Biological Evaluation of Impacts to Northern Long-Eared Bat, Whooping Crane, Red Knot, and Black-Footed Ferret

Marsland Expansion Area In Situ Uranium Recovery

Proposed License Amendment to Source Materials License No. SUA-1534

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Prepared by:

Briana Grange
Division of License Renewal
Office of Nuclear Reactor Regulation

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Abbreviations, Acronyms, and Symbols

ac	acre(s)
ADAMS	Agencywide Documents Access and Management System
CBR	Crow Butte Resources, Inc.
CFR	*Code of Federal Regulations*
cm	centimeter(s)
ECOS	Environmental Conservation Online System
ESA	Endangered Species Act of 1973, as amended
ft	foot (feet)
FWS	U.S. Fish and Wildlife Service
gal	gallon(s)
GEIS	*Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities*
gpm	gallons per minute
ha	hectare(s)
HWA	Hayden-Wing Associates, LLC
in.	inch(es)
IPaC	Information for Planning and Conservation
ISR	in situ uranium recovery
kg	kilogram(s)
km	kilometer(s)
L	liter(s)
lb(s)	pound(s)
Lpm	liters per minute
m	meter(s)
m^3	cubic meter(s)
MEA	Marsland Expansion Area
mi	mile(s)
NRC	U.S. Nuclear Regulatory Commission
SNM	Special Nuclear Material
yd^3	cubic yard(s)

1.0 Introduction

The U.S. Nuclear Regulatory Commission (NRC) staff has prepared this evaluation to comply with the provisions of Section 7 of the Endangered Species Act of 1973, as amended (ESA), in support of the NRC staff's review of Crow Butte Resources, Inc.'s (CBR) request for a license amendment to Source Materials License No. SUA-1534 (SUA-1534). The amendment, if granted, would authorize CBR to perform in situ uranium recovery (ISR) operations at the Marsland Expansion Area (MEA), a site located near the town of Marsland, Nebraska. This document examines the potential impacts of the amendment on federally listed species under the jurisdiction of the U.S. Fish and Wildlife Service (FWS or "the Service").

2.0 Description of the Proposed Action

2.1 Proposed Action

The proposed Federal action is the NRC's decision of whether to approve a license amendment that would authorize CBR to expand its ISR operations to the MEA site.

Currently, Source Materials License SUA-1534 authorizes CBR to conduct ISR activities at the existing Crow Butte site near Crawford, Nebraska. The Crow Butte ISR project (herein referred to as "the existing Crow Butte license area") is a commercial uranium recovery facility located in Dawes County, Nebraska, approximately 4 mi (6.4 km) southeast of the city of Crawford. The existing Crow Butte license area consists of uranium recovery systems and the Crow Butte Central Processing Facility. The site is approximately 3,300 ac (1,300 ha), of which 1,100 ac (450 ha) are used for ISR operations. It was initially operated as a research and development facility beginning in 1986 and was later expanded to include commercial operations beginning in 1991. The NRC (2014a) renewed Source Materials License SUA-1534 in 2014 to authorize CBR to receive, acquire, possess, and transfer byproduct, source, and special nuclear material at the existing Crow Butte license area through November 5, 2024, under the terms specified in the license. Under SUA-1534, CBR is authorized to produce up to 2 million lbs (907,185 kg) per year of yellowcake (U_3O_8), the uranium oxide product of the ISR process that is used to produce various products, including fuel for commercially operated nuclear power reactors.

The proposed action would expand the area over which CBR could conduct such activities to include the 4,622-ac (1,870-ha) MEA site, which lies 11.1 mi (17.9 km) south-southeast of the existing Crow Butte Central Processing Facility, near Marsland, Nebraska. If approved, the amendment would allow CBR to construct and operate a commercial-scale ISR facility on the MEA site in accordance with the NRC-issued source materials license and the requirements in Title 10 of the *Code of Federal Regulations* (CFR) Part 40, "Domestic Licensing of Source Material." The proposed action would also include subsequent aquifer restoration, site decommissioning, and reclamation activities. CBR initiated the proposed Federal action through its submission of a license amendment request to the NRC by letter dated May 16, 2012.

As part of the proposed action, CBR would extract uranium-bearing water from the subsurface aquifer through 11 injection wells on the MEA site, produce uranium-loaded resins from the extracted water, and then transport the loaded resins from the MEA site to a processing facility at the existing Crow Butte license area for further processing and

production of yellowcake. To support these activities, CBR would construct surface and underground infrastructure at the MEA site, including access roads, a satellite facility for the ion exchange process, and wellfields. As uranium recovery in each injection well ends, CBR would begin aquifer restoration activities in that injection well. Following aquifer restoration at all 11 injection wells, CBR would decommission the MEA site and perform reclamation activities according to an NRC-approved decommissioning plan. The following sections briefly describe the ISR process, the proposed MEA site, and each stage of the proposed action. More detailed information on the proposed action is available in NRC's December 2017 *Draft Environmental Assessment for the Marsland Expansion Area License Amendment Application* (NRC 2017a) and CBR's 2014 environmental report (CBR 2014) submitted as part of its license amendment request. Unless otherwise cited, information in this biological evaluation is derived from these two sources.

2.1.1 ISR Process

ISR is a mining process by which uranium is recovered directly from underground ore. Injection wells are drilled into the underground ore deposit, and a lixiviant—a solution of native ground water, typically mixed with oxygen or hydrogen peroxide and sodium bicarbonate or carbon dioxide—is injected into the injection wells to oxidize and dissolve the ore. A solution bearing the dissolved ore content, including the uranium, is pumped to recovery wells and then to a processing facility via a network of buried piping. Monitoring wells surround the injection wells and recovery wells at different depths to detect lixiviant that might migrate out of the production zone. The array of injection, recovery, and monitoring wells and interconnected piping is referred to as the wellfield. Figure 1 illustrates the typical ISR process that takes place in each wellfield. The ISR method allows for the extraction of materials from the ore body without conventional mining involving drill-and-blast, open-cut, or underground mining.

After extraction from the wellfield, the uranium is recovered from the "pregnant" lixiviant in a multi-step process. The lixiviant is piped to a satellite facility where it goes through an ion exchange process to selectively remove the uranium from solution. The now-"barren" lixiviant is treated and pumped back into the injection well. The recovered uranium is then ready to be further processed into yellowcake. Figure 2 is a flowchart of the entire production process, including uranium extraction, uranium recovery, and yellowcake production. Figure 3 is a flowchart of the above-ground processing activities that take place at a typical ISR facility.

Once the ISR process in a specific wellfield has ended, aquifer restoration activities are undertaken to restore the groundwater to applicable water quality standards. Decommissioning is the last stage, during which facilities, equipment, and any remaining wastes are removed from the site.

2.1.2 MEA Site Description

The MEA site is located in the southern portion of Dawes County, Nebraska, approximately 11.1 mi (17.9 km) south-southeast of the Crow Butte Central Processing Facility, as shown in Figure 4. The ore body at the MEA site is located in the basal sandstone of the Chadron Formation (Basal Chadron Sandstone aquifer) at depths ranging from 800 to 1,250 ft (240 to 380 m) below ground surface. The width of the ore body varies from approximately 1,000 to 4,000 ft (300 to 1,200 m).

The MEA, if approved by NRC, would encompass a licensed area of approximately 4,622 ac (1,870 ha). Of this area, a total of approximately 1,754 ac (710 ha) could be affected by ISR activities over the life of the project. Approximately 592 ac (240 ha) would be initially required for the currently planned facilities as follows.

- 1.8 ac (0.73 ha) for the satellite building and associated facilities
- 0.79 ac (0.32 ha) for up to six deep disposal wells
- 1.7 ac (0.69 ha) for access roads
- 587.6 ac (237 ha) for 11 mine units, including injection, production, and monitoring wells; wellhouses; and piping

The remaining 1,162 ac (470 ha) may be disturbed over the life of the project for new activities such as roadways, exploration or delineation drilling, new and expanded mine units, wellhouses, and underground piping. As a result, up to 25 percent of the proposed MEA site may be disturbed over the life of the project. Figure 5 depicts the planned locations of the 11 mine units.

Existing human land uses within the MEA site includes one small residence, farming and ranching activities, watering sites for cattle (i.e., windmills, water tanks, etc.), improved gravel and unimproved two-track roads, and one small gravel pit (HWA 2012). Additionally, some areas of the MEA site have been mildly disturbed by CBR in order to characterize the site for potential ISR activities. These disturbances and construction activities include the installation of environmental sampling stations; monitoring well clusters for characterization; and drill holes for ore body exploration, wellfield delineation, and geologic data collection.

2.1.3 Proposed Action Timeline

CBR estimates that construction and operation activities at the MEA would occur over a 20-year period. Aquifer restoration at the MEA would begin about 5 years after ISR operations begin, would continue concurrently with operations in other mine units, and would ultimately end about 25 years after startup. Final decommissioning activities and surface reclamation would be completed about 25 years after ISR operations commence. The following sections identify the activities that would take place during these periods. Figure 6 depicts the estimated timeline of mining and restoration on the MEA site.

