milk and milk products, and enforces applicable laws and regulations.

(2) The poultry division supervises the national poultry improvement plan and cooperates with the United States department of agriculture in providing grading services. The division promotes the state poultry industry and enforces licensing and bonding rules.

c. Livestock division. The livestock division is responsible for the licensing of livestock dealers and auction markets, as well as the recording and rerecording once every ten years, of brands and marks identifying livestock. The division also enforces applicable laws and regulations.

d. Marketing division. The marketing division is responsible for providing a variety of marketing services to North Dakota food producers and processors, thereby enhancing the sale of agricultural products. The services include educational seminars,

counseling, market research, secondary crop development, and direct export marketing. The division also works with commodity groups to promote and market North Dakota agricultural products in this country and abroad. Administration of the honey and turkey promotion funds is another responsibility of this division.

e. Pesticide division. The pesticide division enforces laws and regulations regarding the storage, transportation, application, and disposal of pesticides. It also enforces laws and regulations dealing with chemigation, noxious weeds, and anhydrous fertilizer plants.

f. Plant protection division. The plant protection division is responsible for the inspection, certification, and enforcement of laws and regulations pertaining to nurseries. It invokes and maintains quarantines to prevent the introduction and spread of plant pests and it conducts surveys to evaluate established pests and detect new ones. It also initiates control programs for the suppression or eradication of pests. Through inspection and certification, this division ensures that plants and plant products meet domestic and foreign plant quarantine requirements.

g. Agricultural mediation service. This division disseminates information and provides assistance to farmers regarding agricultural credit problems. It provides training for negotiators and mediators, assigns them to individual farmers, and coordinates the efforts of public and private entities dealing with agricultural credit matters and financially distressed farmers.

3. Inquiries. Information about the department of agriculture and its programs and responsibilities may be obtained by contacting:

North Dakota Department of Agriculture

State Capitol

Bismarck, North Dakota 58505

History: Amended effective December 1, 1981; February 1, 1986; May 1, 1990.

General Authority: NDCC 28-32-02.1
Law Implemented: NDCC 28-32-02.1
ND ADC 7-01-01-01

NORTH DAKOTA ADMINISTRATIVE CODE
TITLE 7. AGRICULTURE, COMMISSIONER OF
ARTICLE 7-06. NOXIOUS WEEDS
CHAPTER 7-06-01. GENERAL PROVISIONS
Current through Supplement 300 (June 1, 2004)

7-06-01-01. Weed control officer's certification.

A weed control officer shall be certified upon completion of certification in two categories under the North Dakota Century Code chapter 4-35. The two categories are agricultural pest control and right of way. A temporary certification may be issued for a period of one year to a weed control officer.

History: Amended effective February 1,1982.
General Authority: NDCC 28-32-02, 63-01.1-03.
Law Implemented: NDCC 63-01.1-05.1.

7-06-01 -02. Noxious weeds listed.

Weeds declared noxious shall be confined to weeds that are difficult to control, easily spread, and injurious to public health, crops, livestock, land, or other property. The following weeds have been declared noxious for the purpose of North Dakota Century Code chapter 63-0 1. 1:

I. Absinth wormwood (Artemisia absinthiurn L.)

2. Canada thistle (Cirsium an'ense (L.) Scop.)

3. Dalmatian toadflax (Linaria genistifolia ssp. dalmatica)
4. Diffuse knapweed (Centaurea diffusa Lam.)

5. Field bindweed (Con voh'ulus arvensis L.)

6. Leafy spurge (Euphorbia esula L.)

7. Musk thistle (Carduus nutans L.)

8. Purple loosestrife (Lythrum salicaria L., Lvthrurn virgatum L. and all cultivars)

9. Russian knapweed (Acroptilon repens (L.) DC.

10. Saltcedar (Tamarix ramosissima Ledeb., including T chin ensis and T pari'ef flora DC.)
11. Spotted knapweed (Centaurea niaculosa Lam.)

12. Yellow starthistle (Centaurea solstitialis L.)

History: Amended effective June 1,1985; February 1, 2000; September 1, 2002
General Authority: NDCC28-32-02, 63-01.1-03

Law Implemented: NDCC 63-01.1-03

NORTH DAKOTA ADMINISTRATIVE CODE
TITLE 60. PESTICIDE CONTROL BOARD
ARTICLE 60-03. PESTICIDES
CHAPTER 60-03-01. PESTICIDE SALE, DISTRIBUTION, AND USE
Current through Supplement 300 (June 1, 2004)

60-03-01-02. Definitions.

As used in this chapter, the following words shall have the meaning given to them below, unless otherwise made inappropriate by use and context. Words not defined in this section shall have the meaning given to them in North Dakota Century Code chapter 4-35.

1. “Act’ means the North Dakota Pesticide Act.

2. “Board” means the North Dakota pesticide control board created pursuant to North Dakota Century Code section 4-35-02.

3. “Broadcast” means any intentional application of a pesticide over an area, such as a lawn, field, room, crawl space, or other such surface.

4. “Bulk pesticide” means any volume of pesticide that is intended to be repackaged, can be accurately metered, and can be transported or held in an individual container.

5. “Bulk pesticide facility” means any area, location, tract of land, building, structure, or premises used for the handling or storage of bulk pesticides.

6. “Certification” means certification of dealers, commercial applicators, and private applicators provided for by North Dakota Century Code sections 4-35-09, 4-35-12, and 4-35-14.

7. “Commissioner” means the North Dakota agriculture commissioner.

8. “Compensation” means monetary payment for a specific service.

9. “Custom blend” means any diluted mixture of pesticide prepared by a dealer to the specifications of the end-user and not held in inventory.

10. “End-use labeling” means the written, printed, or graphic matter on, or attached to or accompanying the pesticide or device or any of its containers or wrappers.

11. “End-user” means the person who applies the pesticide.

12. “FIFRA” means Federal Insecticide, Fungicide, and Rodenticide Act of 1947.

13. “General use pesticide” means any pesticide formulation which is not classified for restricted use by the board.

14. “Handling” means the mixing, loading, application, repackaging, storage, transportation, distribution, sale, purchase, or disposal of pesticides.

15. “Mixture” means any diluted combination of pesticide with fertilizer, seed, or other medium.

16. “Mobile container” means a container used to transport pesticides.

17. “Operational area” means a pennanent containment area where pesticides are transferred, loaded, unloaded, mixed, repackaged, or refilled; where pesticides are cleaned or rinsed from containers; or application, handling, storage, or transportation equipment.

18. “Permanent containment area” means:

a. An aboveground pad or dike constructed of impervious material, such as sealed concrete, stainless steel, or other material as approved by the department of agriculture;

b. Bermed, curbed, sloped, or otherwise designed to contain spills, leaks, releases, or other discharges that are generated during the handling of pesticides or pesticide-containing materials;

c. Does not have a drain which exits the containment area; and

d. All seams and cracks must be sealed to prevent leakage.

19. “Pesticide-containing material” means:

a. Any container of a pesticide product that has not been triple-rinsed or the equivalent of triple-rinsed;

b. Any rinsate that is derived from a pesticide container, pesticide application equipment, or equipment washing;

c. Any material that is used to collect or contain excess or spilled pesticide or rinsate;

d. Any mixture of pesticide and diluent such as wash water, rinse water, or rainwater; or

e. Material that is generated as a result of contact with or utilization of a pesticide in an application, containment, recovery, reuse, or treatment system. The term does not include personal protective equipment that contains pesticide residue.

20. “Pesticide-producing establishment” means any site where a pesticide is manufactured, packaged, repackaged, prepared, processed, labeled, relabeled, or held for distribution.

21. “Repackaging” means the transfer of a pesticide in an unaltered state from a container into a designated or dedicated refillable container.

22. “Rinsate” means a dilute mixture of pesticide obtained by rinsing pesticide containers or from rinsing the inside and outside of spray equipment.

23. “Spill kit” means a portable kit or other equipment that is designed to recover, minimize, contain, or absorb spills, leaks, releases, or other discharges of pesticides.

24. “Use of a pesticide” means the loading, mixing, applying, storing, transporting, distribution, and disposing of a pesticide.

25. “Use of a pesticide in a manner inconsistent with its labeling” means to use any pesticide in a manner that is not permitted by the label, except that the term does not apply to any of the following:

a. Applying a pesticide at any dosage, concentration, or frequency that is less than that specified on the label, unless the label specifically prohibits deviation from the specified dosage, concentration, or frequency.

b. Applying a pesticide against any target pest that is not specified on the label if the application is to the crop, animal, or site that is specified on the label.

c. Employing any method of application that is not prohibited by the label unless the label specifically states that the product may be applied only by the methods specified on the labeling.

d. Mixing a pesticide or pesticides with a fertilizer when the label does not prohibit such mixture.

e. Any use of a pesticide that is in compliance with sectionS, 18, or 24 of the Federal Insecticide, Fungicide, and Rodenticide Act of 1947 [Pub. L. 104-170; Stat. 7 U.S.C. 136 et seq.].

History: Amended effective April 15, 1985; October 1, 1990; July 1, 1992; March 1, 2003.

General Authority: NDCC 4-35-06

NORTH DAKOTA ADMINISTRATIVE CODE
TITLE 30. GAME AND FISH DEPARTMENT
ARTICLE 30-0 1. GENERAL ADMINISTRATION
CHAPTER 30-01-01. ORGANIZATION OF DEPARTMENT
Current through Supplement 300 (June 1, 2004)

30-01-01-01. Organization and functions of the game and fish department.

1. Organization of department.

a. History. The first game and fish laws were established in Dakota Territory in 1861 but it was not until 1893 when the superintendent of irrigation and forestry was designated as game commissioner that a game and fish department was formed. In 1909 the game and fish board of control was established. The board continued to function as the agency controlling fish and game until 1929 when legislation was passed providing for a single commissioner charged with certain duties and powers to administer a game and fish department. The title commissioner was changed to director in 1991.

b. Divisions. The department consists of the following five divisions:

(1) Administrative services.

(2) Enforcement.

(3) Fisheries.

(4) Conservation and communications.

(5) Wildlife.

c. Director. The director is appointed by the governor. The director holds office for four years beginning on the first day of July after the governor's election and until a successor is appointed and qualified. The director shall appoint a deputy director who may be removed at the director's pleasure. The director may also appoint a chief game warden, district game wardens, biologists, and technicians to enforce the game laws and to perform duties specified by the director. The director is charged with fourteen statutory duties and has twenty-

seven specific powers relating to the department and the resources it must manage. In addition to these specific duties and powers spelled out in North Dakota Century Code sections 20.1-02-04 and 20.1-02-05, the director has additional authority and power given by various sections of North Dakota Century Code title 20.1.

d. Game and fish advisory board. There is an eight-member game and fish advisory board, each appointed for a four-year term by the governor. The board has the authority to advise the director regarding any policy of hunting, fishing, and trapping regulations, and may make general recommendations regarding the operation of the department and its programs which the director may carry out.

e. Orders and proclamations of the governor. After investigation and recommendations by the director, the governor may open seasons for hunting, fishing, and trapping. The governor may determine in what manner, the numbers, the places, and at what times game, fish, or fur-bearers may be taken.

2. Functions of department divisions.

a. Administrative services division. The division of administration is divided into four programs - accounting and basic operations, data processing, licensing, and planning.

(1) Accounting and basic operations. The program is responsible for accounting and general office and facility management.

(2) Data processing. Coordination and technical support is provided for department personal computers and state mainframe computer activities.

(3) Licensing. All fishing, hunting, and boating licensing is handled as part of this program.

(4) Planning. The planning program is responsible for establishing goals, objectives, and strategies for the department. It is a cooperative effort with the other divisions and is coordinated by a game and fish planner.

b. Enforcement division. The law enforcement program enforces game and fish laws and rules and regulations necessary for proper management of fish and game resources. Enforcement officers called district game wardens have districts averaging approximately two thousand six hundred square miles [673396.92 hectares]. In addition to their enforcement activities, they must carry out education programs, and assist other divisions during busy periods of the year. One of their major non-enforcement activities concerns alleviation of wildlife depredations on farmers' crops and feed supplies.

c. Fisheries division. The fisheries division is divided into three programs - fish management, sport fisheries research, and lake/stream management.

(1) Fish production. Fish are provided for North Dakota waters through fish hatcheries and by trapping and moving fish from one area to another.

(2) Sport fish research. The program is responsible for all research and survey work connected with sport fishing. It gathers information about the status of lakes and fish populations and carries out management practices on lakes.

(3) Lake/stream management. The lake management program provides public use facilities, lake improvement systems, watershed development, lake and pond construction, and other developments on public fishing waters.

d. Conservation and communications division. This division has three major sections:

(1) Conservation section. Many state and federal agencies have programs that affect fish and wildlife habitat. The efforts of this section are directed toward compensation, alleviation of losses, or possibly enhancement of fish and wildlife by working with these agencies. Staff in this division also operate the department's nongame and endangered species programs.

(2) Communications section. The section is divided into four programs - public information resource specialists, department webmaster, North Dakota Outdoors magazine, and videography – production of department videos.

(3) Outreach section. This section includes hunter education, project wild, aquatic education, becoming an outdoor woman, boating education, and public information outreach staff located statewide.

e. Wildlife division. The wildlife division is divided into three programs - lands and development, game management, private land habitat programs.

(1) Lands and development. The lands and development program is responsible for all habitat development, and management and maintenance on wildlife management areas. The program involves tree plantings, herbaceous cover and food plantings, road construction, weed control, signing, water developments, and any other activity that might enhance these areas for wildlife, the hunter, and the outdoors person who enjoys hiking, photography, and nature study.

(2) Game management. Staff carry out population surveys that are used to determine annual hunting seasons on various species of game. Research is done with the objective of providing optimum hunting opportunities for the people of the state.

(3) Private land habitat program. A private land habitat improvement program is funded from moneys derived from the interest earned on the game and fish fund, habitat stamp sales, and game and fish operating funds. The program involves annual leasing and development of fish and wildlife habitat and hunting access on private land, entering into cost-sharing agreements with

landowners to help defray a portion of their share of conservation practices which benefit fish and wildlife. The program also carries out practices which will alleviate big game and predatory animal depredation.

3. Inquiries. General inquiries regarding the game and fish department may be addressed to the:

North Dakota Game and Fish Department 100 North Bismarck Expressway Bismarck, North Dakota

58501-5095

Specific inquiries about division functions may be addressed to the chief of the division involved.

4. Personnel roster. A roster of personnel with the department may be found in the monthly issue of North Dakota Outdoors or on the department's web page.

History: Amended effective February 1, 1982; September 1, 1983; December 1, 1985; January 1, 1992; March 1, 2002.

General Authority: NDCC 20.1-02-04 2

NORTH DAKOTA ADMINISTRATIVE CODE
TITLE 30. GAME AND FISH DEPARTMENT
ARTICLE 30-04. FISH AND WILDLIFE MANAGEMENT
CHAPTER 30-04-04. TRANSPLANTING OR INTRODUCTION OF FISH, FISH EGGS, GAME
BIRDS, OR GAME ANIMALS INTO NORTH DAKOTA
Current through Supplement 300 (June 1, 2004)

30-04-04-05. Bait transfer.

It shall be unlawful for any person to empty the contents of any minnow bucket or other receptacle containing bait into any of the public waters of the state.

General Authority: NDCC 20.1-02-05

NORTH DAKOTA ADMINISTRATIVE CODE
TITLE 30. GAME AND FISH DEPARTMENT
ARTICLE 30-04. FISH AND WILDLIFE MANAGEMENT
CHAPTER 30-04-04. TRANSPLANTING OR INTRODUCTION OF FISH, FISH EGGS, GAME
BIRDS, OR GAME ANIMALS INTO NORTH DAKOTA

Current through Supplement 300 (June 1, 2004)

30-04-04-04. Fish or fish eggs.

The introduction of fish or fish eggs into any state waters shall be illegal unless done with the written consent of the game and fish commissioner or the commissioner's duly designated bonded employee.

General Authority: NDCC 20.1-02-05

NORTH DAKOTA ADMINISTRATIVE CODE
TITLE 33. STATE DEPARTMENT OF HEALTH
ARTICLE 33-16. CONTROL, PREVENTION, AND ABATEMENT OF POLLUTION OF SURFACE
WATER
CHAPTER 33-16-02.1 STANDARDS OF QUALITY FOR WATERS OF THE STATE
Current through Supplement 295 (January 1, 2004)

33-16-02.1-04. Definitions.

The terms used in this chapter have the same meaning as in North Dakota Century Code chapter 6 1-28, except:

1. "Acute standard" means the one-hour average concentration does not exceed the listed concentration more than once every three years on the average.

2. "Best management practices" are methods, measures, or procedures selected by the department to control nonpoint source pollution. Best management practices include, but are not limited to, structural and nonstructural measures and operation and maintenance procedures.

3. "Chronic standard" means the four-day average concentration does not exceed the listed concentration more than once every three years on the average.

4. "Consecutive thirty-day average" is the average of samples taken during any consecutive thirty-day period. It is not a requirement for thirty consecutive daily samples.

5. "Department" means the North Dakota state department of health.

6. A standard defined as “dissolved” means the total quantity of a given material present in a filtered water sample, regardless of the form or nature of its occurrence.

7. “Pollution” means such contamination, or other alteration of the physical, chemical, or biological properties, of any waters of the state, including change in temperature, taste, color, turbidity, or odor. Pollution includes discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the state that will or is likely to create a nuisance or render such waters harmful, detrimental, or injurious to public health, safety, or welfare; domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; or livestock, wild animals, birds, fish, or other aquatic biota.

8. “Site-specific standards” mean water quality criteria developed to reflect local environmental conditions to protect the uses of a specific water body.

9. A standard defined as “total” means the entire quantity of a given material present in an unfiltered water sample regardless of the form or nature of its occurrence. This includes both dissolved and suspended forms of a substance, including the entire amount of the substance present as a constituent of the particulate material. Total recoverable is the quantity of a given material in an unfiltered aqueous sample following digestion by refluxing with hot dilute mineral acid.

10. “Water usage”. The best usage for the waters shall be those uses determined to be the most consistent with present and potential uses in accordance with the economic and social development of the area. Present principal best uses are those defined in subdivisions a, b, c, and d. These are not to be construed to be the only possible usages.

a. Municipal and domestic water. Waters suitable for use as a source of water supply for drinking and culinary purposes after treatment to a level approved by the department.

b. Recreation, fishing, and wildlife. Waters suitable for the propagation or support of fish and other aquatic biota, waters that will not adversely affect wildlife in the area, and waters suitable for boating and swimming. Natural high turbidities in some waters and physical characteristics of banks and streambeds of many streams are factors that limit their value for bathing. Low flows or natural physical and chemical conditions in some waters may limit their value for fish propagation or aquatic biota.

c. Agricultural uses. Waters suitable for irrigation, stock watering, and other agricultural uses, but not suitable for use as a source of domestic supply for the farm unless satisfactory treatment is provided.

d. Industrial water. Waters suitable for industrial purposes, including food processing, after treatment. Treatment may include that necessary for prevention of boiler scale and corrosion.

History: Effective June 1, 2001.

General Authority: NDCC 6 1-28-04, 61-28-05

NORTH DAKOTA ADMINISTRATIVE CODE
TITLE 33. STATE DEPARTMENT OF HEALTH
ARTICLE 33-16. CONTROL, PREVENTION, AND ABATEMENT OF POLLUTION OF SURFACE
WATER
CHAPTER 33-16-02.1 STANDARDS OF QUALITY FOR WATERS OF THE STATE
Current through Supplement 295 (January 1, 2004)

33-16-02.1-09. Surface water classifications, mixing zones, and numeric standards.

1. Classifications. Procedures for the classifications of streams and lakes of the state shall follow this subsection. Classifications of streams and lakes are listed in appendix I and appendix II, respectively.

a. Class I streams. The quality of the waters in this class shall be suitable for the propagation or protection, or both, of resident fish species and other aquatic biota and for swimming, boating, and other water recreation. The quality of the waters shall be suitable for irrigation, stock watering, and wildlife without injurious effects. After treatment consisting of coagulation, settling, filtration, and chlorination, or equivalent treatment processes, the water quality shall meet the bacteriological, physical, and chemical requirements of the department for municipal or domestic use.

b. Class IA streams. The quality of the waters in this class shall be the same as the quality of class I streams, except that treatment for municipal use may also require softening to meet the drinking water requirements of the department.

c. Class II streams. The quality of the waters in this class shall be the same as the quality of class I streams, except that additional treatment may be required to meet the drinking water requirements of the department. Streams in this classification may be intermittent in nature which would make these waters of limited value for beneficial uses such as municipal water, fish life, or irrigation.

d. Class III streams. The quality of the waters in this class shall be suitable for agricultural and industrial uses such as stock watering, irrigation, washing, and cooling. These streams have low average flows and, generally, prolonged periods of no flow. They are of limited seasonal value for immersion recreation, fish life, and aquatic

biota. The quality of these waters must be maintained to protect recreation, fish, and aquatic biota.

e. Wetlands. These water bodies are to be considered waters of the state and will be protected under section 33-16-02-08.

f. Lakes. The type of fishery a lake may be capable of supporting is based on the lake's geophysical characteristics. However, the capability of the lake to support a fishery may be affected by seasonal variations or other natural occurrences which may alter the lake characteristics.

Class Characteristics

1 Cold water fishery. Waters capable of supporting growth of salmonid fishes and associated aquatic biota.

2 Cool water fishery. Waters capable of supporting growth and propagation of nonsalmonid fishes and marginal growth of salmonid fishes and associated aquatic biota.

3 Warm water fishery. Waters capable of supporting growth and propagation of nonsalmonid fishes and associated aquatic biota.

4 Marginal fishery. Waters capable of supporting a fishery on a seasonal basis.

5 Not capable of supporting a fishery due to high salinity.

2. Mixing zones. North Dakota mixing zone and dilution policy is contained in appendix III.

3. Numeric standards.

a. Class I streams. Unless stated otherwise, maximum limits for class I streams are listed in table 1 and table 2.

b. Class IA streams. The physical and chemical criteria shall be those for class I, with the following exceptions:

Substance or Characteristic Maximum Limit

Chlorides (Total)
Sod ium
Sulfate (Total)

175 mg/l
60% of total cations as mEq/l
450 mg/l

c. Class II streams. The physical and chemical criteria shall be those for class IA, with the following exceptions:

Substance or Characteristic	Maximum Limit
Chlorides (Total)	250 mg/l
pH	6.0-9.0

d. Class III streams. The physical and chemical criteria shall be those for class II, with the following exceptions:

Substance or Characteristic	Maximum Limit
Sulfate (Total)	750 mg/l

e. Lakes.

(1) The beneficial uses and parameter limitations designated for class I streams shall apply to all classified lakes.

However, specific background studies and information may require that the department revise a standard for any specific parameter.

(2) In addition, these nutrient parameters are guidelines for use as goals in any lake improvement or maintenance program:

Parameter	Limit
N03 as N	.25 mg/i
P04 as P	.02 mg/i

(3) The temperature standard for class I streams does not apply to Nelson Lake in Oliver County. The temperature of any discharge to Nelson Lake shall not have an adverse effect on fish, aquatic life, and wildlife, or Nelson Lake itself

History: Effective June 1, 200i.

General Authority: NDCC 6 1-28-04

Appendix C. **Federal Laws Addressing Aquatic Nuisance Species Relevant to North Dakota**

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport Addressed	Web Site
Dept. of Interior/FWS Dept. of Transportation/Coast Guard EPA Dept. of Defense/Army Corps of Engineers Dept. of DOC/NOAA	National Invasive Species Act (1996)	Reauthorized and amended NANPCA to mandate regulations to prevent introduction and spread of aquatic nuisance species into Great Lakes through ballast water. Authorized funding for research on aquatic nuisance species prevention and control (Chesapeake Bay, Gulf of Mexico, Pacific Coast, Atlantic Coast, San Francisco Bay-Delta Estuary) Required ballast water management program to demonstrate technologies and practices to prevent nonindigenous species from being introduced Modified composition of Aquatic Nuisance Species Task Force Required Task Force to develop and implement comprehensive program to control the brown tree snake in Guam	Aquatic nuisance species and brown tree snake	Unintentional introductions: ballast water	http://www.nemw.org/nisa.htm
Dept. of Interior/FWS Dept. of Transportation/Coast Guard EPA Dept. of Defense/Army Corps of Engineers Dept. of DOC/NOAA	Nonindigenous Aquatic Nuisance Prevention and Control Act (1990)	Established Aquatic Nuisance Species Task Force to: identify areas where ballast water does not pose an environmental threat; assess whether aquatic nuisance species threaten the ecological characteristics and economic uses of US waters (other than the Great Lakes); determine the need for controls on vessels entering U.S. waters (other than Great Lakes); identify and evaluate approaches for reducing risk of adverse consequences associated with intentional introduction of aquatic species. Directs Coast Guard to issue regulations to prevent the introduction and spread of aquatic nuisance species into the Great Lakes through ballast water. Directs Corps of Engineers to develop a program of research and technology to control zebra mussels in and around public facilities and make information available about control methods.	Aquatic nuisance species	Unintentional introductions: ballast water	http://www.anstaskforce.gov/toc.htm
	Alien Species Prevention and Enforcement Act (1992)	Makes the shipment of certain categories of plants and animals through U.S. mail illegal.	Plants and animals whose shipment is prohibited under 18 U.S.C. 42;43, or the Lacey Act Plants or plant matter whose shipment is prohibited under the Federal Plant Pest Act or Plant Protection Act	Intentional introductions: U.S. Mail	
Dept. of Agriculture/ APHIS	Plant Protection Act (2000)	Consolidates and modernizes several major statutes (Plant Quarantine Act, Federal Plant Pest Act, Federal Noxious Weed Act, Organic Act of 1944, and others), replacing them with one flexible statutory framework providing the	Plants and plant material Plant pests	Unintentional and intentional introduction	

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport Addressed	Web Site
		ability to prohibit or restrict imports, exports, and interstate movement; assess higher civil penalties; issue subpoenas; conduct inspections without a warrant; cooperate with industry and others in "quality assurance" programs; recover costs related to disposal of abandoned shipments; and take emergency action. By expanding the definition of "noxious weed" the Act enables APHIS to address a broader range of weed problems.	Noxious weeds Biological control agents		
Federal land management agencies	Federal Noxious Weed Act of 1974	Although the Plant Protection Act superseded and repealed most of the Federal Noxious Weed Act, it left intact Section 15 (management of undesirable plants on Federal lands). Requires Federal land management agencies to develop and establish a management program for control of undesirable plants on Federal lands under the agencies' jurisdiction. Requires those agencies to ANS-Crdinate management where similar programs are being implemented on State and private lands in the same area.	Noxious weeds Undesirable plant species	Control on Federal lands	http://refuges.fws.gov/FICMNEWFiles/FederalNoxiousWeedAct.html
Dept. of Agriculture/ APHIS	International Plant Protection Convention (1952)	Applies primarily to quarantine pests in international trade. Creates an international regime to prevent spread and introduction of plant and plant product pests premised on exchange of phytosanitary certificates between importing and exporting countries' national plant protection offices. Parties have national plant protection organizations established according to the Convention with authority in relation to quarantine control, risk analysis and other measures required to prevent the establishment and spread of all invasive alien species that, directly or indirectly, are pests of plants. Parties agree to cooperate on information exchange and on the development of International Standards for Phytosanitary Measures.	Pests of plants or plant products: "any form of plant or animal life, or any pathogenic agent, injurious or potentially injurious to plants or plant products" Quarantine pests involved with international trade: "pest of potential national economic importance to the country endangered thereby and not yet present there, or present but not widely distributed and being actively controlled"	"Storage places, conveyances, containers and any other object or material capable of harbouring or spreading plant pests, especially where international transportation is involved." Packing material or matter of any kind accompanying plant products Storage places Transportation facilities	http://www.fao.org/legal/treaties/004t-e.htm
Dept. of Interior	Lacey Act (1900; amended in 1998)	Prohibits import of a list of designated species and other vertebrates, mollusks, and crustacea that are "injurious to human beings, to the interests of agriculture, horticulture, forestry, or to wildlife or the wildlife resources of the United States" Declares importation or transportation of any live wildlife as injurious and prohibited, except as provided for under the Act	Species injurious to human beings or resources	Intentional introduction and trade	

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport Addressed	Web Site
		BUT Allows import of almost all species for scientific, medical, education, exhibition, or propagation purposes			
Dept. of Agriculture Dept. of Interior	Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) (1995)	A supplementary agreement to the World Trade Organization Agreement. Provides a uniform interpretation of the measures governing safety and plant and animal health regulations. Applicable to all sanitary and Phytosanitary measures directly or indirectly affecting international trade. Sanitary and Phytosanitary measures are defined as any measure applied a) to protect animal or plant life or health within (a Members' Territory) from entry, establishment or spread of pests, diseases, disease carrying organisms; e) to prevent or limit other damage within the (Members Territory) from the entry, establishment or spread of pests (annex A).	Pests, diseases, disease-carrying organisms, or disease-causing organisms	Importation	http://www.wto.org/goods/spsagr.htm
Dept. of Agriculture/ APHIS	Act of March 2, 1931, often referred to as the Animal Damage Control Act	Gives APHIS authority to control wildlife damage on federal, state, or private land. Protects: field crops, vegetables, fruits, nuts, horticultural crops, commercial forests; freshwater aquaculture ponds and marine species cultivation areas; livestock on public and private range and in feedlots; public and private buildings and facilities; civilian and military aircraft; public health	Damaging species (nutria, blackbirds, European starlings, monk parakeets)	Unintentional introductions	
	North American Agreement on Environmental Cooperation (1994)	Article 10 (2)(h): the Council of the Commission on Environmental Co-operation may develop recommendations regarding exotic species which may be harmful	"Exotic" species: not specified further	Not specified	http://www.cec.org
EPA	Federal Insecticide, Fungicide, and Rodenticide Act	Gives EPA authority to regulate importation and distribution of substances, including organisms, that are intended to function as pesticides	Biological control agents (In terms of biological control agents, EPA currently regulates only eukaryotic and prokaryotic microorganisms under FIFRA. Other biocontrol agents are exempt because they are "adequately regulated" by another agency, I.E. USDA-APHIS)	Intentional introduction	http://www.epa.gov/pesticides/fifra.htm

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport Addressed	Web Site
Dept. of Agriculture/ APHIS and AMS	Federal Seed Act (1939)	Requires accurate labeling and purity standards for seeds in commerce. Prohibits importation and movement of adulterated or misbranded seeds	Seeds	Intentional introduction through trade	
All	Dept. of Interior	Requires federal government agencies to consider the environmental effects of their actions through preparation of environmental impact statements (or environmental assessments to determine whether a full EIS is required). Effects of non-native species, if harmful to the environment, must be included in the EIS	Non-native species posing harm to the environment	Intentional introductions related to major federal actions	http://es.epa.gov/oeca/ofa/nepa.html
	Convention on International Trade in Endangered Species (CITES) (1975)	Represents alternate model for regulating invasive species not already covered by the IPPC or other agreements. Convention intended to prevent harm in *exporting* country; however, can be applied when species is endangered in exporting country and considered an invasive in importing country.	Species of flora and fauna which are threatened or endangered in exporting countries (Appendices I, II and III-see web site)	Intentional introductions through trade: export, re-export, import and introduction from the sea	http://international.fws.gov/global/citestxt.html (For appendices, see: http://international.fws.gov/global/cites.html)
Dept. of Interior	Wild Bird Conservation Act (1992)	Regulates importation of foreign wild birds	Birds and non-native parasites and diseases transported by foreign birds	Importation	http://international.fws.gov/global/law102.html
Dept. of Interior/FWS Dept. of Commerce/ NMFS	Endangered Species Act	Protects endangered species When non-native invasive species threaten endangered species, this act could be used as basis for their eradication.	Non-native species posing a danger to local endangered species	Not specified	http://endangered.fws.gov/esa.html
All	Executive Order 13112 (Feb. 1999)	Defines invasive species (“any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem”) Directs all federal agencies to: -Address invasive species concerns; -Refrain from actions likely to increase invasive species problems. Creates interagency Invasive Species Council Calls for National Invasive Species Management Plan to better ANS-Crdinate federal agency efforts.	All	Unintentional and intentional introductions: escape, release	www. Invasivespecies.gov

Appendix D. **Executive Order 13112**

Executive Order 13112 of February 3, 1999
Invasive Species

By the authority vested in me as President by the Constitution and the laws of the United States of America, including the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended (16 U.S.C. 4701 et seq.), Lacey Act, as amended (18 U.S.C. 42), Federal Plant Pest Act (7 U.S.C. 150aa et seq.), Federal Noxious Weed Act of 1974, as amended (7 U.S.C. 2801 et seq.), Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), and other pertinent statutes, to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause, it is ordered as follows:

Section 1. Definitions.

(a)"Alien species" means, with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.

(b) "Control" means, as appropriate, eradicating, suppressing, reducing, or managing invasive species populations, preventing spread of invasive species from areas where they are present, and taking steps such as restoration of native species and habitats to reduce the effects of invasive species and to prevent further invasions. "

(a) "Ecosystem" means the complex of a community of organisms and its environment.

(b) (d) "Federal agency" means an executive department or agency, but does not include independent establishments as defined by 5 U.S.C. 104. (e) "Introduction" means the intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity.

(f) "Invasive species" means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

(g) "Native species" means, with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

(h) "Species" means a group of organisms all of which have a high degree of physical and genetic similarity, generally interbreed only among themselves, and show persistent differences from members of allied groups of organisms.

(i) "Stakeholders" means, but is not limited to, State, tribal, and local government agencies, academic institutions, the scientific community, nongovernmental entities including environmental, agricultural, and conservation organizations, trade groups, commercial interests, and private landowners.

(j) "United States" means the 50 States, the District of Columbia, Puerto Rico, Guam, and all possessions, territories, and the territorial sea of the United States.

Sec. 2. Federal Agency Duties. (a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law.

1) identify such actions;

2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and
3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.
(b) Federal agencies shall pursue the duties set forth in this section in consultation with the Invasive Species Council, consistent with the Invasive Species Management Plan and in cooperation with stakeholders, as appropriate, and, as approved by the Department of State, when Federal agencies are working with international organizations and foreign nations.
Sec. 3. Invasive Species Council. (a) An Invasive Species Council (Council) is hereby established whose members shall include the Secretary of State, the Secretary of the Treasury, the Secretary of Defense, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Transportation, and the Administrator of the Environmental Protection Agency. The Council shall be Co-Chaired by the Secretary of the Interior, the Secretary of Agriculture, and the Secretary of Commerce. The Council may invite additional Federal agency representatives to be members, including representatives from subcabinet bureaus or offices with significant responsibilities concerning invasive species, and may prescribe special procedures for their participation. The Secretary of the Interior shall, with concurrence of the Co-Chairs, appoint an Executive Director of the Council and shall provide the staff and administrative support for the Council.
(b) The Secretary of the Interior shall establish an advisory committee under the Federal Advisory Committee Act, 5 U.S.C. App., to provide information and advice for consideration by the Council, and shall, after consultation with other members of the Council, appoint members of the advisory committee representing stakeholders. Among other things, the advisory committee shall recommend plans and actions at local, tribal, State, regional, and ecosystem-based levels to achieve the goals and objectives of the Management Plan in section 5 of this order. The advisory committee shall act in cooperation with stakeholders and existing organizations addressing invasive species. The Department of the Interior shall provide the administrative and financial support for the advisory committee.
Sec. 4. Duties of the Invasive Species Council. The Invasive Species Council shall provide national leadership regarding invasive species, and shall:
(a) oversee the implementation of this order and see that the Federal agency activities concerning

invasive species are ANS-Crdinated, complementary, cost-efficient, and effective, relying to the extent feasible and appropriate on existing organizations addressing invasive species, such as the Aquatic Nuisance Species Task Force, the Federal Interagency Committee for the Management of Noxious and Exotic Weeds, and the Committee on Environment and Natural Resources;

(b) encourage planning and action at local, tribal, State, regional, and ecosystem-based levels to achieve the goals and objectives of the Management Plan in section 5 of this order, in cooperation with stakeholders and existing organizations addressing invasive species;

(c) develop recommendations for international cooperation in addressing invasive species; develop, in consultation with the Council on Environmental Quality, guidance to Federal agencies pursuant to the National Environmental Policy Act on prevention and control of invasive species, including the procurement, use, and maintenance of native species as they affect invasive species;

(d) facilitate development of a ANS-Crdinated network among Federal agencies to document, evaluate, and monitor impacts from invasive species on the economy, the environment, and human health;

(e) facilitate establishment of a ANS-Crdinated, up-to-date information-sharing system that utilizes, to the greatest extent practicable, the Internet; this system shall facilitate access to and exchange of information concerning invasive species, including, but not limited to, information on distribution and abundance of invasive species; life histories of such species and invasive characteristics; economic, environmental, and human health impacts; management techniques, and laws and programs for management, research, and public education; and

(f) prepare and issue a national Invasive Species Management Plan asset forth in section 5 of this order.

Sec. 5. Invasive Species Management Plan. (a) Within 18 months after issuance of this order, the Council shall prepare and issue the first edition of a National Invasive Species Management Plan (Management Plan), which shall detail and recommend performance-oriented goals and objectives and specific measures of success for Federal agency efforts concerning invasive species. The Management Plan shall recommend specific objectives and measures for carrying out each of the Federal agency duties established in section 2

(a) of this order and shall set forth steps to be taken by the Council to carry out the duties assigned to it under section 4 of this order. The Management Plan shall be developed through a public process and in consultation with Federal agencies and stakeholders.

(b) The first edition of the Management Plan shall include a review of existing and prospective approaches and authorities for preventing the introduction and spread of invasive species, including those for identifying pathways by which invasive species are introduced and for minimizing the risk of introductions via those pathways, and shall identify research needs and recommend measures to minimize the risk that

introductions will occur. Such recommended measures shall provide for a science-based process to evaluate risks associated with introduction and spread of invasive species and a ANS-Crdinated and systematic risk-based process to identify, monitor, and interdict pathways that may be involved in the introduction of invasive species. If recommended measures are not authorized by current law, the Council shall develop and recommend to the President through its Co-Chairs legislative proposals for necessary changes in authority.

(c) The Council shall update the Management Plan biennially and shall concurrently evaluate and report on success in achieving the goals and objectives set forth in the Management Plan. The Management Plan shall identify the personnel, other resources, and additional levels of ANS-Crdination needed to achieve the Management Plan's identified goals and objectives, and the Council shall provide each edition of the Management Plan and each report on it to the Office of Management and Budget. Within 18 months after measures have been recommended by the Council in any edition of the Management Plan, each Federal agency whose action is required to implement such measures shall either take the action recommended or shall provide the Council with an explanation of why the action is not feasible. The Council shall assess the effectiveness of this order no less than once each 5 years after the order is issued and shall report to the Office of Management and Budget on whether the order should be revised.

Sec. 6. Judicial Review and Administration. (a) This order is intended only to improve the internal management of the executive branch and is not intended to create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies, its officers, or any other person.

(b) Executive Order 11987 of May 24, 1977, is hereby revoked.

(c) The requirements of this order do not affect the obligations of Federal agencies under 16 U.S.C. 4713 with respect to ballast water programs.

(d) The requirements of section 2(a)(3) of this order shall not apply to any action of the Department of State or Department of Defense if the Secretary of State or the Secretary of Defense finds that exemption from such requirements is necessary for foreign policy or national security reasons.

WILLIAM J. CLINTON

THE WHITE HOUSE,

February 3, 1999.

Appendix E: **Budget Matrix for North Dakota's Aquatic Nuisance Species Management Plan**

Funding for staffing of ANS education and prevention activities.

			ANS-SP and IASC Funding Needs									
			Year 1		Year 2		Year 3		Year 4		Year 5	
Agency or Entity	Staffing or payment type	Description	Man-yr	Salary	Man-yr	salary	Man-yr	salary	Man-yr	salary	Man-yr	salary
Game and Fish Department	ANS-SP	ANS activities	0.9	$33,750	0.9	$33,750	0.9	$33,750	0.9	$33,750	0.9	$33,750
	Field Staff	monitoring	0.2	$8,000	0.2	$8,000	0.2	$8,000	0.2	$8,000	0.2	$8,000
	Clerical	mailing	0.01	$550	0.01	$550	0.01	$550	0.01	$550	0.01	$550
	Wardens	inspecting boats	0.2	$8,000	0.2	$8,000	0.2	$8,000	0.2	$8,000	0.2	$8,000
State Water Commission	MOU for expenses	meetings, mailings, review permits	0.05	$1,750	0.05	$1,750	0.05	$1,750	0.05	$1,750	0.05	$1,750
Department of Health	MOU for expenses	meetings, mailings, review permits	0.05	$1,750	0.05	$1,750	0.05	$1,750	0.05	$1,750	0.05	$1,750
Department of Agriculture	MOU for expenses	meetings, mailings, review permits	0.075	$2,650	0.075	$2,650	0.075	$2,650	0.075	$2,650	0.075	$2,650
Parks & Recreation Department	MOU for expenses	meetings, mailings, review permits	0.075	$2,650	0.075	$2,650	0.075	$2,650	0.075	$2,650	0.075	$2,650
Department of Tourism	MOU for expenses	meetings, mailings, review permits	0.01	$350	0.01	$350	0.01	$350	0.01	$350	0.01	$350
Department of Transportation	MOU for expenses	meetings, mailings, review permits	0.01	$350	0.01	$350	0.01	$350	0.01	$350	0.01	$350
NRCS and SCDs	MOU for expenses	meetings, mailings, review permits	0.01	$350	0.01	$350	0.01	$350	0.01	$350	0.01	$350
Wildlife Clubs												
Fishing Clubs												
Guides and Outfitters												
League of Cities												
ND Water Users												
Tribal												
		TOTAL	***1.59***	***$60,150***	***1.59***	***$60,150***	***1.59***	***$60,150***	***1.59***	***$60,150***	***1.59***	***$60,150***

Budget for training and education of field staff, law enforcement and volunteers.