2.1.4 Construction

CBR would construct both surface and underground infrastructure at the MEA site. Surface preparation and construction would include such infrastructure as access roads, a satellite facility for the ion exchange process, and wellfields. The wellfields would include wellheads for each well, wellhouses to control flow to and from the wells and to and from the satellite facility, and some above-ground piping at the wellheads and in the well houses. Currently planned site preparation and construction would specifically include the following:

- Construction of a 130-ft-long by 100-ft-wide (40-m-long by 30-m-wide) satellite building that will contain ion exchange and associated equipment

- Placement of a modular office building
- Construction of chemical storage facilities and other support facilities
- Construction of two deep disposal wells for disposal of wastewater
- A deep well injection building and associated facilities
- Access roads, as required
- Construction of 11 wellfields

Table 1 lists the acreages that would be disturbed to support site preparation and construction for the proposed action by habitat type. Figure 5 depicts the proposed locations of the 11 mine units on the MEA site. Figure 7 depicts the proposed access route between the MEA site and the satellite facility at the existing Crow Butte license area.

Underground infrastructure would include injection and production wells drilled into the uranium ore body, monitoring wells, and buried pipelines linking the wells, wellhouses, and satellite facility.

2.1.5 Operations

During ISR operations, CBR would pump barren lixiviant into the ore body through a series of injection wells to extract uranium from the ore body. As the lixiviant moves through pores in the ore body, it would dissolve uranium and other metals. CBR would pump the resulting ore-bearing lixiviant back out through production wells and collect the recovered lixiviant at wellhouses located in the wellfield.

Once the ore-bearing lixiviant is brought up from the ore body, CBR would pipe the lixiviant from the wellhouses to the satellite facility, where an ion exchange process would move uranium from the lixiviant to an ion exchange resin. The satellite facility would encompass a 1.8-ac (0.73-ha) area. Within this area, a 130-ft by 100-ft (39.6-m by 30.5-m) building would hold the ion exchange columns, water treatment equipment, resin transfer facilities, pumps for injection of lixiviant, wastewater tanks, and an employee break area. Once the majority of an ion exchange column is filled with uranium, CBR would take the column out of service and transport the uranium-saturated resin to the Crow Butte Central Processing Facility via tanker truck. CBR would complete the process of converting the resin to yellowcake at the existing Crow Butte license area. Following this process, the rejuvenated resins would be returned to the MEA satellite facility for reuse in the ion exchange process.

Following uranium removal, the now-barren lixiviant would be treated with sodium and carbonate chemicals, as needed, and pumped to the wellfield for reinjection into the mine unit. The MEA would operate at a maximum production flow rate of 6,000 gallons per minute (gpm) (23,000 liters per minute (Lpm)) and would yield enough uranium to produce an average of 600,000 lbs (270,000 kg) of yellowcake annually.

Table 1. Estimated Area of Land Disturbances by Habitat Type

	Habitat Type								
	Mixed Grass Prairie	**Degraded Rangeland**	**Mixed Conifer Forest**	**Cultivated**	**Drainage**	**Range Rehabilitation**	**Structure Biotope**	**Deciduous Streambank Forest**	**TOTAL**
INITIAL SITE DISTURBANCES									
Mine Units	343.7	143.6	5.6	71.7	7.2	6.9	8.9	-	**587.6**
Satellite Facility	1.8	-	-	-	-	-	-	-	**1.8**
Access Roads	1.6	-	-	-	0.1	-	-	-	**1.7**
Deep Disposal Wells	0.5	-	-	0.2	0.1	-	-	-	**0.8**
TOTAL Initial Disturbed Area	347.6	143.6	5.6	71.9	7.4	6.9	8.9	-	**591.9**
ADDITIONAL LONG-TERM SITE DISTURBANCES									
All Additional Long-term Activities[a]	795.1	84.4	189.0	56.7	23.9	0.2	8.0	4.7	**1162.0**
TOTAL Disturbed Acres	**1,142.7**	**228.0**	**194.6**	**128.6**	**31.3**	**7.1**	**16.9**	**4.7**	**1753.9**

[a]Additional long-term activities may include roadways, exploration and delineation drilling, new and expanded mine units, wellhouses, and underground piping.
Source: CBR 2014, Table 4.1-1

2.1.6 Aquifer Restoration

ISR operations would result in the alteration of the geochemistry and water quality in the uranium recovery zone. As a result, groundwater would likely experience increases in various constituents, including uranium, chloride, bicarbonate, sulfate, and trace metals. When CBR determines that continued ISR operations at a particular mine unit is no longer economical, CBR would initiate groundwater cleanup to restore the affected groundwater to pre-injection baseline values on a mine-unit average. During restoration, CBR would perform stability monitoring to demonstrate that applicable groundwater protection standards are met. CBR is required to restore groundwater quality to the standards listed in Criterion 5B(5) of Appendix A, "Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content," to 10 CFR Part 40, "Domestic Licensing of Source Material," as required by the Uranium Mill Tailings Radiation Control Act. Under EPA requirements (40 CFR Part 192, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings"), groundwater restoration at ISR facilities must meet this Act's standards rather than those associated with the Safe Drinking Water Act or analogous State regulations.

The licensee's planned groundwater restoration activities would consist of four phases, as follows.

- Groundwater transfer involves transferring groundwater between a mine unit where restoration is being undertaken and a unit where uranium recovery is beginning. This action would blend the water in the two mine units until they become similar in conductivity. As part of groundwater transfer, recovered water may be treated by ion exchange and filtration to lower the suspended solids if such concentrations could block injection well screens.

- Groundwater sweep involves pumping water from the wellfield without any reinjection, which would result in an influx of baseline-quality water from the wellfield perimeter.

- Groundwater treatment would occur after groundwater sweep and involves pumping groundwater from production wells and treating the water for constituents, including solubilized uranium and pre-oxidized minerals. Treatment may include ion exchange, reverse osmosis, and Electro Dialysis Reversal.

- Wellfield recirculation may be performed to recirculate solutions by pumping from the production wells and re-injecting the recovered solution into the injection wells.

Once the above-ground restoration steps are completed, CBR would sample the restoration wells and determine whether groundwater protection standards have been achieved. Once standards have been achieved, CBR would notify the NRC that it is initiating the stabilization phase. The stabilization phase involves no extraction or injection of water or reductants. CBR would conduct stability monitoring of restoration parameters in the restoration and monitoring wells. CBR would perform sampling once every other month for four quarters, and if the six samples show that the restoration values for all wells are maintained during the stabilization period with no significant

increasing trends, then CBR would consider restoration complete and submit the restoration data to the NRC and Nebraska Department of Environmental Quality for review and approval.

2.1.7 Decommissioning

Wellfield decommissioning would occur throughout ISR operations. When uranium extraction is complete within a particular mine unit, CBR would undertake aquifer and groundwater restoration. Once aquifer restoration for a particular wellfield has been achieved, CBR would then proceed with other decommissioning and surface reclamation activities. Such activities would include the removal of surface equipment, facilities and buried piping, and the plugging and abandonment of wells, followed by recontouring and removal of contaminated soil, as needed, and final revegetation.

Final site wide decommissioning for purposes of license termination requires submittal and approval of a decommissioning plan and would generally not begin until aquifer restoration has been completed for all (or nearly all) wellfields. Site wide decommissioning activities would include removing contaminated equipment and materials for disposal at an approved facility or for reuse; plugging and abandoning wells; removing soil contamination to meet cleanup limits; backfilling, recontouring, and revegetating disturbed areas; and monitoring the environment. During surface reclamation, CBR would return disturbed lands to equal or better quality compared to their original condition before development for this proposed action. Surface reclamation activities would include topsoil handling and replacement; contouring of disturbed lands; revegetation; removal of buried lines and pipes; and wellfield decommissioning, including well plugging and abandonment. CBR's objective for surface reclamation would be to return lands to a condition capable of supporting livestock grazing and providing habitat for wildlife species.

In its application, CBR has committed to surveying and sampling all facilities and process-related equipment and materials on the MEA site to determine contamination levels. At the end of decommissioning, CBR would survey and release uncontaminated materials and equipment for reuse, if suitable. CBR would relocate and dispose of nonradiological wastes in appropriate facilities and would dispose of radiologically contaminated materials at NRC-approved licensed facilities. Under 10 CFR 40.42, CBR would be required to survey excavation areas for contamination and perform a final site soil radiation survey.

2.1.8 Effluents and Waste Management

The ISR activities at the MEA site would produce airborne effluent and liquid and solid wastes as described below.

<u>Airborne Effluents</u>

Radon-222 is naturally present in the ore body and dissolves in the lixiviant as it travels through the ore body to the production wells; therefore, radon contained in the pregnant lixiviant that is pumped from the wellfield to the MEA satellite facility can be released during the ion exchange process. Releases could occur when individual ion exchange columns are disconnected from the circuit and opened to remove the resin. Tanks associated with the ion exchange process, such as those for resin transfer and

wastewater, would be vented to the atmosphere outside the building. Radon emissions could also occur in a wellfield from wellheads and wellhouses.