			Education of Field staff, law enforcement									
			Year 1		Year 2		Year 3		Year 4		Year 5	
	Agencies and Entities	Description	Man-yr	Salary	Man-yr	Salary	Man-yr	salary	Man-yr	salary	Man-yr	salary
Funded by ANS-SP and ANS program	North Dakota Game and Fish Department	Training of field staff, and wardens	0.01	$2,750	0.01	$1,750	0.01	$1,750	0.01	$1,750	0.01	$1,750
	State Water Commission	Training of staff	>0.01		>0.01		>0.01		>0.01		>0.01	
	Department of Health	Training of staff	>0.01		>0.01		>0.01		>0.01		>0.01	
	Department of Agriculture	Train of law enforcement and field staff	>0.01		>0.01		>0.01		>0.01		>0.01	
	Parks & Recreation Department		>0.01		>0.01		>0.01		>0.01		>0.01	
	Department of Tourism		>0.01		>0.01		>0.01		>0.01		>0.01	
	Department of Transportation		>0.01		>0.01		>0.01		>0.01		>0.01	
	NRSC and SCDs	Training of staff	>0.01		>0.01		>0.01		>0.01		>0.01	
	Wildlife Clubs	Train volunteers	>0.01		>0.01		>0.01		>0.01		>0.01	
	Fishing Clubs	Train volunteers	>0.01		>0.01		>0.01		>0.01		>0.01	
	Guides and Outfitters	Train volunteers	>0.01		>0.01		>0.01		>0.01		>0.01	
	League of Cities	Train volunteers	>0.01		>0.01		>0.01		>0.01		>0.01	
	ND Water Users	Train volunteers	>0.01		>0.01		>0.01		>0.01		>0.01	
	Tribal	Train of law enforcement and field staff	>0.01		>0.01		>0.01		>0.01		>0.01	
		TOTAL		***$2,750***		***$1,750***		***$1,750***		***$1,750***		***$1,750***

Budget for educational materials for field staff and enforcement.

	Educational Materials					
	Description	Year 1	Year 2	Year 3	Year 4	Year 5
Funded by ANS-SP and ANS program	field guides to ANS; provide to staff and enforcement officers	$2,500	$500			
	brochures which will be provided to agencies, entities, and the public	$2,000				$5,000
	booklet defining ANS problems, state laws, responsibility of agencies and entities	$1,500		~~$500~~		

Budget for local and regional educational campaign using mass media.

	Mass Media					
	Description	Year 1	Year 2	Year 3	Year 4	Year 5
Funded by ANS-SP and ANS program	TV and radio spots, half page articles in newspapers and monthly periodicals	$12,500	$12,500	$12,500	$12,500	$12,500

Budget for promotional items.

	Promotional items					
	Description	Year 1	Year 2	Year 3	Year 4	Year 5
Funded by ANS-SP and ANS program	Items (beverage wraps, mugs, pens, stickers, etc)	$5,000	$5,000	$1,000	$500	$1,500

Budget to collect information from anglers on effects of educational campaign and attitudes.

	Data Collection					
	Description	Year 1	Year 2	Year 3	Year 4	Year 5
Funded by ANS-SP and ANS program	Questions in angler interviews	$750	$750	$750	$750	$750

Budget for signs at boat ramps, bait stores, and marine dealers.

	Signs					
	Description	Year 1	Year 2	Year 3	Year 4	Year 5
Funded by ANS-SP and ANS program	for bait dealers	$250	$250	$250	$250	$250
	signs at marina	$750				$750
	boat dealers	$750				
	Meet Parks and Recreation Department guidelines	$500				

$750
$750
$500

Budget for research as directed by the ANS-SP and IASC.

	Contracts					
	Description	Year 1	Year 2	Year 3	Year 4	Year 5
Funded by ANS-SP and ANS program	Consultant - boater interviews at waterbodies, research avenues of introduction, determine compliance with ANS prevention protocols, sample for veligar in selected waterbodies; summer staff to conduct field surveys, post signs, and conduct interviews	$7,500	$17,500	$17,500	$20,000	$5,000

Budget for monitoring selected waterbodies for adult zebra mussels.

	Adult Zebra Mussel Sampling					
	Description	Year 1	Year 2	Year 3	Year 4	Year 5
Funded by ANS-SP and ANS program	ZM traps, other equipment	$500	$1,000	$1,000	$250	$250

Budget for efforts to provide information to the public and private sector by use of outside entities.

	Agency or Entity	Grants					
		Description	Year 1	Year 2	Year 3	Year 4	Year 5
Funded by ANS-SP and ANS program	Tourism	ANS prevention information in publications	$1,000	$1,000	$1,000	$1,000	$1,000
	Wildlife Clubs	serve as liaison to outdoor interests	$1,000	$1,000	$1,000	$1,000	$1,000
	Fishing Clubs	serve as liaison to outdoor interests	$1,000	$1,000	$1,000	$1,000	$1,000
	Guides and Outfitters	serve as liaison to outdoor interests	$1,000	$1,000	$1,000	$1,000	$1,000
	ND Water Users	serve as liaison to water interest	$1,000	$1,000	$1,000	$1,000	$1,000
	Tribal	serve as liaison to outdoor interests	$1,000	$1,000	$1,000	$1,000	$1,000

Budget for ANS-SP for meeting and conferences on ANS issues and education.

	Attend meetings and conferences					
	Description	Year 1	Year 2	Year 3	Year 4	Year 5
Funded by ANS-SP and ANS program	100th Meridian, WRP, MICRA, WRP, etc	$7,500	$7,500	$7,500	$7,500	$7,500

Appendix F. **Invasive Aquatic Nuisance Species Issues for the North Dakota Legislature**

North Dakota Legislation Issues

The following is a listing of areas that legislation will need to be developed to protect North Dakota's economic and recreational opportunities from ANS:

- Develop North Dakota's list of ANS. The list will be determined by the Aquatic Invasive Species Committee (AISC), and adopted by the North Dakota Game and Fish Department after consultation with other (but consensus is not required to list a species as problem), the list will be regularly reviewed and species added or dropped
- Provide for agencies/entities that have a relationship/responsibility/protection of the State's aquatic resources be tasked with:
    - organize and recognize the AISC as a legislatively authorized advisory board with limited authorities
    - list those aquatic species, plants, animals, and pathogens, that cannot be brought into or moved within North Dakota
    - authorities/powers of agencies and entities responsibility for the best management of North Dakota's resources be expanded to include ANS prevention efforts
    - regulation be provided and expanded where and as needed to prevent ANS movement
    - authority to collect monies or grants to provide for funds for operation of the AISC and conduct ANS education/prevention
    - provide for the partnership of state agencies, state agencies and federal government, private or public organizations to fund ANS prevention efforts
- Provide the agencies authorities/responsibilities/mandated efforts :
    - North Dakota Game and Fish Department to provide for regulations on ANS prevention on the importation in baits, live fish for rearing, stocking, or sale which included the pet trade, transported into or within the state on or in boats, trailers, equipment or vehicles, associated inspections and enforcement of regulations, to apply for those funds held available as grants from state, federal or private sources and to spend such monies on ANS activities
    - Dept of Health to consider including REPPs in permits for water projects of all sorts to prevent the importation or transfer of ANS into or within the state
    - State Water Commission to consider including REPPs in permits for water projects of all sorts to prevent the importation or transfer of ANS into or within the state
    - Dept of Ag to provide for regulations/information on the importation, propagation, and growing of plant in the state or those brought into the state to those engaged in such activities, inspection such plant nurseries, garden centers, or facilities/premises for ANS on a

reasonable bases, enforce such regulations as adopted to prevent ANS
    - USDA or appropriate local government entity involved with food handling and preparation will have responsibility inspection of live animals or plants used in the food industry to assure that they are not ANS or will pose a problem to natural resources if they are allowed to escape
    - Natural Resource Conservation Service/Natural Resource Boards/Water Resource Boards shall participate in ANS prevention as part of their activities, cause those landowners to participate in ANS prevention/control efforts, assist in funding AISC activities, provide for the power to rapidly respond to ANS infestations and take needed/necessary efforts to control or eliminate such problems as are identified to them by the AISC; powers to close waterbodies to use while ANS is being eradicated or control efforts required to use a waterbody
    - Parks and Recreation shall include ANS educational/prevention materials in their published literature and place signs or other devices where and as needed; enforce ANS regulations on the movement of ANS into or within the state
    - Tourism shall include ANS educational/prevention material in literature published
    - mandate that law enforcement professionals and DOT representative include ANS inspection on vehicles as prudent and as suspect to/of need
    - provide for a system of fines/legal forfeitures of such ANS regulations as to make Class B misdemeanor
    - agencies/entities which receive public funds shall include ANS educational/prevention literature

- ANS cannot be imported or transported into or within the state; a civil penalty for violation of such regulations is needed; develop a system of fines/legal actions that are commensurate with the problem – Class B misdemeanor
- provide for the authority to enforce ANS legislation to appropriate agencies with a mandate to enforce such regulations which includes the impounding of vehicles or vessels with ANS, and provide for monies/manpower to do such and mandate that such enforcement be done
- Develop a standing committee to deal with ANS prevention, education, and outreach similar to the Invasive Aquatic Species Committee
- Any boat could be inspected by appropriate authorities before being allowed to be launched into ND waters or transported into or within North Dakota
- Fish, including live baitfish, aquarium pet trade, aquiculture, and similar venues, entering the state would be accompanied by certification of ANS

free from the state they were produced in and brought from, the certification can come from an independent laboratory, a fine compensatory with the problem will be established

- Plants, included those sold in plant nurseries, garden supply centers, home improvement stores, and similar venues, plants would be certified as not being ANS from the supplier, state/county of origin, or by an independent laboratory, a fine compensatory with the problem will be established
- Provide for the Rapid Response Plan's authority to quarantine or require ANS prevention protocols from waterbodies with ANS infestations
- Provide for regulations to prevent the sale of live fish or aquatic creatures in the food market, but allow for the display of live fish or aquatic creatures
- Authority to detain, impound, or hold boats, recreational equipment, industrial equipment, and associated trailers or other equipment that require cleaning and disinfection for ANS and to bill those individuals for agencies time and effort to do that work if not done by owner/operator.

This legislation gives the North Dakota Game and Fish Department and other state agencies the authority to properly prevent the importation and establishment of ANS in North Dakota waters. The AISC will foster cooperation between existing agencies and their programs dealing with aquatic nuisance species, fill the gaps between the programs, and to provide funding for ANS activities.

Appendix G: **Agencies, Public and Private Groups, and Individuals (the representative) on the Aquatic Invasive Species Committee**

Aquatic Invasive Species Committee

Named entities and individuals

North Dakota Department of Health
(Mike Sauer, appointed representative)
600 East Boulevard, 2nd Floor-Judicial Wing
Bismarck ND 58505-0200

North Dakota Department of Parks and Recreation
(Kathy Duttenhefner, appointed representative)
1600 East Century Avenue, Suite 3
Bismarck, ND 58503

North Dakota Game and Fish Department
(Lynn R Schlueter, ANS-Coordinator/designated representative)
100 North Bismarck Expressway
Bismarck, ND 58501

Fishing Clubs and Conservation Groups
(Duane Ash/President, volunteer)
ND Sportfishing Congress
PO Box 365
Devils Lake, ND 58301-0708

North Dakota Tourism and Commerce Department
(Mark Zimmerman, appointed representative)
Outdoors Promotion
North Dakota Tourism
1600 East Century Avenues, Suite 2
Bismarck, ND 58501

North Dakota State Water Commission
(Mike Noone, appointed representative)
900 East Boulevard-State Office Building
Bismarck, ND 58505-0187

North Dakota Department of Agriculture
(Rachel Seifert-Spilde, appointed representative)
600 East Boulevard Avenue
Dept. 602
Bismarck, ND 58505

North Dakota Water Users Organization
(Jason Debouds, appointed)
1605 East Capitol Ave
Halkirk Offices
Bismarck, ND 58505-0187

Wildlife Clubs and Conservation Groups
(John Kopp, President, volunteer)
North Dakota Wildlife Federation
2911 116 R Ave SE
Valley City, ND 58072

Tribal Interests
(Daniel Lonhes, appointed representative)
Marina Director
Spirit Lake Casino and Marina
7889 Highway 57
St Michael, ND 58370

North Dakota Guides and Outfitter Association
(Kyle Blanchfield/Association President, volunteer)
President of
1012 Woodland Drive
Devils Lake ND 58301

Invasive Aquatic Species Committee, standing or associated representatives

Named entities and individuals

United States Department of Agriculture
(Dave Dewald, volunteer)
NRCS, Box 1458
Bismarck, ND 58502

North Dakota League of Cities
(Connie Sprynczynatyk/Director, volunteer)
410 East Front Ave.
Bismarck, ND 58504

North Dakota Department of Commerce
(Lee Peterson)
1600 E. Century Ave, Suite 2
P O Box 2057
Bismarck, ND 58502

North Dakota Water Boards Association
(Ben Varnson, President)
4877 112th Ave NE
Lakota, ND 58344-9481

Garrison Conservative Unit
(Kip Kovar, volunteer)
PO Box 140
Carrington, ND 58421

Eastern Grand Forks County Soil Conservation District
(Nedra Holberg, volunteer)
2397 Demers Avenue
Grand Forks, ND 58201

Contributing agencies or entities, cities, and universities

US Fish and Wildlife Services

US Army Corps of Engineers

Bureau of Reclamation

Cities of
Fargo
Bismarck
Grand Forks
Minot
Dickinson
Devils Lake

Valley City State University

University of North Dakota

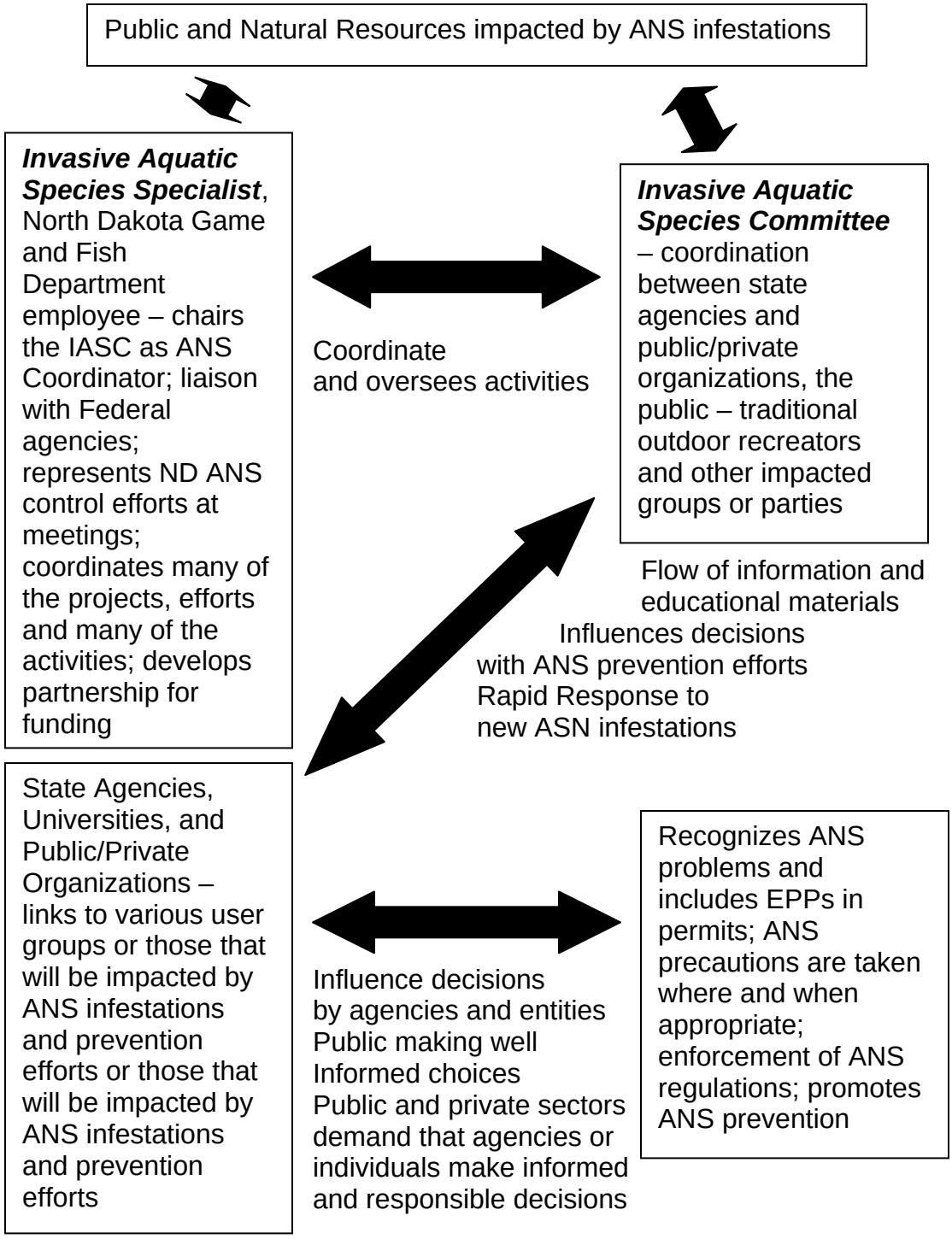
North Dakota State University

Minot State University, Bottineau Campus

Appendix H: **Summary Flow chart for Aquatic Invasive Species Committee and various agencies and entities, public and private.**

North Dakota's Aquatic Invasive Species Committee Flow Diagram for Visualization Purposes

Educated public and private sector, an educated water user will be aware of the need for ANS precautions, North Dakotans will require that ANS precautions be implemented

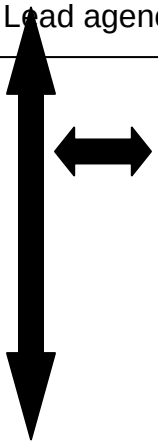


Appendix I: **Detailed Flow chart for Aquatic Invasive Species Committee and various agencies and entities, public and private.**

North Dakota Statewide Aquatic Nuisance Species Management Plan

North Dakota Game and Fish Department
Lead agency for ND-Plan efforts

Fish and Wildlife Service ANS–Task Force will be providing funds



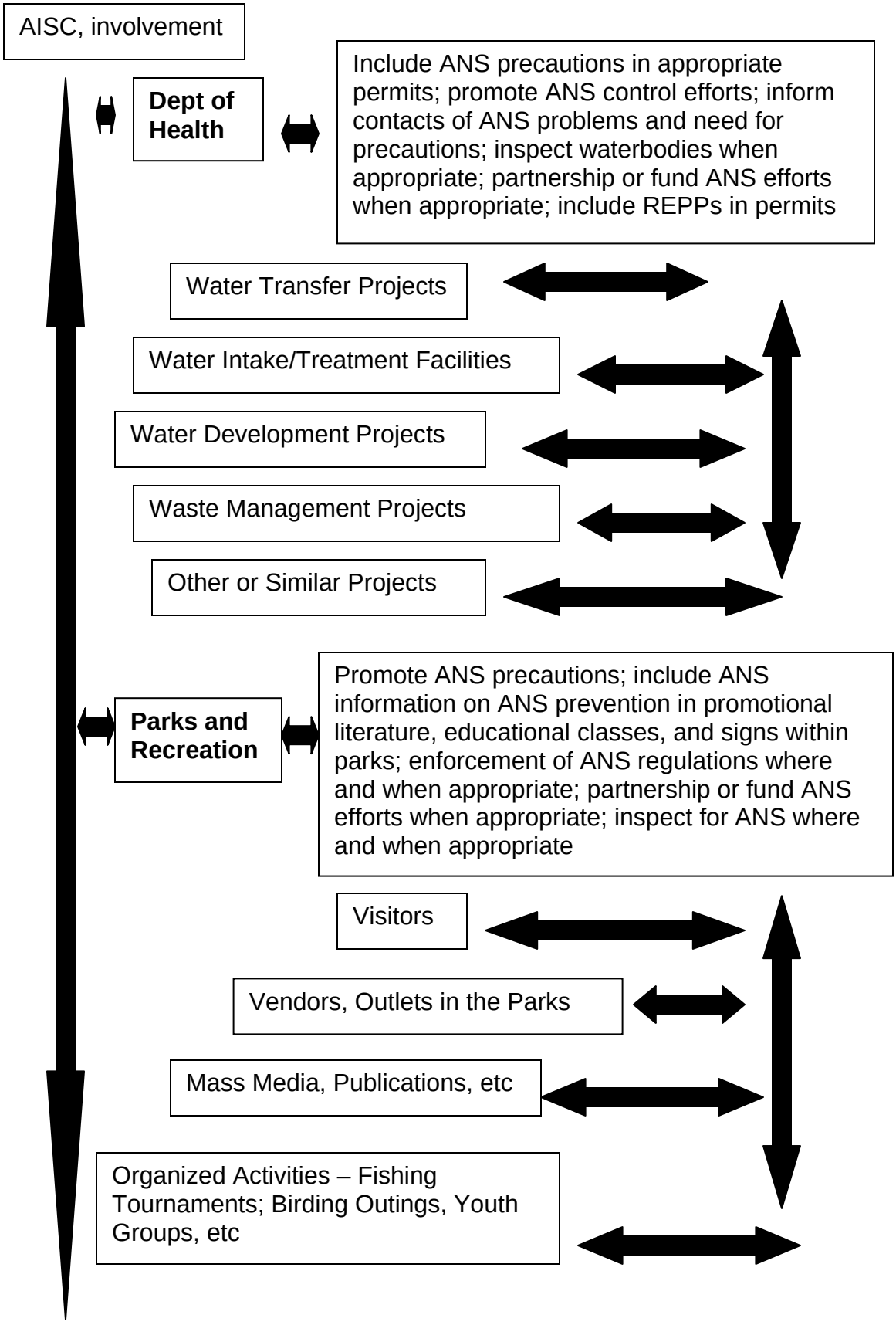
ANS Coordinator, NDGF appointed - the liaison between the various entities (federal entities, state, private, and public) for ANS prevention, education, and control or eradication. Directs the projects and makes recommendation to groups (federal, state, local, private, and private) for ANS education, prevention or eradication. Seek and secure additional funding; alternative sources of funding; use of nontraditional funding sources; partnership between state agencies and federal sources

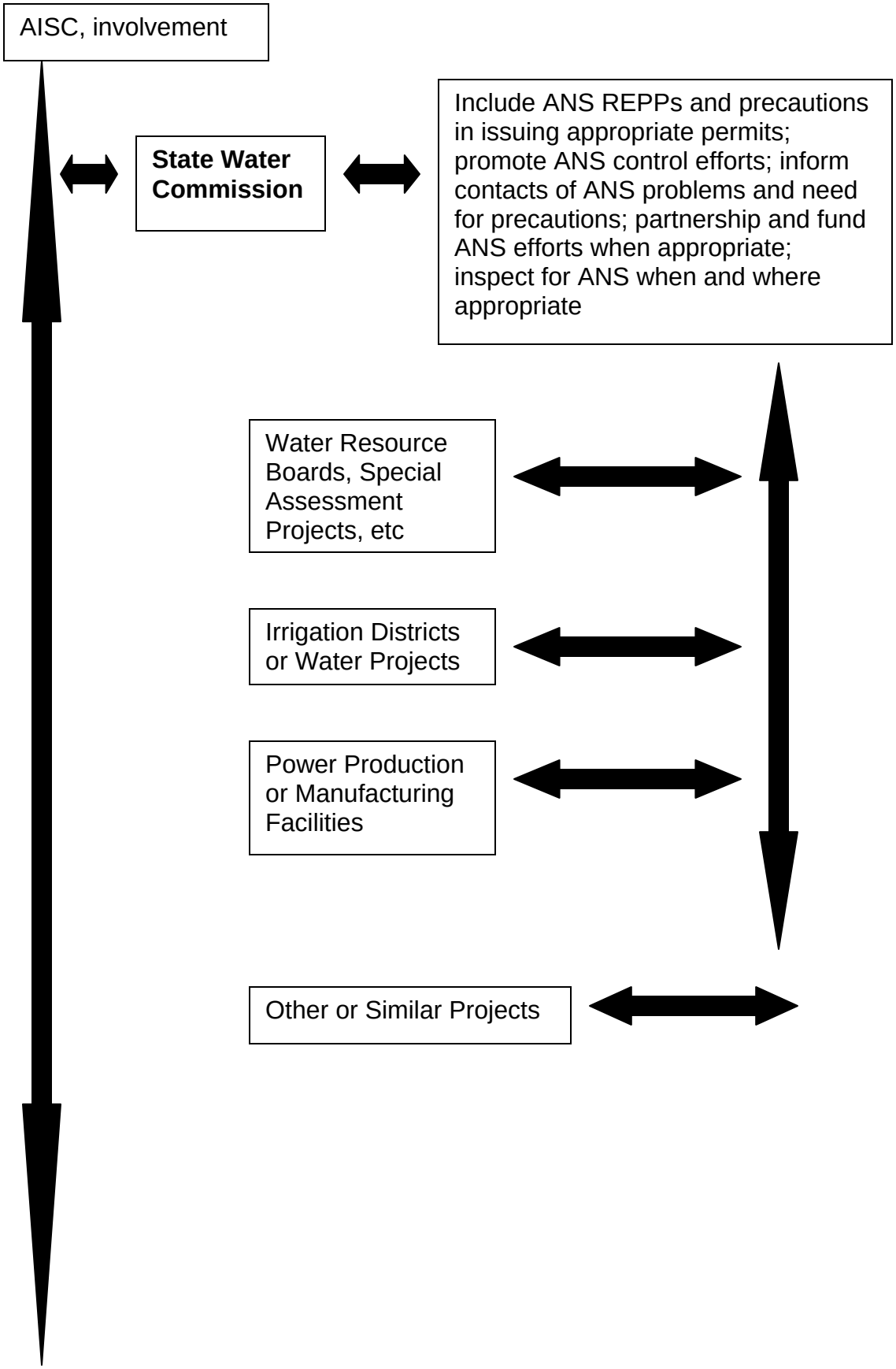
Aquatic Invasive Species Committee (AISC)

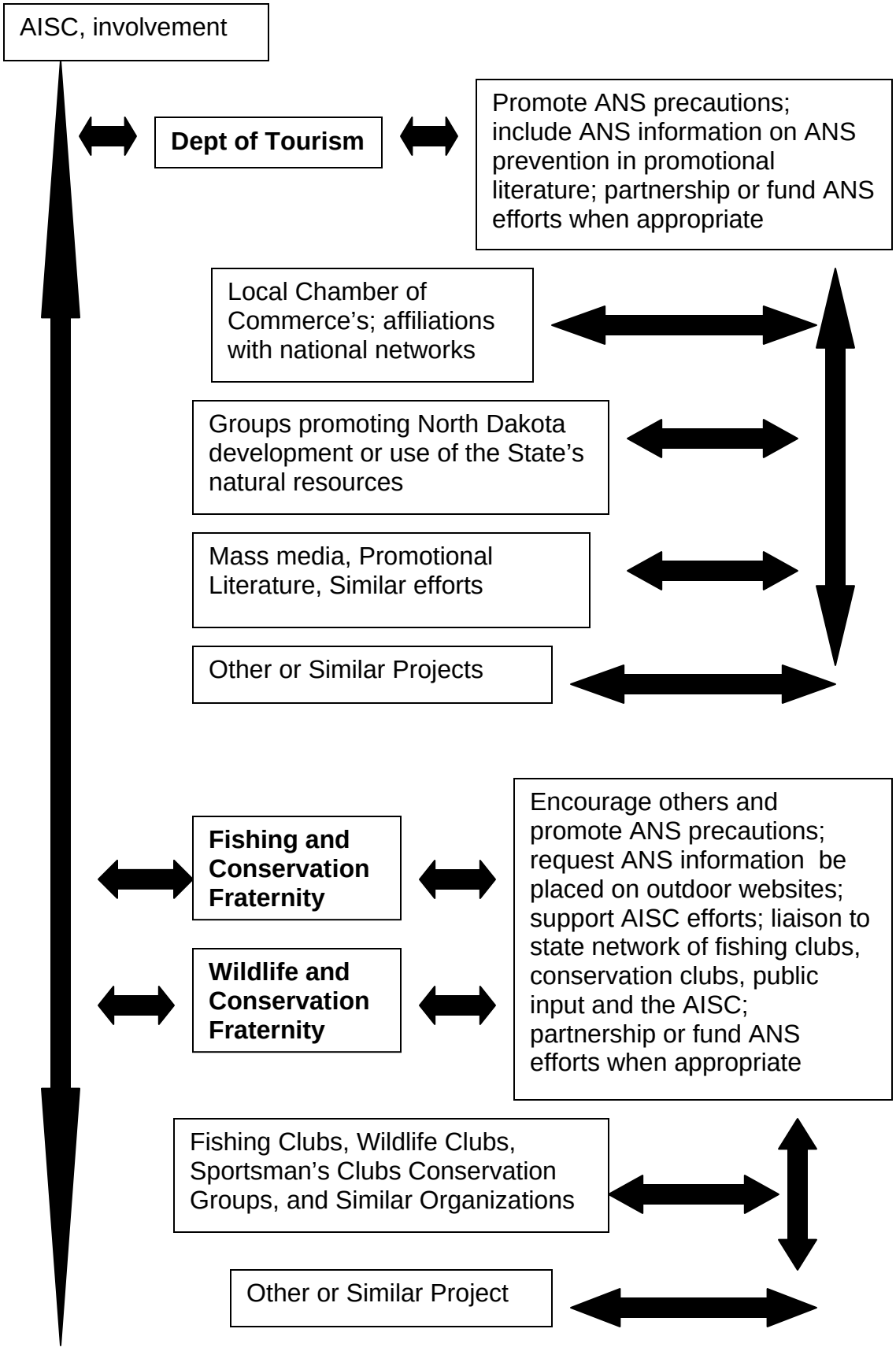
- Development of a North Dakota list of Aquatic Invasive Nuisance Species
- Education and Information, and Public/Private/Commercial Outreach efforts
- Facilitate in monitoring of waterbodies for ANS infestations
- Fund and coordinate monitoring avenues of ANS spread, into or within the state
- Early Detection and Rapid Response to Control or Eradicate Problem Species
- Prevention of Introductions and draft Administrative Code which includes provision for appropriate enforcement of laws and regulations now existing

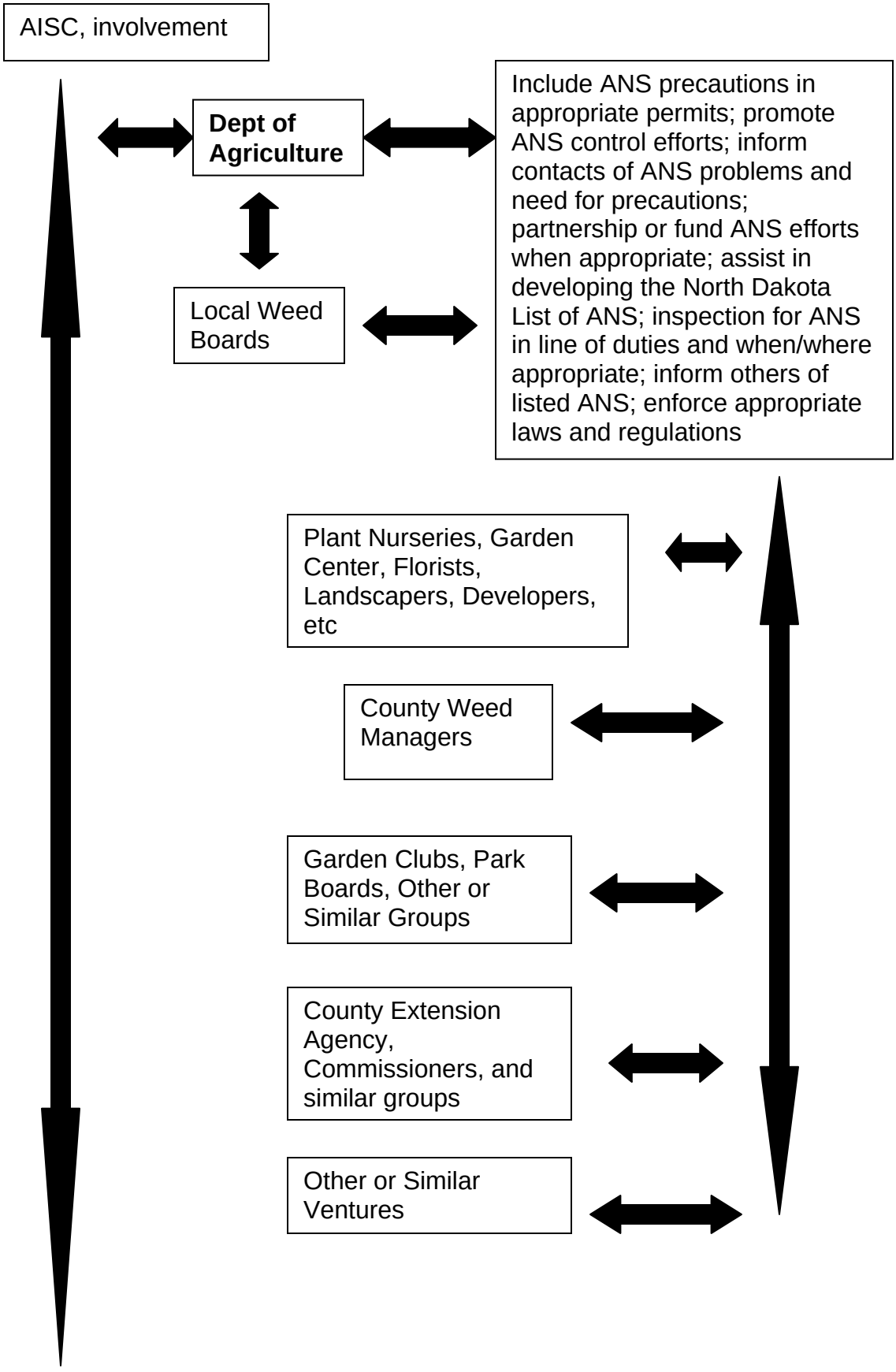
Function as an advisory board for making informed decisions by state, local, public and and private organizations.

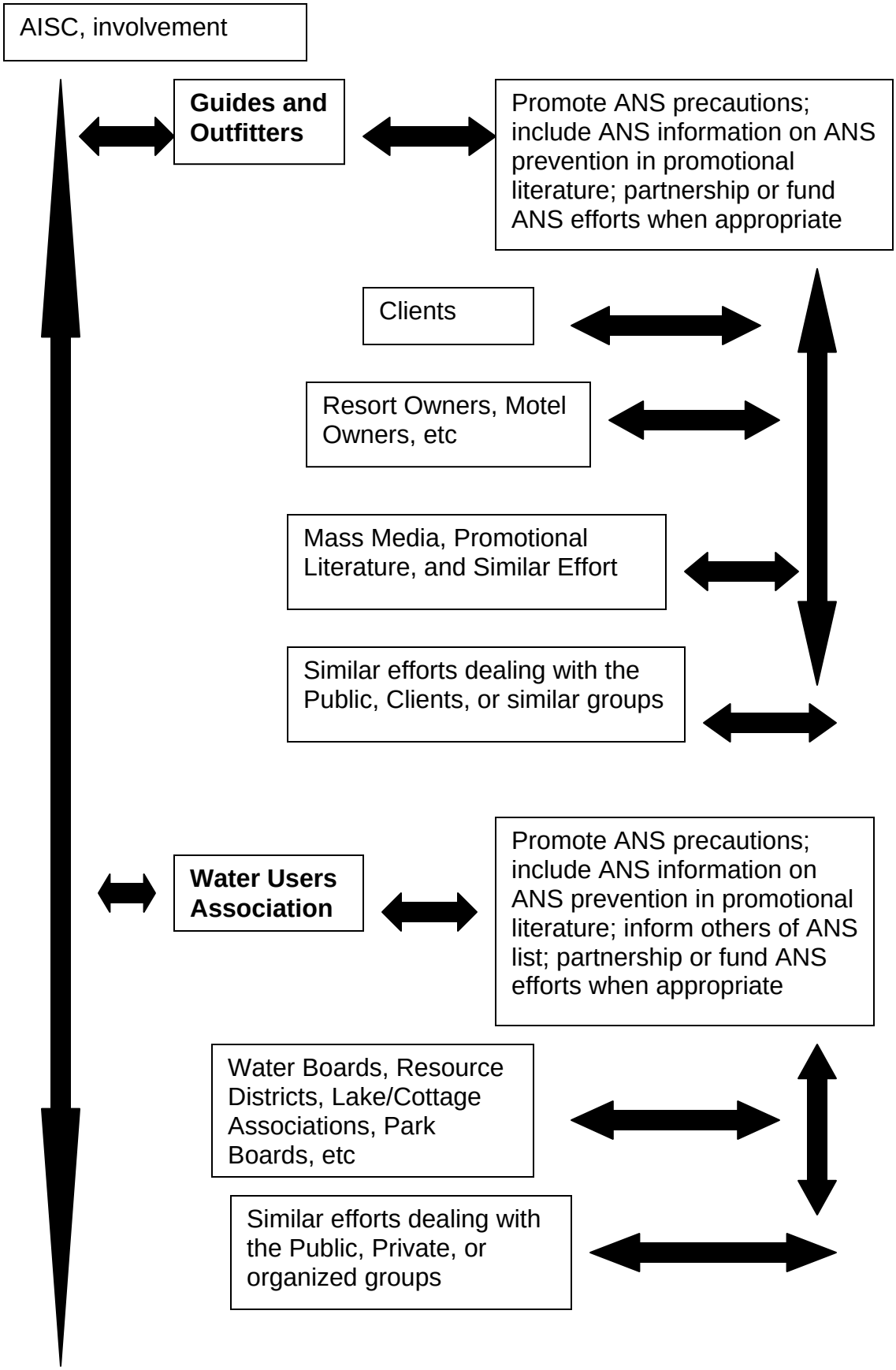
ANS Coordinator is chairperson and facilitates communication between/among agencies, entities, and organizations

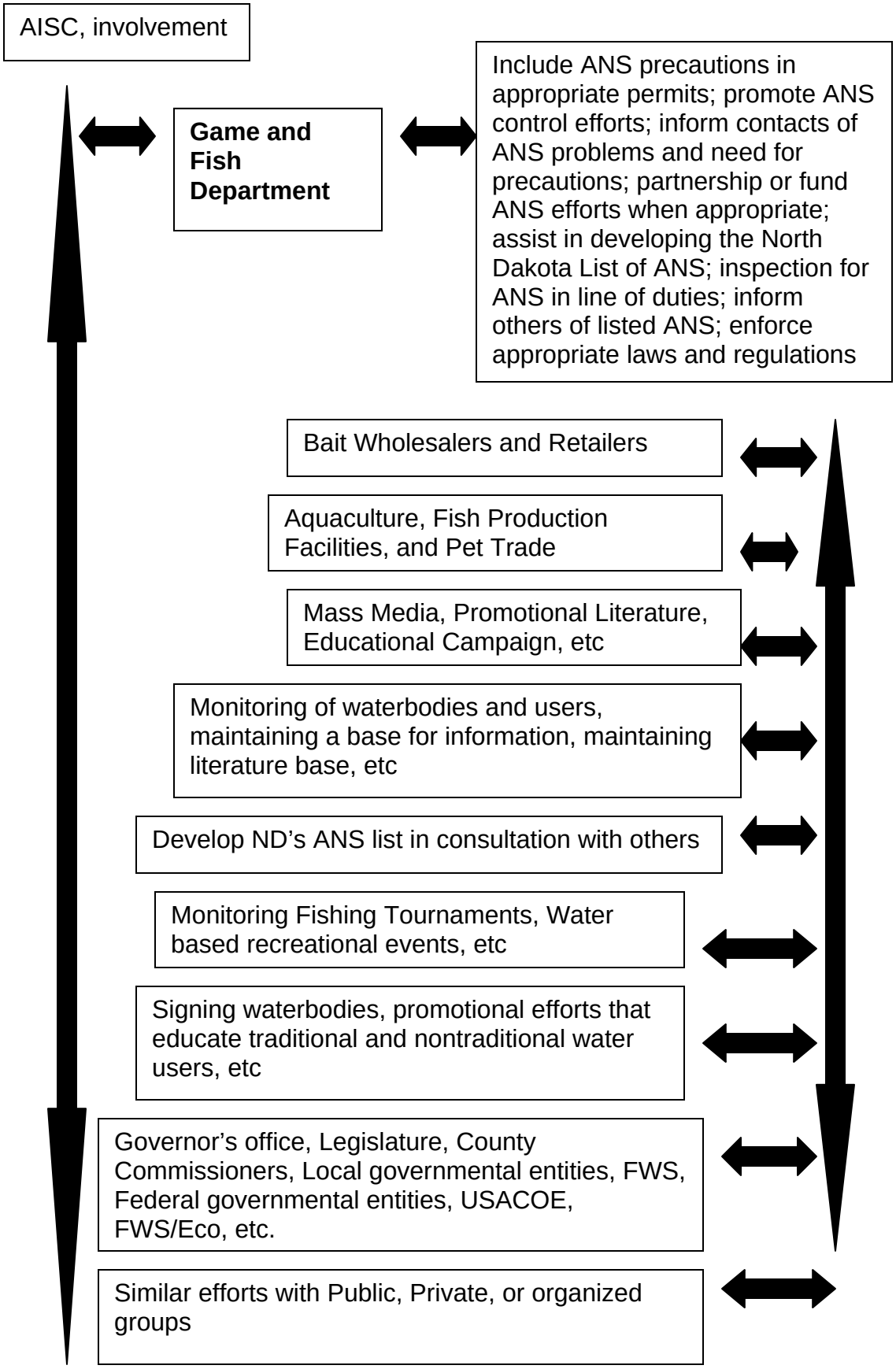

AISC, involvement
Dept of Health
Include ANS precautions in appropriate permits; promote ANS control efforts; inform contacts of ANS problems and need for precautions; inspect waterbodies when appropriate; partnership or fund ANS efforts when appropriate; include REPPs in permits
Water Transfer Projects
Water Intake/Treatment Facilities
Water Development Projects
Waste Management Projects
Other or Similar Projects
Parks and Recreation
Promote ANS precautions; include ANS information on ANS prevention in promotional literature, educational classes, and signs within parks; enforcement of ANS regulations where and when appropriate; partnership or fund ANS efforts when appropriate; inspect for ANS where and when appropriate
Visitors
Vendors, Outlets in the Parks
Mass Media, Publications, etc
Organized Activities – Fishing Tournaments; Birding Outings, Youth Groups, etc

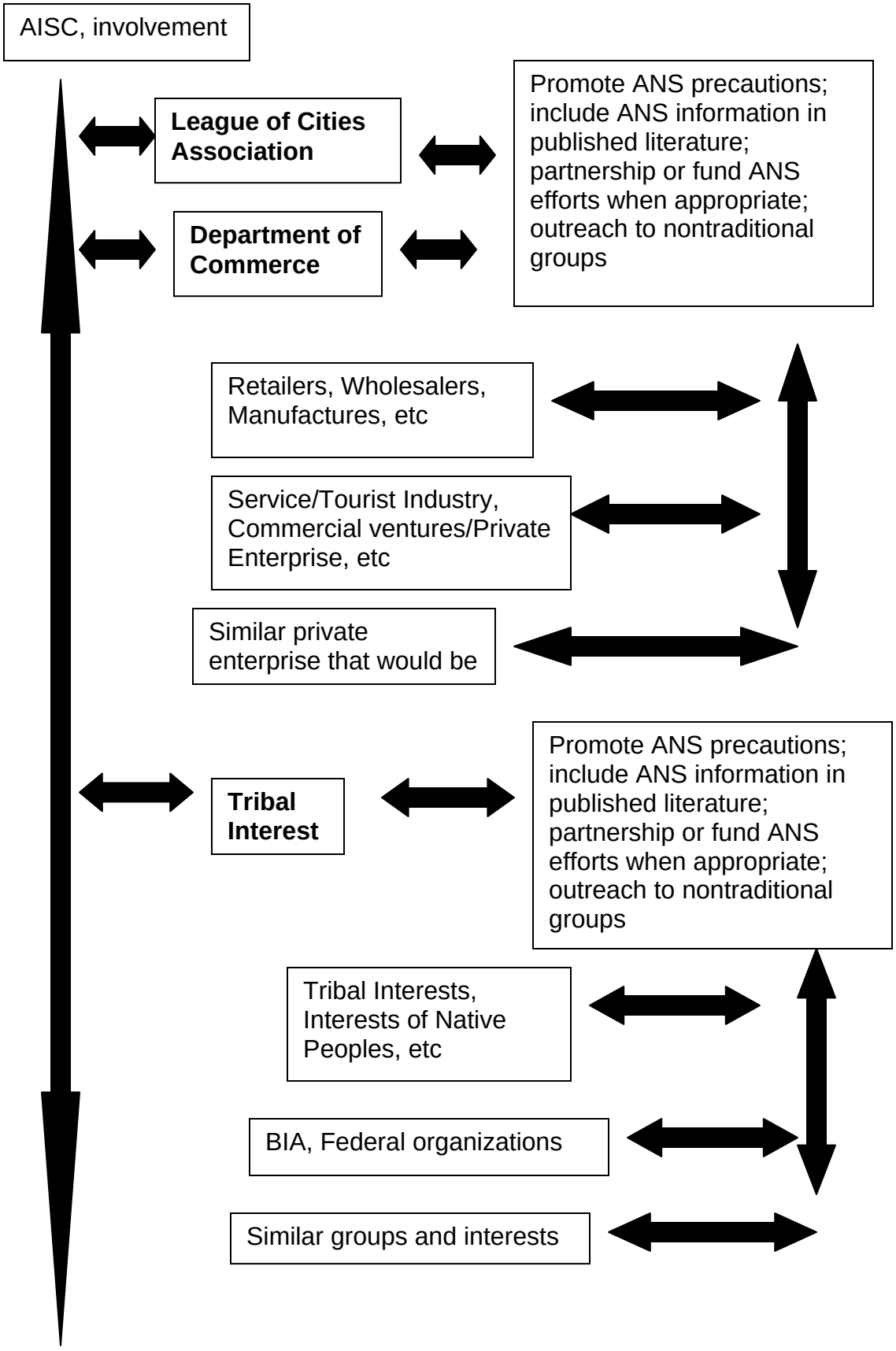

AISC, involvement
State Water Commission
Include ANS REPPs and precautions in issuing appropriate permits; promote ANS control efforts; inform contacts of ANS problems and need for precautions; partnership and fund ANS efforts when appropriate; inspect for ANS when and where appropriate
Water Resource Boards, Special Assessment Projects, etc
Irrigation Districts or Water Projects
Power Production or Manufacturing Facilities
Other or Similar Projects

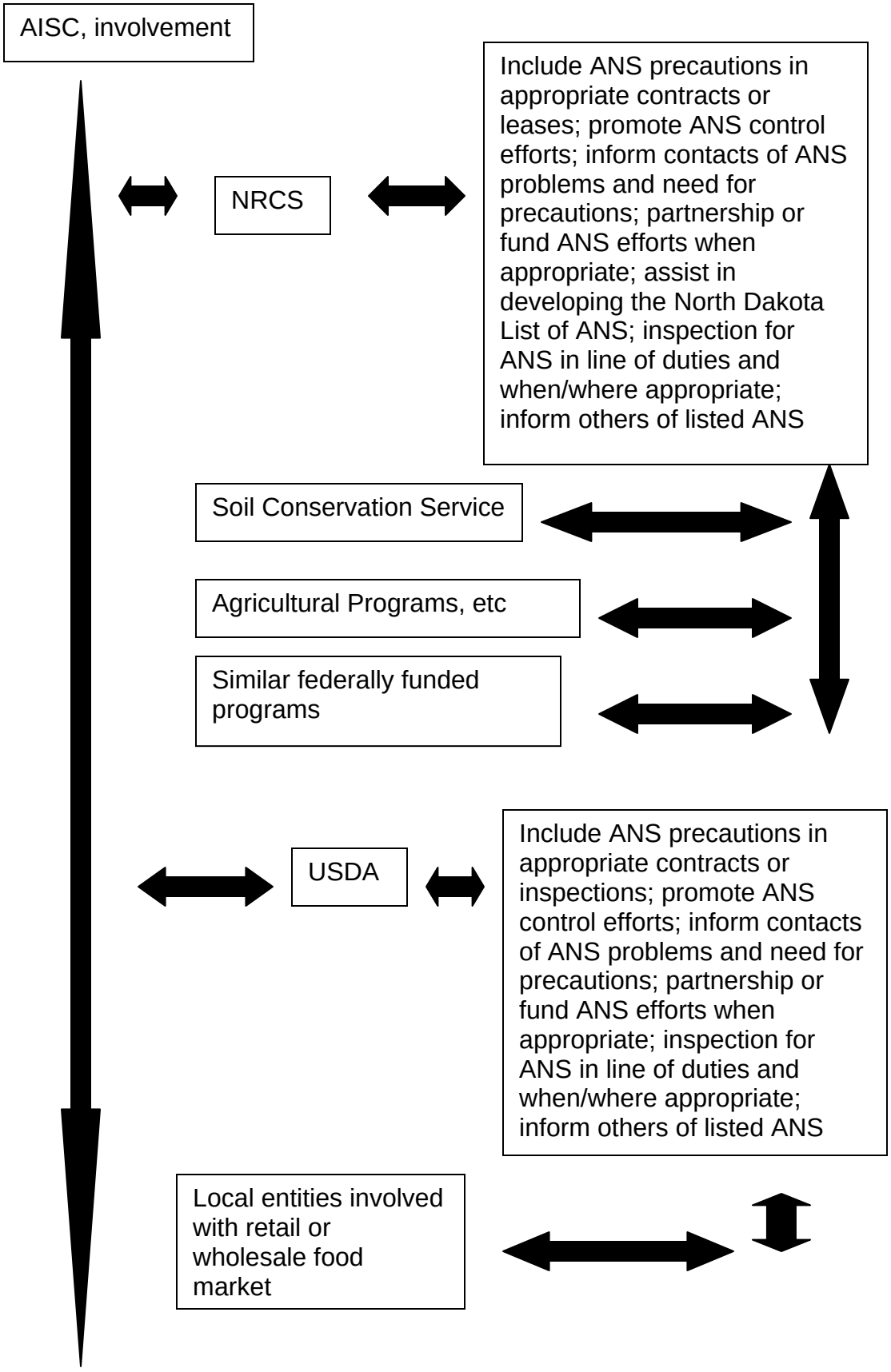

AISC, involvement
Dept of Tourism
Promote ANS precautions; include ANS information on ANS prevention in promotional literature; partnership or fund ANS efforts when appropriate
Local Chamber of Commerce's; affiliations with national networks
Groups promoting North Dakota development or use of the State's natural resources
Mass media, Promotional Literature, Similar efforts
Other or Similar Projects
Fishing and Conservation Fraternity
Wildlife and Conservation Fraternity
Encourage others and promote ANS precautions; request ANS information be placed on outdoor websites; support AISC efforts; liaison to state network of fishing clubs, conservation clubs, public input and the AISC; partnership or fund ANS efforts when appropriate
Fishing Clubs, Wildlife Clubs, Sportsman's Clubs Conservation Groups, and Similar Organizations
Other or Similar Project

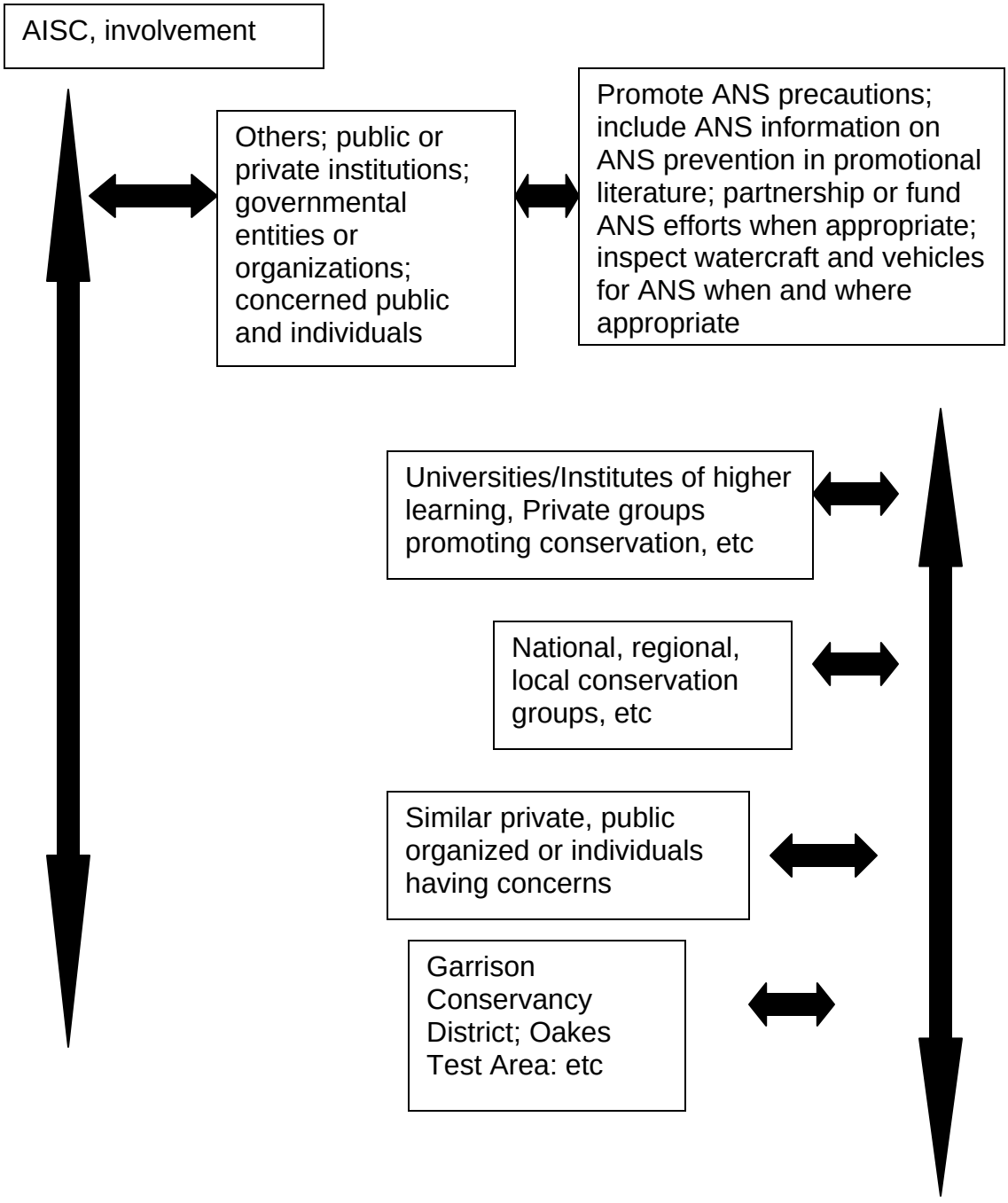

AISC, involvement
Dept of Agriculture
Include ANS precautions in appropriate permits; promote ANS control efforts; inform contacts of ANS problems and need for precautions; partnership or fund ANS efforts when appropriate; assist in developing the North Dakota List of ANS; inspection for ANS in line of duties and when/where appropriate; inform others of listed ANS; enforce appropriate laws and regulations
Local Weed Boards
Plant Nurseries, Garden Center, Florists, Landscapers, Developers, etc
County Weed Managers
Garden Clubs, Park Boards, Other or Similar Groups
County Extension Agency, Commissioners, and similar groups
Other or Similar Ventures


AISC, involvement
Guides and Outfitters
Promote ANS precautions; include ANS information on ANS prevention in promotional literature; partnership or fund ANS efforts when appropriate
Clients
Resort Owners, Motel Owners, etc
Mass Media, Promotional Literature, and Similar Effort
Similar efforts dealing with the Public, Clients, or similar groups
Water Users Association
Promote ANS precautions; include ANS information on ANS prevention in promotional literature; inform others of ANS list; partnership or fund ANS efforts when appropriate
Water Boards, Resource Districts, Lake/Cottage Associations, Park Boards, etc
Similar efforts dealing with the Public, Private, or organized groups


AISC, involvement
Game and Fish Department
Include ANS precautions in appropriate permits; promote ANS control efforts; inform contacts of ANS problems and need for precautions; partnership or fund ANS efforts when appropriate; assist in developing the North Dakota List of ANS; inspection for ANS in line of duties; inform others of listed ANS; enforce appropriate laws and regulations
Bait Wholesalers and Retailers
Aquaculture, Fish Production Facilities, and Pet Trade
Mass Media, Promotional Literature, Educational Campaign, etc
Monitoring of waterbodies and users, maintaining a base for information, maintaining literature base, etc
Develop ND's ANS list in consultation with others
Monitoring Fishing Tournaments, Water based recreational events, etc
Signing waterbodies, promotional efforts that educate traditional and nontraditional water users, etc
Governor's office, Legislature, County Commissioners, Local governmental entities, FWS, Federal governmental entities, USACOE, FWS/Eco, etc.
Similar efforts with Public, Private, or organized groups


AISC, involvement
League of Cities Association
Department of Commerce
Promote ANS precautions; include ANS information in published literature; partnership or fund ANS efforts when appropriate; outreach to nontraditional groups
Retailers, Wholesalers, Manufactures, etc
Service/Tourist Industry, Commercial ventures/Private Enterprise, etc
Similar private enterprise that would be
Tribal Interest
Promote ANS precautions; include ANS information in published literature; partnership or fund ANS efforts when appropriate; outreach to nontraditional groups
Tribal Interests, Interests of Native Peoples, etc
BIA, Federal organizations
Similar groups and interests


AISC, involvement
NRCS
Include ANS precautions in appropriate contracts or leases; promote ANS control efforts; inform contacts of ANS problems and need for precautions; partnership or fund ANS efforts when appropriate; assist in developing the North Dakota List of ANS; inspection for ANS in line of duties and when/where appropriate; inform others of listed ANS
Soil Conservation Service
Agricultural Programs, etc
Similar federally funded programs
USDA
Include ANS precautions in appropriate contracts or inspections; promote ANS control efforts; inform contacts of ANS problems and need for precautions; partnership or fund ANS efforts when appropriate; inspection for ANS in line of duties and when/where appropriate; inform others of listed ANS
Local entities involved with retail or wholesale food market



Activities are to promote and benefit the citizens of North Dakota and to provide protection to the State's aquatic resources from the introduction and establishment of injurious species.

Appendix J: **Invasive Aquatic Species Committee Meeting Dates and Summary of that meeting, and How the North Dakota statewide aquatic nuisance species plan was developed.**

Invasive Aquatic Species Committee meeting dates, a summary of that meeting, and of the development of the North Dakota statewide ANS plan.

Date	Activity/Summary
FEB 04	Discussion with in North Dakota Game and Fish Department about problems associated with ANS
20 MAY 04	Initial meeting; various representatives from federal, state, and local shareholders in ANS prevention
02 JUN 04	Letter for Department to selected representatives to join the ANS efforts
10 JUN 04	Initial meeting of Invasive Aquatic Species Committee
22 JUN 04	Meeting to review draft of ND-Plan
06 JUL 04	Meeting to review draft of ND-Plan
20 JUL 04	Meeting to review draft of ND-Plan
17 AUG 04	Meeting to review draft of ND-Plan
21 SEP 04	Meeting to review draft of ND-Plan
25 SEP 04	ND-Plan for internal review within ND Game and Fish Department
26 SEP 04	ND-Plan provided to consultant for review and comment
12 OCT 04	Contacted Consultant about comments that were provided
21 OCT 04	Provided AISC with draft of ND-Plan with consultants comments
03 NOV 04	Final meeting of AISC to review draft plan
05 NOV 04	Final draft of ND-Plan prepared
15 NOV 04	Draft of the ND-Plan provide to the public and other agencies or entities, comments due by 24 DEC 04
24 DEC 04	Final day for comments to be received
06 JAN 05	Review and incorporated comments received into final version of the ND-Plan
14 JAN 05	ND-Plan provided to Director of the North Dakota Game and Fish Department for review and comment
19 JAN 05	ND-Plan provided to North Dakota Governor's Hoeven for review and comment

PROCESS and PLANNING
involved in preparing the
North Dakota statewide aquatic nuisance species plan.

The initial meeting of interested state and federal agencies, public organizations, and interested parties was held on 20 MAY 04 at the Department of Game and Fish headquarters in Bismarck, North Dakota. Following a brief presentation on ANS impacts to North Dakota aquatic resources, an invitation was made to participants to become part of the Aquatic Invasive Species Committee (ASIC) and work to develop the ND-Plan. A letter from the Department was sent out on 02 JUN 04 asking agencies and private groups to participate in the AISC and to name a representative for future contact. On 10 JUN 04, the AISC was formed. With the AISC formed, the Aquatic Invasive Species Coordinator provided this group a working copy of a statewide ANS plan. The AISC reviewed this draft, made suggestions which the Coordinator considered and incorporated where needed. This review was considered to be the first draft of the ND-Plan. A number of AISC meetings were required to prepare a final draft

ND-Plan which was suitable for public review. News releases were provided to all the newspapers in North Dakota via the Department's Conservation and Communication Division.

The final draft of the ND-Plan was provided to the public and interested agencies via the North Dakota Game Fish Department webpage, public meetings, and to all who requested a hard copy or CD. A forty-four day comment period was provided for and comments could be provided to the Bismarck office or to the Devils Lake office.

The draft of the ND-Plan was provided to technical advisors who provided species-specific information and technical review of the document (see Appendix I for a list of those who reviewed the final draft).

Public meetings were held at Grand Forks, Fargo, Riverdale, and Bismarck to provide opportunities for private and agencies or entities to comment on the ND-Plan.

After the public, technical, and other state agency review, a final draft plan was provided to North Dakota's Governor for review and approval. With the signature of the Governor, the ND-Plan was provided to the federal ANS TASK Force for their review and approval.

The development of the ND-Plan was the result of the dedication and coordinated efforts from all of these individuals on the AISC and those that reviewed the draft document.

Appendix K: **Public Comments (reference the North Dakota's statewide aquatic nuisance species management plan.**

Comments on the North Dakota aquatic nuisance species statewide management plan.

Public Comments

Only a few individuals attended the public meetings: Grand Forks – 3 people; Fargo – 3 people; Riverdale – 3 people; and Bismarck – 2 people. There were no negative comments from these individuals and these comments were all verbal. The individuals were encouraged to provided written comments, but they choose not to do such.

Comments from Agencies or Entities

No written comments were received from agencies or entities in opposition to the North Dakota's state management plan for prevention and control of aquatic nuisance species. These groups or representatives from those groups did offer verbal support of the Department's effort to organize the state's efforts to prevent aquatic nuisance species introduction into or within North Dakota.

Appendix L: **Technical Advisors and Individuals that Reviewed North Dakota Aquatic Species Management Plan**

Technical Advisors and Individuals that Reviewed North Dakota Aquatic Species Management Plan

ANS Coordinators

Doug Jensen
Minnesota Sea Grant

Jeff Shearer
South Dakota Game Fish and Parks

Steve Schainhost
Nebraska Game and Parks Department

Eileen Ryce
Montana Game, Fish, and Parks

Kim Bogenschutz
Iowa Department of Natural Resources

Tom Flatt
Illinois Department of Natural Resources Section

Federal

Steve Krentz
Fisheries Assistance Operation
Fish and Wildlife Service

Universities

Steven Kelsch
University of North Dakota
Chair of Biology Department

North Dakota Game and Fish Department

Ron Wilson
Editor of North Dakota Outdoors

Terry Steinwand
Chief of Fisheries

Consultant

Michael E. Fraidenburg
Dynamic Solutions Group, LLC

Appendix M: **Comments from the Technical Advisors that Reviewed the North Dakota ANS Management Plan**

Comments on the North Dakota aquatic nuisance species statewide management plan provided by other states' aquatic nuisance species coordinator or technical representatives

Excerpts from ANS Coordinators' Comments

From
Tom Flatt, Aquatic Habitat Coordinator (AIS and Contaminants)
Div. of Fish and Wildlife, Fisheries Section
402 W. Washington St., Room W273
Indianapolis, IN 46204-2781
Phone: 317-232-4093 FAX: 317-232-8150

Lynn …. I went through it (the ND-Plan) enough to see how it was developed. I see what you mean by the plan being action orientated with development of a comprehensive public input plan coming later. And I can't disagree with your approach. Most of the action items necessary for control and prevention of ANS are universal and do not have to be reinvented in each management plan. I think the main purpose of the public input process is to get stakeholders and partners to have ownership in the plan, but that can happen later as your plan proposes. I think your approach will be as, if not more effective, as the traditionally developed plans.

From
Kim Bogenschutz
Aquatic Nuisance Species Program Coordinator Iowa Department of Natural Resources
1436 255th Street
Boone, Iowa 50036
515-432-2823 (phone)
515-432-2835 (fax)
Kim.Bogenschutz@dnr.state.ia.us

Lyn-

I have a few comments on your ANS plan based on my own experience implementing our plan. I was not involved in writing our plan but can tell you how things have gone over the past four years since we began implementation. Most of my comments are minor, so that must mean you did a great job developing your plan. I loved that you really made it North Dakota's plan, not a Game and Fish plan. I am sure that helps with agency and public buy-in.

From
Eilleen Ryce [ERyce@state.mt.us]

Montana Aquatic Nuisance Species Coordinator
Montana Fish, Wildlife, and Parks
1420 East 6th Avenue
Helena, MT 59620-0701

Hi Lynn,
Your plan looks great. I will get a formal letter sent to you today stating how Montana supports your plan …..

A couple of comments that I have:
1) on pg 2 under the "Outdoor Recreation" section. Whirling disease is a parasite NOT a viral pathogen.
2) in Appendix J, I work for Montana Fish, Wildlife and Parks
3) the only thing I thought a little strange about the way the plan was arranged was that in the plan there was no listing of the priority ANS in North Dakota. I noticed that this information is all in Appendix L in the Risk Assessment. To me it makes sense to have a section in the plan on exactly which species are of highest concern and why they are of concern.

For what they are worth, those are my comments.

Great job, Eileen.

From
Hazel Sletten
Supt. Water Utility
P.O. Box 5200
Grand Forks, ND 58206-5200
(701) 746-2595
Hsletten@grandforksgov.com

Lynn
I apologize for the delay in getting back to you with comments on the INS Report and presentation. I enjoyed the presentation. As a representative of a water utility using surface water I appreciate the opportunity to review the document and the acknowledgement of potential impacts to water utilities from invasive species. I have no comments on the document, it appears to be well thought out and addresses the concerns of the water utility.

Thanks you for the opportunity to comment and review the document.

Hazel

Appendix N: **Outtakes from: RISK ASSESSMENT FOR THE INTRODUCTION AND ESTABLISHMENT OF AQUATIC NUISANCE SPECIES IN NORTH DAKOTA**

Outtakes from:

RISK ASSESSMENT FOR THE INTRODUCTION AND ESTABLISHMENT OF AQUATIC NUISANCE SPECIES IN NORTH DAKOTA

Prepared by
Larry Brooks, Minot State University – Bottineau, 105 Simrall Boulevard,
Bottineau, ND 58318

and

Lynn R Schlueter, Special Project Biologist, North Dakota Game and Fish Department

Submitted on January 2004

Status of Aquatic Nuisance Species in North Dakota - Priority for Action

All nonindigenous species impact native species and habitat in some manner, but not all of them pose a significant threat, and some provide an economic and recreational benefit in certain areas. While it is hard to elucidate the effects that species will have once they are introduced, there are species that have current or potential impacts on native species and habitats and economic and recreational activity in North Dakota are known to be negative and significant are of concern. These ANS are a priority for management actions. At the same time, the ability to manage each species varies greatly, and the resources available are limited. Management efforts must, therefore, be focused on species where actions can produce the greatest benefit. In recognition of the known threats, impacts, and potential problems of certain ANS and the state's current management capabilities, a system to classify species was developed that recommends management activities for each classification. Yet, because impacts either do not occur immediately or may not be apparent until well after establishment, effort must also be devoted to assessing the overall impacts of nonindigenous species, regardless of their classification. The following are examples of species to be addressed by the ND-Plan. This list is not comprehensive, but is provided to illustrate species in each management class. The Plan provides for an on-going assessment of potential priority class species.

PRIORITY CLASS 1

Priority Class 1 species are currently not known to be present in North Dakota, but have a high potential to invade and there are limited or no known management strategies for these species. Appropriate management for this class includes prevention of introductions and eradication of pioneering populations. Examples of species that need to be addressed under this management class are discussed below.

Eurasian Watermilfoil (*Myriopyllum spicatum*)

Eurasian watermilfoil (EWM) was accidentally introduced to North America from Europe. Spread westward into inland lakes primarily by boats and water birds, it reached the Midwestern states between the 1950s and 1980s. A key factor in the plant's success is its ability to reproduce through stem fragmentation and runners. A single segment of stem and leaves can take root and form a new colony. Fragments clinging to boats and trailers can spread the plant from lake to lake. Once the plant is established it is almost impossible to eradicrate it. Populations of this plant exist in Minnesota and Wisconsin which is the home to many of the non-resident outdoor recreators which come to North Dakota.

While EWM was sampled in the Sheyenne River above Valley City, North Dakota, in the early 1990's, it has not been found in subsequent sampling. The Sheyenne River above Valley City was dewatered in the late fall in the mid 1990's to repair the city's water intake. The temperature dropped to zero or below for a few days and the mudflat on which the ANS was growing froze solid. Eurasian watermillfoil has not been found after that event.

Zebra Mussel (***Dreissena polymorpha*)**

In the late-1980s, the zebra mussel was discovered in Lake St. Clair, between Lake Huron and Lake Erie. Zebra mussels were introduced from Eastern Europe via ballast water discharge from European freighters. This species spread rapidly to 20 states in the Mississippi River drainage. Nationwide expenditures to control zebra mussels in water intake pipes, water filtration equipment, and electric generating plants are estimated at $3.1 billion over 10 years (OTA, 1993).

Zebra mussels can easily survive overland transport from the Midwest to North Dakota while attached to boat hulls or in live wells, engine cooling systems, or bait buckets. Live zebra mussels have been found in Minnesota lakes which are less than 100 miles from North Dakota's border. Juvenile zebra mussels have been found in the Missouri River below Gavins Point Dam and Big Bend Dam in South Dakota. These two areas are within a short drive from North Dakota's primary fisheries, i.e., Devils Lake, Lake Sakakawea, and the Missouri River. The zebra mussel is a prolific fouling organism with great potential to disrupt municipal water intake structures and cause ecological and economic damage in upper Midwest. Zebra mussel die-off can occur and large numbers of individuals are left rotting on the shoreline which is a human health concern. In addition, the shells of the zebra mussel can be jagged and be dangerous to walk on with bare feet associated with wading or swimming on beaches.

Asian clam *(Corbicula fluminea)*

Corbicula are freshwater natives of southern and eastern Asia. The sources and pathway of initial introductions are not well documented. This ANS has been in found in the United State beginning in the late 1070's. *Corbicula* will cause the same problems as zebra mussel.

In 2003, *Corbicula* was discovered in the water intake for Yankton, South Dakota and is the closest known population. *Corbicula* have been documented in many of the Midwest states, but no populations are reported this close to North Dakota.

Asian Carp (*Four Species*)

The black carp (*Mylopharyngodon piceus*) has been approved for release for stocking commercial aquaculture ponds to control snails and will surely escape into the wild just as the other three species of Asian carp, the silver (*Hypophthalmichthys molitrix*), bighead (*H. nobilis*) and the grass carp (*Ctenopharyngodon idella*) have. The latter three species were released in the 70s, 80s and early 90s for aquaculture and pond applications and have now developed large wild populations in the Missouri River basin.

Large numbers of bighead carp have been reported "staking in large numbers" below Gavins Point Dam, near Yankton, South Dakota. Gavins Point Dam is the first barrier on the Missouri River. If Asian carp get past the dam, one way or another, they will proceed up the Missouri River and to impact recreation in North Dakota. These carp also have the ability to capitalize on inundated river habitats such as upper Lake Sakakawea and upper Lake Oahe in North Dakota. The bighead carp, a plankton feeder may compete for food with paddlefish and bigmouth buffalo, as well as with forage fishes. All three species compete for food with the larval stages of our native game fish.

Although the extent of their impact and distribution in the Missouri River is largely unknown it would be prudent to keep them out of North Dakota waters.

Round Goby (***Neogobius melanostomus*)**
This fish is a bottom-dwelling fish, native to eastern Europe that entered the eastern Great Lakes in ballast water. They can spawn several times per year, grow to about 10 inches, are aggressive, and compete with native bottom-dwellers including bullheads. The round goby, was introduced, via ballast water, into the St. Clair River and vicinity on the Michigan-Ontario border where several collections were made in 1990. The numbers of native fish species have declined in areas where this goby has become abundant. The round goby has been found to prey on darters, other small fish, and lake trout eggs and fry in laboratory experiments (Marsden, J. E., and D. J. Jude, 1995). The round goby's potential range includes North Dakota and would do well in most of North Dakota's waterbodies.

Ruffe (***Gymnocephalus cernuus*)**
The ruffe (*Gymnocephalus cernuus*) is a small perch-like Eurasian fish. It was apparently introduced to the Great Lakes in the St. Louis River near Duluth, Minnesota from a ballast water discharge. In Europe the ruffe feeds on whitefish eggs and competes with other more desirable fish. The spiny dorsal fins of the ruffe discourage predation by other fish. In Lake Superior, the species of fish that is most affected by the ruffe is the yellow perch. Populations of perch have declined up to 75% in water bodies where the ruffe have become established. If established in North Dakota, there could be serious affects to our lake and reservoir fisheries.

Spiny Water Flea (*Bythotrephes cederstroemi*)
The spiny water flea is not actually an insect, but a tiny (less than half an inch long) crustacean with a long, sharp, barbed tail spine. This creature is native to Great Britain and northern Europe east to the Caspian Sea. The animal was first found in Lake Huron in 1984, probably imported in ballast water of a transoceanic freighter. Since then populations have exploded and the animal can be found throughout the Great Lakes and some inland lakes.

The effects spiny water fleas will have on the ecosystems of the Great Lakes region are unclear. The animals compete directly with young fish for food, such as Daphnia zooplankton. Spiny water flea also reproduces rapidly. During warmer summer conditions, each female can produce up to 10 offspring every two weeks. As temperatures drop in the fall, eggs are produced that can lie dormant all winter.

It is not known if this exotic will have larger impacts on inland lakes. Spiny water fleas eggs and adults spread unseen in bilge water, bait buckets, and livewells. In addition, fishing lines and downriggers will often be coated with both eggs and adults.

Heterosporosis (**Parasite that infects a variety of fish species)**

Heterosporosis is a microscopic parasite, which has the potential to infect several fish species resulting in muscle lesions and can cause serious harm to fish. The parasite was first reported in yellow perch, but may also be found in walleye, northern pike, fathead minnows or other fish species. This parasite has been reported in fish in Minnesota and Wisconsin. It has never been reported in North Dakota, but has the potential to become established in North Dakota fish if infected fish are imported into North Dakota. The parasite causes milky white lesions with a granular texture in fish fillets. Severity of the infection will vary between infected fish populations, but in heavily infected fish as much as 80% of the fillet may be affected.

Infectious Hematopoietic Necrosis (IHN) Virus

IHN virus is an example of a pathogen, which is not currently known to occur in North Dakota, but which has the potential to cause serious mortality if it is introduced. It is a pathogen known to occur in fish in states west of North Dakota. We must constantly be on guard to ensure it is not imported into North Dakota with fish imported from other states. For this reason, IHN virus and other viral pathogens are listed as "pathogens of concern" on North Dakota import and disease laws. Fish may not be imported into North Dakota unless they are certified to be disease free at the request of the Chief of Fisheries.

PRIORITY CLASS 2

Priority Class 2 species are present and established in North Dakota and have the potential to spread in North Dakota and there are limited or no known management strategies for control of these species. These species can be managed through actions that involve mitigation of impact, control of population size, and prevention of dispersal to other waterbodies. Examples of species addressed under this management class are discussed below.

Saltcedar (*Tamaricaceae spp.)*

While this plant is not an aquatic, it has an impact on waterbodies due to its large water volume use during the summer. This invasive small tree or large shrub remains a popular ornamental despite its classification as a "successful" weed. Thousands of tiny pink to white flowers are produced throughout the spring and summer. One mature plant can produce ½ million seeds each year. As well as reproducing by the wind and water borne seed, saltcedar can reproduce vegetatively. Large saltcedar plants can use up to 200 gallons of water a day; reducing and even eliminating water flow. It out-competes native plant communities, degrades wildlife habitat and has resulted in the decline of many species. Tamarisk reduces recreational and agricultural use, and increases wildfire frequency. In North Dakota, counties east of the divide are experiencing a tremendous impact from the rapid spread of the competitive saltcedar. Western North Dakota has an abundance of these ornamentals that pose a threat. A very active group of weed fighters are working together to develop a North Dakota Saltcedar management plan that targets a statewide survey, containment, and eradication program.

Curlyleaf Pondweed (*Potamogeton crispus*).
Curlyleaf pondweed is a perennial, rooted, submerged aquatic vascular plant native to Eurasia, Africa, and Australia. By 1950 most of the U. S. was infested by this species. By late spring it may form dense mats which interfere with recreation and limit the growth of native aquatic plants. By July, this plant senesces and forms vegetative propagules called turions. The turions are dispersed by water movement throughout a water body. Turions may also be transferred to uninfested lakes by the usual means. In some areas it may not be considered a problem but in shallow lakes it can grow dense enough to affect recreational boating and fishing. It can alter the nutrient dynamics of a fertile lake causing heavy summer algae blooms.

PRIORITY CLASS 3

Priority Class 3 species are not known to be established in North Dakota and have a high potential for invasion and appropriate management techniques are available, but effectiveness is of concern. Appropriate management for this class includes prevention of introductions and eradication of pioneering populations. Examples of species that need to be addressed under this management class are discussed below.

Whirling Disease (***Myxobolus cerebralis*)**
Whirling disease is caused by a metazoan parasite that infects cartilage tissue of many Salmonid species. The whirling disease parasite was first introduced to the United States from Europe in the 1950s, probably through trout infected in Europe. This parasite has a two-host life cycle which includes both the primary Salmonid host and a common aquatic worm (*Tubifex tubifex*). Infective spores are produced in each host and are capable of spreading the disease in a variety of ways. The disease is now known to occur in over 20 states. Whirling disease has become a major problem in some western states, and has caused major declines in some wild rainbow trout populations and is especially severe in Colorado and Wyoming. Currently whirling disease has not been found in North Dakota waters.

Asian tapeworm (*Bothriocephalus acheilognathi*)
The Asian tapeworm is not known to be present in North Dakota at this time. As with any fish pathogen or parasite, if the Asian tapeworm is introduced and does become established in North Dakota, it will be extremely difficult or impossible to eradicate. For this reason, it is essential that this parasite not be introduced into North Dakota waters. The Asian tapeworm may infect many species of game, forage and bait fish. It has the potential to do serious harm to fish if introduced into North Dakota waters. This parasite was introduced into the United States through shipments of infected grass carp from China. It has spread into several states with infected fish. The tapeworm can result in mortality, but most often is responsible for reduced growth and poor condition of infected fish.

New Zealand Brown Mud Snail (***Potamopyrgus antipodarum*)**

Native to New Zealand but long established in Australia and Europe, this species was discovered in North America in 1987 in the Snake River in south-central Idaho. Population levels can exceed 100,000 snails per square meter (NCSE, 1999). New Zealand mud snails (NZMS) have become established in every major river drainage in Yellowstone National Park, in the Madison River Drainage in Montana, at several other locations in the western U.S., and in Lake Ontario, New York. Modes of transportation may include hitchhiking on recreational equipment and other equipment used in water, in the guts of harvested or illegally transported fish, or via transport on waterfowl and other aquatic birds. Effects on native aquatic invertebrates are being documented in the Madison River and in Darlington Ditch, a small stream along the lower Madison River. NZMS degrade habitat due to their high reproductive capacity and the subsequent impacts on invertebrate food sources. Fish receive little, if any, nutritive value from eating the snail. The snail has an operculum that it closes when threatened, which prevents digestive juices from reaching the soft tissue of the snail's body when ingested by fish.

PRIORITY CLASS 4

Priority Class 4 species are present and have the potential to spread in North Dakota but there are management strategies available for these species. These species can be managed through actions that involve mitigation of impact, control of population size, and prevention of dispersal to other waterbodies. Examples of species addressed under this management class are listed below.

Common carp (*Ciprio carpio*)

The carp was introduced into Europe from the Caspian Sea region during the era of the Roman Empire and raised as a food fish. Carp were introduced into the United States in the late 1800's to meet the desires of European immigrants for a food fish. The United States government propagated and stocked carp in many states during this time period. This fish species proved to be adaptable and thrived in its new environment which allowed it to quickly expand its range. By the early 1900's carp were found in all of the states and in a variety of waterbodies.

Carp are omnivorous, feeding on both plant materials and animal food items. They root for food in the mud for plant materials and roots, insects, worms, crayfish, small clams and other small animals. Their feeding activities dislodge plants, break plants into fragments, they stirs up the bottom and its sediments, and will leave the water very turbid. Carp activity makes a lake an unsuitable environment for angler desirable fish. Waterfowl use decreases in waterbodies with a high carp population as there is no aquatic plants in those water bodies.

Carp can be moved from water body to water body by anglers who are using "dirty", i.e., undesirable fish used as bait, live bait and releasing those small fish being used for bait into the water body where the anglers are fishing at. Carp are not a legal baitfish in North Dakota waters. Anglers cannot import this fish species into North Dakota to use as a baitfish. Control methods for carp include eradicating that ANS infestation at a

tremendous cost to the Department. In addition, when a lake is eradicated, the recreational fishery is eliminated for approximately three to five years as stocked fish grow to an angler acceptable size. In many cases, carp are soon found in that waterbody after the eradication due an incomplete fish kill or the reintroduction of that species.

Purple Loosestrife (*Lythrum salicaria*)

Purple loosestrife is a wetland invader that was imported from Europe in the early 1800s for its medicinal value and for the beautiful purple spikes of the blooming plant. Unsupecting visitors to an infested wetland often admire the beauty of the marsh when purple loosestrife is in bloom, unaware that it has displaced native plants and animals. Its vegetative dominance may increase the likelihood of listing additional native species under the ESA. Purple loosestrife is still sold as an ornamental in nurseries in some states, though 24 states, including North Dakota, have listed it as a noxious weed and prohibit its sale. It is found in 42 of the contiguous states, and could invade the remaining six. The plant is extremely difficult to eradicate although recently a suite of biological control agents, i.e., beetles and weevils, have proven effective in suppressing the plant. Estimated losses are $45 million per year in control costs and forage loss (ATTRA, 1997). The North Dakota Purple Loosestrife Task Force has developed a statewide management plan for this species and active eradication programs are currently underway in Lake and Cascade counties in North Dakota.