Additional air emissions would be generated from fugitive dust during site construction; well site preparation; facility operations; and restoration, reclamation, and decommissioning activities. Combustion engine exhaust would result from vehicle operation, well drilling equipment, and other small combustion sources that may be present at the MEA site.

Liquid Wastes

CBR would dispose of liquid wastes primarily through deep disposal wells. CBR has applied to the Nebraska Department of Environmental Quality for a permit to install and operate two Class I Nonhazardous Waste Injection Wells on the MEA site. CBR could add additional deep disposal wells (up to six) or propose to use other disposal options in later years as flows increase from the MEA mine units, as necessary. Other disposal options to support normal operations may include surge tanks, evaporation ponds, or land application. CBR's current license authorizes use of these other disposal methods at the existing Crow Butte license area, but CBR has not requested authorization to use these other methods at the MEA site as part of the proposed action. Therefore, CBR would need to request and NRC would need to approve a license amendment for CBR to use these other methods. CBR would also have to obtain Nebraska Department of Environmental Quality permits, as applicable.

Activities at the MEA site would result in the following types of liquid waste:

- Well drilling fluids
- Well development water
- Purge water collected during baseline or operational monitoring well sampling
- Liquid process waste
- Wastewater produced during aquifer restoration
- Any stormwater runoff or snowmelt that is potentially contaminated from coming in contact with industrial materials

Section 2.3.5.2 of the NRC's (2017a) environmental assessment describes these liquid wastes and associated treatment and disposal in detail.

Solid Wastes

Solid wastes would include spent resin, fine particles from the resin, empty chemical containers, miscellaneous pipe and fittings, and domestic trash. CBR would segregate solid waste based on whether there is potential for contamination with 11e.(2) byproduct materials.[1] CBR would collected non-contaminated solid waste in designated areas on

[1] 11e.(2) byproduct materials are the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

the MEA site and dispose of the waste in the nearest permitted sanitary landfill. Solid waste contaminated with 11e.(2) byproduct material that could not be decontaminated would be stored on the MEA site until a full shipment could be shipped to a licensed facility. CBR estimates that ISR activities on the MEA site would produce approximately 700 cubic yards (yd^3) (535 cubic meters (m^3)) of non-contaminated solid waste and 60 yd^3 (45.6 m^3) of 11e.(2) byproduct materials per year. Under CBR's current license, License Condition 9.9 requires CBR to maintain an agreement for solid waste disposal at a properly licensed facility. This license condition would remain in place under the proposed action.

MEA construction and operation activities would also generate universal hazardous wastes such as spent waste oil and batteries. CBR estimates that the MEA satellite facility would produce approximately 211 gal (800 L) of waste oil per year, which CBR would dispose of through a licensed waste oil recycler.

The largest volume of solid wastes would be produced during facility decommissioning. Such wastes would include the dismantled satellite facility and wellfield support facilities. As described previously, CBR would perform decommissioning soil surveys to determine radiological content, and any soils exceeding NRC release limits would be removed and disposed of as 11e.(2) byproduct waste.

3.0 Proposed Action Area

The implementing regulations for Section 7(a)(2) of the ESA define "action area" to mean all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area effectively bounds the analysis of federally listed species and critical habitats because only species and habitats that occur within the action area may be affected by the Federal action.

For the purposes of the ESA analysis, the NRC staff considers the action area to include the following areas.

- the 4,622-ac (1,870-ha) MEA site, of which:
    - 592 ac (240 ha) would be directly disturbed by ISR construction and operations for the 11 mine units, wellhouses, piping, access roads, the satellite facility, and deep disposal wells
    - 1,162 acres (470 ha) may be disturbed over the life of the project for roadways, exploration or delineation drilling, new and expanded mine units, wellhouses, and underground piping
- the roadways that would be used to transport materials to and from the MEA site and Crow Butte Central Processing Facility, which lie 11.1 mi (17.9 km) apart
- the 1,100 ac (450 ha) of the existing Crow Butte license area used for ISR operations, which is currently licensed and in operation for uranium recovery and which includes the Crow Butte Central Processing Facility that would be used to turn uranium-loaded resins from the MEA site into yellowcake as part of the proposed action

The NRC staff recognizes that while the action area is stationary, federally listed species can move in and out of the action area. Thus, in its analysis, the NRC staff considers not only those species known to occur directly within the action area, but those species

that may passively or actively move into the action area. The staff then considers whether the life history of each species makes the species likely to move into the action area where it could be affected by ISR activities at the MEA site.

The terrestrial and aquatic environments within the action area are described briefly below. Section 3.5 of CBR's (2014) environmental report contains detailed descriptions of the ecological resources on and near the MEA site.

3.1 Terrestrial Action Area

The action area is located within the Western High Plains Level III ecoregion, which lies in the rain shadow of the Rocky Mountains. As such, it is characterized by a semiarid to arid climate. Natural vegetation on this smooth to slightly irregular plain is dominated by drought-tolerant shortgrass prairie and large areas of mixed grass prairie (Chapman et al. 2001).

Within the Western High Plains, the northern part of the MEA site and the existing Crow Butte license area are in the Pine Ridge Escarpment Level IV ecoregion, which forms the boundary between the Missouri plateau to the north and the High Plains to the south. The region is characterized by dramatic bluffs, escarpments, areas of exposed bedrock, ponderosa pine woodlands, and mixed-grass prairies (Chapman et al. 2001). In addition to ponderosa pine (*Pinus ponderosa*), ponderosa pine woodlands typically contain Rocky Mountain juniper (*Juniperus scopulorum*), western soapberry (*Sapindus drummondii*), skunkbush sumac (*Rhus trilobata*), choke cherry (*Prunus virginiana*), and Arkansas rose (*Rosa arkansana*). These woodlands are found on ridge tops and north- and east-facing slopes. Mixed-grass prairies are typically comprised of little bluestem (*Schizachyrium scoparium*), western wheatgrass (*Pascopyrum smithii*), reed grass (*Phalaris* spp.), needle-and-thread grass (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), and threadleaf sedge (*Carex filifolia*) in moist areas.

The southern part of the MEA site is in the Sandy and Silty Tablelands Level IV ecoregion (Chapman et al. 2001). This area is characterized by tablelands with areas of moderate relief. Vegetation primarily consists of mixed-grass prairie dominated by blue grama, western wheatgrass, junegrass (*Koeleria macrantha*), needle-and-thread grass, rabbitbrush (*Ericameria nauseosa*), fringed sage (*Artemisia frigida*), and various forbs. This ecoregion is more arid than the other areas within the Western High Plains. As such, land use is predominantly rangeland mixed with some agriculture.

The MEA site is comprised of eight vegetative communities, which are described briefly below and depicted on a map in Figure 8.

- <u>Mixed-grass prairie</u> comprises about 2,978 ac (1,205 ha) or 65 percent of the MEA site and is the dominant habitat type throughout the parts of the site that would be physically impacted by the proposed action. This habitat type is most common in the northern part of the project area and varies in composition. Species associated with mixed-grass prairie include needle-and-thread grass, junegrass, Sandberg bluegrass (*Poa secunda*), and threadleaf sedge. Abundant nonnative species include cheatgrass (*Bromus tectorum*) and Kentucky bluegrass (*Poa pratensis*). Non-grass plants include white sagebrush (*Artemisia ludoviciana*), fringed sagebrush, phlox (*Phlox* spp.), locoweed (*Oxytropis* spp.), lupine (*Lupinus* spp.), pussytoes (*Antennaria* spp.), and yucca (*Yucca glauca*).

- <u>Degraded rangeland</u> comprises about 646 ac (261 ha) or 13.7 percent of the MEA site. These areas have been overtaken by cheatgrass and other nonnative species and have a lower overall species richness than mixed-grass prairie. Sections of the southern half of the project area have large patches of degraded rangeland dominated by cheatgrass and Kentucky bluegrass, and the southernmost portion of the MEA site has large patches of degraded rangeland dominated by smooth brome grass (*Bromus inermus*).

- <u>Mixed-conifer forests</u> comprise about 418 ac (169 ha) or 8.3 percent of the MEA site and are the most common forested vegetative community on the site. Mixed-conifer forests are dominated by ponderosa pine and occur along drainages in the northern third of the MEA site in bands that extend northwest to southeast. Chokecherry (*Prunus virginiana*), skunkbush sumac, and snowberry (*Symphoricarpos albus*) are common understory species. Both native and nonnative grasses occur. Smooth brome grass is and pussytoes are particularly common in low-lying areas.

- <u>Cultivated fields</u> of crops such as alfalfa, wheat, oats, corn, barley, and rye comprise about 300 ac (12 ha) or 6.3 percent of the MEA site. It is likely that the cultivated fields were occupied by mixed-grass prairie prior to human alteration.

- <u>Drainages</u> cover about 133 ac (54 ha) or 2.9 percent of the MEA site. Those in the south end are intermittent tributaries to the Niobrara River that are well-drained and usually dry. The vegetation is similar to that in surrounding grasslands, although it is generally more robust. Other typical species include meadow death camas (*Zigadenus venenosus*), wild onion (*Allium* spp.), and monkeyflower (*Mimulus* spp.). Conifers dominate the overstories of drainages to the north, and smooth brome grass dominates the understory.