Yellow Flag Iris (*Iris pseudacorus)*

Yellow iris is a rhizomatous emersed wetland forb. It has very showy yellow iris flowers, and is a tall plant with long, flat, dark green, sword-like leaves. This invasive plant propagates by both seed and underground rhizomes. The drought tolerant rhizomes break off, and spread downstream, as does the seed. Poisonous if ingested, and irritating to the skin, yellow iris is fast growing, fast spreading, and very competitive. It forms almost impenetrable thickets. It was brought into the United States in the early 1900's as an ornamental and has been used for erosion control, as a dye and fiber plant, and in sewage treatment cells. In North Dakota, there are not known populations of yellow flag iris.

Flowering Rush (*Butomus umbellatus*)

Flowering rush was introduced through the North American shipping trade at the turn of the century in ballast as long-lived seed and possibly reproductive bulblets into the ecosystems of Quebec and Michigan. Use as an ornamental provided this invasive plant another route to the Midwest and expedited it's spread westward to the Idaho panhandle which would include North Dakota. Where flowering rush is found it is reported to be out-competing the native willows and cattails. An emergent in shallow areas of lakes, flowering rush has umbellate pink flowers and grows to 3 (three) feet tall on triangular stems. It has a submersed form also, which can grow in water 10 (ten) feet deep.

Nonindigenous fish, invertebrates, and amphibians

These species have been introduced, intentionally and unintentionally, into North Dakota and are well established in some areas. Fish and invertebrates have been implicated in the decline of native fish and amphibians. Impacts of introduced fishes on native fish species include predation, introduction of diseases and parasites, competition for food and space, and hybridization. In some cases non-natives may be controlled for conservation and restoration of native species. Some species, *e.g*. walleye, largemouth bass, lake trout and rainbow trout, are the basis of popular fisheries that provide recreational benefit to many North Dakotans. In addition, recreational angling can provide substantial economic benefits to local economies. While these species have populations in many waters, these lakes did not have fish populations prior to the Department's management efforts. An environmental assessment is required the Department before a fish introduction can occur.

Bacterial fish pathogens

Bacterial fish pathogens, such as *Aeromonas salmonicida* (Furunculosis), are present in some North Dakota watersheds. *Aeromonas salmonicida* is the bacterial pathogen that causes a disease known as furunculosis in fish. This bacterium is known to occur in several North Dakota watersheds. In the wild it generally does not cause serious problems in fish. However, when fish become stressed, the pathogen can result in a disease problem with high potential mortality. Management actions that can reduce elevated water temperatures or other stress factors may have a significant impact on reducing impact of this pathogen on fish. Furunculosis in a hatchery can often be successfully treated with antibiotics. Because of the potential negative impact of this fish pathogen on North Dakota's wild and cultured fisheries, import and transport of fish infected with this pathogen should be closely regulated. North Dakota law prohibits the importation of live fish infected with this bacterial fish pathogen and other known bacterial pathogens.

Appendix O: **List of Non-indigenous Aquatic species in North Dakota**

LIST OF NONINDIGENOUS AQUATIC SPECIES IN NORTH DAKOTA AND THOSE CONSIDERED TO BE AQUATIC NUISANCE SPECIES (ANS)

The following list of nonindigenous fish species reported introduced into public waters in North Dakota is North Dakota Game and Fish Department Fisheries Division's fish stocking records, information published in *Fishes of Dakota* by the Dakota Chapter of American Fisheries Society, and USGS Nonindigenous List, i.e., website - nas.er.usgs.gov/. Other animals or plants listed here are from the nonindigenous list prepared by the USGS and listed on their website, i.e., "nas.er.usgs.gov/". In addition, the list also notes those plants or animals which are considered to be an invasive and injurious species (an ANS species) to North Dakota waterbodies are noted.

Fish

Common name	Species name	ANS
Sacromental perch	*Archoplites interruptus*	
goldfish	*Carassius auratus*	YES
Cisco	*Coregonus artedii*	
lake whitefish	*Coregonus clupeaformis*	YES
common carp	*Cyprinus carpio*	YES
grass carp	*Ctenopharyngoden idella*	
muskellunge	*Esox masquinongy*	
smallmouth bass	*Micropterus dolomieu*	
largemouth bass	*Micropterus salmoides*	
white bass	*Morone chrysops*	
stripped bass	*Morone saxatilis*	
spottail shiner	*Notropis hudsonius*	
cutthroat	*Oncorhynchus clarki*	
coho salmon	*Oncorhynchus kisutch*	
rainbow trout	*Oncorhynchus mykiss*	
Kokanee	*Oncorhynchus nerka*	
chinook salmon	*Oncorhynchus tshawytscha*	
rainbow smelt	*Osmerus mordax*	
Landlocked Atlantic salmon	*Salmo salar Sebago*	
brown trout	*Salmo trutta*	
brook trout	*Salvelinus fontinalis*	
lake trout	*Salvelinus namaycush*	
Saugeye	*Stizostedion canaense x Stizostedion vitreum*	
Zander	*Stizostedion lucioperca*	

Crustaceans

Common name	Species name	ANS
rusty crayfish	*Orconectes rusticus*	YES

Mollusks

NONE

Aquatic Plants

Common name	Species name	ANS
curlyleaf pondweed	*Potamogeton crispus*	YES
eurasian watermilfoil	Myriophyllum spicatum	YES
purple loosestrife	*Lythrum salicaria*	YES
flowering rush	*Butomus umbellatus*	
watercress	*Nasturtium officinale*	

Amphibians

NONE

Appendix P: **North Dakota Rapid Response Plan**

NORTH DAKOTA

RAPID RESPONSE PLAN

TO

AQUATIC NUISANCE SPECIES

PREPARED BY

AQUATIC INVASIVE SPECIES COMMITTEE

Table of Contents

PURPOSE

Rapid response is essential when an injurious organism is discovered in an area free of that infestation. Rapid response includes the successful control or elimination of the problem specie(s) in a timely and efficient manner. This document identifies factors that affect the probability of developing a successful response to a new problem, and it identifies common problems that may preclude success.

Containment and eradication activities require they be done promptly, will be effective, are focused on the actual problem, and the parties involved in the project are committed. In addition, efforts to control aquatic nuisance species (ANS) cannot effectively move forward in an environment of complex demands that are unfounded, based on uncertain requirements for constraints, and control actions being subject to second guessing with no apparent improvement in the outcome. The goal of the model system is to create a consensus driven decision process of those involved, but one where discussions about general strategies occur before the arrival of a new invader and without influences of turf-wars. The group makes the decision as to the general course of action when a nuisance species arrives and proceeds forward with the control efforts. This decision provides the on-the-ground manager clear goals to obtain within reasonable restrictions. Because each situation tends to include unique conditions related to the species and the environment, this plan is general in nature, and it does not attempt to address regional or national processes or the unique circumstance.

BACKGROUND AND RATIONALE

ANS are obligate aquatic species that are invasive and injurious organisms that create problems for ecosystems or for native or desirable species. They may cause direct problems to outdoor recreators as weeds that interfere with boating, fishing, hunting, and water related activities. ANS will cause problems to all North Dakotans, through the costs being passed on to individuals, such as cleaning of municipal water intakes of zebra mussels, removing Asian clams from power plants cooling towers, and reduced values of waterfront properties. ANS will cause a reduced need for the serves industry, i.e., less motel rooms rented, less tourist at convenience stores, less need for sporting goods and similar nonessential goods and services. The numbers of native or desirable fish or aquatic plants in a waterbody can be reduced by direct competition with ANS and habitat modification by ANS. ANS modify habitats which further reduces the carrying capacity for native or desirable species. Traditional management efforts cannot be used to overcome ANS infestations.

The species listed by the Federal government as invasive and injurious species grows each year as more non-native flora and fauna are found in the United States. The Federal list of aquatic nuisance species is provided in Appendix B.

Aquatic nuisance species can cause large and ongoing costs when they invade new locations, but those costs can be avoided if the species can be kept out of those new areas. This approach of avoiding problems is the general concept behind a variety of

programs. It was first applied to public health with the old quarantine laws, and then in agriculture where it was given the name “Pest Prevention.” Now the concept is being adopted to protect some natural resources as well.

LESSONS FROM SUCCESSFUL RESPONSE EFFORTS

There are three requirements for a successful containment and elimination of the problem species are: **A**ccess to the target organism; **P**ersistence of effort; and adequate **T**ools to control the populations. Any response will have a higher chance of success where these requirements are met. Conversely, in responses where these requirements are not adequately met, the chance of failure will be high. Many interdependent factors influence whether the requirements for a rapid response are met. Significant factors include: funding and other resources; legal authority; will to act or indecisive actions; regulatory hurdles; interagency and public cooperation; experienced oversight; biology of the pest; available control methods; and geographic scope of the project.

Rapid response efforts are not new and lessons can be learned about the elements that lead to success or failure, by considering efforts that have proceeded relatively smoothly or not so smoothly.

The initial approach used in these successful responses was very similar. Someone found an infestation because of heightened public awareness and the infestation was confirmed by an expert. Once the problem was confirmed, different agencies and local groups that might be affected or could assist in the response were contacted. Representatives of the interested parties met to consider the situation. Delimitation proceeded quickly while the control options were quickly reviewed with input from expert biologists and managers. At all of these points, the public was informed and educated to the problems that this ANS infestation could cause. The potential control methods were frankly and openly discussed and the likely outcome for action or what would result from inaction. While there was more than one group or entity working on this project, they all understood the gravity of the situation and how not participating would affect them. The efforts were well coordinated, sufficient manpower was made available, and the funds needed to complete the control efforts were provided in a timely manner.

The key to successful operations was that all affected participants worked together with a common goal to reach the needed and desired outcome. The group working on the solution was not side tracked in turf-wars and side bars of second guessing the outcome of the efforts. Examples of successful ANS controls are provided as an attachment to this Appendix.

LESSONS FROM UNSUCCESSFUL RESPONSE EFFORTS

An important lesson can be gained from rapid response efforts that did not succeed for reasons that could have been avoided, quickly rectified when they became obvious, or the process encumbered by entity or personal inability to interact with another entity or turf protection issues. The major reasons for unsuccessful responses was that that agencies were unwilling to deal with the problem, the agencies were indecisive in action and in funding, and the public and other were not made aware of the problem and its impact to them. Examples of unsuccessful ANS controls are provided as an attachment to this Appendix.

FACTORS LEARNED FROM SUCCESSFUL RESPONSE EFFORTS

An important part of learning is to understand what leads to the spread of ANS and what causes projects to fail. Rather than dwell on this point, it is best to state that knowing of a problem and the failure to take control measures in a reasonable time and without adequate control measures will allow for the establishment of ANS in new locations. There needs to be an overall understanding of the decline of the environment and recreational opportunities if ANS becomes established.

Factors to consider when deciding what control measure to use - is an eradication needed or is an unpopular control method justified:

A. Is there knowledge of the risk of reintroduction and is the risk to non target species low enough to justify eradication?

B. Taken overall, can controls be rapidly initiated?

1. Was the invasion detected early? Is the infestation small and only in a few locations?
2. Was the invader rapidly and accurately identified?
3. Is information on species biology and management quickly available?
4. Are treatment methods available?
5. Are there serious environmental issues or regulatory hurdles that will lead to delays or greatly increase the cost of treatment?
6. If permits are needed, can they be obtained in a timely fashion?
7. Has the species been prioritized for response and is there a pre-existing action plan?

C. Taken overall, is there a will to act?

1. Are there decision making procedures in place and entities/agencies with the power to determine whether eradication should proceed, how, and who should fund it?
2. Has there been a clear assessment of technical, field, administrative, funding, and legal resources available for an eradication campaign?
3. Is there acceptance of the need to proceed on the best information available?

4. Is there acceptance of short-term, local impacts in return for long-term, wide-area benefits?
5. Is there acceptance that the “no action” response has serious impacts and is a poor option?
6. Do a preponderance of the agencies (and their staff) feel they have a clear responsibility to act, or does one agency have a clear mandate and authority to act?
7. Is there recognition and acceptance that the eradication effort can be a long term effort, almost always taking years in the case of plants or other organisms with resistant resting stages?

D. Taken overall, is organization adequate and willing to work together?

1. Is there an ability to quarantine the infested area?
2. Is there a capacity to survey, in order to determine whether the pest is restricted to the quarantine area?
3. Will program staff with experience in pest management and eradication be assigned to direct the control efforts and monitor results?
4. Are funding sources adequate and of sufficient duration?
5. Is there effective collaboration among the parties carrying out the effort?
6. Is there regional collaboration where infestations cross jurisdictions?
7. Are there provisions for monitoring in order to modify, expand or end an eradication campaign?

E. Other factors

1. Is there support for the effort by affected parties, including the public?
2. Is there effective outreach and education for both the public and government decision makers?

Clearly, many of these factors are related but they all bear on ready access to the target, availability of adequate tools, and the ability to persist in the effort long enough to achieve eradication.

UNDERTAKING A RAPID RESPONSE

In the current sociopolitical environment in the U.S., the initiation and success of a rapid response can depend strongly on the extent of the infestation, ease of control, public response to the need to take action, and the governmental groups involved in the response working together to effectively respond to the problem. If the general requirements that are needed to initiate an eradication program are anticipated and preparations are made to meet those needs, the initiation of responses can avoid some of the confused and hesitant nature that sometimes characterize them at present.

A rapid response program is a variation of an integrated pest management program. The difference between rapid response and pest management is that the goal of rapid response is to reduce the population to zero (eradication) or no impact to the existing ecosystem or within manageable numbers of individuals. The goal in pest management is to maintain the population below an economic threshold (the point where potential damage outweighs the cost of control). Also, an eradication program is based upon an

intentional trade-off of short-term, localized impacts for long-term, wide-area benefits, so an eradication effort may require accepting higher levels of non-target damage than a pest management program. Eradication programs become less desirable as they require more widespread treatment and cause longer term damage.

The elements of a basic rapid response are relatively straightforward. It is the sociopolitical and environmental issues in a response that can and will complicate the situation. In a basic response to a known threat the usual steps are: rapid confirmation of the identity of a suspicious organism; survey (delimitation) to determine the extent of the infestation; quarantine of the infested area if possible; a very quick review of the available control options to choose the one best suited for the treatment conditions; application of the chosen control options, with at least a visual evaluation of the results on the target and non-target species; and modification of the control strategy as indicated by the results (sometimes called “adaptive management”).

For a less well-known pest, there would be additional steps. Once the pest was identified, a rapid literature survey of the biology and control of the organism might be needed, as well as quick tests of the potential control options to identify the most promising ones. The first applications of the chosen options might be made on a limited basis, with at least a visual evaluation of the results on the target and non-target species, to check that the treatment works as expected. The treatment might be modified as indicated by the results of the early applications or experiments and then general application would begin, with continued evaluation and modification as before. Some of these steps can be progressing at the same time.

In almost all situations involving aquatic nuisance species, the circumstances of the response will probably be complex and involve multiple entities and impacted participants. In a complex situation, the ELEMENTS OF A RESPONSE that need to be considered include:

1. Authority, leadership, and organization (that is, who has the legal ability to act, as well as who has the operational capability, and who is willing to undertake the control measures);
2. Coordination and cooperation among the different parties;
3. Funding and resources (included is manpower and time);
4. Quarantine establishment and enforcement of precautions to the problem’s spread;
5. Environmental regulatory compliance - obtaining permits, developing documentation(s);
6. Public awareness and education - outreach to affected property owners and parties;
7. Delimitation survey (possibly also widespread detection survey) and mapping, evaluation of the risk of spreading;
8. Review of knowledge on biology and controls, convening a science/management/environment advisory panel, research and technology transfer, and identification of potential treatment methods;

9. Informing the public and impacted participants of the problems, its affect on the regional ecosystem, and the needed control measures, and provide a realistic timeline for completion of each phase of the project;
10. Implementation of eradication methods, including persistent surveys and treatment to ensure eradication;
11. Treatment assessment and adaptation. Accountability for progress towards eradication must be recorded for review;
12. Environmental monitoring; and
13. Restoration/mitigation as needed or as legally permissible.

As was shown by successful control of ANS, the response generally begins when a biologist or field staff recognizes something out-of-place, has a specimen identified, and provides that information to appropriate entities. If the potential problem is identified, there must be an effort to determine if it can be controlled and who is responsible for that effort. In a complex situation, a number of agencies and interested parties come together and try to organize a response.

While it sounds simple and prudent to control the initial infestation, it is often a challenge to find an agency with clear authority, or, even better, a mandate and resources to respond to the introduction or an interest in controlling the problem. As a result, the unorganized group tries to identify a lead agency and resources in a non-binding fashion. Either intentionally or not, they will also address some of the response elements listed above, often embodying the results in a consensus-based action plan while each believes that it is the other parties problem(s) and no one is willing to take the lead.

THE MODEL SYSTEM AND RAPID RESPONSE PLANS

The initial rapid response plans for aquatic problems were adapted from agricultural plans. In both terrestrial and aquatic responses to exotic species, the problem(s) begin with detection capabilities, which are extremely important to success in a rapid response. In rapid response itself, the problems center on the lack of clear authority, funding, resolution of environmental issues, and planning to control the problem. These are problems that have been recognized at the national level and they have been identified as issues in the “National Invasive Species Management Plan” released by the National Invasive Species Council in November, 2000. The Council is a Cabinet-level group created by President Clinton’s Executive Order of February 3, 1999.

The model system attempts to address the weaknesses that have been identified in current rapid response efforts. It uses a two-level approach, both organized within the state government. The first level works on a statewide basis to address authority, policy, funding, and priorities. The second level addresses the details of implementing specific projects, particularly the need for experienced supervision. Either embodied in this structure or through a separate fund, adequate resources for responses also need to be available on short notice, because new introductions are unpredictable. The goal of this approach is to create a system, where, for a given introduction, the question of

whether to eradicate is decided at the outset or even prior to introduction, and, if the decision is to eradicate, then all aspects of the eradication are provided for. The system should address the response elements listed above, which currently are typically addressed in an ad hoc action plan developed by a volunteer group as the response unfolds.

North Dakota's Rapid Response Plan will utilize a central working group associated with North Dakota's Aquatic Nuisance Species Management Plan (ND-Plan), the Invasive Aquatic Species Committee (IASC), and chaired by the ANS-Specialist (ANS-SP) from the North Dakota Game and Fish Department. The IASC's purpose is to develop an invasive species management plan and part of that action will be to write a Rapid Response Plan and suggest to North Dakota's Legislature a series of laws which give authority to undertake control of new ANS infestations to the IASC and to provide funds to do such work. The efforts of the IASC could include work that may include providing grants, manpower, expertise, or a variety of efforts to control ANS infestations, and other needed phases of any ANS control effort.

Determine North Dakota's existing authorities and regulations, develop the authorities need to deal with a new aquatic nuisance species

The ability to control and regulate various flora and fauna for different markets such as agriculture purposes, food industry, pet trade, plant nurseries, and for recreational purposes may be covered by existing authorities and their laws and regulations. Determine if there is an authority that has responsibility in the management of ANS infestations. If there is no single authority, work must proceed with North Dakota's legislature to develop the authority for agencies to conduct ANS prevention or control activities.

Authority for an Invasive Aquatic Species Committee (IASC) to function in a Rapid Response role

The authority to eliminate or control ANS needs to be a matter of law and the regulations should lie within one group or with one agency's core mission and responsibility. The current laws shall be reviewed, areas of authority for each state agency will be delineated and compared to the needs facing the state's natural resources, and the ability and willingness to use those authorities to provide the efforts for control of ANS.

The IASC will be given the authority to act in the best interests of the state, and country in order to provide for long term protection from ANS infestations and with management authorities to take appropriate responses to the those infestations.

NATIONAL INITIATIVES

In addition to setting up a statewide system for addressing rapid response, relatively modest efforts at the national level could help tremendously. The most cost-effective

efforts would be through development of reviews of biology and control methods for various high priority species or higher taxonomic groups to be used as the basis for control projects. It makes little sense for each state to have to develop this information for itself and to keep track of the data or provide a data base for others. Many authorities have repeatedly noted the importance of ready access to technical information in the success of an eradication effort.

SUMMARY

A rapid response can occur in a complicated social and environmental setting, but in most instances a response must be initiated quickly without turf-wars and second guessing to have a successful eradication. Although debate and consensus-building are desirable means to construct public policy, if they are slow, the initiation of a response is likely to be counterproductive to the goal of eradication. Once a new ANS infestation is noticed, there must be a forum that will quickly rapidly address the issues and then make a sound decision. That decision can range for do nothing to a complete eradication. If the decision is made to eradicate, the ultimate goal of this plan is to put competent pest management personnel on the ground and give them the freedom to focus on the infestation with the persistence that is required to achieve eradication.

The approach to these goals employs a two-level organization. The first level, the state's Aquatic Invasive Species Committee (AISC), would focus on the problem of that ANS infestation and on preparing for a vigorous response effort(s). This level agreement must occur at a high level of state management and with participation of affected federal and local interests. The AISC's decisions on a course of action should provide the state a management plan to achieve the goals of control or eradication of the problem(s). The second level of organization focuses on the operations on the ground. It also identifies the various issues and options surrounding invasive species and informs the first level about them and further uses that information to prepare for introductions. Once the first level outlines a course of action, the second level focuses its knowledge and experience on the field operations needed to achieve the goals.

A successful response to an invasive species requires access to adequate tools, access to the target species, and, often, dogged persistence. Sometimes these requirements are inconvenient or too expensive for society, and extra costs fall on the people and habitats caught up in the area of the infestation. The decision to eradicate or otherwise respond to an invasive species can be difficult, and it needs to have a forum that reflects the importance of the issues involved. Once the decision is made to eradicate or suppress an introduced population, the managers on the ground then need to put their full energies on finding and removing the target species. This plan attempts to address these dual needs and maximizes success against invasive aquatic nuisance species.

THE FRAMEWORK PROVIDING FOR NORTH DAKOTA'S RAPID RESPONSE ACTIONS

The steps that follow provide the framework of the actions that North Dakota will take in the event that a new ANS is discovered within the state.

Discovery of new infestation

The Department will develop a website for reporting the occurrence of ANS, provide for the reporting methodology for the discovery of new ANS, for tracking the presence or absence of ANS species and their locations, and a protocol to verify specimen suspected of being a new ANS.

Confirmation of a new ANS or an ANS in a new location is done by the Lead Agency (the North Dakota Game and Fish Department). The North Dakota Game and Fish Department may defer to another agency if it is in the best interest of controlling the problem to be the LEAD AGENCY.

The information flow on the new ANS will be from the Lead Agency via the coordinator to prevent problems with conflicting comments, tracking information dissemination, and how information is provided. This step is critical to prevent false and misleading information being provided to the public as direct reports or via mass media.

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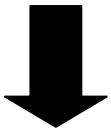

Report/Notice to Lead Agency

The Lead Agency will have the responsibility of communicating with other involved agencies that have jurisdiction or regulatory authorities, local experts, stakeholders, directly with the public, and with the mass media. The Department's Director or the Chief of Fisheries will head the committee with assistance of the ANS coordinator (coordinator), a Department position, to facilitate the efforts to eliminate or control the aquatic nuisance species. The Department will contact the AISC and inform them of the new discovery.

The Lead Agency and ANS-SP will notify others (agencies with jurisdiction or regulatory authority, stakeholders, local experts, etc.) when a new ANS is located within the State or is on the state's borders. As a matter of operating procedures, when a new species is found, but not yet confirmed, the ANS-SP and associated response team will be notified when a new ANS has been reported or reported/confirmed in North Dakota.

The Risk Assessment Matrix (RAMx) will be filled out for existing species and for any

new species identified. See attachment for a copy of the RAMx. The value of the RAMx will be in a quick determination of the new species likelihood of become a significant problem to North Dakota waterbodies.

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IASC Convenes a Science Panel to discuss the problem and develop a statement of facts and anticipated direction

The AISC convenes a Science Panel (SP) after an ANS infestation has been confirmed. The SP will be made up of five to eleven experts in their respective field(s) and from various federal, state, and local agencies, or from institutions of higher learning. It shall be the SP's responsibility to make a time review of information on the specie or genera, make a recommendation on the need for control(s), method(s) of control, and likely outcome(s) if no control is done. Included in the "likely outcome" will be an analysis of environmental and economical impacts of the new ANS. A portion of this report will contain the likely scenario of no action being taken and the likely effects on natural resources. This report shall be completed in a reasonable time frame and be of reliable estimations which would include a peer review of regional authorities.

The above effort will need to be done in a timely manner and with a professional product being produced. A concern is if the process drags on for an extended period of time, the ANS can and will spread, which negates the effectiveness of the SP. Any recommendation by the SP could be for remedial action(s) that are only effective in the initial stages of an infestation. When decisions are delayed, the controls may now be inadequate for a widespread infestation that cannot be controlled.

The SP can be called prior to any new ANS infestation, review the available information on controlling species or genera of concern, provide likely problems if a specific ANS becomes established, provide for a likely listing of control options or eradication measures (the tool box approach), and document this information for use at a later date. The exercise on control measures should periodically be updated to reduce the time needed to respond in the event of an actual new ANS infestation.

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Lead Agency actions

The information provided by the SP will be reviewed by the AISC, coordinator, and the Department to determine the next sequence of steps. The Lead Agency's action could range from a news release in that area of the state to a complete closure of the waterbody to all users. Within this range there could be any item of control listed in the tool box of control and elimination measures.

In any course of action, an informed public is vital to allowing for control and to eradicate the problem ANS. When the public is provided the information and that information is correct, the likely outcome from the ANS infestation, ramifications to the them, i.e., environment, water supplies, economics, reduced recreation, increased costs of living, and other appropriate information, it is firmly believed that the general public will select the best alternative for them and the environment.

leads to

Outreach efforts about the ANS problem, the Science Panel recommendation and concurrence of Lead Agency, and take public input/comment

The AISC, via the coordinator, will provide the public with information about the ANS infestation, the potential impacts of the ANS, the formation of the SP, the objectives of the SP, and alternative(s) to control the problem species. The coordinator will work closely with mass media outlets to provide current and factual information, which will be delivered in a timely manner. It shall be the responsibility of the AISC, via the coordinator, rather than the individuals of the committee or individual entities to provide information to the public or other entities about ANS infestations or potential problems**.**

Public information available to the coordinator and ANS-SP can be provide in many different avenues: mass media presentations, conducting public meetings, give interviews or conduct open houses to provide the information, reporting the data the SP has found, and answer appropriate questions. This effort will be used in selecting the preferred control methodology within the bounds of obtaining reasonable results.

Again, this process should not become involved and time consuming. When the time from discovery of the ANS infestation to control is prolonged, the effectiveness of control or confinement is greatly reduced. To promote local residents being aware of the ANS problem, appropriate field staff of the Lead Agency will be making some of the contacts to various local entities or groups to provide information on the problem.

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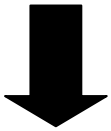

AISC shall select the action plan or appropriate solution and inform the public within a reasonable time

The AISC shall review the documentation provided by the coordinator and select the appropriate action plan or control methodology. The ANS-SP shall inform the public of the preferred control methodology and review their comments and concerns. Legitimate concerns will be addressed and appropriate information will be provided to those groups involved in the management of the resource and use of the natural resources.

The ANS-SP shall acquire the needed permits to conduct the action plan or control method that will be used.

The AISC shall have the authority to collect funds or provide billing for reimbursement from the various agencies that make up the working group.

An integral part of this phase of the project will be selecting an appropriate method for the recording of the before and after conditions so a baseline can be established, and results can be determined allowing for an evaluation of the IASC actions.

The process can select from a variety of control methods or a combination of those methods. In general, the control from the tool box of actions could include: 1) a campaign to inform the public of the problem(s) and request their help in not spreading the problem; 2) posting signs at the area informing the public of the problem(s); 3) posting information on the preferred procedures on how to clean and disinfect a boat/PWC/trailer and recreational gear; 3) requiring that recreators take proper cleaning methods when leaving that waterbody; 4) limiting recreation on that waterbody to a time period when the problem(s) is not likely to be moved to a new location; 5) closing of that waterbody to recreational efforts until the problem is eliminated or brought under control; 6) complete eradication of the waterbody which includes elimination of closely associated species and a short term modification of that waterbody's ecosystem; and 7) do nothing as the problem is widespread and cannot be controlled or eliminated by current methodology.

All of the above information and options, along with the preferred method, are to be provided to the Lead Agency for their decision on the method of control and for informing the public. As part of this work, a timeline must be developed which lists the major needs of the control plan, whom (both as an entity or an individual within that entity) will accomplish that section of the control plan, when these sections of the control plan will be accomplished, how the efforts and the status of the control will be reported to the public and involved or impacted participants, and the expected outcome with a

plan for evaluation(s) that includes the methodology to be used and when the evaluation(s) will be accomplished.

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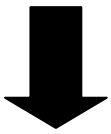

Implementation of the preferred control method

The preferred method of control must be put into place in a timely manner and at the levels decided on by the Lead Agency. To achieve the desired effects, there should not be infighting or disagreements voiced outside of the IASC or SP to the general public. The Lead Agency will designate appropriate staff to complete the activities selected by the AISC.

Implementation will occur as or when all permits are acquired, the public is informed, the public's consent or grudging acceptance or agreement by education has been done, and other agencies concerns addressed with those being satisfied or acknowledged.

The control method will be undertaken within a reasonable timeline to be the most effective. A reasonable timeline must be constructed and followed.

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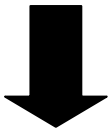

Evaluation of the outcome

As this is the final portion of the AISC activities, it is important that the process be used to reach the defined objective and be recorded, that the objective was clearly stated, that the objective was one that could be quantified and measured, and the control method used be described and recorded. The monitoring of the infested site is to continue for a reasonable time and the expectation is that the infestation be eliminated, controlled, or its spread curtailed. The latter will be compared to the objective and a determination of success can be made by the members of the AISC. This will also allow for modification of the control measures for future infestation by other species or the same species at another site.

The public will be informed of the evaluation procedures, the status of information being collected, and the outcome of the control methods. This information will be provided in a reasonable time frame and in understandable context for the public.

Attachment to Appendix K

Snakehead in Maryland

A species of snakehead (Family Channidae) that could survive in temperate to cold climates was collected from a small abandoned, rock quarry in Maryland. This specie's diet includes a variety of food items, i.e., bottom dwelling invertebrates, small fish, and animals on the waters surface which they capture with strong, toothed jaws. It can grow to a large size, produce large numbers of young, and are long lived. The source of these fish was likely to have been from the pet trade or from Oriental food markets.

Maryland has had a history of working with ANS infestations and understood the potential for additional problems if this infestation spread beyond this pond. A Scientific Advisory Panel was convened to make recommendations on controlling this fish species. The group reviewed many possible control methods. The working group focused on determining the practical solution to the infestation and this task was completed in less than 24 hours. The solution to the temperate snakehead infestation was to eradicate the pond in a timely manner.

Many state and federal agencies worked closely on this project which allowed for information to be quickly exchanged, problems identified, and compromises to problem areas could be found with little loss of time. The inter agency cooperation was good, the various groups focused on eradicating the abandoned rock quarry in an expedient manner, and the desired outcome was reached.

In all phases of this project, the public was provided with current and honest information which greatly decreased pubic concerns about the project and associated delays. The need to eradicate the quarry was conveyed to the public and little or no objections from the public or environmental groups was voiced.

The eradication was successful as temperate snakeheads have not been found in that pond. Due to the public concern about this species, snakeheads are now included in the Federal list of prohibited animals for importation or for sale.

Caulerpa in Coastal Southern California

Caulerpa taxifolia is a saltwater alga -- a seaweed -- that is native to tropical waters, where it typically grows to a small size and in limited patches. In the late 1970's the species became popular in the aquarium trade because it is a fast growing and decorative plant. A clone of this specie escaped from an aquarium into the Mediterranean and it rapidly spread from a patch of about one square yard to over two acres by 1989. By 1997 it blanketed more than 11,000 acres of the northern Mediterranean coastline.

On June 12, 2000, Caulerpa was noticed in the Aqua Hedionda Lagoon, in
Attachment to Appendix K

Carlsbad, California. Once the plant was identified, the firm contacted a variety of agencies that address invasive species, water, and wildlife issues, and discussions began about possible responses. Several different groups began researching control possibilities by June 22nd. By the end of June the group outlined an action plan that they released on July 12th as the Southern California Caulerpa Action Team (SCCAT) Rapid Response Program. By then, the infested area had been cordoned off and the local police and game wardens were helping enforce the closures. In addition, intensive public outreach efforts had been initiated.

In the ensuing weeks and months, SCCAT continued to focus on eradicating the population and reaching out to other interested groups. By September 18th, all the known patches in the Aqua Hedionda Lagoon had been treated. In early August, another small infestation was found in Huntington Harbor, near Los Angeles. Again decisive steps were taken and the problem was quickly and effectively treated.

The description of the response might give the impression that there was a strong central authority, with a clear strategy and unquestioned lines of command from the outset, but the original records show otherwise. The group had a diversity of opinions and agendas and it developed its strategies through a consensus approach. A different set of people spearheaded the different components of the response and they volunteered according to their abilities as much as being appointed by the group.

Salvinia in the Lower Colorado River

Salvinia molesta is an attractive plant in small quantities and has been used in the aquarium trade and with the current interest in water gardens, offered for sale in the nursery trade. Unfortunately, *Salvinia*'s growth rate, ease of spread, tendency to clump or form large mats, and the creation of critical dissolved oxygen problems when these mats decompose make up for its small size.

On August 4, 1999, a biologist for the U.S. Fish and Wildlife Service (USFWS) noticed thousands of free-floating *Salvinia* plants on the Colorado River as it passes through the Imperial National Wildlife Refuge, about 25 miles north of the Mexican border. On August 20th, over fifty agency representatives and other interested people attended a meeting to consider the situation and plan a course of action. The USFWS was identified as the lead agency for the project. The group decided to quickly and cooperatively expand the search for the plant. They completed the delimitation survey by September 15th, when a second planning meeting occurred. The infested area included two federal wildlife refuges and the habitat of two endangered fish and two endangered birds.

Attachment to Appendix K

At the second meeting, the Task force formed a Science/Management Advisory Panel of five experts in aquatic plants and their control from across the US. This group

established a Task Force and encouraged all land managers in the infested area to undertake "...whatever actions they could to control *Salvinia* within existing and pertinent regulatory constraints". A Task Force began development of an Action Plan and was completed by October 13th. The group's recommendations were for "...a comprehensive, integrated and aggressive control program whose objectives are…to **eliminate** (their emphasis) populations in the River and all waters of the Western states". Yet the all-out eradication program failed to materialize.

The primary problems with completing the eradication were typical for interjurisdictional endeavors. Some of the specific areas of concern were:

1) Serious environmental concerns created a difficult situation, because two wildlife refuges, four endangered species, and a major water supply all required special consideration; 2) Within the authorities working on the problem, no consensus about an overall approach to treatment throughout the infestation could be reached; 3) The involved institutions had difficulty finding funds to provide a dedicated project manager or other staff and necessary support; 4) Everyone involved tried to participate in the response in addition to all their normal duties; 5) Federal agencies could use their funds for herbicide treatments but that would likely trigger the need for an Environmental Impact Statement, and this would cause likely delays; and 6) The biological control method which holds out the best hope was a Brazilian weevil specializing in feeding on *Salvinia,* which was not certified for release in this area.

Momentum for an all-out eradication program did not materialize. Although the U.S. Fish and Wildlife Service took on the role of lead agency for the response, a variety of agencies have jurisdictions along the River, and there was no consensus about an overall approach to treatment throughout the infestation. Part of the difficulty was to use pesticides which would likely trigger an Environmental Impact Statement, with the attended delays. Another factor was that biological control holds out hope for a less painful option. For some unclear reason, but probably related to water chemistry, *Salvinia* has not thrived in the Colorado River itself, although it does well in the ditch. These latter two factors made the situation appear less threatening, reducing the incentive to eradicate.

<u>Eurasian watermilfoil in Minnesota</u>

Eurasian watermilfoil arrived in the northeastern United States in the 1880's. This plant was used in the aquarium trade during the 1950's. Aquarium owners who dumped their aquariums into local lakes or ponds could have started new infestations. Recreational boats or trailers moved plant fragments to new

waterbodies. By 1985, Eurasian watermilfoil was reported in 33 states and three Canadian provinces. Minnesota's first infestation of Eurasian watermilfoil was reported in Lake Minnetonka, located near the twin cities of Minneapolis and St. Paul, in 1987. This lake has been highly popular with numerous private estates and property holdings

by influential private parties along the shoreline. While the effects of Eurasian watermilfoil is known, there was no interest by the lake's property owners in taking actions which would have included localized application of an aquatic herbicide.

By 2001, 133 waterbodies have been found to have Eurasian watermilfoil infestations. A pattern of infestation was observed where new infestations radiated from Lake Minnetonka and these infestations were along the major travel routes used by recreators. Eight infested lakes are found along U.S. Highway 169 and 65, which lead from the Twin Cities to the lake country of northern Minnesota. There are seven infected lakes along Interstate 94, the
route leading to North Dakota. One of these lakes is about 45 miles east of Fargo, North Dakota. The rate of new infestations of Eurasian watermilfoil has increased in recent years. While the majority of these early infestations were near the Twin Cities, more outlying infestations are being found. Many of these new infestations are located at a considerable distance from the original site near the Twin Cities. One of the new infestations is about 60 miles from the Twin Cities, but is not on a major travel route. The rate of new infestations has been increasing in the past few years. These new infestations can be the source of plants that are being transported to new waterbodies and these then create an infestation at that site or sites.

Efforts to control Eurasian watermilfoil have included a public education campaign, regulations prohibiting the transportation of aquatic vegetation on boats, trailers or vehicles, and chemical eradications. The first two reactions have helped make the public aware of the problems and methods to prevent the movement of the problem species. The latter example, application of a herbicide, is a dramatic step to eliminate the problem from an area and the likelihood of it being spread from that site. The two lakes in Itasca County were treated with a fluridone herbicide, Sonar, in a whole-lake treatment in 1999. Inspections for Eurasian watermilfoil were done in 2001 and these did not find Eurasian watermilfoil to have reestablished an infestation.

The use of a herbicide was an effort to quickly eliminate the problem and prevent its spread. This tactic would have been effective in the initial infestations, but it was not done without public concerns about localized recreational opportunities. As an outcome, the Minnesota Department of Natural Resources is spending approximately $1 million dollars annually to treat ANS. Not all of the monies are used to control Eurasian watermilfoil, but has prevented the problem from
Attachment to Appendix K

spreading. Nor have these efforts of monies and manpower eliminated the problem.

Attachment 1

Risk Assessment Matrix

	Species
Factors Influence the Establishment of ANS in North Dakota	
North Dakota's climate and habitat conditions are similar to those in the specie's native range: very similar - 5; at the end of its range - 3; outside of its range – 1	
This specie is: not on a state or other local lists - 5, is a state or local listed species - 3; on a Federal 1	
The specie already has: statewide distribution - 5, is in isolated areas in the state - 3, or is not present at this time - 1	
The species is: self controlled due to location, time of year, i.e., fall, movement is unlikely for the short term – 1; there is a likelihood that the ANS will be moved – 3; the species is readily moved and is likely to be moved to new areas in a relatively short time – 1.	
Introduction will cause the loss of native or desirable specie(s) or habitats - 5, expanding its range is of ecological concern - 3, and no concerns from the establishment – 1	
This specie causes environmental or economic problem(s) - 5, this specie has the potential to cause problem(s) - 3, has caused no known problems -1	
Control method(s) are: proven - 1, experimental - 3, unknown – 5	
Control efforts are focused on preventing the introduction - 1, eradicate the isolated populations -3, prevent the spread or slow the introduction of the species – 5	
Introduction pathways are: many or unknown - 5, few -3, single – 1	
Agencies have the authority/responsibility to deal with the problem(s): multiple - 1, few - 3, and single – 5	
Agencies that are wiling to deal with the problem(s): multiple - 1, few - 3, and single – 5	
Information available on the specie: extensive on the specific specie - 1, general - 3, little or none – 5	
Public concern about this species: no concern – 5; aware with some concern and might do something – 3; concerned about the problem and willing to do something – 1	
Total Score	

Attachment: **2004 PROGRESS REPORT NORTH DAKOTA AQUATIC NUISANCE SPECIES MANAGEMENT PROGRAM by LR Schlueter, Special Project Biologist, North Dakota Game and Fish Department, Devils Lake, ND.**

2004 PROGRESS REPORT
NORTH DAKOTA AQUATIC NUISANCE SPECIES (ANS)
MANAGEMENT PROGRAM

January 2005

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The following summarizes completed activities or activities in-progress identified in North Dakota Statewide ANS Plan's Strategy and Objectives. It is understood that many of these activities need to continue at the current level or more effort will be required to make sure that ANS prevention is effective. The initial contacts and involvement has been made with target audiences, it is important to continue to work with them in ANS education and prevention as it will be very difficult to keep the momentum if the efforts wane or falter.

Objective 1: Coordination of aquatic nuisance species activities and preparing/implementing a comprehensive management plan

Strategy 1A: Coordination of ANS activities for all ANS management programs and activities within North Dakota through development of the Aquatic Invasive Species Committee.

Strategy 1A1. The Game and Fish Department will designate an Aquatic Nuisance Species Coordinator and support this position with federal ANS Task Force funds and matching state funds. The Coordinator will encourage communication between governmental entities, the public, and private sector; provide information, archive appropriate ANS information, and provide the public with needed information for them to make responsible decisions.

Action Taken: ANS prevention is a priority of the Game and Fish Department. The Department assigned the Special Project Biologist to work on ANS issues and be the coordinator for the state's ANS management. The Department, through the Special Project Biologist, will support the efforts of the Aquatic

Invasive Species Committee (AISC) in developing and implementing North Dakota's Aquatic Nuisance Specie Management Plan (ND-Plan).

Strategy 1A2. The coordinator will identify key personnel in governmental, tribal, private, and the public sector with ANS responsibilities. These individuals will be invited to form the Aquatic Invasive Species Committee to oversee ANS activities within North Dakota. The Coordinator will be the chairperson of this advisory committee. The AISC will work to ensure that the ANS strategy is coherent and consistent throughout North Dakota. AISC will develop ANS assessment guidelines as needed for local governments or cooperating entities.

Action Taken: An *ad hoc* AISC was formed to produce a draft of the ND-Plan. The AISC will become recognized through the approval and acceptance of coordinated, pro ANS management efforts in North Dakota. The Seated Committee, e.g., voting privileges, will provide information and recommendations to the various government agencies, public entities, and the private sector. Using representatives from a variety of agencies, public entities, and private organizations the AISC (see Appendix H for a listing of Seated Committee and Standing Representatives on the AISC) will strive to ensure communication between government and private sectors on ANS issues, resolve issues before they become road blocks to the prevention of ANS, and to make recommendations for continuous improvement of the state's ANS management (see Appendix I for flow chart and communication description). The AISC is open to all interested parties as Standing Representative, e.g., no voting authority, to participate in ANS management in North Dakota. Initial committee representation was a cross-section of North Dakotans. The AISC reviewed a draft of a state management plan adapted from other state's efforts. The ND-Plan and sent it out for technical review (see Appendix J for a listing of the Technical Review panel). The plan received considerable internal review by the AISC (see Appendix K for a review of the plan development process).

Strategy 1A3. The state plan will allow for coordinating North Dakota ANS prevention efforts with those being done on a regional and national scale.

Action Taken: The coordinator is working with the US Fish and Wildlife Service's ANS-Task Force, the Western Regional Panel, other states, and local government agencies to improve and to collaborate on ANS issues. These efforts requires that funding be available to travel to meetings and actively participate in dialog to reach mutually achievable goals and objectives.

Strategy 1B: Prepare and implement a comprehensive management plan.

Strategy 1B1. AISC will prepare a plan to begin comprehensive, statewide ANS management plan for North Dakota.

> **Action Taken:** A draft North Dakota AQUATIC NUISANCE SPECIES (ANS) MANAGEMENT PLAN will have been completed and submitted to the FWS ANS-Task Force for approval and funding by March 2005.

Strategy 1B3. The state plan will allow for coordinating North Dakota ANS prevention efforts with those being done on a local level, in the region such as the efforts outlined in Montana's and Iowa's state plan and Minnesota's Sea Grant work, and on a national scale.

> **Action Taken:** A draft North Dakota AQUATIC NUISANCE SPECIES (ANS) MANAGEMENT PLAN is contingent on state agencies, entities, the private sector, and the public work together to achieve the solutions to ANS problems and the spread of such problems.

Strategy 1C: Participate in and support regional, federal, and international efforts to control ANS.

Strategy 1C1. The coordinator is to participate in the FWS ANS-Task Force's Western Regional Panel, support the Pacific States Marine Fisheries Commission's 100th Meridian Project, and coordinate with Canadian provinces and neighboring states on ANS issues.

> **Action Taken:** The Coordinator is participating with groups that are actively working to prevent the spread of ANS. Those groups include: Western Regional Panel, 100th Meridian Project, Missouri Interstate Cooperative Resource Association ANS-Panel, and initiated coordination activities with neighboring Canadian provinces and states. These activities will continue as funding permits.
>
> **I**nteraction during the meeting and seminars is critical to ANS prevention and networking which provides for better ANS prevention efforts. These efforts are frequently dropped when funding is low, but they need to continue at current or higher levels.

Strategy 1D: Develop partnerships and funding sources to leverage state and federal funds with nonfederal funds to increase ANS prevention efforts that will be undertaken.

Strategy 1D1. Create stable funding sources for ANS management in North Dakota by seeking federal funding from the Nonindigenous Aquatic Nuisance Prevention and Control Act-1990 (NANPCA Act), seek other potential funding sources from state agencies, alternative funding sources, or grants for ANS prevention or control efforts.

> **Action Taken:** The Game and Fish Department requested funding from

the North Dakota Legislature for the 2005 to 2007 biennium. The Coordinator will leverage these funds with federal funds, grant monies, and other funding sources to accomplish the prioritized needs of the ND-Plan.

In preceding years, 1998 through 2004, the North Dakota spent approximately $125,000 on ANS prevention efforts. The funding sources were both federal and state. To accomplish ANS efforts, the Game and Fish was able to shift allocated funds and manpower from other fish management projects. Initial federal funding was part of the impetus for North Dakota concerted ANS prevention effort. Other state agencies were conducting ANS prevention, but the amount that they have spent has not been qualified as the effort was not closely tracked.

The ND-Plan and ANS efforts to date are concrete efforts that the state legislature will recognize. Funding the ND-Plan by North Dakota Legislature should be increased because previous ANS efforts have been successful and is concrete evidence that education is effective in prevention.

The ability to combine state funds with anticipated funds from the FWS ANS-Task Force makes the ND-Plan more likely to be funded at an appropriate level. Federal dollars are needed to make the ND-Plan a more credible program and more effective.

Strategy 1D2. Develop partnerships with state and federal agencies, private enterprise, and the public to leverage existing funding sources to undertake additional ANS prevention and eradication efforts. Partnerships to fund ANS prevention information with local entities will create a buy-in for ANS prevention with those groups and an ownership in preventing ANS importation.

Action Taken: The AISC was developed based on the concept of having partners to accomplish the ND-Plan's prioritized needs. The coordinator has developed partnerships with private groups such as fishbait retailers, fishing and hunting guides, motels and other lodging accommodations, convenience stores, commercial ventures, and local chambers of commerce. Partnerships have been formed with a variety of state and federal agencies or entities such as the US Army Corps of Engineers, US Fish and Wildlife Service, Bureau of Reclamation, Coast Guard, and others that are concerned with ANS prevention. The partnerships have included ANS prevention efforts as funds for educational information and manpower to do monitoring.

The coordinator has worked with Department of Tourism to include ANS information in publication they provide on local and regional bases. This effort has been extended to fishing clubs, local chamber of commences, fishing and hunting guides, and other groups which has resulted in local agreement and buy-in for ANS prevention efforts. The use of partnerships on local ANS information is a ownership of prevention efforts by the local outdoor recreational community.

Strategy 1E: Review and evaluate state efforts in addressing ANS.

Strategy1E1. Update the state ANS plan as needed, with annual progress reports and a five-year program report

> **Action Taken:** The 2004 PROGRESS REPORT-NORTH DAKOTA ANS AQUATIC NUISANCE SPECIES MANAGEMENT PROGRAM is the initial document that addresses ND-Plan's accomplishments. This document will be updated in following years, but dependent on funding for the ND-Plan.

OBJECTIVE 2: PREVENT THE INTRODUCTION OF AQUATIC NUISANCE SPECIES INTO NORTH DAKOTA.

Strategy 2A: Research and address pathways of introduction.

Strategy 2A1. Describe the potential pathways through which ANS can enter North Dakota via recreational, commercial, esthetic, and illegal pathways, and include judgments of the risks of introduction from specific pathways.

> **Action Taken:** The Coordinator reviewed literature on biota introduction into North Dakota, identifying 19 separate pathways. There is a risk associated with each pathway, but the most likely ANS introduction will be from recreational vessels and equipment.

Strategy 2A2. Estimate the potential for ANS introduction for each pathway; conduct a risk analysis.

> **Action Taken:** Conducted comprehensive boater surveys that determined: 1 – boat owners' residence, 2 – water the boat was last in, 3 - intended destination for boaters, 4 – awareness of ANS issues, and 5 – ANS precautions taken prior to this trip. Interviews will be a combination of questions asked during angler creel interviews, statewide questionnaires, and by contract with outside entities to conduct specific boater interviews. Interviews provide a baseline for comparing changes in boater attitudes and evaluating the risk for ANS import to North Dakota's waters. Continue this effort as angler interviews are conducted at North Dakota's major waters, e. g., Devils Lake, Missouri River, and Lake Sakakawea, ever three years and on other waters in association with fisheries management projects.
>
> Pet retailers were contacted to determine origin of goldfish, Koi or other carp. The concerns was the these fish could be a source of Spring Viremia of Carp Virus which can be infectious to cyprinids and related species. Additional efforts are needed to define actual sources of fish or aquatic plants and animals being offered for sale in North Dakota's markets.
>
> The pathways that ANS could enter North Dakota should be continued to be researched and monitored. For each pathway, a risk assessment and likelihood of infections from a pathway or a combination of pathways should be

conducted. These efforts would be best undertaken by contracting with a university to complete a study on non recreational boating ANS pathways.

Strategy 2B: Prevention of ANS along determined pathways of introduction.

Strategy 2B1. Continue to educate public and private groups that are shown to be the likely sources of ANS importation and the results of accidental introduction of ANS.

Action Taken: The coordinator contacted representatives from power production plants, industry and manufacturing, and municipal water plants about impacts of ANS to those systems. These groups were provided with information on the financial impact to their businesses from ANS infestations. North Dakota groups were unaware of the potential ANS financial impact on their ventures. These groups were provided website information on the problem, given contact within umbrella groups to develop their prevention program, and invited to AISC meetings.

Educational efforts must be on-going as to keep the target audiences' awareness at appropriate levels, these efforts need to continue and be increases where and when possible.

Strategy 2B3. Implement the HACCP (Hazard Analysis and Critical Control Point) training program for appropriate fish hatchery, field, and survey personnel of the North Dakota Game and Fish Department.

Action Taken: ANS transport on vessels and prevention protocols were reviewed with the North Dakota Game and Fish Department's Fisheries Division during their staff meeting. To prevent ANS transport on nets or in boats, prevention would include equipment washing and nets, disinfection as required, and air drying when practical. North Dakota fish for stocking sources, e.g., federal fish hatcheries in North Dakota and fish hatcheries outside of North Dakota, were contacted to determine ANS prevention protocols used. These efforts were made to assure that the Fisheries Division and FWS hatcheries were not unintentionally moving ANS with loads of fish.

These efforts need to be ongoing to prevent complacency which could allow for the unintentional introduction on ANS.

Strategy 2B4. Work with fishing tournament officials to ensure boats and equipment under went ANS prevention protocols.

Action Taken: The coordinator worked with fishing tournament officials to provide participants information on ANS impacts, ANS prevention protocols, and encouragement of ANS protocols to be mandatory for the tournament. This effort has been as a presentation at numerous fishing tournaments during 2003 and 2004. Participants' ANS awareness, prevention protocols are determined by questions they are asked at the time they register to participate in a tournament.

Fishing tournament officials ANS inspections were monitored by the coordinator. Information was summarized in unpublished Fisheries Division reports.

Annual efforts were made by the coordinator to reinforce the need to take ANS prevention as tournament anglers travel between lakes. The tournament anglers were requested to include ANS prevention information in seminars they present in the off season.

Strategy 2D: Prohibit, control, or permit the importation of nonindigenous aquatic species based upon their invasive potential.

Strategy 2D1. The develop a non-indigenous species list in North Dakota.

Action Item: The coordinator compiled a North Dakota non-indigenous fish species list from information on file from the Dakota Chapter of American Fisheries Society (see Appendix M for a listing and those species considered to be an ANS) and from the USGS web site on nonindigenous species on record for each state.

Strategy 2D2. Develop a list of defined ANS and those that are of high concern to North Dakota and develop preferred management strategies for dealing with these as listed by priority class.

Action Item: The North Dakota Game and Fish Department contracted with Minot State University, Bottineau Campus for a life history review of selected ANS, comparing that information with abotic condition, e.g., temperature, water chemistry parameters, turbidity, and bottom types, etc., found in North Dakota waters, and determine which ANS species could survive if introduced into them. The information became the "Status of Aquatic Nuisance Species in North Dakota - Priority for Action" report (see Appendix K for the North Dakota ANS Status Report and species of concern). A summary of that information is given below:

Outtake from - *Status of Aquatic Nuisance Species in North Dakota*
Priority Class 1:

Presence in ND:	Currently not in North Dakota
Risk for importation:	High potential to be brought into North Dakota.
Significance of impact to economies or ecosystems:	Significant negative impact to ecosystems and to regional economies.
Cost and/or effectiveness of control options:	Control prohibitively expensive.
Availability of management strategies:	Limited effectiveness, or no known management strategies for these species.
Appropriate management stance:	Prevent introduction and eradication of pioneering populations.

continued: *Status of Aquatic Nuisance Species in North Dakota*

Species in this Priority Class:

1. Eurasian Watermilfoil (*Myriopyllum spicatum*)
2. Zebra Mussel (*Dreissena polymorpha*)
3. Asian Clam (*Corbicula fluminea*)
4. Asian Carp (Bighead *Hypophthalmichthys nobilis)*
   (Grass *Ctenopharyngodon idella)*
   (Silver *Hypophthalmichthys molitrix)*
   (Black *Mylopharyngodon piceus*)
5. Round Goby (*Neogobius melanostomus*)
6. Ruffe (*Gymnocephalus cernuus*)
7. Spiny Water Flea (*Bythotrephes cederstroemi*)
8. Heterosporosis (Micsporidia that infects a variety of fish species)
9. Infectious Hematopoietic Necrosis (IHN) Virus

Priority Class 2:

Presence in ND:	Present and established in North Dakota.
Risk for importation:	High potential to spread within North Dakota.
Significance of impact to economies or ecosystems:	Localized ecosystem and economical impacts.
Cost and/or effectiveness of control options:	Control prohibitively expensive.
Availability of management strategies:	Limited in nature, or no known management strategies.
Appropriate management stance:	Prevent introduction or spread or if the species becomes established mitigate impacts, control of population size, and prevent dispersal.

Species in this Priority Class:

1. Saltcedar (*Tamarix spp*.) – this is a terrestrial plant species, managed as a terrestrial problem, and is listed as an ANS because of its impact on watersheds and water bodies
2. Curlyleaf Pondweed (*Potamogeton crispus*).

Priority Class 3:

Presence in ND:	Not established in North Dakota.
Risk for importation:	Potential for introduction into specific North Dakota waters.
Significance of impact to economies or ecosystems:	Impact to specific ecosystems, watersheds, or economies.
Cost and/or effectiveness of control options:	High costs due the constraints associated with the species life histories.
Availability of management strategies:	No management techniques available for wide spread application.
Appropriate management stance:	Prevention of introductions and eradication of pioneering populations.

continued: *Status of Aquatic Nuisance Species in North Dakota*

Species in this Priority Class:
1. Whirling Disease (*Myxobolus cerebralis*)
2. Asian tapeworm (*Bothriocephalus acheilognathi*)
3. New Zealand Mud Snail (*Potamopyrgus antipodarum*)

Priority Class 4:

Presence in ND:	Present in North Dakota.
Risk for importation:	Potential to easily spread in the state.
Significance of impact to economies or ecosystems:	Wide ranging impact to specific ecosystems or economies.
Cost and/or effectiveness of control options:	Expensive to treat on an extensive level.
Availability of management strategies:	Management strategies are limited.
Appropriate management stance:	Prevention of dispersal to other water bodies and control of species where practical and appropriate.

Species in this Priority Class:

1. Common Carp (*Cyprinus carpio*)
2. Purple Loosestrife (*Lythrum salicaria*) - this is a terrestrial plant species, managed as a terrestrial problem, and is listed as an ANS because of its impact on watersheds and water bodies
3. Yellow Flag Iris (*Iris pseudacorus*)
4. Flowering Rush (*Butomus umbellatus*)
5. Bacterial fish pathogens (various species)

The Priority List must be periodically reviewed and updated as new ANS are found in the United States, the spread of known ANS is found to have occurred, and additional information on life histories becomes available.

2D3. Develop a North Dakota list of ANS that cannot be imported, moved, possessed or sold within North Dakota. Provide that information to the North Dakota Legislature for review and concurrence.

> **Action Taken:** The information for 2D2 and existing regulations were reviewed, and regulations from other states were reviewed. The listingof ANS was developed and can be provided to the North Dakota Legislature when requested.

Strategy 2E: Promote legislation and regulatory rules that establishes or increases the state's authority to control the introduction of new species.

Strategy 2E5. Require that fish imported for hatchery use or bait is disease free or collected from areas free of ANS. Periodically review the status of ANS in areas the fish or bait originate in and new ANS to keep North Dakota's moratorium on importation current.

Action Taken: The North Dakota Game and Fish Department requires that live fish brought into the state are free from known diseases, and that fish for stocking and baitfish are collected from ANS free areas. The prohibited list of diseases and ANS for the importation of fish into North Dakota is updated when relevant information comes available. The location of bait fish collection is required on import permits and reviewed against the current ANS location maps.

The import of fish must continue to be monitored as ANS infestation spread to new locations in bordering states. The moratorium on baitfish or importation of fish from areas that are known to have ANS must continue.

OBJECTIVE 3: DETECT A PIONEERING AQUATIC NUISANCE SPECIES AND MONITOR EXISTING POPULATIONS OF AQUATIC NUISANCE SPECIES.

Strategy 3A: Implement a monitoring and early detection program.

Strategy 3A2. Conduct an annual monitoring of high-risk water bodies and monitor other water bodies with regularity.

Action Taken: The coordinator developed a monitoring program that is conducted on waters where the Fisheries Division is conducting fisheries inventories. Data sets track waters initially surveyed, lakes inspected a last time, and ANS found. ArcView provides layered maps to track the initial infestations and spread of ANS. The efforts to collect data and provide ArcView mapping is contingent on funding of the ND-Plan. These efforts will be important to track any ANS infestation and know in which areas the ANS has not been found.

Strategy 3A3. Place zebra mussel colonization substrates (traps) in areas of high probability of infestation or provide traps to other agencies or individuals. In addition, inspect boat docks or buoy lines that have been recently removed from the water bodies for zebra mussels.

Action Taken: The coordinator developed partnerships with the US Army Corp of Engineers to place and retrieve artificial substrates (traps) for zebra mussel colonization for Lake Sakakawea and Lake Ashtabula. North Dakota Game and Fish, Fisheries Division staff placed and retrieved traps in Lake Sakakawea and Bowman-Haley Reservoir. Fisheries staff and personnel for US Army Corps of Engineers inspected boat dock, marker buoy anchor lines, and other equipment that had been in the water for the summer. Information from these efforts is summarized and provided to the Pacific State Marine Fisheries Commission for their records. North Dakota's zebra trap information is made available as ArchView layers in ANS tracking maps.

Strategy 3B: Develop an early response mechanism to deal with detected and potential invasive species.

Strategy 3B1. Implement a Rapid Response Plan.

> **Action Taken:** The coordinator and the AISC prepared a Rapid Response Plan (see Appendix N for details on North Dakota's Rapid Response Plan). The ND-Rapid Response is proactive in order to quickly eliminate an ANS infestation. This document is a proactive approach towards developing solutions to ANS as they are discovered. This approach differs from the traditional views of "wait to see" or "manage around the problem" and "react after the problem" has caused economic damage. A fundamental reality of the ANS issue in that all agencies must begin to communicate and agree on actions in a timely and effective manner.
>
> The Rapid Response Plan should be periodically reviewed and updated to make sure that it is a useable and functional document.

OBJECTIVE 4: EDUCATIONAL CAMPAIGN TO PREVENT THE SPREAD OF AQUATIC NUISANCE SPECIES.

Strategy 4A: Educate resident anglers and hunters about ANS prevention protocols by providing focused information in the best avenues of dissemination.

Strategy 4A1. Identify what is the key message, the best format to deliver the information, and where to best deliver the message to this group.

Strategy 4A2. Provide information and education (e.g., signs, posters, kiosks, banners, newspaper articles, articles in periodicals, on radio and television spots, and similar venues) on ANS risks and prevention protocols as found in 4A1.

> **Action Taken for 4A1 and 4A2:** The North Dakota Game and Fish Department and the coordinator have developed the following: a 15 minute video on ANS problems; methodology of introduction; prevention protocols; brochures provided with each boat renewal; posters provide to major sporting good outlets, e.g., Cabelas, Gander Mountain, Wal-Mart, K-Mart, and Scheelds,; posters in baits shops, boat dealerships, and marinas; posted signs at boat ramps; produced numerous articles in local and regional news papers, articles in regional periodicals; public appearances; and individual contacts. The North Dakota Game and Fish Department assisted the 100th Meridian with the design and the posting of ANS informational signs at Lewis and Clark Bicentennial destination sites. The coordinator worked with the FWS ANS-Task Force to design and distribute promotional items which were supplied by the FWS.

Increase in marketing to target audience will require additional funds to be in the correct market to reach the intended audience and achieve the desired response.

Strategy 4A3. Determine the levels of ANS awareness and precautions used.

Action Taken: Through interviews and statewide questionnaires, anglers are asked questions to determine their level of ANS awareness and ANS prevention protocols. These interviews are repeated at heavily used waters every three years which will give comparisons over time. Statewide angler questionnaires are done annually. Comparing recent results with those of the prior five-years, North Dakota anglers have had a significant increased in both ANS awareness and of their taking ANS precautions between fishing and boating trip.

Conducting interviews requires funds that need to be made available to complete this section of the ANS prevention efforts.

Strategy 4B: Educate non-resident anglers and hunters about ANS prevention protocols by providing focused information through the best avenues of dissemination.

Strategy 4B1. Identify what is the key message, the best format to deliver the information, and where to best deliver the message to this group.

Strategy 4B2. Provide information and education (e.g., newspaper articles, articles in periodicals, in tourism publications, on radio and television spots, and similar venues) on ANS risks and prevention protocols as found in 4B1.

Action Taken for 4B1 and 4B2: The coordinator is working with State and local tourism officials to determine those regions where North Dakota travel information is most requested and is the most likely source of ANS introductions. Include ANS information in packets being mailed out and list web links of ANS prevention sites. Determine if mass media efforts will provide the ANS prevention message to the market-audience. These mailings require additional postage that is an increased expense to small cities' Chamber of Commerce.

Strategy 4B3. Determine the level of ANS awareness and precautions used.

Action Taken: The coordinator compared the response from nonresidents from recent and previous angler interviews at North Dakota's major waters. Determine if there have been any changes in the level of ANS awareness and of ANS prevention used. Focus on ANS prevention protocols listed to be taken before making the trip to that water.

Determine where the nonresident and resident are receiving the ANS information and if there would be a better source for information dissemination. A secondary effort would be to determine if the style of information dissemination should be adjusted to reach this targeted audience.

Strategy 4C: Educate non-consumptive outdoor recreators about ANS, the need to prevent it, and disseminate information in the best form and venue.

Strategy 4C1. Identify what is the key message, the best format to deliver the information, and where to best deliver the message to this group.

> **Action Taken:** The coordinator worked with established groups, e.g., birding groups and eco-tourism, to determine attitude of non-consumptive recreators toward ANS prevention. Provide eco-tourism information on ANS impacts and prevention protocols.
>
> Determine where the non-consumptive recreators are receiving the ANS information and if there would be a better source for information dissemination. A secondary effort would be to determine if the style of information dissemination should be adjusted to reach this targeted audience.

Strategy 4D: Educate water users about ANS problems for them, the need to prevent the introduction or spread of the problem, and how to best provide that message.

Strategy 4D1. Determine where the different types of water users can be contacted and in what form will the ANS message be best received and understood by them.

> **Action Taken:** The coordinator contacted local water resource boards, and provided them presentations on the ANS impacts. The water resource boards were encouraged to consider ANS impacts and to include REPPs in their projects, and realize their projects impacts extend beyond the traditional take line.
>
> Education will need to continue and this will require additional funds be made available to reach this target audience that was typically over looked in ANS prevention efforts.

Strategy 4E: Provide tourism promotion groups, including state and local efforts which include guides and outfitters, fishing tournament promoters, etc., with information about the impacts of ANS, how ANS are moved into or within the State, and how critical prevention is.

Strategy 4E2. Determine these groups willingness to provide additional information on ANS prevention methods.

> **Action taken:** The coordinator has contacted these groups and determined which will provide ANS information to their contacts or clients.

Strategy 4F: Develop communication with public and private entities, such as the Garrison Conservancy District, water pipeline cooperatives, etc., about potential

ANS impacts to their operation, the need for a cooperative approach to prevention, and the need to heighten staff awareness.

Strategy 4F1. Determine the level of awareness that these groups have regarding potential ANS problems and what ANS prevention and monitoring is currently being done.

> **Action taken:** The coordinator will contact these groups and determined which are receptive to learning about ANS impacts for their particular ventures.

OBJECTIVE 5: INSPECTIONS OF RECREATIONAL BOATS, COMMERCAL VESSELS, AND EQUIPMENT USED IN AQUATIC SITUATIONS.

Strategy 5A: Implement an inspection program for boats used for fishing, hunting, or pleasure.

Strategy 5A1: Develop and implement boat inspections at boat ramps to determine if ASN is present, where the boat has been, where the boat will be used, and owner/operators awareness of ANS problems and preventions.

> **Action taken:** Boaters were contacted at boat ramps in 1999, their boats inspected, and they were interviewed to determine ANS awareness. These interviews should continue as specific projects conducted by contracts to universities or to conservation groups. This should be an ongoing project and be done via contract to outside sources rather than done by Department staff.

Strategy 5B: Implement an inspection program for vessels used during construction in aquatic situations.

Strategy 5B1. Develop and implement requirements as provided in permits that vessels such as barges, tugs, work boats, tenders, or similar vessels be required to be ANS free prior to their being launched or used on or in North Dakota's waters.

> **Action taken:** The Department has preparing verbiage to be provided to Corps of Engineers to be included in permitting. Inspection of vessels has occurred where and when the location of the vessel was made availably to the Coordinator and the vessel could be inspected.

Strategy 5C: Implement an inspection program for equipment used in construction in aquatic situations.

Strategy 5C1. Develop and implement requirements as provided in permits that equipment used in aquatic situations be required to be ANS free prior to their being launched or used on or in North Dakota's waters.

Action taken: The Department has preparing verbiage to be provided to Corps of Engineers to be included in permitting. Inspection of construction equipment has occurred where and when the location of such equipment was made availably to the Coordinator and the vessel could be inspected.

OBJECTIVE 6: WHERE FEASIBLE, CONTROL AND ERADICATE PIONEERING OR ESTABLISHED AQUATIC NUISANCE SPECIES THAT HAVE SIGNIFICANT IMPACTS ON NATIVE OR DESIRABLE SPECIES.

Strategy 6A: Control known nuisance populations where economically and technically feasible.

Strategy 6A3. Provide technical assistance to watershed councils, conservation districts, irrigation districts, lake associations, and other groups for development of management plans.

Action Taken: The coordinator and State Water Commission are working with local Water Resource Boards to prevent common carp from being introduced into waters not infested with carp. Details on fish barriers were provided along with recommendations on which design was the most effective.

The value of local Water Resource Boards including ANS prevention efforts should become part of their planning proposes and not an after the fact thought when it is brought to their attention. Early incorporation of ANS prevention is cost effective and allows designing REPPs.

OBJECTIVE 7: INFORM THE POLICY MAKERS ABOUT THE RISKS AND IMPACTS OF AQUATIC NUISANCE SPECIES.

Strategy 7A: Educate public officials about the problems of ANS and how ANS are spread.

Strategy 7A1. Create med presentation and accompanying information on ANS concerns, impacts, and need for proactive prevention efforts

Action Taken: The coordinator has developed a presentation highlighting the potential ANS impacts to North Dakota's resources.

Strategy 7A2. Provide interested law makers the pertinent points to be considered when crafting legislation to prevent the introduction or spread of ANS.

Action Taken: The coordinator and AISC have prepared a list of items to be considered in promulgating legislation on ANS. (see Appendix K for additional information on ANS concerns provided to North Dakota Legislators)

OBJECTIVE 8: INCREASE THE AQUATIC NUISANCE SPECIES KNOWLEDGE BASE AND DISSEMINATE THAT KNOWLEDGE IN NORTH DAKOTA THROUGH COMPILING DATA, CONDUCTING RESEARCH AND INFORMATIONAL PUBLICATIONS.

Strategy 8C: Facilitate the collection and dispersal of information, research, and data on ANS in North Dakota.

Strategy 8C1. Create a central repository for reference materials and a central data base on ANS infestations.

> **Action Taken:** The coordinator has begun to compile information on ANS species, infestation sites, and life history.

Appendix C

Noxious Weed Inventory Location Figures

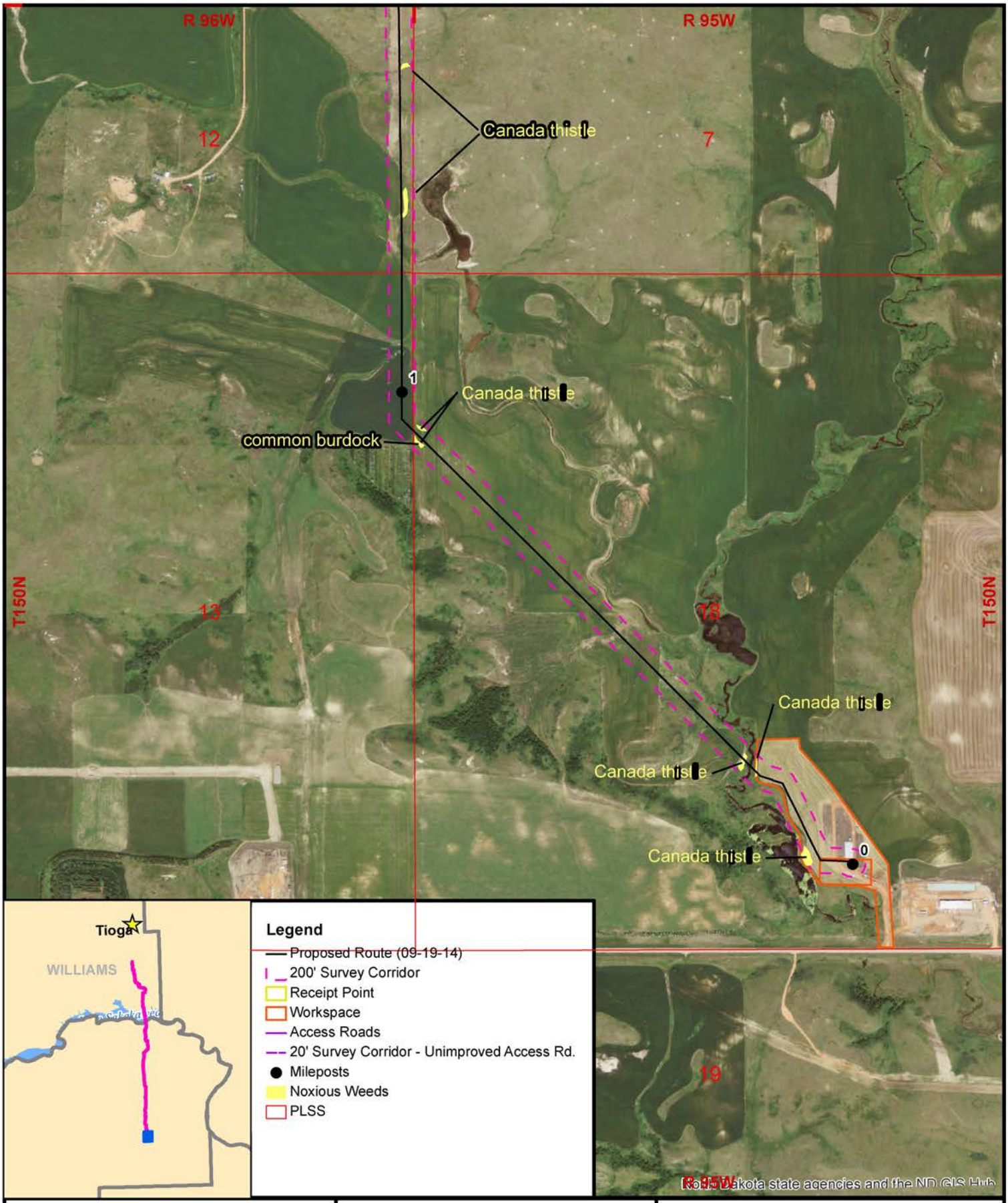

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Figure 1

Noxious Weed Locations
Dry Creek Terminal to Beaver Lodge
BakkenLink Pipeline

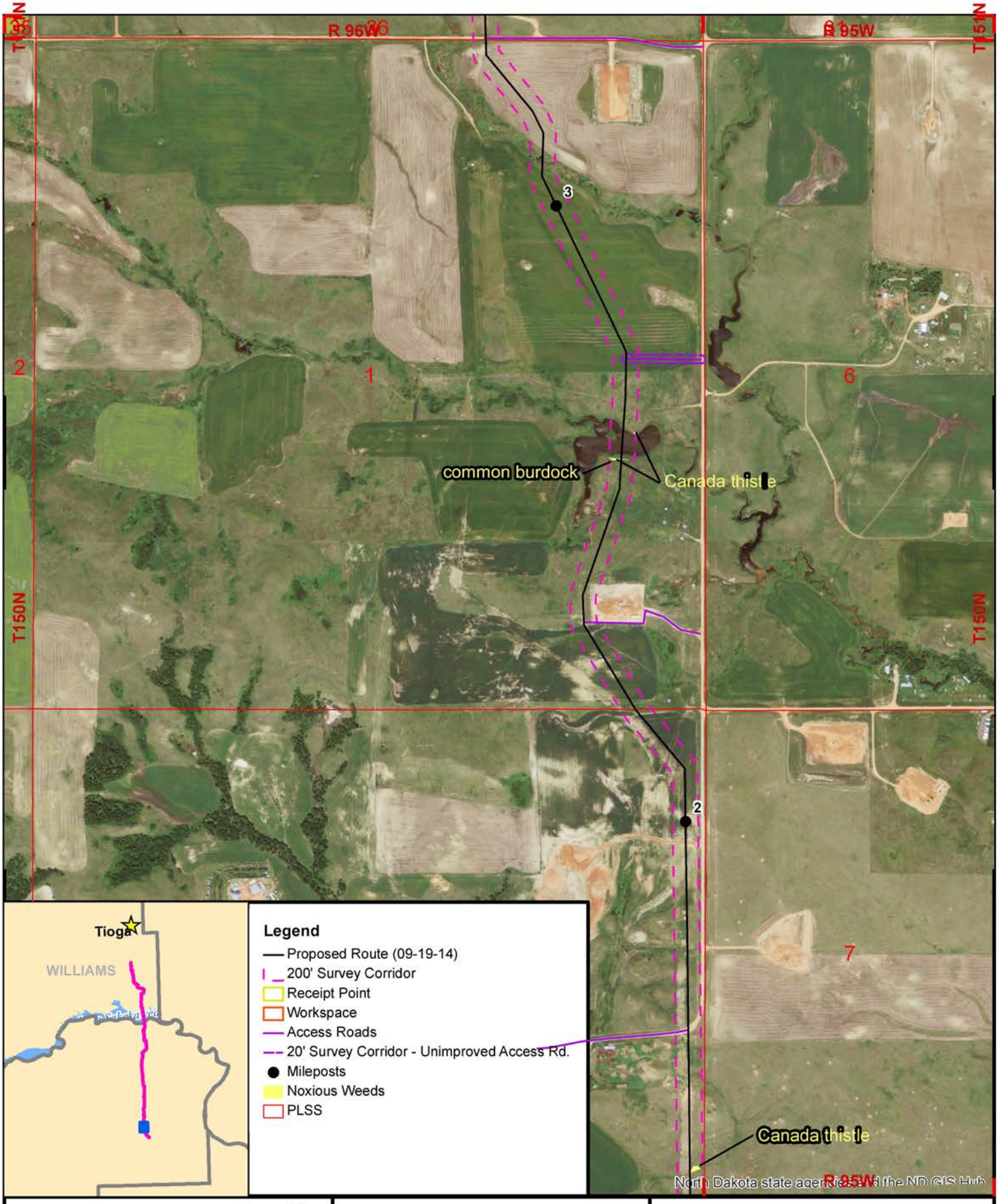

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Figure 2

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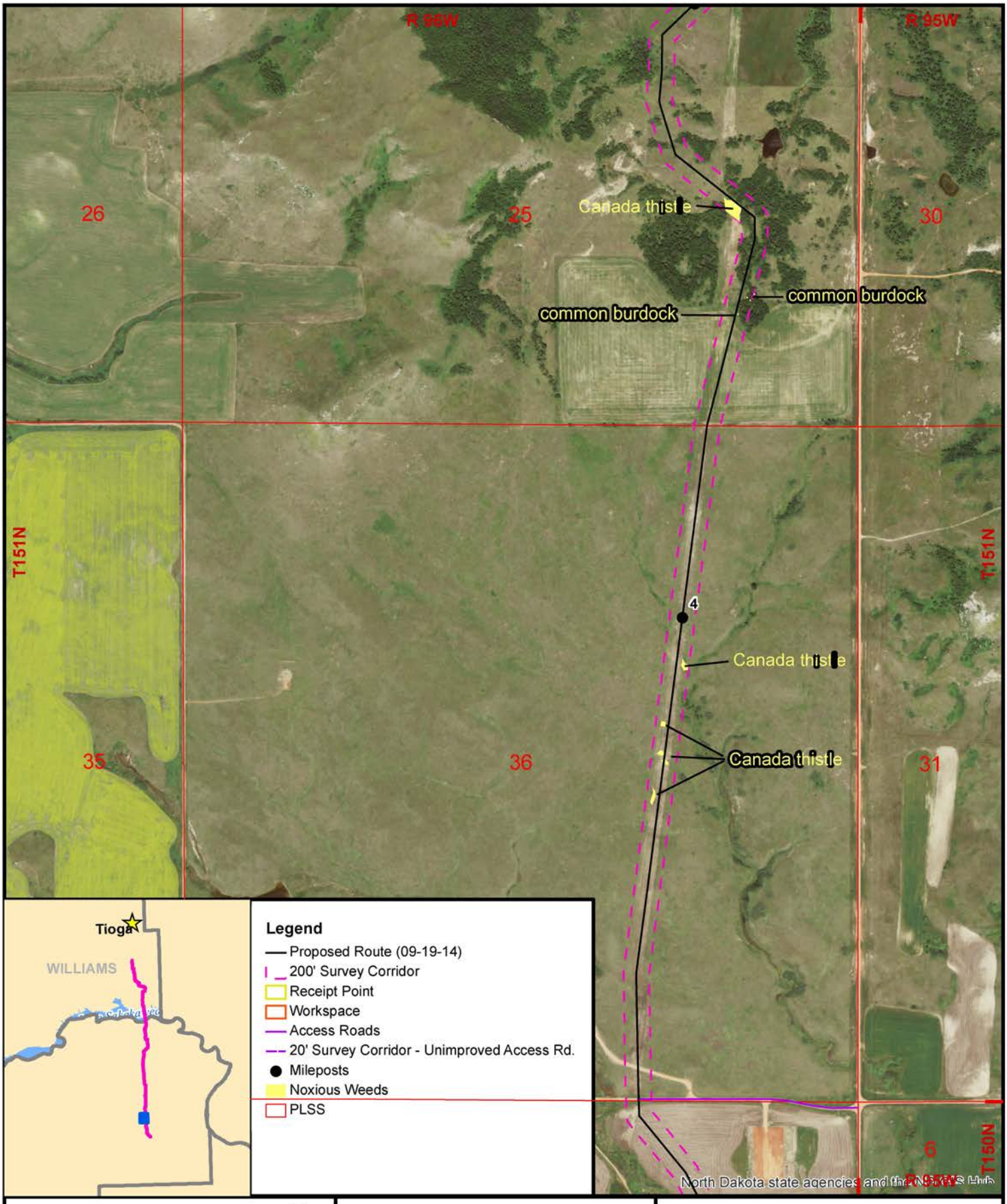