- <u>Range rehabilitation areas</u> comprise about 70 ac (28 ha) or 1.4 percent of the MEA site and include previously cultivated fields that are generally heavily grazed and seasonally cut for hay. Vegetation varies, and weedy species, including crested wheatgrass (*Agropyron cristatum*) and fringed sagebrush, are more prevalent in areas with cattle disturbance.

- <u>Structure biotopes</u>, or manmade features such as roads and buildings, cover about 68 ac (28 ha) or 1.4 percent of the MEA site. Nonnative weedy species often dominate such areas and include smooth brome grass, cheatgrass, white sweetclover (*Melilotus alba*), yellow sweetclover (*Melilotus officinalis*), and mustard species (*Brassicacea* spp.).

- <u>Deciduous streambank forest</u> occurs along ephemeral streams and comprises about 10.0 ac (4 ha) or less than 1 percent of the project area. Eastern cottonwood (*Populus deltoides*), boxelder (*Acer negundo*), and willow (*Salix* spp.) are common in the overstory. Snowberry, Kentucky bluegrass, smallwing sedge (*Carex microptera*), docks and sorrels (*Rumex* spp.), and annual mustards (*Brassicacea* spp.) are common understory species.

The existing Crowe Butte license area and roadways between the two sites contain similar habitats to those described above for the MEA site. The ecology of the Crow

Butte site is described in detail in the NRC's (2014b) final environmental assessment for license renewal of SUA-1534.

3.2 Aquatic Action Area

The project area has little to no aquatic habitats. No perennial streams are present, and other small drainages, such as Dooley Spring and Willow Creek, are dry, lack defined banks, and have no stream beds. These features may form small pools intermittently but would only be expected to carry water during exceptional precipitation events. The prominent drainage near the MEA site is the Niobrara River, which is located just south of the site and flows into the Box Butte Reservoir.

In 2011, Hayden-Wing Associates, LLC (HWA) surveyed the MEA site for areas that qualify as wetlands as defined in U.S. Army Corps of Engineers guidance (USACE 1987, 1992). HWA also assessed any areas identified in the National Wetlands Inventory as wetlands or potential mesic sites. Surveyors investigated all drainages and low-lying areas on the site by all-terrain vehicle or on foot and assessed whether identified areas qualified as wetlands based on hydric soil, hydrophytic vegetation, and hydrology. Sites containing all three indicators of hydric conditions were classified as wetlands. HWA (2012) identified one small area of freshwater emergent wetland on the western border of the MEA site within a larger area of mixed-grass prairie. The site consists of a very small low-lying depression in a grassy field with ephemeral open water created by runoff and rainwater. Figure 8, *Vegetation Types on the Proposed MEA Site*, depicts the ephemeral wetland as Site 1 on the map; Figure 9 is the wetland determination form; and Figure 10 contains surveyor photographs of the area. At the time of the survey, spadefoot toad tadpoles were present.

The existing Crowe Butte license area and roadways between the two sites contain similar habitats to those described above for the MEA site. The ecology of the Crow Butte site is described in detail in the NRC's (2014b) final environmental assessment for license renewal of SUA-1534.

4.0 Federally Listed Species Considered

The NRC used the FWS's Environmental Conservation Online System (ECOS) Information for Planning and Conservation (IPaC) system to identify the potentially present federally listed species and critical habitats in the action area. As a result, the NRC staff determined that two federally listed species, the northern long-eared bat (*Myotis septentrionalis*) and whooping crane (*Grus americana*), have the potential to occur in the MEA action area (FWS 2017). The FWS provided comments on the NRC's draft environmental assessment indicating that the NRC should also consider the red knot (C*alidris canutus rufa*) and the black-footed ferret *(Mustela nigripes*) (FWS 2018a). The staff did not identify any proposed species, candidate species, or proposed or designated critical habitat in the action area. The following sections describe each of the four species' distributions, population trends, and relevant life history information. The staff also makes conclusions in these sections as to whether or not each species may occur in the action area given the available information.

4.1 Northern Long-Eared Bat

The FWS listed the northern long-eared bat as threatened throughout its range in 2015 (80 FR 17974). In 2016, the FWS determined that designating critical habitat for the species was not prudent because such designation would increase threats to the species resulting from vandalism and disturbance and could potentially increase the spread of white-nose syndrome (81 FR 24707).

The northern long-eared bat is found across much of the eastern and north central United States and all Canadian provinces from the Atlantic coast west to the southern Northwest Territories and eastern British Columbia. Its range includes 37 U.S. states, although it is uncommon to rare in the western extremes of its range, which includes Nebraska. Nonetheless, the FWS reports both summer and winter occurrences of the species within the state (80 FR 17974). In a combined mist net (2011-2014) and acoustic (2014) survey, Geluso et al. (2015) determined that the best current evidence suggests that the species does not occur within Dawes County, the county in which the MEA site is located. However, the species occurs within adjacent counties. In the summer, northern long-eared bats occur in the Pine Ridge area of Sheridan County, which lies directly east of Dawes County (80 FR 17974). In its 2015 listing notice (80 FR 17974), the FWS reports the presence of a small maternity colony in this county. The FWS's listing notice also reports that a reproducing population has been documented north of Valentine in Cherry County, the county directly east of Sheridan County. Acoustic surveys in 2012 and 2014 have detected the species in Holt and Cass Counties in eastern Nebraska, and hibernacula in limestone quarries are also known to exist in Cass County (80 FR 17974). The species is generally uncommon or absent from the extreme southeastern Nebraska, although a 2014 telemetry survey detected the presence of two individuals in Otoe County (80 FR 17974). The FWS reports two winter hibernacula from Nebraska as well (80 FR 17974; FWS 2016). Figure 11 depicts the range of the northern long-eared bat.

Northern long-eared bats hibernate during winter months, typically October through mid-March to April, in caves and cave-like structures such as active or abandoned mines and railroad tunnels. Following emergence from hibernation, northern long-eared bats migrate short distances (35 to 55 mi (56 to 89 km)) to summer roosts. Spring migration typically occurs from mid-March to mid-May, and fall migration occurs between mid-August and mid-October. In the summer, females actively form nesting colonies, and individuals generally show interannual fidelity to roost trees and maternity areas. Suitable summer habitat for the species consists of a wide variety of forested and wooded habitats throughout which the northern long-eared bat roosts, forages, and travels. This includes forests and woodlots, where roosts may potentially occur, and linear landscape features, such as fence rows, riparian forests, and other wooded corridors. The species uses wooded areas of various size and with variable amounts of canopy closure. Roosts may occur in cavities, crevices, hollows, or under the bark of live and dead trees and snags of greater than 3 in. (8 cm) diameter at breast height. (81 FR 24707)

As previously described, the MEA site contains areas of mixed-conifer forest (418 ac (169 ha)) and a small area of deciduous streambank forest (10.0 ac (4 ha)). Based on available data, the northern long-eared bat is unlikely to occur on the MEA site because the species is not known to currently occur in Dawes County and because the MEA site would provide only marginal habitat. Related to the existing Crow Butte license area, the

NRC (2014b) did not identify the northern long-eared bat as occurring within this area in the final environmental assessment for license renewal of that facility, and the FWS (2015) concurred with this determination in a letter dated February 9, 2015. In its review of the proposed action, the NRC staff has not identified any studies or records indicating that this information has changed. Thus, for the purposes of this proposed action, the NRC staff assumes that the northern long-eared bat continues to be absent from the current Crow Butte license area. Related to the portion of the action area containing access roads between the MEA site and current Crow Butte license area, the staff expects that the northern long-eared bat is absent in these areas due to lack of suitable forested habitat.

In summary, because the northern long-eared bat is not currently known to occur in Dawes County, the species is likely absent from the action area, and life history activities that entail longer residence times (i.e., roosting, swarming, and hibernation) are unlikely to occur in the action area. The NRC staff conservatively assumes, however, that individuals may occasionally occur within the action area over the course of the spring and fall migration period during which time individuals may use forested areas of the action area for resting and feeding. Thus, the species has the potential to occur in the action area from mid-March to mid-May and from mid-August and mid-October.

4.2 Whooping Crane

The FWS listed the whooping crane as endangered wherever found in 1967 prior to the ESA's promulgation on the original endangered species list under the Endangered Species Preservation Act of 1966 (32 FR 4001). The FWS designated critical habitat for the species in 1978 to include Platte River bottoms in south central Nebraska between Lexington and Dehman within Dawson, Buffalo, Hall, Phelps, Kearny, and Adams Counties (43 FR 20938).