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Figure 3

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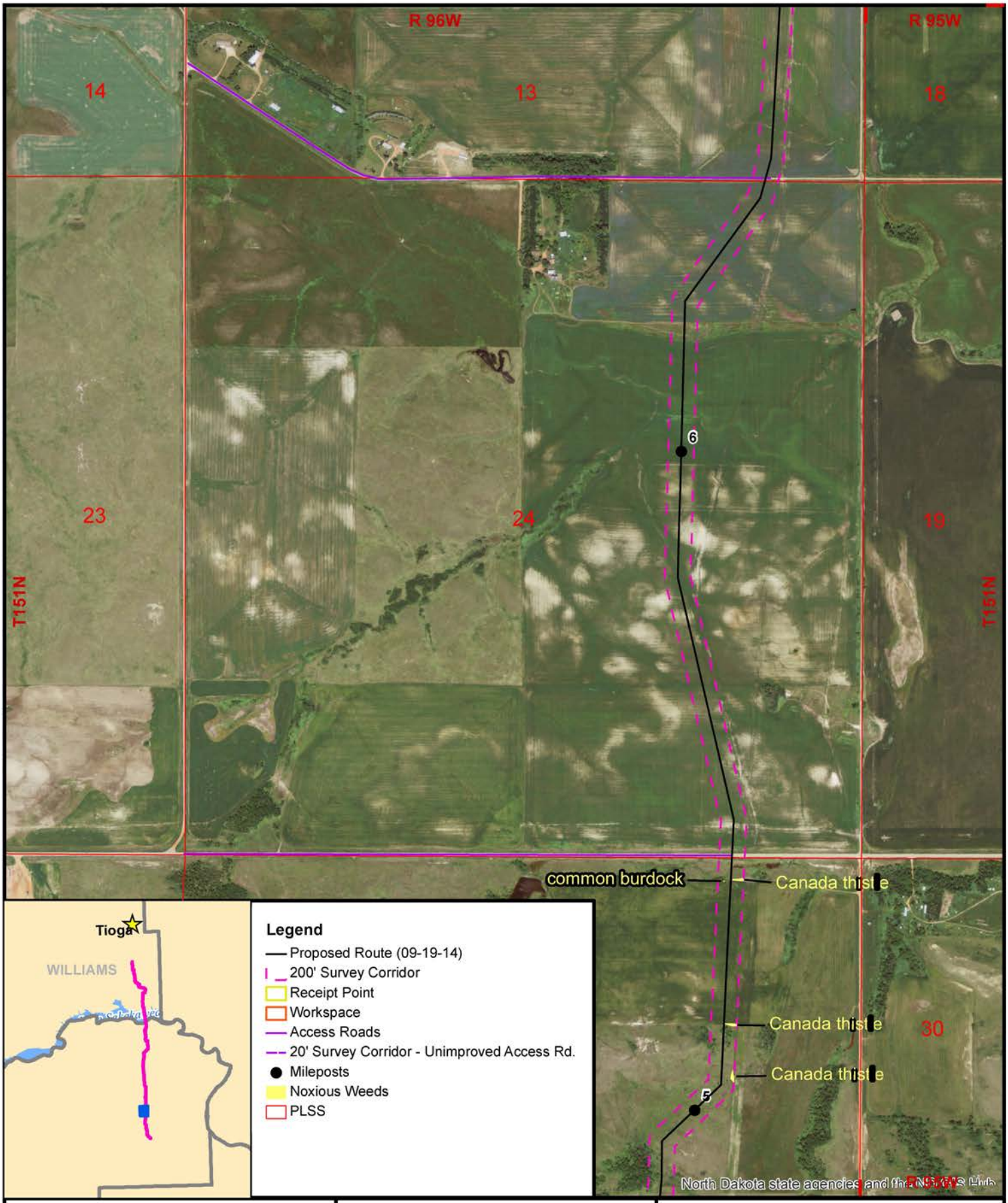

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Figure 4

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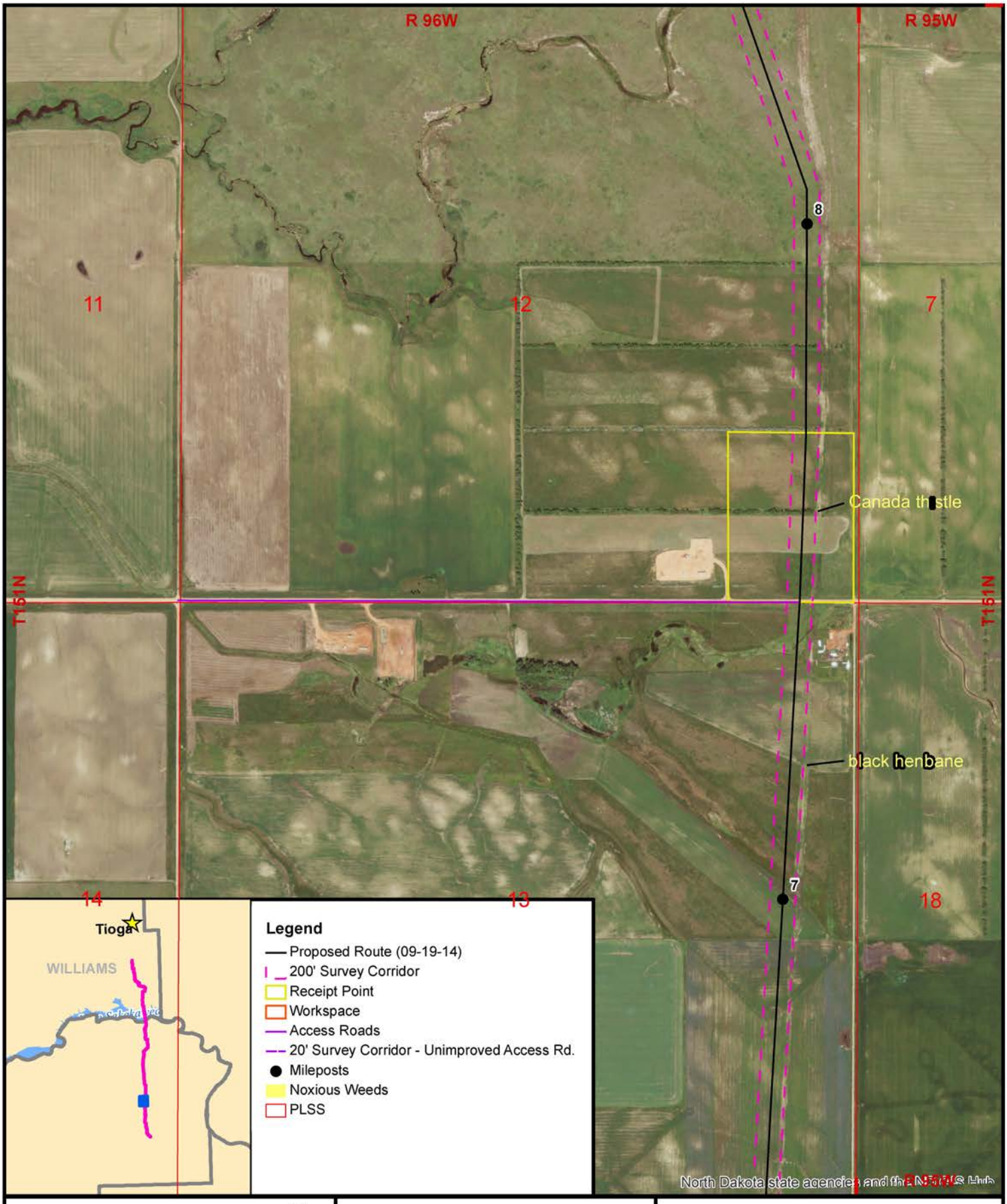

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Figure 5

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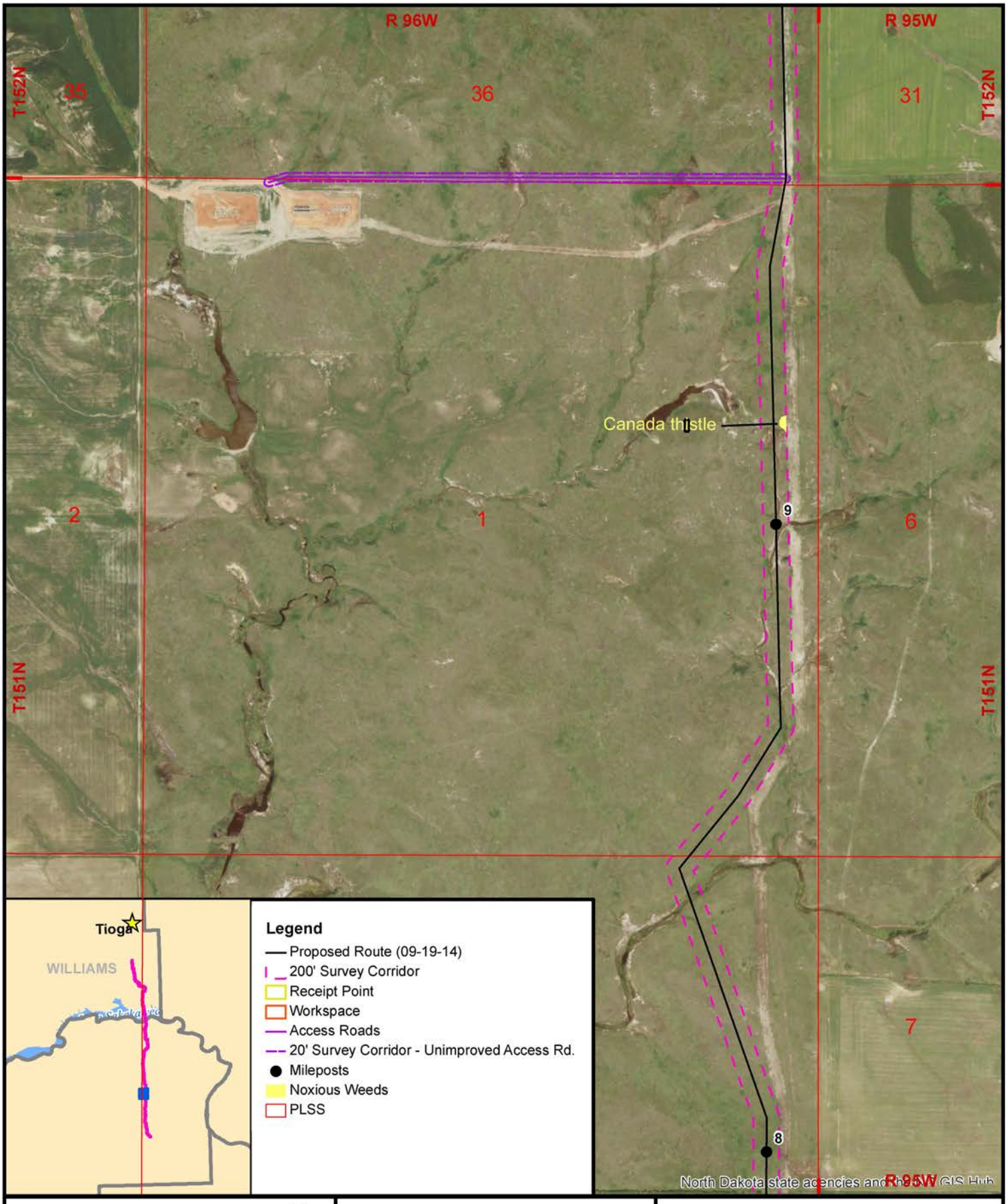

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Figure 6

Noxious Weed Locations
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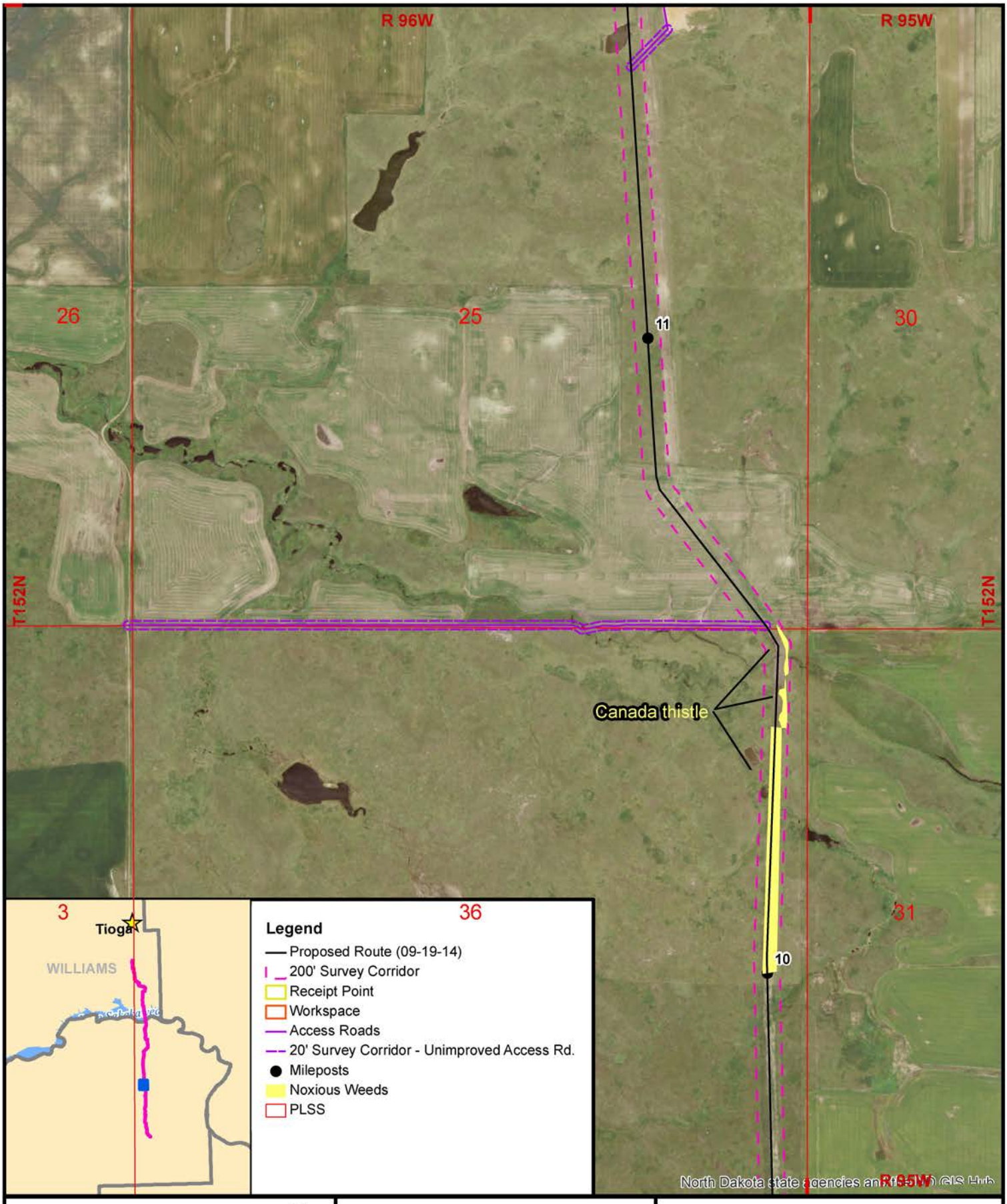

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Figure 7

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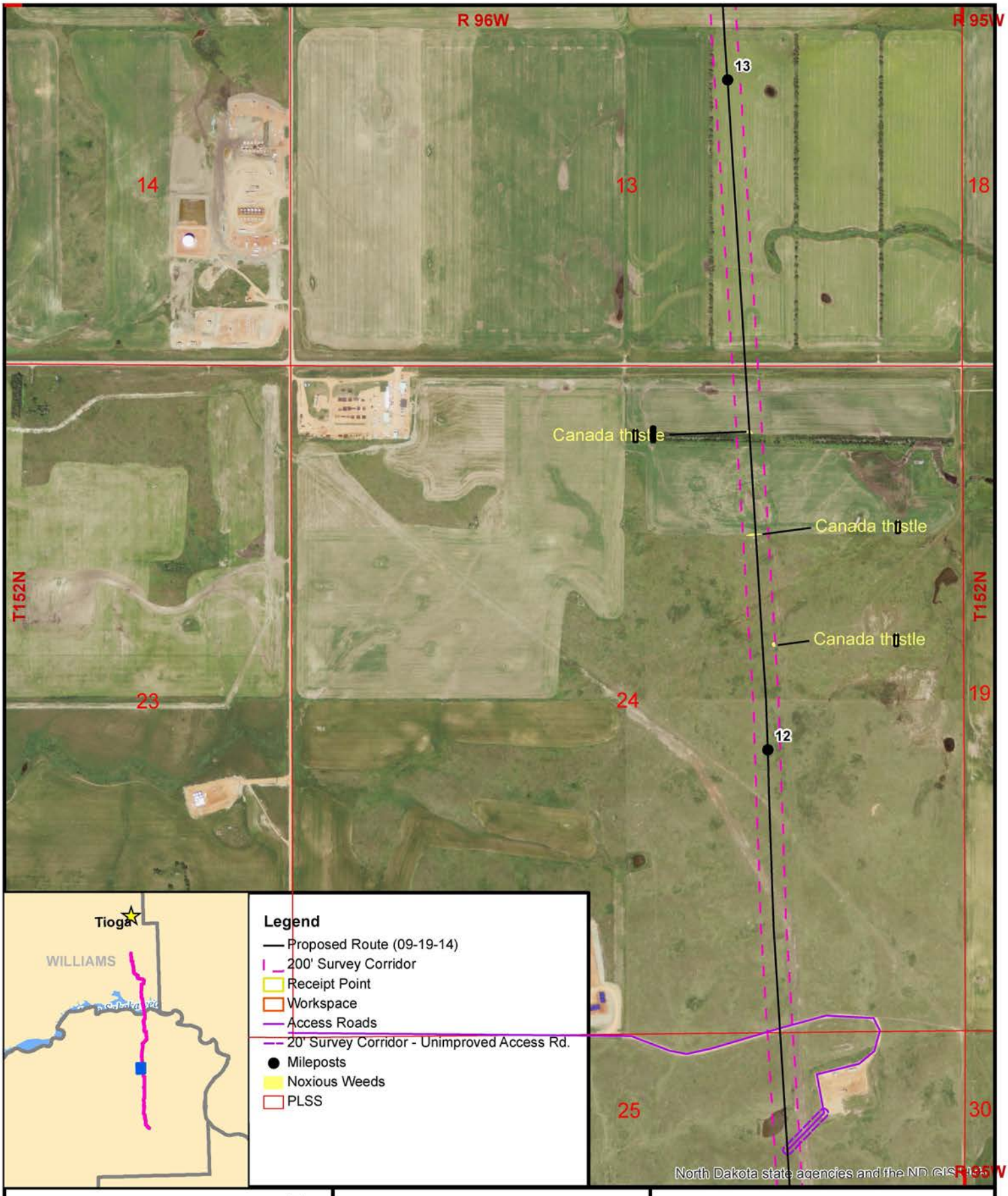

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Figure 8

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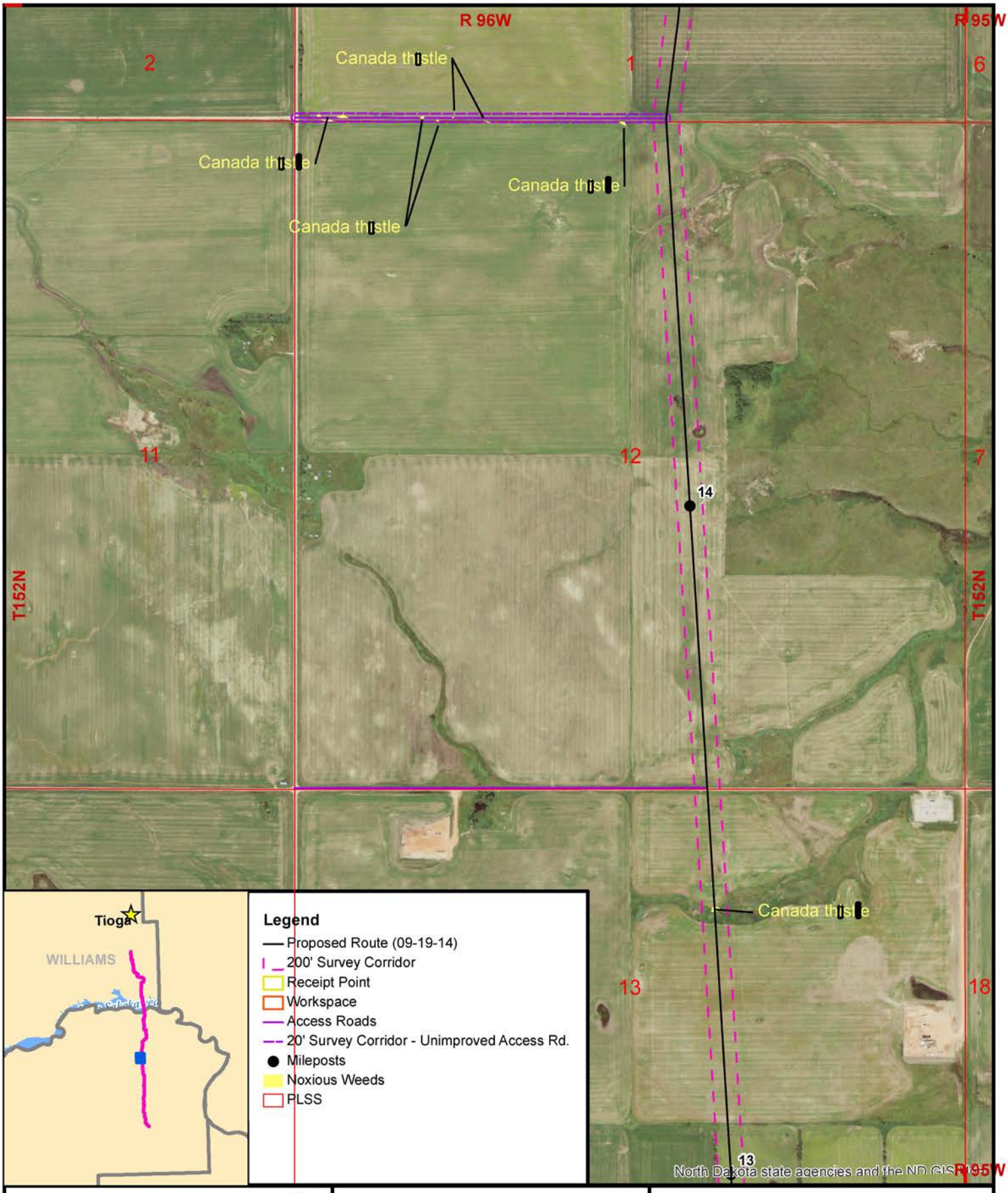

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Figure 9

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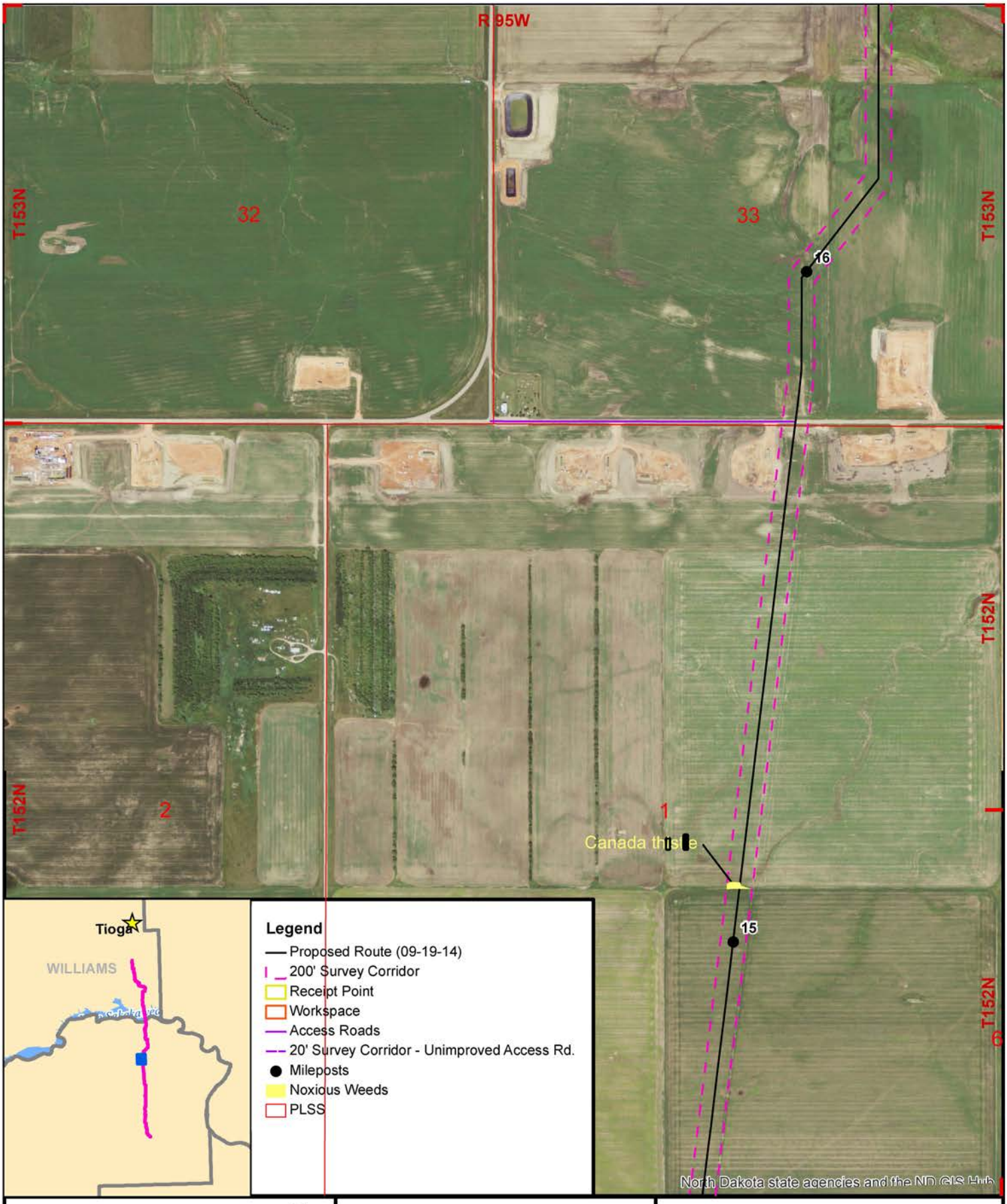

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Figure 10

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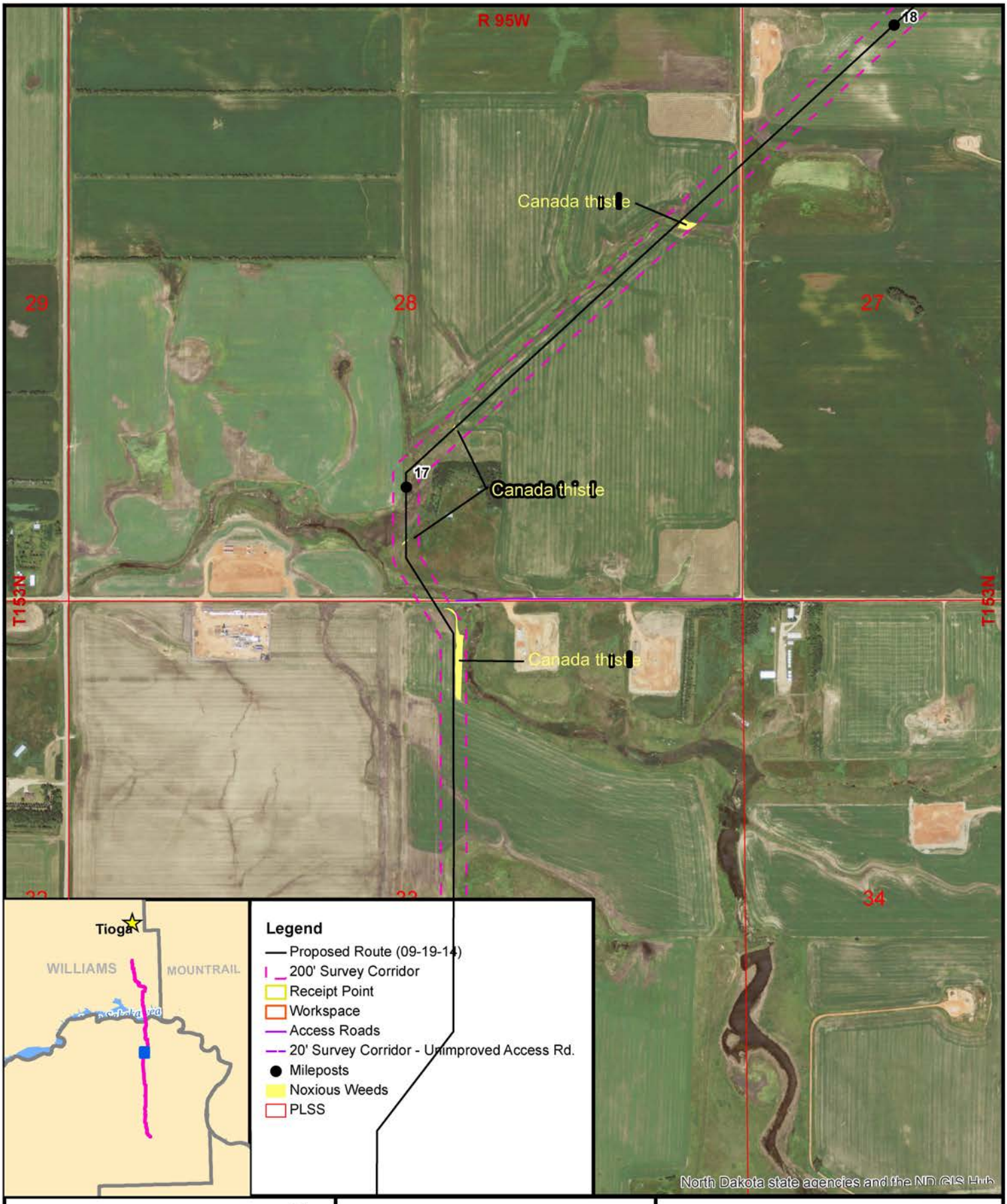

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Figure 11

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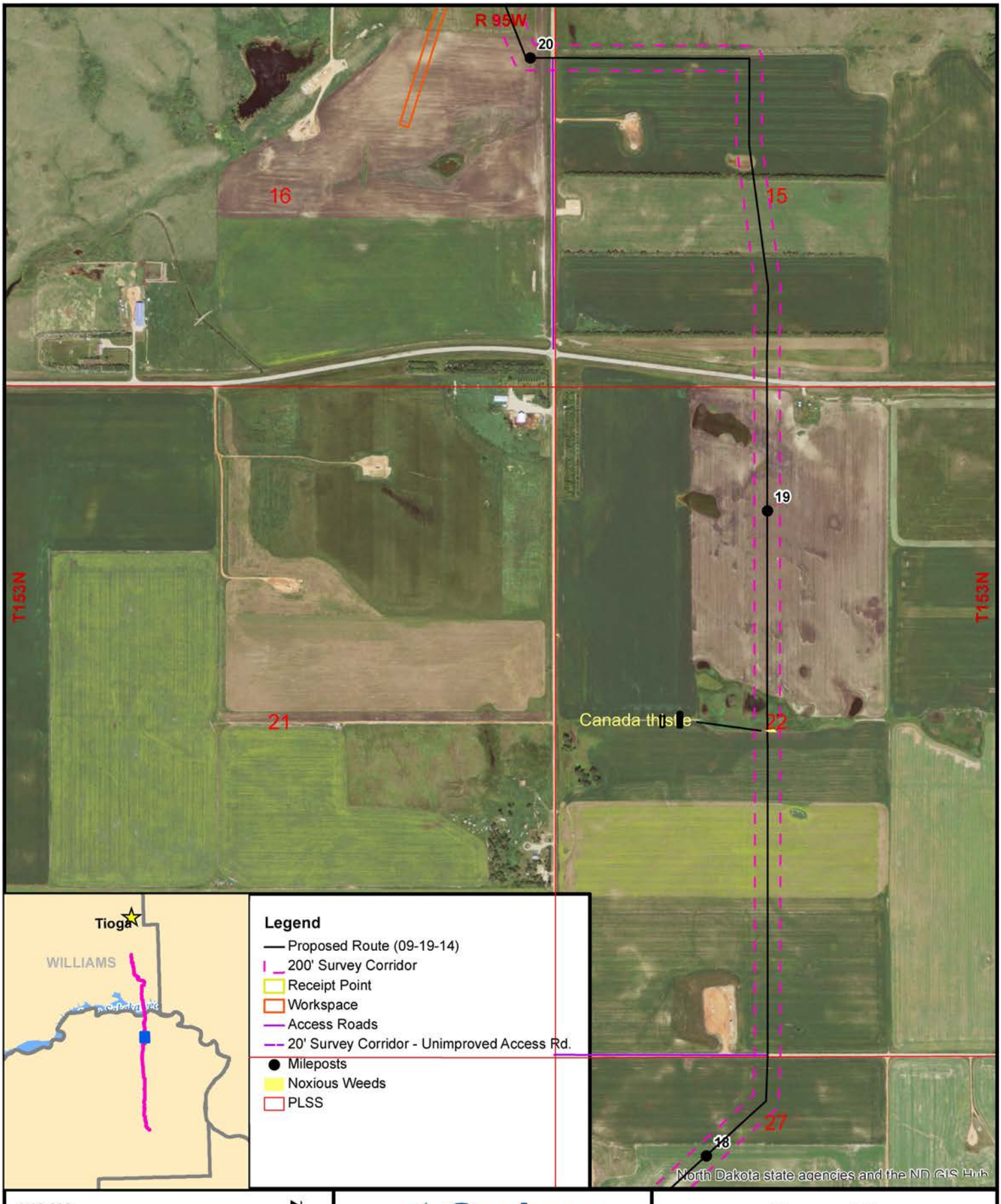

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Figure 12

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BakkenLink Pipeline

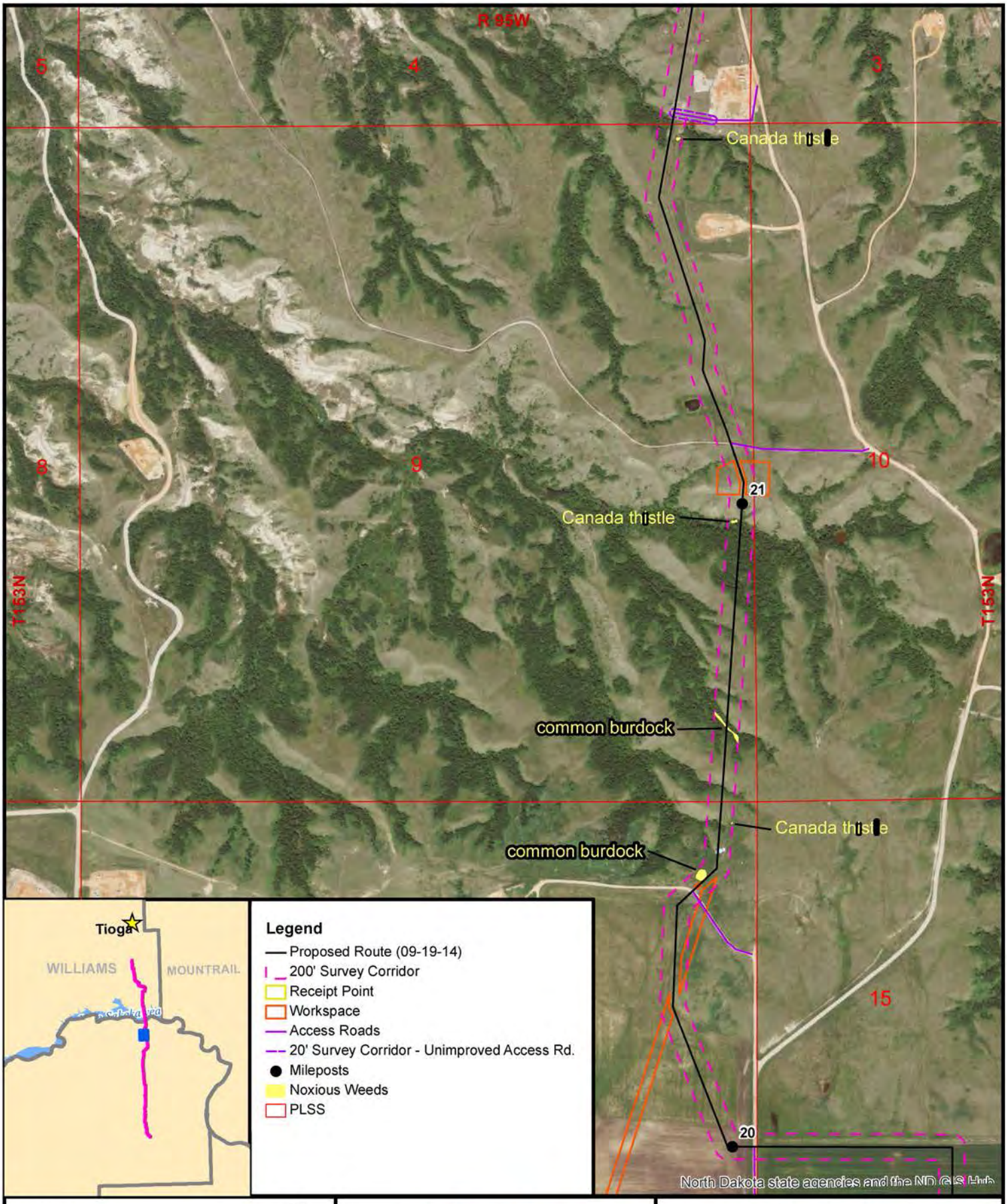

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Figure 13

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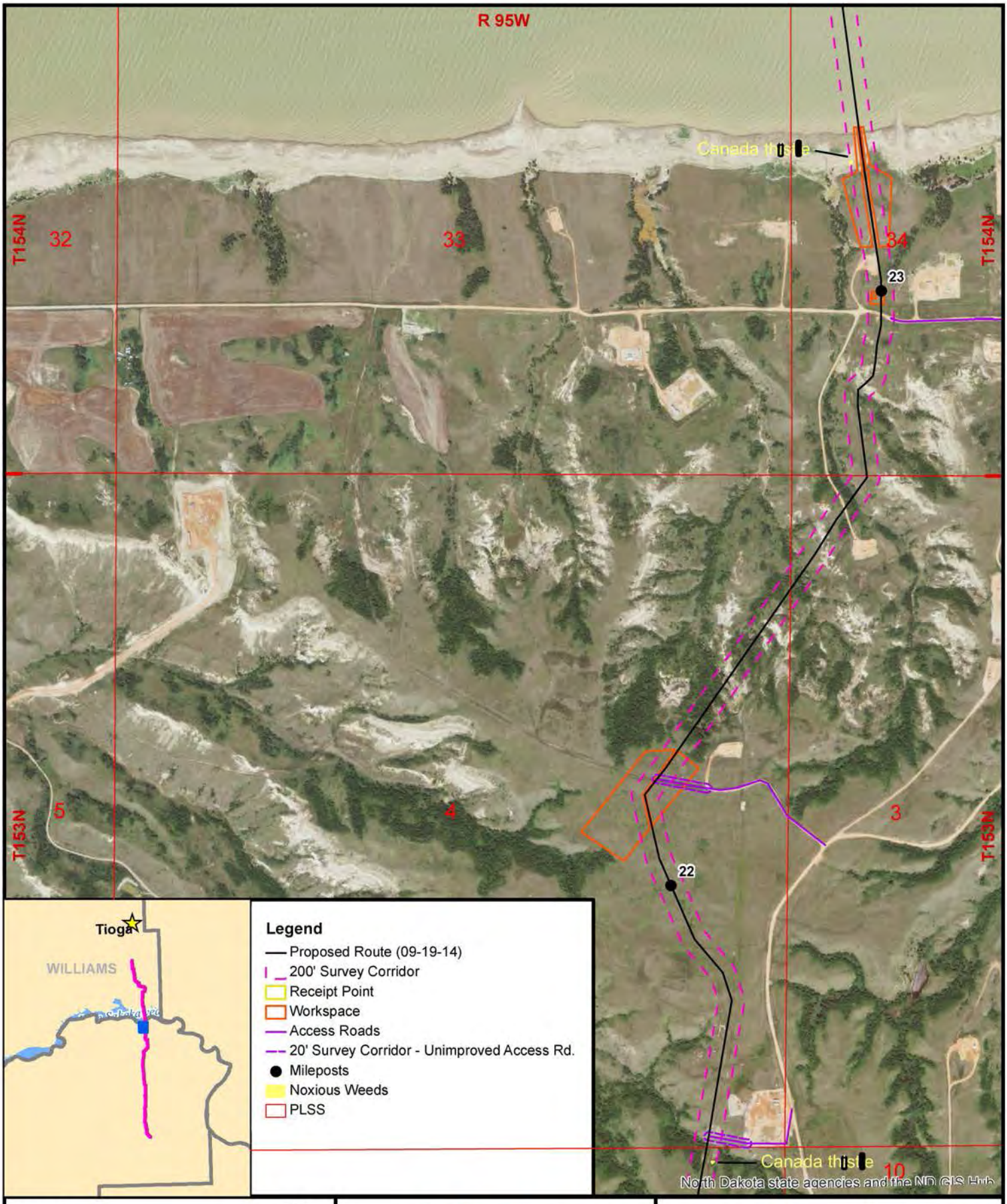