Currently, the only natural wild population of whooping cranes winters in Texas and migrates along the Central Flyway to breeding grounds in Canada. The FWS has introduced nonessential experimental populations in Florida, the Rocky Mountains, the eastern United States, and southwestern Louisiana. The species occurs in Nebraska only as a migrant. Migrations occur from March 6 through April 29 in the spring and from October 6 through November 5 in the fall (FWS 2018a). Migrants travel during the day along narrow corridors in small groups (i.e., individuals, mated pairs, or family groups) under limited cloud cover, tail winds, and otherwise favorable conditions. At night, whooping cranes roost in palustrine and riverine wetlands. These habitats, along with agricultural fields, are used for feeding, self-maintenance, socializing, and resting (Jorgensen and Brown 2017). The species typically selects sites with large, shallow wetlands and wide, unobstructed views that are isolated from human disturbance (FWS 2018b; NGPC 2013). In a 2009–2015 study of nocturnal roost and diurnal sites used by migrating whooping cranes, Pearse et al. (2016) determined that cranes selected roosts in emergent wetlands (50 percent), lacustrine wetlands (25 percent), riverbanks (20 percent), and dryland sites (5 percent). Migrants selected day-use sites in drylands (54 percent), wetlands (45 percent) and riverbanks (1 percent). Whooping cranes tend to stop wherever they happen to be later in the day when conditions are no longer suitable for migration such that stopover use patterns are often very unpredictable (FWS 2009). Thus, whooping cranes could use a given wetland pond regularly, rarely, or even just once over the course of many years of migrations.

The FWS (2017) identified the whooping crane as potentially occurring in the action area in the ECOS IPaC report for the proposed action. However, the whooping crane migration corridor lies east of the action area within central Nebraska. In a multi-year study that identified migratory stopover site use intensity within the Great Plains, Pearse et al. (2015) used radio-tagged whooping cranes to assess 2,158 stopover sites over 10 migrations and 5 years (2010–2014). All of the sites in western Nebraska sites were determined to be unoccupied or exhibited low-intensity use (see Figure 12). According to range maps prepared by the Nebraska Natural Heritage Program (NNHP 2013), the primary areas used by whooping cranes during migration do not include the action area (see Figure 13). A FWS (2009) assessment of the whooping crane migration corridor based on 1,858 confirmed sightings through spring 2007 corroborates this information (see Figure 14). In communications with the FWS directly related to the proposed action, the FWS (2018b) has indicated that its Whooping Crane Databse contains no records of whooping crane sightings in and near the action area. Nonetheless, both the FWS (2018) and the Nebraska Natural Heritage Program (NNHP 2013) report sightings of the species in northwestern Dawes County (NNHP 2013). Thus, the NRC staff assumes that whooping cranes may rarely to occasionally occur within this area if, for instance, cranes are blown west by strong winds that would carry individuals a considerable distance off the centerline of their migration corridor.

As previously described in this evaluation, the MEA site contains one small area of freshwater emergent wetland on the western border of the site. The action area also contains prairie, agricultural lands, and other open areas that could serve as marginal stopover habitat, and whooping crane occurrences are possible although the action area is outside of the species' primary migration corridor. During a preliminary review of the action area, the FWS (2018b) confirmed that migrating cranes could potentially stopover within the action area although available habitat is of very low quality. Thus, for purposes of this proposed action, the NRC staff assumes that the whooping crane could rarely to occasionally occur throughout the action area (MEA site, existing Crow Butte license area, and associated access roads) during spring and fall migrations (early March through April and early October through early November).

4.3 Red Knot

The FWS listed the red knot as threatened wherever found effective in 2015 (79 FR 73706). The red knot is a medium-sized shorebird that migrates annually between breeding grounds in the Canadian Arctic and several wintering regions, including the southeastern United States, northeastern Gulf of Mexico, northern Brazil, and Tierra del Fuego in southern South America. During both spring and fall migrations, red knots use key staging and stopover areas to rest and feed. While most individuals travel through the Atlantic coast during migration, some Texas-wintering red knots pass over the Northern Plains region of the Central Flyway twice annually during migration. In Nebraska, the red knot is considered a causal spring and fall migrant, which means that it has occurred at least twice for a particular season but does not occur annually (Sharpe et al. 2001). Sharpe et al. (2001) lists only 15 documented occurrences of red knots in their comprehensive review of over 100 years of Nebraska bird records. In its *Rufa Red Knot Background Information and Threats Assessment*, the FWS (2014) summarizes these occurrences, which include records from south-central Nebraska, Lake McConaughy in Keith County and the North Platte River valley. The most recent recorded occurrences of red knots in Dawes County are from September 1975 (Bray et al. 1986; Rosche 1992).

During migration, red knots use coastal marine and estuarine habitats with large areas of exposed intertidal sediments; ocean- or bay-front areas; and tidal flats in more sheltered bays and lagoons (FWS 2014). Along the Atlantic coast, dynamic and ephemeral features are important red knot habitats; these include sand spits, islets, shoals, and sandbars (Harrington 2008). Inland stopovers include saline lakes within the Northern Great Plains (Newstead et al. 2013). The FWS (2014) has found that although little information exists indicating whether red knots may utilize inland freshwater habitats during migration, current data suggests that certain freshwater areas may warrant further study as potential stopover habitat. The FWS (2014) also concluded that the best available data indicate that small numbers of red knots may use impoundments and other manmade freshwater habitats during inland migrations.

Red knots migrate long distances over a relatively short period of time. According to a 2009–2012 geolocator study of midcontinent red knot migrations, individuals depart Texas between May 16 and 21 and fly two days directly to a stopover site in the Northern Great Plains or fly three days to a stopover site at the southern edge of Hudson Bay in Manitoba or Ontario. Birds spent 15 to 21 days at the selected stopover site before departing for breeding grounds between June 1 and 13. Similar flights are made in the fall with birds arriving in Texas wintering grounds by October. (Newstead et al. 2013).

Given that red knots have rarely been observed in Nebraska during spring and fall migration periods and the lack of suitable staging and stopover habitat on the MEA site, on the existing Crow Butte license area, and within the vicinity of associated access roads, the NRC staff concludes that the species is unlikely to occur in the action area.

4.4 Black-Footed Ferret

The FWS listed the black-footed ferret as endangered wherever found, except where listed as an experimental population, in 1967 on the original endangered species list under the Endangered Species Preservation Act of 1966 (32 FR 4001). The species is exempt from critical habitat designation as it was listed prior to the critical habitat amendments to ESA (FWS 2013).

In Nebraska, the FWS (2018a) considers the black-footed ferret to be extirpated. The last confirmed sighting in the state occurred in Overton, Nebraska in 1949 (Fichter and Jones 1953). The historical range of the ferret coincides with the ranges of the black-tailed prairie dog (*Cynomis ludovicianus*), Gunnison's prairie dog (*C. gunnisoni*), and white-tailed prairie dog (*C. leucurus*) (Cahalane 1954; FWS 2013). Black-footed ferrets depend on prairie dogs for food and on their burrows for shelter. From the late 1800s through 1960s, prairie dog populations dramatically declined as a result of the conversion of native grasslands for agricultural use, poisoning, and disease. This in turn led to the ferret's decline due to the species' close association with prairie dogs. As of 2013, the FWS (2013) estimated that the breeding number of adult black-footed ferrets in the wild was 418 individuals with most individuals occurring at four locations in Arizona, South Dakota, and Wyoming.

In 2011, HWA (2012) performed aerial surveys for black-tailed prairie dog colonies on the MEA site and within a 2.5-mi (4-m) buffer area. HWA identified four prairie dog colonies—two along the MEA site border and two within the 2.4-mi (4-m) buffer—all of which were occupied by black-tailed prairie dogs at the time of the surveys. HWA

mapped the colonies partially on foot and partially with National Agricultural Imagery Program imagery for areas that were access-restricted due to lack of landowner permission (see Figure 15). The prairie dog colonies are as follows.

- A 0.63-ac (0.25-ha) colony lies just east of the MEA site boundary in section 7, T29N:R50W.
- A 20-ac (8.1-ha) colony borders the MEA site boundary in section 30, T29N:R50W.
- A 47-ac (19-ha) colony lies in the buffer area south of the MEA site in section 36, T29N:R51W and sections 2 and 3, T28N:R51W.
- A 151-ac (61.1-ha) colony lies in the buffer area east of the MEA site in sections 16 and 21, T29N:R50W.

In addition to these colonies, the U.S. Forest Service (USFS 2008) reports that 1,125 ac (455 ha) of land within the Oglala National Grasslands in Dawes and Sioux Counties, Nebraska contain active colonies of black-tailed prairie dogs.

Although the FWS has reintroduced experimental populations of black-footed ferrets in a number of locations (Wyoming, South Dakota, Montana, Arizona, Utah, Colorado, Kansas, New Mexico, Canada, and Mexico), there are currently no reintroduction sites in Nebraska. The closest known locations of the species are in the Black Hills National Forest and Rosebud Indian Reservation in South Dakota. Based on this information, the NRC staff concludes that the black-footed ferret does not occur in the action area.

4.4.1 Summary of Potential Species Occurrence in the Action Area

Table 2 below summarizes the potential for each of the four listed species to occur in the action area.

Table 2. Potential Occurrences of Federally Listed Species in the Action Area

	Species			
	Northern Long-Eared Bat	**Whooping Crane**	**Red Knot**	**Black-Footed Ferret**
Occurrence in Nebraska				
Type of occurrence	migrant	migrant	migrant	resident
Period of occurrence	mid-March through mid-May and mid-August through mid-October	early March through April; early October through early November	mid-May and early to mid-June	year-round
Likelihood of Occurrence Within the Action Area				
MEA site	Occasional presence possible	Rare to occasional presence possible	Does not occur	Does not occur

	Species			
	Northern Long-Eared Bat	**Whooping Crane**	**Red Knot**	**Black-Footed Ferret**
Existing Crow Butte license area	Unlikely to be present	Rare to occasional presence possible	Does not occur	Does not occur
Access roads	Unlikely to be present	Rare to occasional presence possible	Does not occur	Does not occur

5.0 Proposed Action Effects Analysis

This section describes the potential direct, indirect, interrelated, and interdependent effects of the proposed action—the NRC's decision of whether to approve a license amendment that would authorize CBR to expand its ISR operations to include the MEA site—on northern long-eared bat, whooping crane, red knot, and black-footed ferret. In order to evaluate potential effects, the NRC staff first considers whether each species will be exposed to proposed action-related stressors. If exposure is likely, the NRC staff then evaluates how the exposed individuals are likely to respond.

5.1.1 Direct and Indirect Effects

Northern Long-Eared Bat

In Section 4.1, the NRC staff concludes that the northern long-eared bat has the potential to occur in the action area as a migrant within forested areas of the MEA site from mid-March to mid-May and mid-August to mid-October.

The potential stressors to northern long-eared bats that could result from the proposed action are follows.

- Loss of potential habitat due to forest conversion during project construction, reclamation, or decommissioning
- Displacement or stress to individuals from noise, lighting, and human presence during all phases of the project
- Direct or indirect injury to or mortality of individuals from collisions with construction equipment during construction phases and with other vehicles during all phases of the project

Forest conversion would occur during the various construction phases of the proposed project. In its programmatic biological opinion for the 4(d) Rule for the northern long-eared bat, the FWS (2016) defines forest conversion to mean any activity that removes forested habitat that is suitable for the northern long-eared bat. This includes, but is not limited to, tree removal from commercial or residential development, energy production and transmission (oil, gas, solar, wind), mining, agriculture, transportation, military

training, and other ecosystem management. Unlike forest management, forest conversion permanently removes forested habitat on the landscape.

Initial construction activities would affect 5.6 ac (2 ha) of mixed conifer forest for mine unit construction, and additional long-term activities (e.g., roadways, exploration and delineation drilling, new and expanded mine units, wellhouses, and underground piping) could affect an additional 228.0 ac (92 ha) of mixed conifer forest and 4.7 ac (1.9 ha) of deciduous streambank forest (see Table 1). Thus, construction activities could result in the conversion of roughly 50 percent of the MEA site's forested habitat to other uses. The resulting impacts to northern long-eared bat would include loss of suitable foraging and resting habitat during migration, fragmentation of remaining forest patches, and removal of travel corridors. Such effects could reduce the fitness of northern long-eared bats migrating through the action area because the loss of habitat could result in longer flight times to find alternative suitable habitat (FWS 2016, Table 4.1). In areas with little forest or highly fragmented forests, such as the western U.S. edge of the species' range where the action area is located, the impacts of forest loss would be disproportionately greater than similar-sized losses in heavily forested areas, such as in the Appalachians and northern forests (FWS 2016). Nonetheless, the FWS (2016) anticipates that reductions in fitness associated with habitat loss would be small because the northern long-eared bat does not appear to be limited by habitat, as demonstrated by a great deal of plasticity within its environment. For instance, the species is found in a range of highly fragmented forest habitats to contiguous forest blocks from the southern U.S. to Canada's Yukon Territory (FWS 2016). Within the action area, CBR would not perform tree clearing activities during northern the long-eared bat mating season (June 1 through July 31), which would further reduce the potential for construction activities and associated forest conversion to affect northern long-eared bat mating behavior or reproductive fitness.

Another potential impact of the proposed action is displacement or stress to northern long-eared bats in the action area resulting from noise, lighting, and human presence during all phases of the project. Noise and vibration and general human disturbance are stressors that may disrupt normal feeding, sheltering, and breeding activities (FWS 2016). At low noise levels or farther distances, bats initially may be startled but would likely habituate to the low background noise levels. At closer range and louder noise levels, particularly if accompanied by physical vibrations from heavy machinery, many bats would probably be startled to the point of fleeing from their day-time roosts. Fleeing individuals could experience increased susceptibility to predation and would expend increased levels of energy, which could result in decreased reproductive fitness (FWS 2016, Table 4.1). Within the action area, noise, vibration, and other human disturbances could initially dissuade northern long-eared bats from using the remaining intact forested habitat during migration, which could also reduce fitness of migrating bats. Bats that do use the action area would likely become habituated to such disturbances over time. For instance, Indiana bats (*Myotis sodalis*) have been documented as roosting within approximately 300 m (1000 ft) of a busy state route adjacent to Fort Drum Military Installation and immediately adjacent to housing areas and construction activities on the installation (U.S. Army 2014). Northern long-eared bats would likely respond similarly. CBR's avoidance of tree clearing from June 1 through July 31 would further reduce the potential for noise, lighting, and human presence to affect northern long-eared bats, if present in the action area.

The final potential impact that the NRC staff identified is direct or indirect injury to or mortality of northern long-eared bats from collisions with construction equipment and with other vehicles. Collision risk of bats varies depending on time of year, location of roads and travel pathways in relation to roosting and foraging areas, the characteristics of individuals' flight, traffic volume, and whether young bats are dispersing. Although collision has been documented for several species of bats, the Indiana Bat Draft Recovery Plan (FWS 2007) indicates that bat species do not seem to be particularly susceptible to vehicle collisions. However, the FWS (2016) also finds it difficult to determine whether roads pose a greater risk for bats colliding with vehicles or a greater likelihood of deterring bat activity, thus decreasing risk of collision. In most cases, the FWS (2016) expects that roads of increasing size decrease the likelihood of bats crossing the roads, and therefore, reduce collision risk. In the case of the proposed project, vehicles would travel along small private access roads, some of which already exist and some of which would be constructed as part of the project. Construction vehicles and equipment would also be used off-road or on private access roads constructed within the MEA site footprint. Use of these vehicles would be primarily in open areas that migrating bats would be less likely to frequent. Additionally, the sequenced, noncontiguous (phased) development of the mine units on the MEA site would limit the amount of activity and land affected within the action area at any one time and, thus, reduce the potential for injuring or killing northern long-eared bats, if present, such that mortality or injury to northern long-eared bats associated is unlikely. CBR's avoidance of tree clearing from June 1 through July 31 would further reduce the potential for injury or mortality.

The proposed action would also result in a small increases in traffic on neighboring county and state roads resulting from daily truck and employee travel. The NRC (2017a) estimates that 10 to 15 workers would travel to and from the MEA site 7 days per week during construction, 4 to 7 workers would travel to and from the MEA site 7 days per week during operations, and an average of one truck and two tanker trucks per day would travel to and from the site. Once per month, wellfield construction materials would be delivered by truck, and twice per year low-level radioactive waste would be removed from the site by truck (NRC 2017a). This additional traffic would result in a small increase in existing traffic and would be unlikely to noticeably affect the risk of northern long-eared bat collisions.

In conclusion, the potential stressors to the northern long-eared bat resulting from the proposed action would include loss of habitat to forest conversion, displacement or stress to individuals, and direct or indirect injury or mortality through collision with vehicles and equipment. These stressors are unlikely to affect the species in a manner or to an extent that could be meaningfully measured, detected, or evaluated, or these stressors are otherwise unlikely to occur, because CBR would not perform tree-clearing activities during the mating season; because the northern long-eared bat does not appear to be limited by fragmentation; and because the species is likely absent from the action area and would only occur as a seasonal migrant if present. Thus, all effects of the proposed action would be insignificant or discountable. The NRC staff concludes that the proposed action **may affect, but is not likely to adversely affect** the northern long-eared bat.

Whooping Crane

In Section 4.2, the NRC staff concludes that the whooping crane could rarely to occasionally occur throughout the action area during the species' spring and fall migration periods (early March through April and early October through early November).

The potential stressors to whooping cranes that could result from the proposed action are as follows.

- Habitat loss, alteration, or fragmentation during project construction, reclamation, or decommissioning

- Displacement or stress to individuals from noise, lighting, and human presence during all phases of the project

- Direct or indirect injury to or mortality of individuals from collisions with construction equipment during construction phases and with other vehicles during all phases of the project

Habitat loss, alteration, and fragmentation would occur during the various construction phases of the proposed project and would affect prairie, agricultural land, and other open areas that whooping cranes could potentially use for feeding, socializing, and resting during spring and fall migrations. Initial construction activities would affect 577.4 ac (233.7 ha) of open areas for mine unit construction, and additional long-term activities (e.g., roadways, exploration and delineation drilling, new and expanded mine units, wellhouses, and underground piping) could affect an additional 960.3 ac (388.6 ha) (see Table 1). Open areas include mixed grass prairie, degraded rangeland, cultivated land, drainages, and range rehabilitation areas. Thus, over the life of the project, ISR activities could affect roughly 37 percent of the areas on the MEA site that could be marginally suitable to suitable for whooping crane migratory stopover habitat. The sequenced, noncontiguous (phased) development of the mine units on the MEA site would limit the amount of land affected at any one given time, and subsequent reclamation and restoration of disturbed areas would make these areas available for use by whooping cranes in the future. Because ample open habitat would remain available throughout the project lifespan and because whooping cranes are rare in the action area, the small reduction in available habitat would not result in measurable or detectable impacts to whooping cranes and would, therefore, represent an insignificant impact.