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Figure 14

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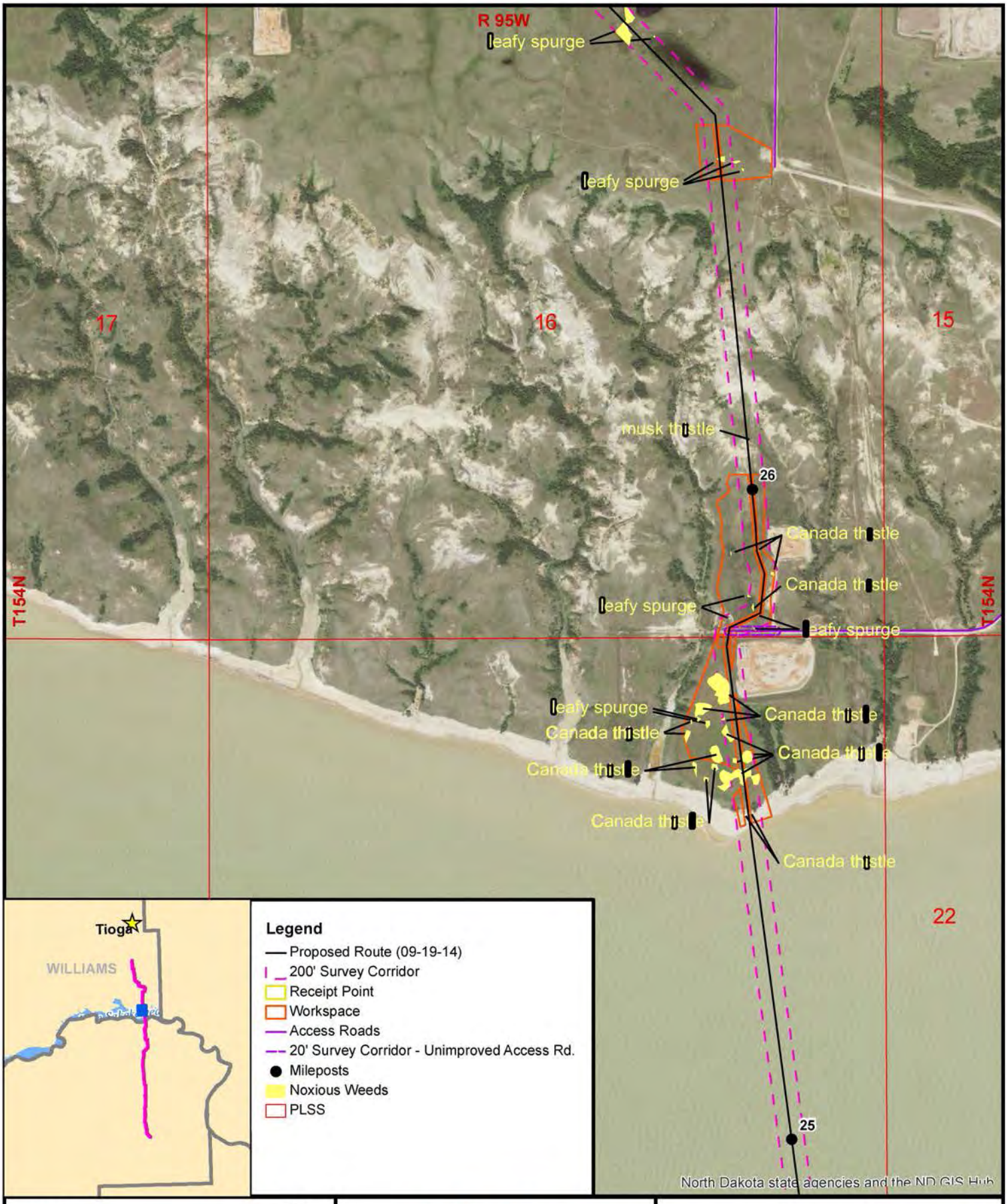

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Figure 15

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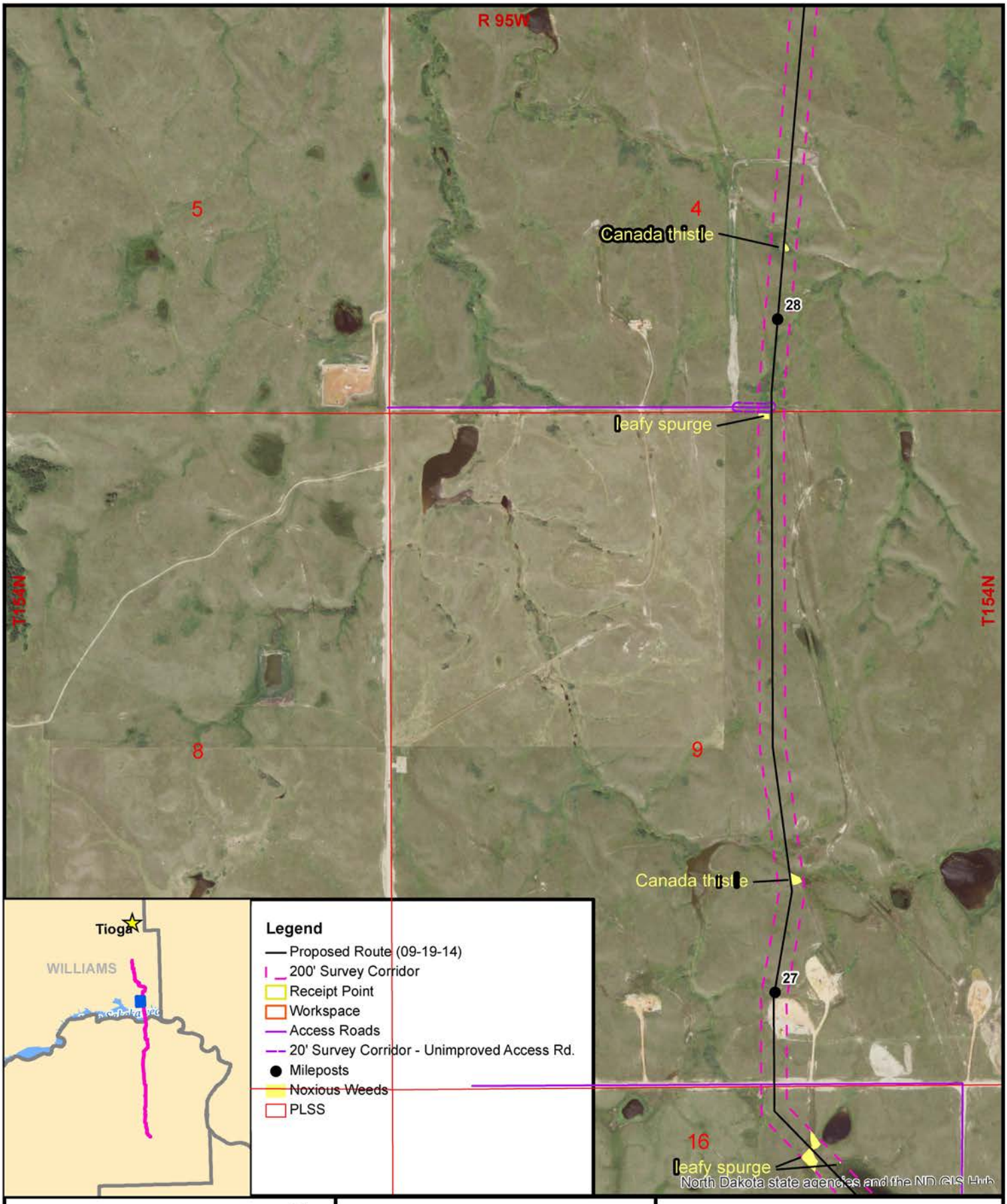

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Figure 16

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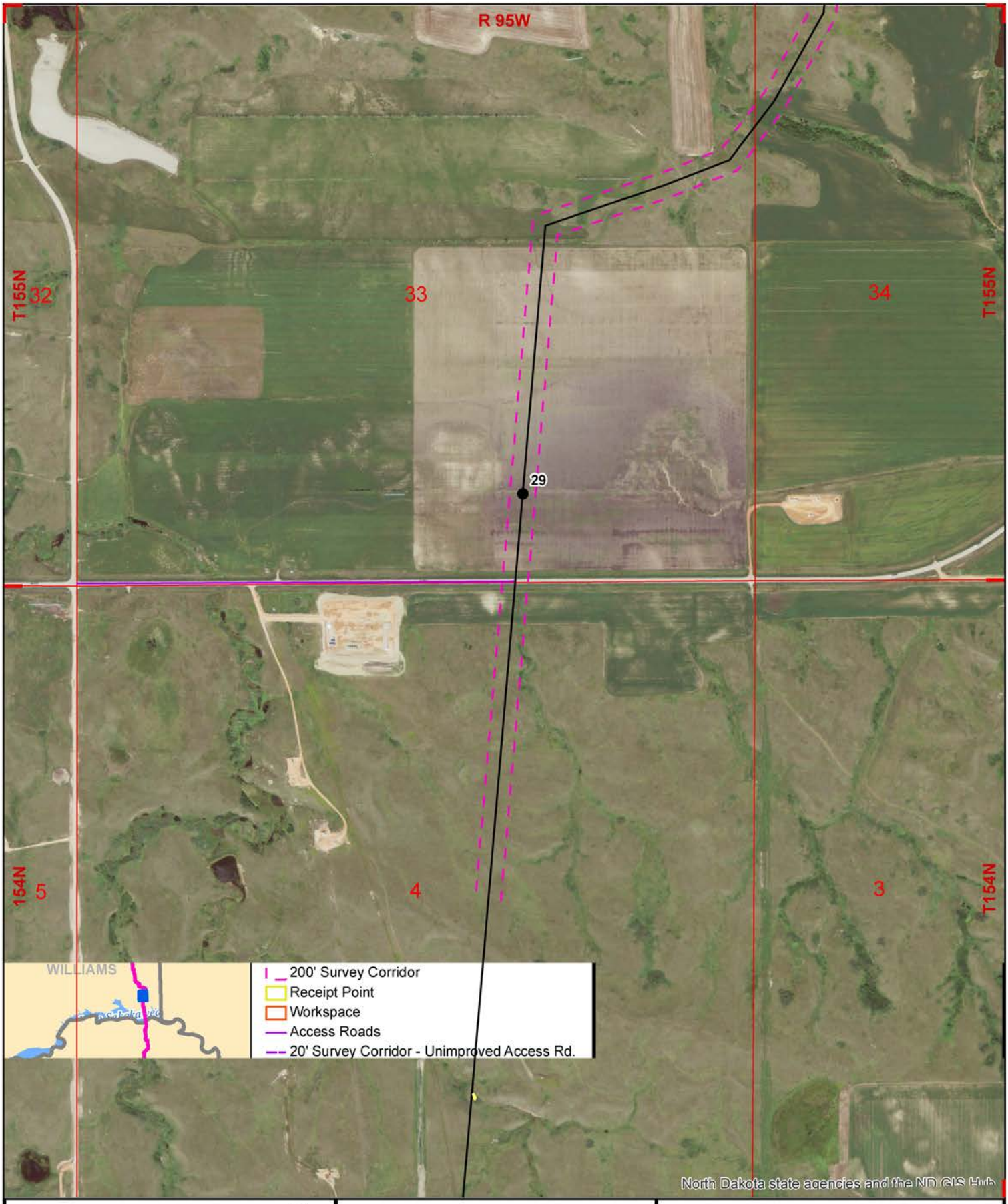

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Figure 17

Noxious Weed Locations
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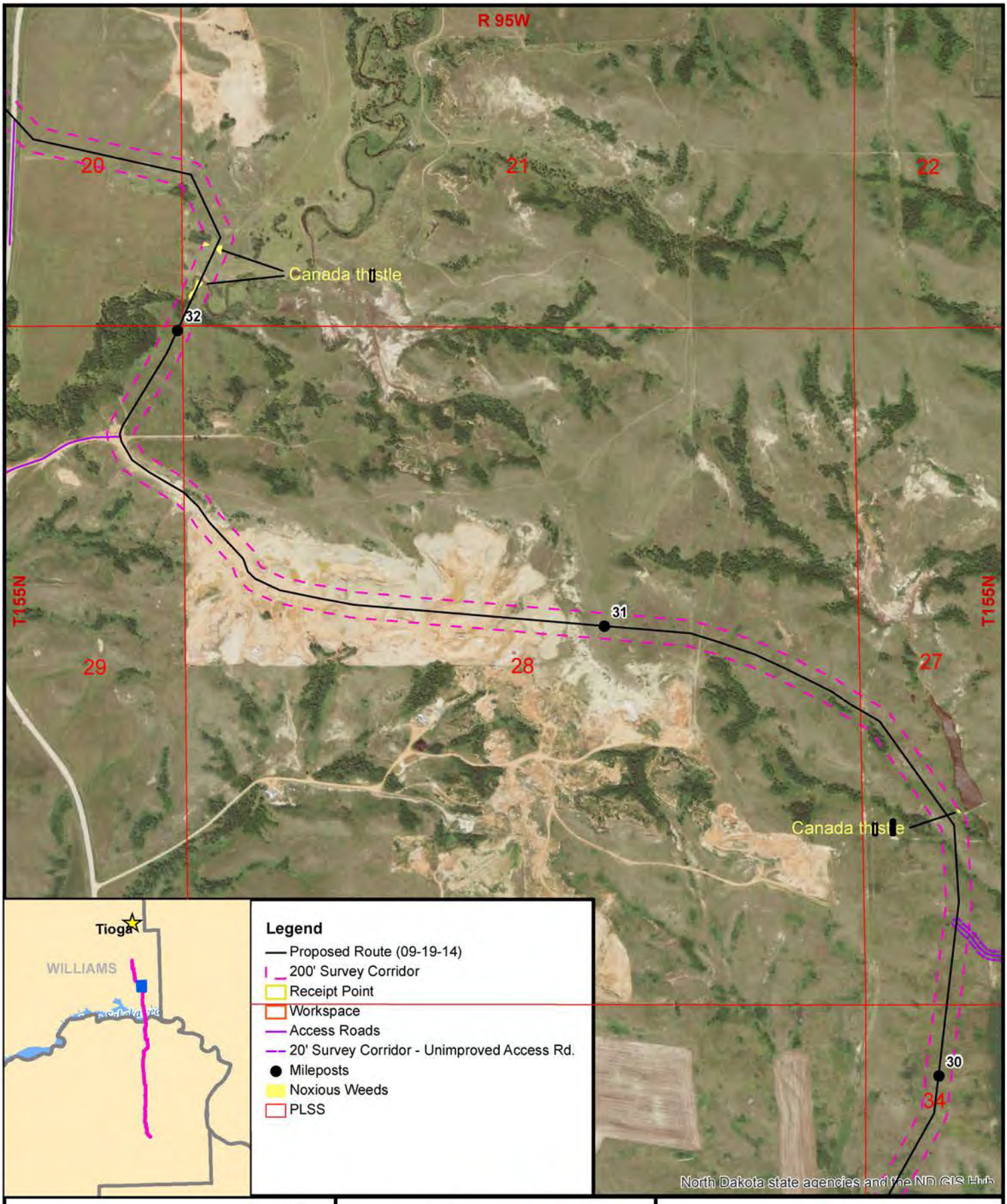

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Figure 18

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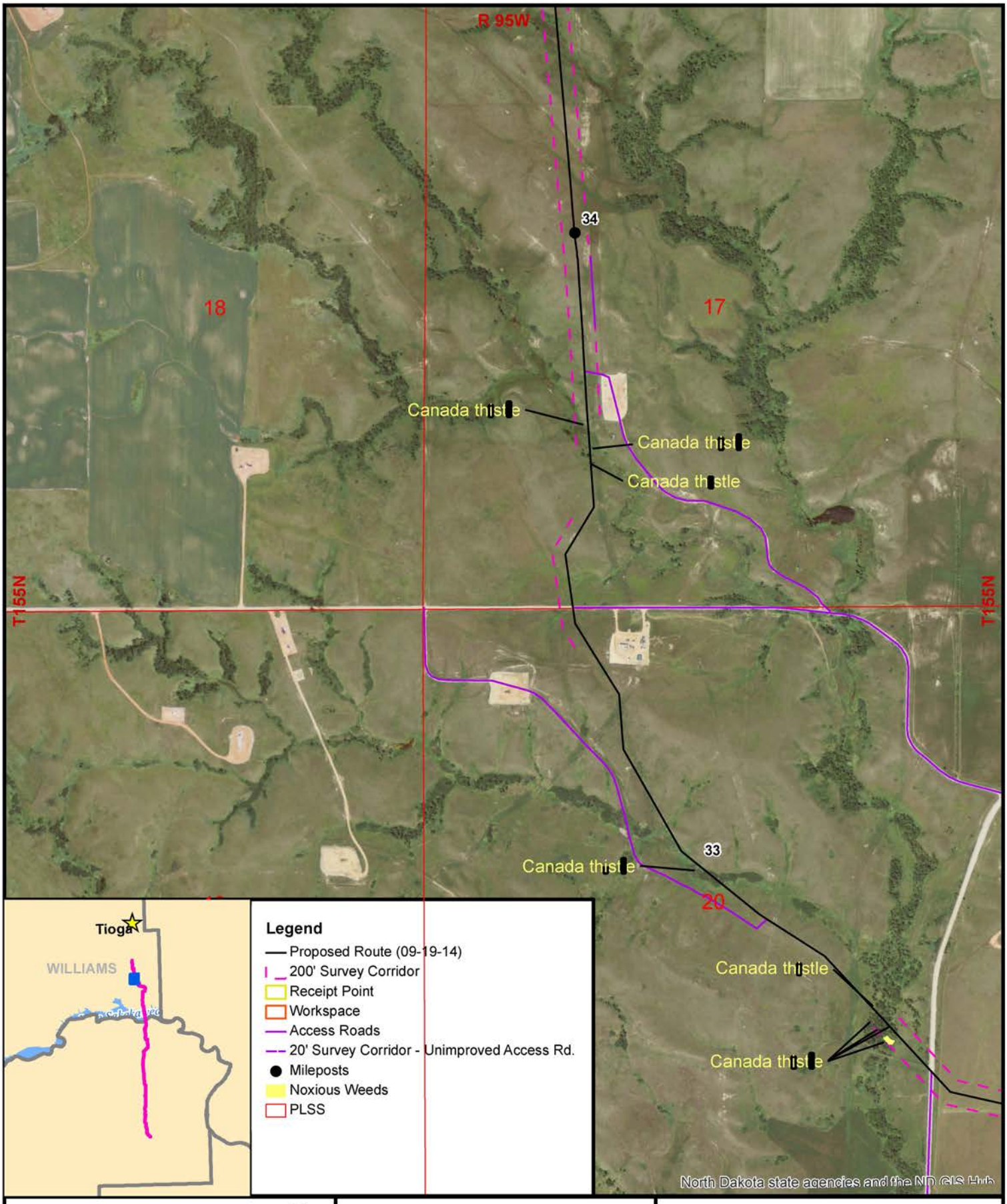

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Figure 19

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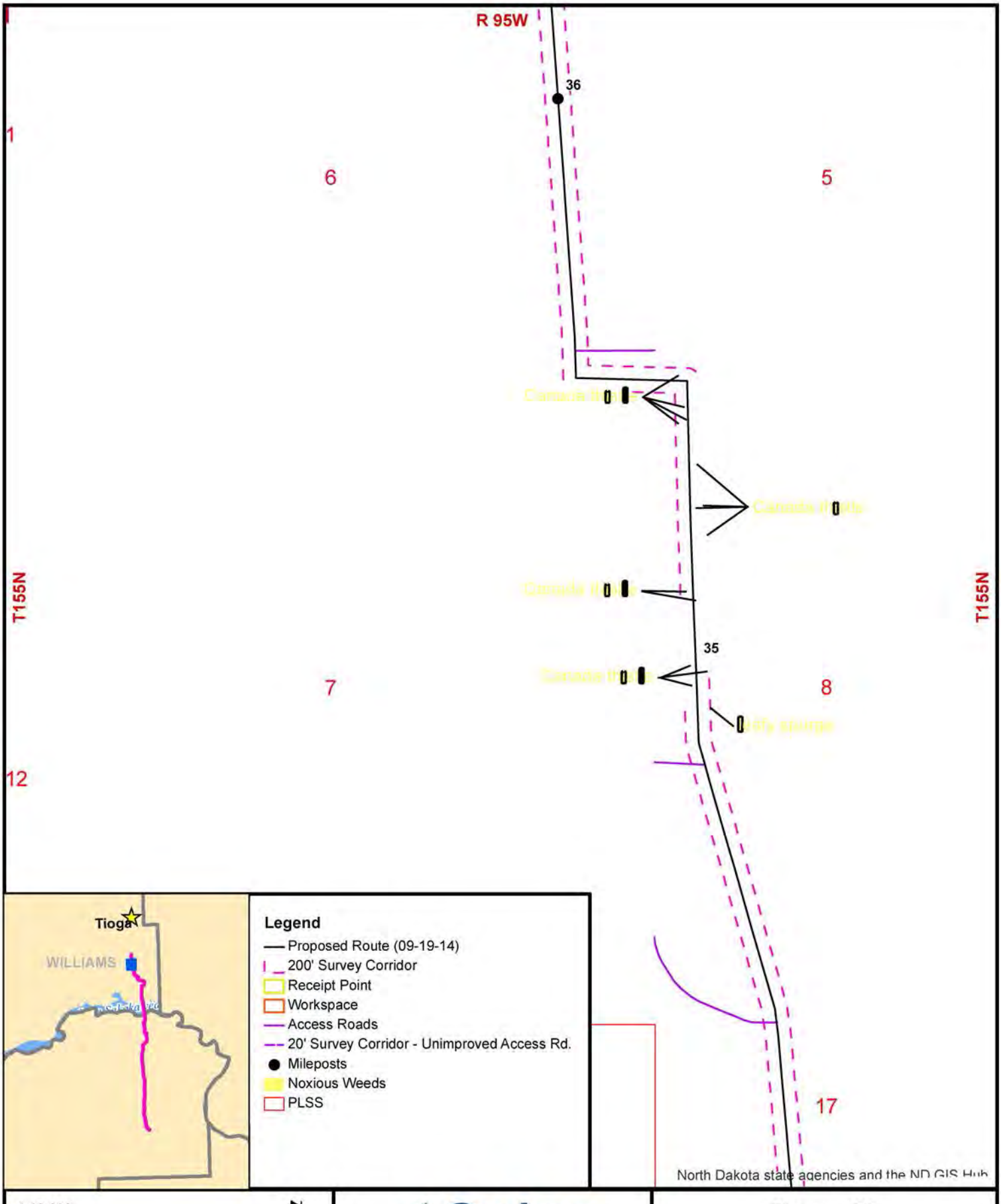

Figure 20

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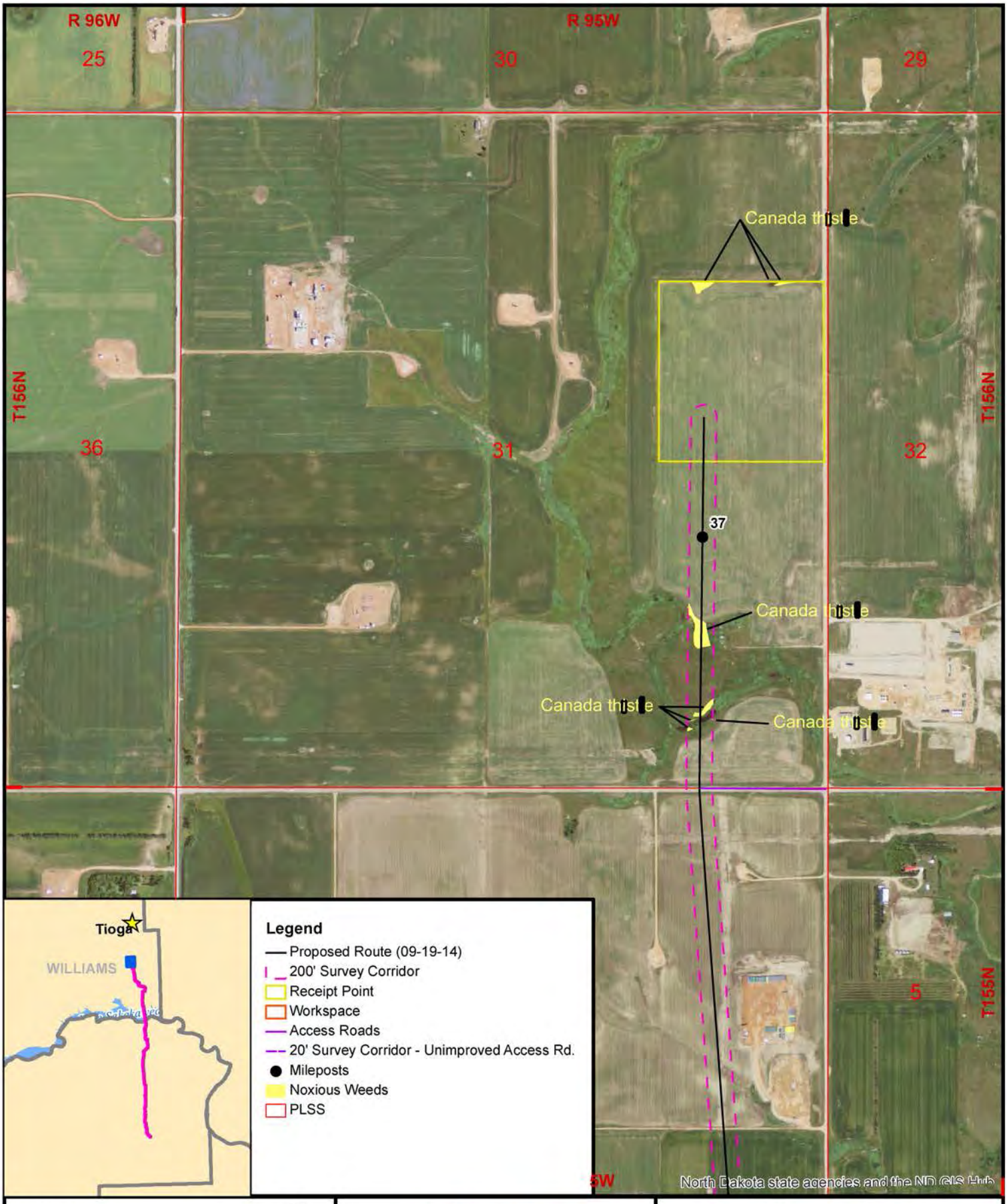

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Figure 21

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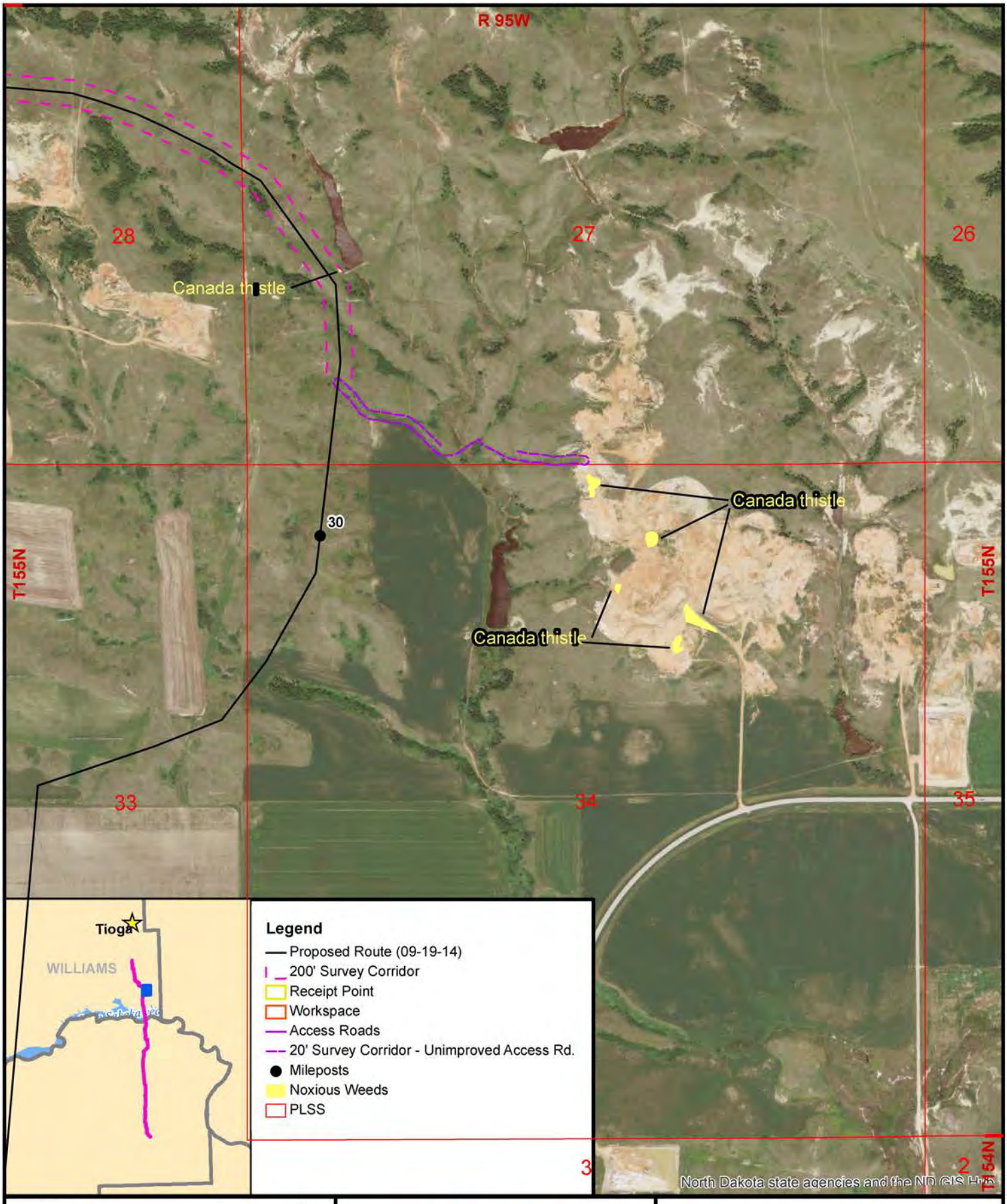

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Figure 22

Noxious Weed Locations
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Appendix D

USFS Stipulations for Herbicide
Approved Herbicides for Use on the Little Missouri National Grasslands
Noxious Weed Seed Viability Quick Reference Chart
Pesticide Use Proposal (Form FS-2100-2)
Pesticide Use Proposal Attachment A, Supplement (DPG-2100-2A)
Pesticide Application Records/Year End Report

USFS Stipulations for Herbicide

Noxious Weed Prevention & Control

The following are prescribed prevention and control measures which, when used in conjunction with other measures, will help the Operator or Holder meet their responsibilities in preventing and controlling noxious weeds and/or invasive plants as identified by the North Dakota Sate Dept of Agriculture, individual Counties, and within the 2007 Dakota Prairie Grasslands Noxious Weed Management Project.

Integrated Pest Management Program

The Operator or Holder must annually coordinate their noxious weed prevention and control plans with state or county management agencies. The plans may include biological, mechanical, and/or chemical treatments or a combination of all three.

Existing Weeds

Annual treatment is required if noxious weed species are present.

Construction & Drilling Equipment

Remove all mud, dirt, and plant parts from all off road construction and drilling equipment before moving into the project area. If this equipment was recently used on a weed infested site, it should be thoroughly cleaned with a pressure washer. Cleaning must occur off National Forest System Lands. This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area. Likewise, all equipment must be cleaned prior to leaving the project site if operating within infested areas.

New Construction and/or Reconstruction

- Areas infested with noxious weeds, which will be disturbed during the construction process, should be chemically treated during the normal growing season with herbicides a year prior to disturbance. If this is not possible, the infestations should be treated at least two to four weeks prior to disturbance.
- Excavated topsoil infested with noxious weeds shall be stored separately from other topsoil and periodically treated with herbicides if sprouting of either is detected.
- Keep construction sites closed to vehicles not involved with the construction until construction and revegetation is complete.
- If straw is used for road stabilization and erosion control, it must be certified weed free.

Borrow Materials (Scoria, Gravel, Dirt, Manure, & Topsoil)

- It is the Operator's or Holder's responsibility to obtain borrow materials from pits or sites that have been inspected and certified as weed free sites, and approved by the Forest Service prior to use.
- Certification shall be in writing and shall include the quarter/quarter, section, township, and range, and the name and address of the surface owner. If the Operator or Holder is in doubt as to whether a site has been inspected and certified, the Operator or Holder may request the individual County Weed Board or the Forest Service to inspect and certify the site.
- Borrow material will not be used if the weeds present at the borrow site are not found at the site of intended use. If weeds are present, they must be treated before transport and use.
- The borrow site may not be used if new invader species are found at the borrow site.

- It is in the Operator's or Holder's best interest to help maintain regularly used sites as weed free.

Road Maintenance

- Do not blade roads or pull ditches where new invaders are found.
- Coordinate road maintenance activities with herbicide application to maximize efficiency.

Road Obliteration

Chemically treat infested roads prior to obliteration and reclamation.

Plugged and Abandoned Sites

Noxious weeds and exotics should be sprayed prior to reclamation of the site and during the monitoring of the site until released. Use caution not to use herbicides that will have a detrimental effect to any seeding requirements.

Chemical Treatment

Reference Vegetative Control, Application of Herbicides, for the guidelines regarding the application of approved herbicides.

Monitoring

The Forest Service shall perform annual inspections to monitor the effectiveness of treatments. The Forest Service will also take the lead in identifying any new noxious weed occurrences in cooperation with the local County Weed Boards and the Operator or Holder.

Vegetative Control, Application of Herbicides

NOTE: Herbicides used for vegetative control are generally pre-emergence short-term (less than one year duration) herbicides that will kill all vegetation including grasses and forbs. Therefore, it is extremely important that these herbicides not be used to control noxious weeds and/or invasive species within those areas of the pad or road where native vegetative cover is being established under interim or final reclamation.

Chemical Treatment

The following mitigation measures shall apply to the ground application of all herbicides:

General

All chemical treatments must be approved in writing by the Forest Service prior to any surface application. A copy of the approval must be present on the site being treated. Failure to produce a copy of the approval may result in immediate shut down of operations.

Applications, Forms, Monitoring

Companies using herbicides for vegetative control or for control of noxious weeds and/or invasive species must annually complete, submit, and have approved prior to use the following documents:

a. Pesticide-Use Proposal (Form FS-2100-2).
b. Pesticide-Use Proposal Attachment A, Supplemental Information (Form DPG-2100-2A).
c. Spill Incident Response Plan for transporting herbicides.

A current and blank copy of forms 2100-2 and 2100-2A can be obtained from the Forest Service District Office upon request.

Do not combine vegetative control use with control of noxious weeds and/or invasive species use on the same forms. Separate forms must be submitted for each.

Herbicides

Only approved herbicides as specified within the 2007 Dakota Prairie Grasslands Noxious Weed Management Project can be used for chemical treatment. Since this listing may change from year to year, it is the Operator's or Holder's responsibility to request and submit use for the most current listing of approved herbicides. An approved current listing of vegetative control herbicides can be obtained from the Forest Service District Office upon request.

Ground Application

- General use herbicides must be applied by or under the direct supervision of a certified herbicide applicator in accordance with the laws of the State of North Dakota.
- Restricted use herbicides must be applied by a certified herbicide applicator in accordance with the laws of the State of North Dakota.
- Herbicide application must adhere to label instructions and restrictions. Tank mixes will be managed according to the most restrictive of the combined chemicals.
- No herbicide will be applied directly to surface water or where surface water from treated areas can run into live water sources.
    a. A buffer of at least one hundred (100) feet from bodies of water must be maintained.
    b. The buffer width would be determined based on soil, slope, etc.
- No spraying of liquid formulations will be done if temperatures exceed eighty (80) degrees.

- No spraying of liquid formulations will be done if the wind velocity exceeds ten (10) mph or per herbicide labeling directions.
- If boom spraying is done, boom pressure will not exceed forty (40) psi to minimize drift.
- Herbicide use will be permitted only within the areas identified within the applications.
- A sign saying the area has been treated with herbicides will be posted in areas receiving treatments at least one full day (unless the herbicide label says longer) after the treatment.

Monitoring

- The Forest Service will monitor the herbicide use in the form of random compliance inspections.
- All monitoring will be done under the direction of a Forest Service employee who is a licensed Commercial Pesticide Applicator.

Year End Report

When you have completed your herbicide treatment for the season and prior to October 1 of each year, you must submit the following information for each site treated and for each herbicide applied on National Forest System lands:

- Date of application
- Name of the treated site
- Legal description of treated site including quarter/quarter, section, township, range and county
- Chemical formulation and trade name of chemicals applied
- EPA registration number and manufacturer
- Rate of application of active ingredient, including pounds of active ingredient applied to the site
- Amount of diluted material applied and total acres treated on the site
- Time of day, temperature, and wind speed and direction at time of application
- Type of equipment used for application

In the case of a combination of herbicides being used, you will need to submit the information for each herbicide in the mixture.

DPG form 2100-2-B or a comparable form should be used to report the season's activities. An electronic version of the form can be obtained from the Forest Service District Office upon request.

Failure to submit the reports will delay the permitting of the following year's Pesticide Use Proposal.

Plugged and Abandoned Sites

- Noxious weeds should be sprayed prior to reclamation of the site and during the monitoring of the site until released. Use caution not to use herbicides that will have a detrimental effect to any seeding requirements.

NOXIOUS WEEDS REQUIRED TO BE TREATED.

COMMON NAME	SCIENTIFIC NAME	DPG OCCURRENCE	NOXIOUS WEED LIST	TREATMENT PRIORITY
Absinth wormwood	*Artemisia absinthium*	Known	ND, SD	High
Canada thistle	*Cirsium arvense*	Known	ND, SD, MT, MN	High
Diffuse knapweed	*Centaurea diffusa*	Unknown	ND, MT	High
Field bindweed	*Convolvulus arvensis*	Known	ND, SD, MT, MN	Low
Leafy spurge	*Euphorbia esula*	Known	ND, SD, MT, MN	High
Purple loosestrife	*Lythrum salicaria*	Potential	ND, SD, MT, MN	High
Russian knapweed	*Centaurea repens*	Known	ND, SD, MT	High
Spotted knapweed	*Centaurea maculosa*	Known	ND, MT	High
Yellow starthistle	*Centaurea solstititialis*	Unknown	ND, MT	High
Perennial sow thistle	*Sonchus arvensis*	Known	SD, MN	Low
Black henbane	*Hyoscyamus niger*	Known	Billings Co., ND	High
Dalmation toadflax	*Linaria dalmatica*	Unknown	ND, MT	High
Hoary cress	*Cardaria draba*	Known	SD, MT	Low
St. Johnswort	*Hypericum perforatum*	Unknown	MT	High
Saltcedar	*Tamarix ramosissima*	Known	ND, MT, SD	High
Yellow toadflax	*Linaria vulgaris*	Unknown	McKenzie Co., ND, MT	High
Bull thistle	*Cirsium vulgare*	Known	MN	Low
Musk thistle	*Cardus nutans*	Known	ND, MN, SD	High
Plumeless thistle	*Caruus acanthoides*	Known	MN, SD	Low
Houndstongue	*Cynoglossum officinale*	Known	MT	Low
Hemp	*Cannabis sativa*	Known	MN	High
Buckthorn	*Rhamnus cathartica*	Known	MN	High
Common Burdock	*Arctium minus*	Known	Billings Co, ND	Low

Chemical Name[1]	Residual[2]	Mobility[3]	Vegetation Controlled
imazapic	Moderate	Low	See label
chlorsulfuron	Moderate	High	All
glyphosate	Moderate	Low	All
imazapyr	Long	Variable	All
sulfometuron methyl	Moderate	Low	All
aminopyralid	Moderate	Low	Broadleaf, woody
clopyralid	Moderate	High	Broadleaf
dicamba	Short	High	Broadleaf
metsulfuron methyl	Moderate	High	Broadleaf
picloram	Moderate	Moderate	Broadleaf
2,4-D amine (dichlorophenoxyacetic)	Short	Moderate	Broadleaf
triclopyr	Moderate	Moderate	Broadleaf

[1]**CHEMICAL NAME**: Names the active ingredient in the herbicide formulation. Trade names and manufacturer do not matter as long as the active ingredients are on the approved list.

[2]**RESIDUAL**: Short = Remains active in soil for a short time - usually less than 30 days.

Moderate = Remains active in soil more than two weeks but generally less one year.

Long = Could potentially remain active in the soil for more than one year.

None = Does not remain active in the soil.

Note: The residual effects of a herbicide formulation may be highly variable based on soil pH, soil type, soil temperature, water content, presence of microbes, and other site-specific factors.)

[3]**MOBILITY**: The ability of the active ingredient to move through the soil.

The herbicides named in the above table may be used in combinations as long as all combined chemicals are included in the list. When chemicals are combined, they must be managed based on the most restrictive of the combined chemicals.