Another potential impact of the proposed action is displacement or stress to whooping cranes in the action area resulting from noise, lighting, and human presence during all phases of the project. The NRC staff did not identify any studies or reports that specifically address the whooping crane's sensitivity to these factors, although the staff assumes that whooping cranes would generally be less sensitive to disturbances during migration than during other lifecycle periods (e.g., nesting and chick-rearing). A FWS (2009) issue paper on whooping cranes and wind development suggests that an indirect effect of wind development could be that birds would avoid otherwise suitable habitat, forcing the birds to search for alternate stopover areas. However, the FWS (2009) noted that such avoidance behavior would likely be local and would not alter the overall migration corridor of the population. Removal of stopover habitat could increase

susceptibility of the individuals to mortality if cranes are forced to use suboptimal habitat or fly farther to find stopover habitat (FWS 2009). Such behavior would also lengthen the migration and require cranes to expend extra energy. Flying greater distances under low-light conditions could expose the cranes to additional dangers (hunting, power line collisions, etc.) as they search for stopover habitat, and cranes could be forced to use stopover habitat that is less suitable and thus be more subject to predation, disease, or human disturbance, all of which could increase mortality. Although the FWS contemplated these effects for wind development, whooping cranes, if present in the action area, could experience similar effects as a result of noise, lighting, and human presence associated with the proposed action. As previously discussed, however, the sequenced, noncontiguous development of the mine units on the MEA site would limit the amount of land affected at any one given time, which would also limit noise, lighting, and other general human disturbances. Because ample open habitat would remain available throughout the project lifespan and because whooping cranes are rare in the action area, whooping cranes could use other unaffected open areas within the action area such that displacement or stress would not result in measurable or detectable impacts to migrating cranes.

The final potential impact that the NRC staff identified is direct or indirect injury to or mortality of whooping cranes from collisions with construction equipment and with other vehicles. As described previously in the effects analysis for the northern long-eared bat, construction vehicles and equipment would be used off-road or on private access roads constructed within the MEA site footprint, and the proposed action would only result in small increases in traffic on neighboring county and state roads. Migrating whooping cranes are most vulnerable to collisions early in the morning or late in the day when light levels are diminished as they fly at low altitudes between roost and foraging sites (FWS 2009). Although whooping cranes generally fly at high altitudes when migrating (1,000 to 6,000 ft (305 to 1830 m)), cranes will fly at low altitudes when starting or ending a migration flight, especially when thermal currents are minimal or for brief periods during mid-day to drink or feed (FWS 2009). Thus, while whooping cranes could be susceptible to collision with vehicles and equipment associated with the proposed action, the probability of such an event is unlikely because the species may only rarely occur within the action area and because site activities would be phased and limited to a small area at any given time.

To further reduce the potential for any of the previously described impacts to occur, CBR would perform daily surveys during the spring (March 6 through April 29) and fall (October 9 through November 5) whooping crane migration periods during construction and decommissioning of the mine sites. If whooping cranes are spotted within 0.5 mi (0.8 km) of planned construction or decommissioning activities, CBR would cease work until the birds move on and would inform the NRC of the birds' presence on the site. The NRC would contact the FWS upon such notifications. Appendix C contains the FWS whooping crane survey protocol that CBR would follow.

In conclusion, the potential stressors to the whooping crane resulting from the proposed action would include habitat loss or alteration, displacement or stress to individuals, and direct or indirect injury or mortality. These stressors are unlikely to affect the species in a manner or to an extent that could be meaningfully measured, detected, or evaluated, or these stressors are otherwise unlikely to occur, because CBR would perform daily surveys during spring and fall migrations prior to commencing construction or decommissioning activities; because the affected habitat is already of low-quality and

ample alternate open areas would remain available for use; and because the whooping crane is rare in the action area and would only occur as a seasonal migrant if present. Thus, all effects of the proposed action would be insignificant or discountable. The NRC staff concludes that the proposed action **may affect, but is not likely to adversely affect** the whooping crane.

Red Knot

In Section 4.3, the NRC staff concludes that the red knot is unlikely to occur in the action area given that the species has rarely been observed in Nebraska during migration and that the action area lacks suitable staging and stopover habitat. Accordingly, the NRC staff concludes that the proposed action would have **no effect** on the red knot.

Black-Footed Ferret

In Section 4.4, the NRC staff concludes that the black-footed ferret does not occur in the action area because the species has been extirpated from Nebraska and no experimental populations have been reintroduced into the state. Accordingly, the NRC staff concludes that the proposed action would have **no effect** on the black-footed ferret.

5.1.2 Interrelated and Interdependent Effects

Interrelated actions are those actions that are part of a larger action and depend on the larger action for their justification (50 CFR 402.02). Interdependent actions are those actions having no independent utility apart from the proposed action (50 CFR 402.02). The NRC staff has not identified any information that would indicate that there would be any interrelated or interdependent actions associated with the proposed action.

5.2 Cumulative Effects

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). When formulating biological opinions during formal Section 7 consultation, the FWS and the National Marine Fisheries Service consider cumulative effects when determining the likelihood of jeopardy or adverse modification. During informal consultation, a Federal agency need only consider cumulative effects under the ESA in the biological evaluation if listed species would be adversely affected by the proposed action and formal Section 7 consultation is necessary (FWS 2014). Because the NRC staff concluded earlier in this evaluation that the proposed license renewal is not likely to adversely affect the northern long-eared bat and whooping crane and that the proposed action would have no effect on the red knot and black-footed ferret, consideration of cumulative effects is not necessary. Additionally, the NRC staff did not identify any actions within the action area that meet the definition of cumulative effects under the ESA.

6.0 Determination of Effects

Based on the foregoing analysis in Section 5.0 of this evaluation, the NRC staff finds that all potential impacts on the northern long-eared bat and whooping crane resulting from the proposed action would be insignificant or discountable. Therefore, the NRC staff concludes that the proposed action may affect, but is not likely to adversely affect these species. The NRC staff finds that the red knot and black-footed ferret do not occur in the

action area, and therefore, the proposed action would have no effect on these species. The staff's conclusions are listed below in Table 3.

Table 3. Effect Determinations for Federally Listed Species

Species	Common Name	Federal Status[a]	Effect Determination
Myotis septentrionalis	northern long-eared bat	FT	not likely to adversely affect
Grus Americana	whooping crane	FE	not likely to adversely affect
Calidris canutus rufa	red knot	FT	no effect
Mustela nigripes	black-footed ferret	FE	no effect

[a] FE = federally endangered under the ESA; FT = federally threatened under the ESA

7.0 References

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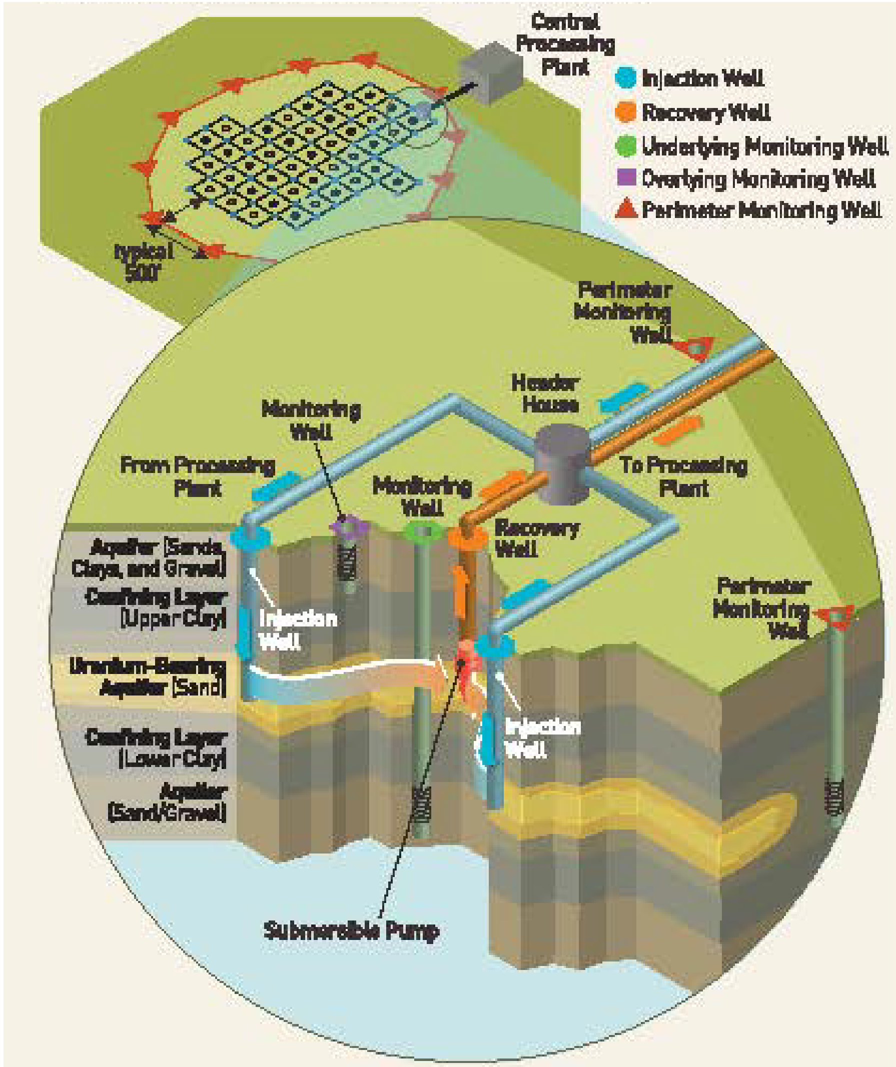
Appendix A. Figures