Species common *(and scientific)* name	**Perennial**	**Seed viability**	**Reproduction/ seed production**	**Flowers/seed maturity**	**Treatment (ALWAYS refer to herbicide label for correct application)**	**Timing (ALWAYS refer to label for correct timing)**
absinth wormwood *(Artemisia absinthium)*	long-lived perennial that grows back each year from a woody base	3-4 years	no evidence of vegetative reproduction but may regenerate from root stock; prolific seed producer; one stem can produce between 674-1468 flower heads with 35-38 seeds per head (over 51,000 seeds/plant)	July – September; seeds mature in early fall; seedlings emerge early spring to August or whenever moisture and warmth are available	easily controlled by herbicides and vigorous competition from grasses; picloram; clopyralid; dicamba; 2,4-D; glyphosate; aminopyralid; clopyralid plus triclopyr;	treat when plant is at least 12" tall and actively growing (late June to mid August); refer to individual label instructions for best timing of each herbicide
Canada thistle *(Cirsium arvense)*	creeping perennial	up to 22 years; deep burial (more than 8") promotes survival longevity	adventitious creeping root buds; root fragments as short as 0.2" if vegetative material is moved on equipment or in the soil; also reproduces by seed; up to 40,000 seeds per stem	June through August; seeds mature in as few as ten days after flowering	persistent treatment is imperative to continually stress plant and exhaust root nutrient stores; treatment must be followed through for several years to be successful; picloram; aminopyralid; clopyralid; dicamba; chlorsulfuron; glyphosate; imazapyr;	bud, rosette, and bolt stages; early spring or fall; refer to individual label instructions for best timing of each herbicide
knapweeds diffuse knapweed *(Centaurea diffusa)* spotted knapweed *(Centaurea maculosa)*	annual, biennial or perennial; individual spotted knapweed plants can live up to 9 years	5-8 years	plants regrow from buds on the root crown but reproduction is primarily by seed; seed production varies widely with site conditions; avg 680 – 25,260 seeds/plant;	flowers July through September; mature seeds usually formed by mid-August, followed by the death of the plant; dead plants break off at ground level and tumble with the wind to spread seed	although knapweeds are easily killed by herbicide application, a careful follow-up program is essential to control missed plants and seedlings; picloram; dicamba; dicamba plus 2,4-D; clopyralid plus 2,4-D; 2,4-D; triclopyr; aminopyralid	spring rosette to bloom stage or fall rosette; refer to individual label instructions for best timing of each herbicide

Species common *(and scientific)* name	**Perennial**	**Seed viability**	**Reproduction/ seed production**	**Flowers/seed maturity**	**Treatment (ALWAYS refer to herbicide label for correct application)**	**Timing (ALWAYS refer to label for correct timing)**
Russian knapweed *(Centaurea repens)*	creeping perennial	2-3 years; once established very difficult to control	seed and vegetative root buds; roots can grow as deep as 6' below surface after 1 years growth and 23' after 2 years; 1200 seeds per plant	June - September	2,4-D; dicamba; picloram; clopyralid; clopyralid plus 2,4-D; clopyralid plus triclopyr; metsulfuron plus 2,4-D; imazapic	generally in the fall following several hard frosts; metsulfuron plus 2,4-D can also be effective in bud to early bloom stage; refer to individual label instructions for best timing of each herbicide
field bindweed *(Convolvulus arvensis)*	long-lived perennial; life span unknown but believed to be up to 30 years	20 years or more; seed that is 60 years old has been found to be alive! once established very difficult to control	roots can reach depth of 20'; shoots capable of budding have been found at 14' depth; rhizomes develop from root buds and emerge as new plants; root fragments may generate new plants; 25-300 seeds per plant	June through fall frost	dicamba; glyphosate; picloram; 2,4-D; triclopyr; dicamba plus 2,4-D; metsulfuron	during periods of active growth and stems at least 12" long; bud to full-bloom; spring or fall depending on herbicide; refer to individual label instructions for best timing of each herbicide
leafy spurge *(Euphorbia esula)*	persistent, long-lived, deep rooted perennial; unknown life span	8 years or more	regenerates from very small root fragments, vegetative root buds, and by seed; average 140 seeds per plant; first year plants do not produce seeds	yellow-green bracts develop May – early June and true flowers develop a few weeks later; flowering is usually complete by mid-July; seeds mature about 30 days after pollination	picloram; dicamba; imazapic; 2,4-D; glyphosate	true flower growth stage and seed development or during fall re-growth; refer to individual label instructions for best timing of each herbicide
purple loosestrife *(Lythrum salicaria)*	yes; individual plants may live up to 22 years	3+ years	primarily by seed but also vegetatively by cuttings; estimated 2.7 million seeds per plant	early June – mid September	glyphosate if labeled for aquatic use; triclopyr if labeled for use in wetland sites; 2,4-D if labeled for use near water	July – early September; refer to individual label instructions for best timing of each herbicide

Species common *(and scientific)* name	**Perennial**	**Seed viability**	**Reproduction/ seed production**	**Flowers/seed maturity**	**Treatment (ALWAYS refer to herbicide label for correct application)**	**Timing (ALWAYS refer to label for correct timing)**
yellow starthistle *(Centaurea solstititialis)*	winter annual or rarely biennial or short-lived perennial	10+ years	reproduces by seed only; up to 80,000 seeds per plant	early July through September	clopyralid plus 2,4-D; clopyralid plus triclopyr; dicamba; picloram; imazapic; aminopyralid; use surfactants to improve herbicide performance	refer to individual label instructions for best timing of each herbicide
perennial sow thistle *(Sonchus arvensis)*	creeping perennial	1-5 years	vegetative root buds; rhizomes develop as deep as 10' below surface; average 30 seeds per flower with numerous flowers per plant; known to produce up to 9750 seeds on a single plant	blooms June & July; seeds mature July & August	clopyralid; aminopyralid; glyphosate; 2,4-D; dicamba; picloram	spring pre-bud or bud stage or fall; refer to individual label instructions for best timing of each herbicide
black henbane *(Hyoscyamus niger)*	annual or biennial	up to 5 years	reproduces by seed only; a single plant can produce up to a half million seeds	flowers June – August; seed production July - October	2,4-D; dicamba; picloram; glyphosate; metsulfuron; metsulfuron plus chlorsulfuron	rosette stage to early bolting; when the plant is actively growing; refer to individual label instructions for best timing of each herbicide
dalmation toadflax *(Linaria dalmatica)* yellow toadflax *(Linaria vulgaris)*	deep-rooted, short-lived perennials; individual plants live 3 – 5 years	up to 10 years	seed reproduction, vegetative buds on creeping roots, and by root fragments; a single plant can produce over 500,000 seeds	late June through August; seed production July through October	picloram for both; imazapic or chlorsulfuron for dalmation toadflax; glyphosate; dicamba	although slow to establish, this weed is difficult to control once it takes root because many herbicides are ineffective; requires repeated treatments at high rates; apply pre-bloom to flowering or in the fall; refer to individual label instructions for best timing of each herbicide

Species common *(and scientific)* name	**Perennial**	**Seed viability**	**Reproduction/ seed production**	**Flowers/seed maturity**	**Treatment (ALWAYS refer to herbicide label for correct application)**	**Timing (ALWAYS refer to label for correct timing)**
hoary cress *Cardaria draba)*	deep-rooted perennial with spreading root system from which many aerial shoots are produced; individual plants can live up to 8 years	about 3 years	vegetatively by persistent, adventitious roots and by seed production; a single plant produces between 1200 – 4800 seeds	flowers May – June; seed production by July; if conditions are favorable, hoary cress can produce a second crop of seeds by fall	metsulfuron; chlorsulfuron; dicamba; glyphosate; 2,4-D; dicamba plus 2,4-D; use surfactants to improve herbicide performance	up to 76% of this plant's biomass is below ground; May or June, bud or flowering stage; refer to individual label instructions for best timing of each herbicide
St Johnswort *(Hypericum perforatum)*	yes; individual plants can live up to 8 years	6-10 years	vegetatively by short creeping stems and by seed production; a single plant can produce up to 100,000 seeds; average seed production is 15,000 – 30,000	flowers May – September;	repeated applications of 2,4-D during seedling and pre-bloom stages; metsulfuron with a surfactant post-emergent; picloram; aminopyralid; glyphosate;	extensive root system makes it hard to eradicate; refer to individual label instructions for best timing of each herbicide
saltcedar *(Tamarix ramosissima)*	yes; long-lived; in New Mexico, plants up to 100 years old show no signs of deteriorating from age	less than 6 months especially if subject to desiccation	vegetatively by adventitious roots or by seed production; a single mature plant can produce >500,000 seeds per season	early to mid-April through July; seeds are shed throughout the growing season	imazapyr for green leaved plants; triclopyr for cut-stump control	refer to individual label instructions for best timing of each herbicide
bull thistle *(Cirsium vulgare)*	biennial or sometimes monocarpic perennial (flowers and fruits only once, then dies)	up to 3 years if buried at least 5" deep; seeds on the surface usually don't remain viable for longer than a year	by seed only; a single mature, healthy plant can produce up from 5000 to 50,000 seeds	July - September	picloram; dicamba; glyphosate; clopyralid; clopyralid plus triclopyr; 2,4-D; metsulfuron; chlorsulfuron; imazapic; imazapic plus glyphosate; aminopyralid	late fall or early spring; seedling to rosette stage; bolting to bud stage; refer to individual label instructions for best timing of each herbicide

Species common *(and scientific)* name	**Perennial**	**Seed viability**	**Reproduction/ seed production**	**Flowers/seed maturity**	**Treatment (ALWAYS refer to herbicide label for correct application)**	**Timing (ALWAYS refer to label for correct timing)**
musk thistle *(Carduus nutans)* musk thistle (Cont) *(Carduus nutans)*	herbaceous tap rooted biennial; spring annual; occasionally a winter annual	about 10 years	by seed only; a single plant produces about 10,000 seeds	May or early June through August;	picloram; dicamba; glyphosate; clopyralid; clopyralid plus triclopyr; 2,4-D; metsulfuron; chlorsulfuron; imazapic; imazapic plus glyphosate; aminopyralid	late fall or early spring; seedling to rosette stage; refer to individual label instructions for best timing of each herbicide
plumeless thistle *(Carduus acanthoides)*	winter annual or biennial	10 years or more	by seed only; up to 9000 seeds per plant	May to August; seeds are dispersed 1-3 weeks after flowering	picloram; dicamba; glyphosate; clopyralid; clopyralid plus triclopyr; 2,4-D; metsulfuron; chlorsulfuron; imazapic; imazapic plus glyphosate; aminopyralid	late fall or early spring; seedling to rosette stage; refer to individual label instructions for best timing of each herbicide
houndstongue *(Cynoglossum officinale)*	biennial or short lived perennial	2-3 years unless buried; then only about a year	average 300-675 seeds per plant but single plants can produce over 2000 seeds	flowering May through July; seeds mature July through August	picloram; dicamba; chlorsulfuron; 2,4-D; metsulfuron; use surfactants to improve herbicide performance	1st year rosettes in spring, summer or fall; early spring before bloom for second year rosettes; when plant is actively growing; refer to individual label instructions for best timing of each herbicide
hemp *(Cannabis sativa)*	annual		by seed only;	flowering July to September; seed production August until frost	2,4-D; sulfometuron;	refer to individual label instructions for best timing of each herbicide
buckthorn *(Rhamnus cathartica)*	perennial	up to 5 years	reproduces by seed or by stump sprouting	flowers May – June; berries ripen during August and September	triclopyr for cut-stump method within 2 hours of cutting; glyphosate	late summer and throughout the fall; refer to individual label instructions for best timing of each herbicide

Species common *(and scientific)* name	**Perennial**	**Seed viability**	**Reproduction/ seed production**	**Flowers/seed maturity**	**Treatment (ALWAYS refer to herbicide label for correct application)**	**Timing (ALWAYS refer to label for correct timing)**
common burdock *(Arctium minus)*	biennial	2-10 years	by seed only; each plant produces 15,000 – 60,000 seeds	flowers July – frost; seeds mature by September and are shed continuously throughout the fall, winter, and following spring	2,4-D; picloram; dicamba; glyphosate; clopyralid; clopyralid plus triclopyr; aminopyralid; metsulfuron	herbicides are most effective when applied to first-year rosettes and before bloom stage; refer to individual label instructions for best timing of each herbicide
halogeton *Halogeton glomeratus*	winter annual; plants can germinate in fall, winter, or spring depending on soil moisture	black seeds have no dormancy and are viable for up to 1 year; brown seeds have a dormancy and are viable for up to 10 years	by seed only; a single large plant can produce 100,000 seeds	flowers July – August; seed maturity August - October	halogeton alters soil properties, making it difficult to establish desirable plants, so it's best not to allow this plant to establish; metsulfuron; imazapyr; chlorsulfuron; 2,4-D; imazapic; aminopyralid; sulfometuron;	apply when actively growing or very early in spring prior to flowering; refer to individual label instructions for best timing of each herbicide
baby's breath *Gypsophila paniculata*	herbaceous perennial;	2 years	new shoots can grow from the crown, but not the root; reproduces by seed only; a single plant can produce up to 14,000 seeds	flowers late June to late August;	hard to get good coverage with herbicides because of sparse foliage; picloram; dicamba, 2,4-D; glyphosate;	bolting to pre-flower; refer to individual label instructions for best timing of each herbicide

Chemical Name[1]	Residual[2]	Mobility[3]	Vegetation Controlled
imazapic	Moderate	Low	See label
chlorsulfuron	Moderate	High	All
glyphosate	Moderate	Low	All
imazapyr	Long	Variable	All
sulfometuron methyl	Moderate	Low	All
aminopyralid	Moderate	Low	Broadleaf, woody
clopyralid	Moderate	High	Broadleaf
dicamba	Short	High	Broadleaf
metsulfuron methyl	Moderate	High	Broadleaf
picloram	Moderate	Moderate	Broadleaf
2,4-D amine (dichlorophenoxyacetic)	Short	Moderate	Broadleaf
triclopyr	Moderate	Moderate	Broadleaf

[1]**CHEMICAL NAME**: Names the active ingredient in the herbicide formulation. Trade names and manufacturer do not matter as long as the active ingredients are on the approved list.

[2]**RESIDUAL**: Short = Remains active in soil for a short time - usually less than 30 days.

Moderate = Remains active in soil more than two weeks but generally less one year.

Long = Could potentially remain active in the soil for more than one year.

None = Does not remain active in the soil.

Note: The residual effects of a herbicide formulation may be highly variable based on soil pH, soil type, soil temperature, water content, presence of microbes, and other site-specific factors.)

[3]**MOBILITY**: The ability of the active ingredient to move through the soil.

The herbicides named in the above table may be used in combinations as long as all combined chemicals are included in the list. When chemicals are combined, they must be managed based on the most restrictive of the combined chemicals.

Noxious Weed Seed Viability Quick Reference Chart

Species Common Name *(scientific name)*	Perennial	Seed Viability	Reproduction/ Seed Production	Flowers/Seed Maturity	Treatment (ALWAYS refer to herbicide label for correct application)	Timing (ALWAYS refer to label for correct timing)
Absinth wormwood *(Artemisia absinthium)*	Long-lived perennial that grows back each year from a woody base	3-4 years	No evidence of vegetative reproduction but may regenerate from root stock; prolific seed producer; one stem can produce between 674-1468 flower heads with 35-38 seeds per head (over 51,000 seeds/plant)	July – September; seeds mature in early fall; seedlings emerge early spring to August or whenever moisture and warmth are available	Easily controlled by herbicides and vigorous competition from grasses; picloram; clopyralid; dicamba; 2,4-D; glyphosate; aminopyralid; clopyralid plus triclopyr;	Treat when plant is at least 12" tall and actively growing (late June to mid August); refer to individual label instructions for best timing of each herbicide
Canada thistle *(Cirsium arvense)*	Creeping perennial	Up to 22 years; deep burial (more than 8") promotes survival longevity	Adventitious creeping root buds; root fragments as short as 0.2" if vegetative material is moved on equipment or in the soil; also reproduces by seed; up to 40,000 seeds per stem	June through August; seeds mature in as few as ten days after flowering	Persistent treatment is imperative to continually stress plant and exhaust root nutrient stores; treatment must be followed through for several years to be successful; picloram; aminopyralid; clopyralid; dicamba; chlorsulfuron; glyphosate; imazapyr;	Bud, rosette, and bolt stages; early spring or fall; refer to individual label instructions for best timing of each herbicide
Knapweeds Diffuse knapweed *(Centaurea diffusa)* Spotted knapweed *(Centaurea maculosa)*	Annual, biennial or perennial; individual spotted knapweed plants can live up to 9 years	5-8 years	Plants regrow from buds on the root crown but reproduction is primarily by seed; seed production varies widely with site conditions; avg 680 – 25,260 seeds/plant;	Flowers July through September; mature seeds usually formed by mid-August, followed by the death of the plant; dead plants break off at ground level and tumble with the wind to spread seed	Although knapweeds are easily killed by herbicide application, a careful follow-up program is essential to control missed plants and seedlings; picloram; dicamba; dicamba plus 2,4-D; clopyralid plus 2,4-D; 2,4-D; triclopyr; aminopyralid	Spring rosette to bloom stage or fall rosette; refer to individual label instructions for best timing of each herbicide
Russian knapweed *(Centaurea repens)*	Creeping perennial	2-3 years; once established very difficult to control	Seed and vegetative root buds; roots can grow as deep as 6' below surface after 1 years growth and 23' after 2 years; 1200 seeds per plant	June - September	2,4-D; dicamba; picloram; clopyralid; clopyralid plus 2,4-D; clopyralid plus triclopyr; metsulfuron plus 2,4-D; imazapic	Generally in the fall following several hard frosts; metsulfuron plus 2,4-D can also be effective in bud to early bloom stage; refer to individual label instructions for best timing of each herbicide

Species Common Name *(scientific name)*	Perennial	Seed Viability	Reproduction/ Seed Production	Flowers/Seed Maturity	Treatment (ALWAYS refer to herbicide label for correct application)	Timing (ALWAYS refer to label for correct timing)
Field bindweed *(Convolvulus arvensis)*	Long-lived perennial; life span unknown but believed to be up to 30 years	20 years or more; seed that is 60 years old has been found to be alive! once established very difficult to control	Roots can reach depth of 20'; shoots capable of budding have been found at 14' depth; rhizomes develop from root buds and emerge as new plants; root fragments may generate new plants; 25-300 seeds per plant	June through fall frost	Dicamba; glyphosate; picloram; 2,4-D; triclopyr; dicamba plus 2,4-D; metsulfuron	During periods of active growth and stems at least 12" long; bud to full-bloom; spring or fall depending on herbicide; refer to individual label instructions for best timing of each herbicide
Leafy spurge *(Euphorbia esula)*	Persistent, long-lived, deep rooted perennial; unknown life span	8 years or more	regenerates from very small root fragments, vegetative root buds, and by seed; average 140 seeds per plant; first year plants do not produce seeds	Yellow-green bracts develop May – early June and true flowers develop a few weeks later; flowering is usually complete by mid-July; seeds mature about 30 days after pollination	Picloram; dicamba; imazapic; 2,4-D; glyphosate	True flower growth stage and seed development or during fall re-growth; refer to individual label instructions for best timing of each herbicide
Purple loosestrife *(Lythrum salicaria)*	Yes; individual plants may live up to 22 years	3+ years	Primarily by seed but also vegetatively by cuttings; estimated 2.7 million seeds per plant	Early June – mid September	Glyphosate if labeled for aquatic use; triclopyr if labeled for use in wetland sites; 2,4-D if labeled for use near water	July – early September; refer to individual label instructions for best timing of each herbicide
Yellow starthistle *(Centaurea solstititialis)*	Winter annual or rarely biennial or short-lived perennial	10+ years	Reproduces by seed only; up to 80,000 seeds per plant	Early July through September	Clopyralid plus 2,4-D; clopyralid plus triclopyr; dicamba; picloram; imazapic; aminopyralid; use surfactants to improve herbicide performance	Refer to individual label instructions for best timing of each herbicide
Perennial sow thistle *(Sonchus arvensis)*	Creeping perennial	1-5 years	Vegetative root buds; rhizomes develop as deep as 10' below surface; average 30 seeds per flower with numerous flowers per plant; known to produce up to 9750 seeds on a single plant	Blooms June & July; seeds mature July & August	Clopyralid; aminopyralid; glyphosate; 2,4-D; dicamba; picloram	Spring pre-bud or bud stage or fall; refer to individual label instructions for best timing of each herbicide

Species Common Name *(scientific name)*	Perennial	Seed Viability	Reproduction/ Seed Production	Flowers/Seed Maturity	Treatment (ALWAYS refer to herbicide label for correct application)	Timing (ALWAYS refer to label for correct timing)
Black henbane *(Hyoscyamus niger)*	Annual or biennial	Up to 5 years	Reproduces by seed only; a single plant can produce up to a half million seeds	Fowers June – August; seed production July - October	2,4-D; dicamba; picloram; glyphosate; metsulfuron; metsulfuron plus chlorsulfuron	Rosette stage to early bolting; when the plant is actively growing; refer to individual label instructions for best timing of each herbicide
Toadflaxes Dalmation toadflax *(Linaria dalmatica)* Yellow toadflax *(Linaria vulgaris)*	Deep-rooted, short-lived perennials; individual plants live 3 – 5 years	Up to 10 years	Seed reproduction, vegetative buds on creeping roots, and by root fragments; a single plant can produce over 500,000 seeds	Late June through August; seed production July through October	Picloram for both; imazapic or chlorsulfuron for dalmation toadflax; glyphosate; dicamba	Although slow to establish, this weed is difficult to control once it takes root because many herbicides are ineffective; requires repeated treatments at high rates; apply pre-bloom to flowering or in the fall; refer to individual label instructions for best timing of each herbicide
Hoary cress *(Cardaria draba)*	Deep-rooted perennial with spreading root system from which many aerial shoots are produced; individual plants can live up to 8 years	About 3 years	Vegetatively by persistent, adventitious roots and by seed production; a single plant produces between 1200 – 4800 seeds	Flowers May – June; seed production by July; if conditions are favorable, hoary cress can produce a second crop of seeds by fall	Metsulfuron; chlorsulfuron; dicamba; glyphosate; 2,4-D; dicamba plus 2,4-D; use surfactants to improve herbicide performance	Up to 76% of this plant's biomass is below ground; May or June, bud or flowering stage; refer to individual label instructions for best timing of each herbicide
St Johnswort *(Hypericum perforatum)*	Yes; individual plants can live up to 8 years	6-10 years	Vegetatively by short creeping stems and by seed production; a single plant can produce up to 100,000 seeds; average seed production is 15,000 – 30,000	Flowers May – September;	Repeated applications of 2,4-D during seedling and pre-bloom stages; metsulfuron with a surfactant post-emergent; picloram; aminopyralid; glyphosate;	Extensive root system makes it hard to eradicate; refer to individual label instructions for best timing of each herbicide
Saltcedar *(Tamarix ramosissima)*	Yes; long-lived; in New Mexico, plants up to 100 years old show no signs of deteriorating from age	Less than 6 months especially if subject to desiccation	Vegetatively by adventitious roots or by seed production; a single mature plant can produce >500,000 seeds per season	Early to mid-April through July; seeds are shed throughout the growing season	Imazapyr for green leaved plants; triclopyr for cut-stump control	Refer to individual label instructions for best timing of each herbicide

Species Common Name *(scientific name)*	Perennial	Seed Viability	Reproduction/ Seed Production	Flowers/Seed Maturity	Treatment (ALWAYS refer to herbicide label for correct application)	Timing (ALWAYS refer to label for correct timing)
Bull thistle *(Cirsium vulgare)*	Biennial or sometimes monocarpic perennial (flowers and fruits only once, then dies)	Up to 3 years if buried at least 5" deep; seeds on the surface usually don't remain viable for longer than a year	By seed only; a single mature, healthy plant can produce up from 5000 to 50,000 seeds	July - September	Picloram; dicamba; glyphosate; clopyralid; clopyralid plus triclopyr; 2,4-D; metsulfuron; chlorsulfuron; imazapic; imazapic plus glyphosate; aminopyralid	Late fall or early spring; seedling to rosette stage; bolting to bud stage; refer to individual label instructions for best timing of each herbicide
Musk thistle *(Carduus nutans)*	Herbaceous tap rooted biennial; spring annual; occasionally a winter annual	About 10 years	By seed only; a single plant produces about 10,000 seeds	May or early June through August;	Picloram; dicamba; glyphosate; clopyralid; clopyralid plus triclopyr; 2,4-D; metsulfuron; chlorsulfuron; imazapic; imazapic plus glyphosate; aminopyralid	Late fall or early spring; seedling to rosette stage; refer to individual label instructions for best timing of each herbicide
Plumeless thistle *(Carduus acanthoides)*	Winter annual or biennial	10 years or more	By seed only; up to 9000 seeds per plant	May to August; seeds are dispersed 1-3 weeks after flowering	Picloram; dicamba; glyphosate; clopyralid; clopyralid plus triclopyr; 2,4-D; metsulfuron; chlorsulfuron; imazapic; imazapic plus glyphosate; aminopyralid	Late fall or early spring; seedling to rosette stage; refer to individual label instructions for best timing of each herbicide
Houndstongue *(Cynoglossum officinale)*	Biennial or short lived perennial	2-3 years unless buried; then only about a year	Average 300-675 seeds per plant but single plants can produce over 2000 seeds	Flowering May through July; seeds mature July through August	Picloram; dicamba; chlorsulfuron; 2,4-D; metsulfuron; use surfactants to improve herbicide performance	1st year rosettes in spring, summer or fall; early spring before bloom for second year rosettes; when plant is actively growing; refer to individual label instructions for best timing of each herbicide
Hemp *(Cannabis sativa)*	Annual		By seed only	Flowering July to September; seed production August until frost	2,4-D; sulfometuron;	Refer to individual label instructions for best timing of each herbicide
Buckthorn *(Rhamnus cathartica)*	Perennial	Up to 5 years	Reproduces by seed or by stump sprouting	Flowers May – June; berries ripen during August and September	Triclopyr for cut-stump method within 2 hours of cutting; glyphosate	Late summer and throughout the fall; refer to individual label instructions for best timing of each herbicide

Species Common Name *(scientific name)*	**Perennial**	**Seed Viability**	**Reproduction/ Seed Production**	**Flowers/Seed Maturity**	**Treatment (ALWAYS refer to herbicide label for correct application)**	**Timing (ALWAYS refer to label for correct timing)**
Common burdock *(Arctium minus)*	Biennial	2-10 years	By seed only; each plant produces 15,000 – 60,000 seeds	Flowers July – frost; seeds mature by September and are shed continuously throughout the fall, winter, and following spring	2,4-D; picloram; dicamba; glyphosate; clopyralid; clopyralid plus triclopyr; aminopyralid; metsulfuron	Herbicides are most effective when applied to first-year rosettes and before bloom stage; refer to individual label instructions for best timing of each herbicide
Halogeton *(Halogeton glomeratus)*	Winter annual; plants can germinate in fall, winter, or spring depending on soil moisture	Black seeds have no dormancy and are viable for up to 1 year; brown seeds have a dormancy and are viable for up to 10 years	By seed only; a single large plant can produce 100,000 seeds	Flowers July – August; seed maturity August - October	Halogeton alters soil properties, making it difficult to establish desirable plants, so it's best not to allow this plant to establish; metsulfuron; imazapyr; chlorsulfuron; 2,4-D; imazapic; aminopyralid; sulfometuron;	Apply when actively growing or very early in spring prior to flowering; refer to individual label instructions for best timing of each herbicide
Baby's breath *(Gypsophila paniculata)*	Herbaceous perennial;	2 years	New shoots can grow from the crown, but not the root; reproduces by seed only; a single plant can produce up to 14,000 seeds	flowers late June to late August;	Hard to get good coverage with herbicides because of sparse foliage; picloram; dicamba, 2,4-D; glyphosate;	Bolting to pre-flower; refer to individual label instructions for best timing of each herbicide

PESTICIDE - USE PROPOSAL (Reference FSM 2150)	DEPARTMENT/ AGENCY	CONTACT/PHONE NO.	
	USDA / FS DPG / District 7	**Minerals/Lands Dept. (701) 227-7819**	
	REGION	FOREST	DATE SUBMITTED
	01	**18**	

1) OBJECTIVE a) Project No. b) Specific Target Pest c) Purpose	
2) PESTICIDE a) Common Name b) Formulation c) % AI,AE,or lb / Gal. d) Registration No.	
3) a) Form Applied b) Use Strength (%) or Dilution Rate c) Diluent	
4) lbs. AI Per Acre or Other Rate	
5) APPLICATION a) Method b) Equipment	
6) a) Acres or Other Unit to be Treated b) Number of Applications c) Number of Sites d) Specific Description of Sites	
7) a) Month(s) of Year b) States	
8) SENSITIVE AREAS a) Areas to be Avoided b) Areas to be Treated with Caution	
9) REMARKS a) Precautions to be Taken b) Use of Trained / Certified Personnel c) State and Local Coordination d) Other Pesticides Being Applied to Same Site e) Monitoring f) Other	

Approval (Signature of USFS Approving Official)	Date (mm/dd/yy):

PESTICIDE - USE PROPOSAL (Reference FSM 2150)	DEPARTMENT/ AGENCY	CONTACT/PHONE NO.	
	USDA / FS DPG / District 7	**Minerals/Lands Dept. (701) 227-7819**	
	REGION	FOREST	DATE SUBMITTED
	01	**18**	**mm / dd / yy**

1) OBJECTIVE a) Project No. b) Specific Target Pest c) Purpose	a) Big-Crude Oil Co., Big Wind Field, FY-2010 b) Emergent and pre-emergent vegetation/weeds c) Control vegetation/weeds on and around well pads/pump stations
2) PESTICIDE a) Common Name b) Formulation c) % AI, AE, or lb / Gal. d) Registration No.	And/Or: a) Glyphosate; b) Water-soluble; c) 41%-3 lbs. per gal.; d) EPA # 524-475 And/Or: a) Dicamba; b) Water-soluble; c) 48.2%-4 lbs, per gal.; d) EPA # 55947-1 a) Imazapic; b) dispersible granules; c) 80% active ingredients; d) EPA # 535-392
3) a) Form Applied b) Use Strength (%) or Dilution Rate c) Diluent	a) Solution b) 1½ gal. glyphosate to 300 gal. water, 1 qt. dicamba to 300 gal. water c) Water
4) lbs. Applied Per Acre or Other Rate	1.5 pounds per acre
5) APPLICATION a) Method b) Equipment	a) Ground b) Hand gun sprayer
6) a) Acres or Other Unit to be Treated b) Number of Applications c) Number of Sites d) Specific Description of Sites	a) One acre per site. Total of six acres b) One initial treatment and spot treatments as needed. c) Six d) Area of operations for well site(s) noted on attachment A, block 3 (Other attachments may be used if considered necessary)
7) a) Month(s) of Year b) States	a) May and June b) North Dakota, Billings County
8) SENSITIVE AREAS a) Areas to be Avoided b) Areas to be Treated with Caution	a) Trees, drainages/waterways/surface water. b) Areas adjacent to waterways, sloped areas. Other Areas - None
9) REMARKS a) Precautions to be Taken b) Use of Trained / Certified Personnel c) State and Local Coordination d) Other Pesticides Being Applied to Same Site e) Monitoring f) Other	a) Will follow recommended standards within F.S. COA's 2308 & 2319 and COA's Other 3715 and 3732B. PPE will be worn by applicator(s). Signs will be posted warning that the area has been treated with herbicides . b) Note attachment A, block #1 c) Local d) None e) Operations will be monitored by company representative and/or contractor foreman. f) Additional herbicide applications may be needed at a later date depending on effectiveness of initial application.

Approval (Signature of USFS Approving Official) **Signature of USFS Official Only**	Date (mm/dd/yy)

ATTACHMENT A **Supplemental Information for Pesticide Use Proposal Form FS-2100-2**	USDA Forest Service, Region One Dakota Prairie Grasslands Medora Ranger District	**Check One** (____) Noxious Weed Control (____) Vegetative Control
	Minerals / Lands Department	FS Contact – **Carmen Waldo** Phone Number - (701) 227-7819

Company, Proposal Submitted For	**Contractor**	**Date Submitted**

1) Applicator Information a) Applicators Name(s) b) N.D. State License or Certificate # c) Expiration Date	a) b) c)
2) Delegation of Authority (If applicable) a) Delegation Statement b) Company Officials Signature	a) b)
NOTE:	If a contracting herbicide applicator is going to submit the Pesticide Use Proposal Form for a company, the FS will need written notification from the company, designating said contractor to represent the company. The company is responsible for making sure that the form is complete and accurate.
3) Specific Site Description a) Name and/or number of well pads, central tank batteries, stations or other sites. b) Legal descriptions: quarter/quarter, section, township, range, and county.	**Well / Station** **Legal Description**
4) Remarks a) End of Year Report	

Approval Signature of Company Official or Representative	**Date (mm/dd/yy):**
Approval Signature of USFS Official	**Date (mm/dd/yy):**

ATTACHMENT A **Supplemental Information for Pesticide Use Proposal Form FS-2100-2**	USDA Forest Service, Region One Dakota Prairie Grasslands Medora Ranger District	**Check One** (___) Noxious Weed Control (___) Vegetative Control
	Minerals / Lands Department	FS Contact – **Carmen Waldo** Phone Number - (701) 227-7819

Company, Proposal Submitted For	**Contractor**	**Date Submitted**
Big-Crude Oil Co. Or Weed Wackers Inc for Big-Crude Oil	Weed Wackers Inc.	04/15/10

1) Applicator Information a) Applicators Name(s) b) N.D. State License or Certificate # c) Expiration Date	a) Reed Wacker b) Certificate # 101010 c) 12/31/10
2) Delegation of Authority (If applicable) a) Delegation Statement b) Company Officials Signature	a) Reed Wacker of Weed Wackers Inc. is hereby authorized to represent Big-Crude Oil Co. in matters pertaining to the submission of the Forest Service Pesticide Use Proposal Forms, FS –2100-2 and DPG 2100-2-A. He and/or his designate (being a North Dakota licensed applicator) is also authorized to oversee the application of the pesticides/herbicides on Big-Crude Oil sites indicated within Attachment A, Part 3, below. b) *I. M. Big* I. M. Big, Big-Crude Oil Co.
NOTE:	If a contracting herbicide applicator is going to submit the Pesticide Use Proposal Form for a company, the FS will need written notification from the company, designating said contractor to represent the company. The company is responsible for making sure that the form is complete and accurate.
3) Specific Site Description a) Name and/or number of well pad, central tank battery, station or other site. b) Legal description: quarter/quarter, section, township, range, and county.	**Well/Station** — **Legal Description** Big # 1 — NWNW, Sec. 1, T140N, R100W, Billings Co., ND Big # 2 — NWNE, Sec. 2, T140N, R100W, Billings Co., ND Big # 3 — SWNW, Sec. 3, T140N, R100W, Billings Co., ND Big # 4 — SWSE, Sec. 4, T140N, R100W, Billings Co., ND Big # 5 — NENE, Sec. 5, T140N, R100W, Billings Co., ND Big-X Central Battery — NWSW, Sec. 3, T140N, R100W, Billings Co., ND Or Note attached list of specific site descriptions.
4) Remarks a) End of Year Report	A report, pertaining to the herbicide treated sites will be submitted to the Forest Service prior to October 1, 2010, regarding the information requested within the F.S. letter dated April 13, 2010.

Approval Signature of Company Official or Representative	**Date (mm/dd/yy):**
Reed Wacker	04/15/10
Approval Signature of USFS Official	**Date (mm/dd/yy):**

Pesticide Application Records / Year End Report

Customer/Company : _____ **Contractor :** _____

Applicators Name : _____ **License/Certification # :** _____

Specific Target Pest : _____

Application Information	Site	Site	Site	Site
Site Name or Number				
Legals: ¼¼ / Sec / Twn / Rng, County				
Application Date				
Start Time / Stop Time				
Pesticide Chemical Name				
Pesticide Trade Name				
Pesticide Registrant / Mfr.				
EPA Registration Number				
Wind Direction				
Wind Velocity				
Temperature – ^{o}F				
Pesticide Rate (per acre, sq. ft., etc.)				
Diluted Material (per acre/1000 sq. ft., etc.)				
Total Acres or Sq. Ft. Treated				
Equipment Used				
Applicators Signature				

Field Notes:

Pesticide Application Records / Year End Report

Customer/Company : Big Crude Oil Co. **Contractor :** Weed Wackers Inc.

Applicators Name : Reed Wacker **License/Certification # :** 101010

Specific Target Pest : Control vegetation / weeds on and around well pads / pump stations

Application Information	Site	Site	Site	Site
Site Name or Number	Big #1			
Legals: ¼¼ / Sec / Twn / Rng, County	NWNW, Sec. 1/ 140 / 100 Billings Co.			
Application Date	06 / 15/ 10			
Start Time / Stop Time	8:00 am / 9:00 am			
Pesticide Chemical Name	Glyphosate			
Pesticide Trade Name	Roundup			
Pesticide Registrant / Mfr.	Monsanto			
EPA Registration Number	524-475			
Wind Direction	NNW			
Wind Velocity	2 MPH			
Temperature	65^{o} F			
Pesticide Rate (per acre, sq. ft., etc.)	1.5 pounds per acre			
Diluted Material (per acre/1000 sq. ft., etc.)	1½ gal. to 300 gal. water			
Total Acres or Sq. Ft. Treated	2.2 acres			
Equipment Used	Hand gun			
Applicators Signature	*Reed Wacker*			

Field Notes:

Appendix XXVIII

Paleontological Plan

Unanticipated Discoveries for Paleontological Resources

Pipeline excavations can have significant impact on surface and subsurface paleontological resources. Occurrences of paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used to assess the potential for occurrence of paleontological resources. The Bureau of Land Management (BLM) uses the Potential Fossil Yield Classification (PFYC) system to rank geological unit based on their potential to yield paleontological resources. Geological units ranked as PFYC 1 have limited potential to yield scientifically significant paleontological resources. Geological units ranked as PFYC 3 have moderate or unknown potential to yield scientifically significant paleontological resources. Geological units ranked as PFYC 5 have the highest potential to yield scientifically significant paleontological resources.

The proposed BakkenLink Pipeline Project area is underlain by Paleocene-age Tongue River/Bullion Creek and Sentinel Butte formations of the Fort Union Group and Quaternary surficial deposits. These formations were ranked using the Potential Fossil Yield Classification (PFYC) system. Both the Sentinel Butte and Tongue River/Bullion Creek Formations of the Fort Union Group have high paleontological potential (PFYC Class 4).

A pedestrian survey of exposed bedrock outcrops was conducted within a 200-foot-wide corridor centered on the proposed pipeline centerline. No new scientifically significant paleontological resources were discovered during the survey. Although no new paleontological resources were discovered during the survey, data provided by the North Dakota Geological Survey and University of North Dakota show numerous paleontological resource localities within proximity of the proposed ROW, which suggest that ground-disturbing Project activities through areas underlain by these bedrock units could uncover paleontological resources. Therefore, monitoring for paleontological resources during ground-disturbing activities in areas identified with PFYC Class 4 bedrock may be warranted.

According to BLM Instructional Memorandum No. 2009-011 (Assessment and Mitigation of Potential Impacts to Paleontological Resources), which supersedes BLM Handbook 8270-1, paleontological resources collected from privately-owned or split-estate lands are the property of the surface-estate owner, and their disposition shall be in accordance with the surface agreement between the landowner and the permittee.

<u>Discovery of Unanticipated Paleontological Resources</u>

The process for handling unanticipated paleontological resources will be in accordance with BLM rules and guidance. All Project personnel should be instructed on procedures to be followed in the event of an unanticipated paleontological resource.

1. In the event that paleontological resources are encountered during the construction phase, all undertaking-related activities, including vehicular traffic, within 100 feet of the discovery should immediately be halted. Fossils will be left in place untouched until further instructions are received from the BLM Authorized Officer.

    a. If the discovery is on public (Federal or State) land, BakkenLink will immediately notify the BLM, the North Dakota Industrial Commission – Department of Mineral Resource-Division of Paleontology, and BakkenLink's Paleontological Resource Consultant (PRC). If the discovery is on Federal land, BakkenLink will notify the BLM Authorized Officer and the PRC. For discoveries on State land, BLM will notify the North Dakota Industrial Commission – Department of Mineral Resource-Division of Paleontology. These agencies, in consultation with BakkenLink's PRC shall determine the significance of the paleontological discovery and the need for mitigation. If the discovery is on private land,

BakkenLink will immediately notify the BLM and BakkenLink's PRC. The landowner will be notified. The BLM, in consultation with BakkenLink's PRC, and the landowner, shall determine the significance of the paleontological discovery and the need for mitigation.

2. If mitigation measures are determined appropriate, BakkenLink's PRC shall consult with the BLM and the PRC as appropriate regarding the preferred mitigation measures within two working days of the discovery.

    a. If deemed necessary by the BLM, and the PRC as appropriate, a mitigation program would be developed and implemented to document and remove significant paleontological resources prior to ground disturbing activities. BakkenLink's PRC shall prepare and submit a mitigation plan for approval by the BLM as appropriate. The BLM shall approve a mitigation plan within seven (7) days of submittal.

    b. Significant paleontological resources recovered during mitigation shall be prepared for curation in accordance with standard professional paleontological techniques and reposited at an appropriate, BLM approved, repository. The mitigation plan developed by the PRC shall identify qualified personnel per BLM regulations who shall conduct mitigation activities.

3. BakkenLink will ensure that reports of mitigation efforts for discovery situations are completed in a timely manner and conform to the standards for paleontological resource reports. For fossils collected from Federal lands, a report on the findings of the salvage program, including a list of the recovered fossils, shall be prepared following completion of the program. A copy of this report shall accompany the fossils to the BLM approved curation facility (repository). Final reports will be submitted to all applicable agencies.

4. Undertaking-related activities within 100 feet of the discovery will not resume until the BLM notifies BakkenLink (in writing) that mitigation is not required or that mitigation is complete and activities can resume.

5. BakkenLink will be responsible for all expenses associated with the discovery including evaluations, preparation of mitigation plans, excavation, preparation, reporting, and curation.

Recording Procedures, Emergency Salvage, and Reporting

Every paleontological occurrence is a unique situation which must be assessed on a case-by-case basis. Assessment of mitigation requirements, including the need for emergency salvage, excavation, recording, and reporting procedures (collectively called a mitigation plan) will be conducted on a case-by-case basis. At a minimum, recording procedures will include procedures outlined in Moses et al. (2014). The PRC will present recommended mitigation actions to the BLM within two working days of the discovery. The recommendations will provide the framework for the Mitigation Plan, including documentation, sampling, testing, excavation, screen washing, emergency salvage, reporting and other paleontological protocol as appropriate**.**

Contact Information

Name	Title/Agency	Phone	E-mail
Bureau of Land Management			
Lowell Hassler	Project Manager	406-538-1909 (direct) 701-290-4235 (cell)	lhassler@blm.gov
Greg Liggett	Regional Paleontologist	406-896-5162 (direct)	gliggett@blm.gov

Name	Title/Agency	Phone	E-mail
North Dakota Industrial Commission, Department of Mineral Resource, Division of Paleontology			
Jeff Person	Paleontologist	701-328-8000 (office) [need direct line]	jjperson@nd.gov
Paleontological Resources Consultant			
?	Paleontologist	**?**	**?**
BakkenLink			
?	Environmental Project Manager	**?**	**?**
Stantec			
?	Environmental Inspector	**?**	**?**

Reference:

Moses, R.J., Martin, J.E., Schaaf, C.A., Shoup, B.E., and Adams, J.S. 2014. *Recommended Standards for Field Assessments in Mitigation Paleontology*, Proceedings of the 10th Conference on Fossil Resources, Dakoterra, Vol. 6, p. 286-300.