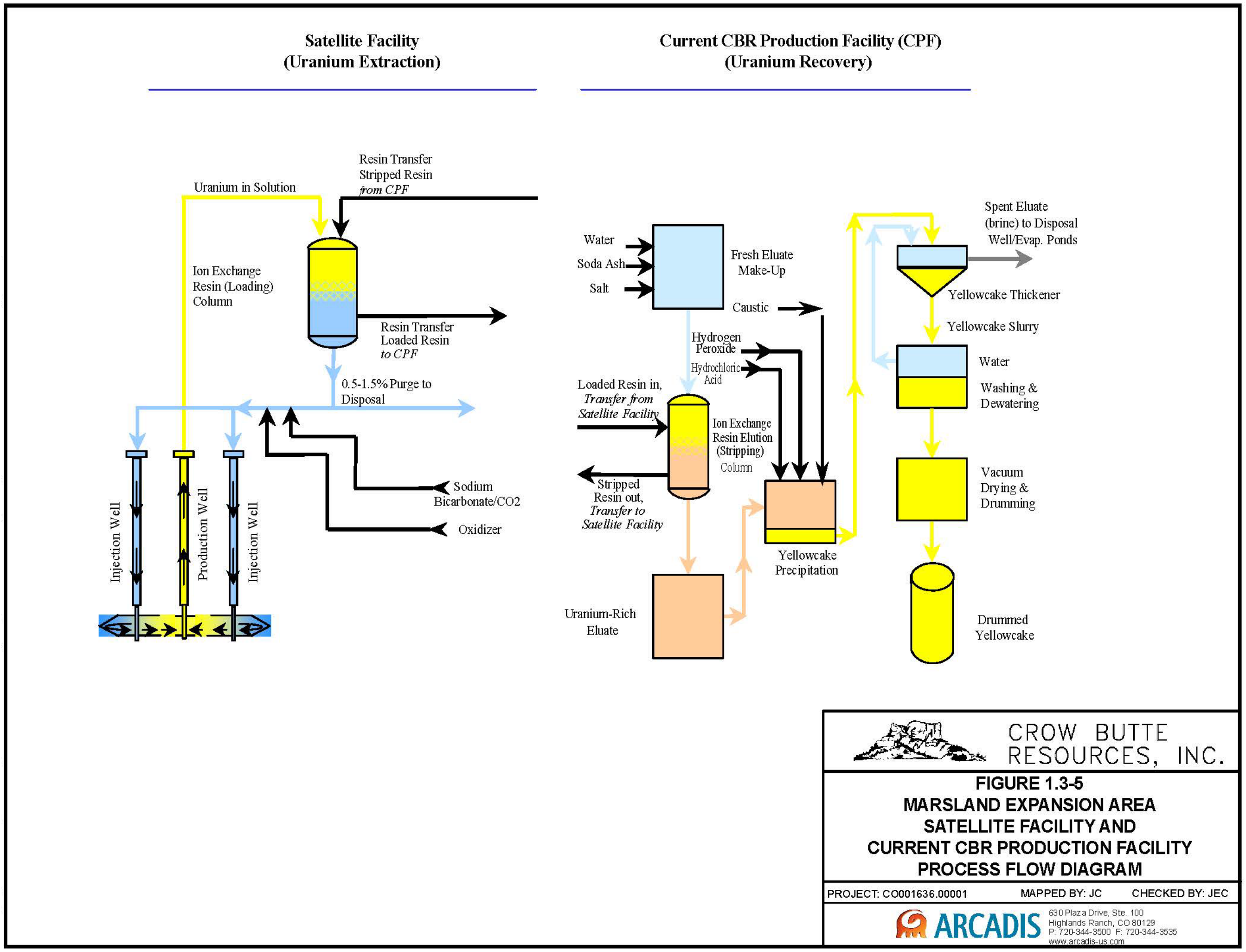
Figure 1. The In Situ Uranium Recovery Process



Injection wells pump a solution of native ground water, usually mixed with sodium bicarbonate and oxygen, into the aquifer (ground water) containing uranium ore. The solution dissolves the uranium from the deposit in the ground and is then pumped back to the surface through recovery wells , all controlled by the header house. From there, the solution is sent to the processing plant. Monitoring wells are checked regularly to ensure the injection solution is not escaping from the wellfield. Confining layers keep ground water from moving from one aquifer to another.

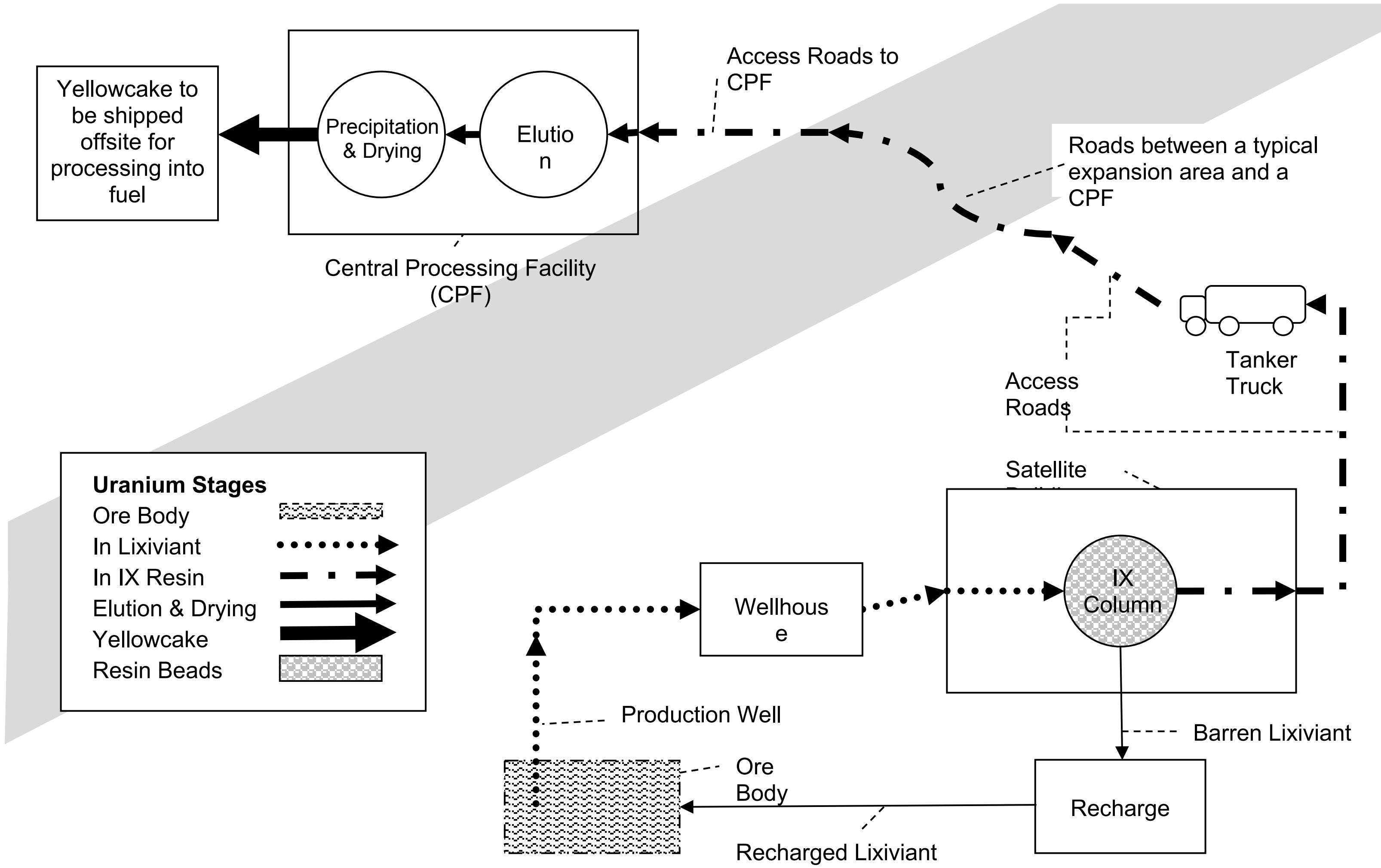
Source: NRC 2017b, Figure 28

Figure 2. Yellowcake Production Process Flow Diagram



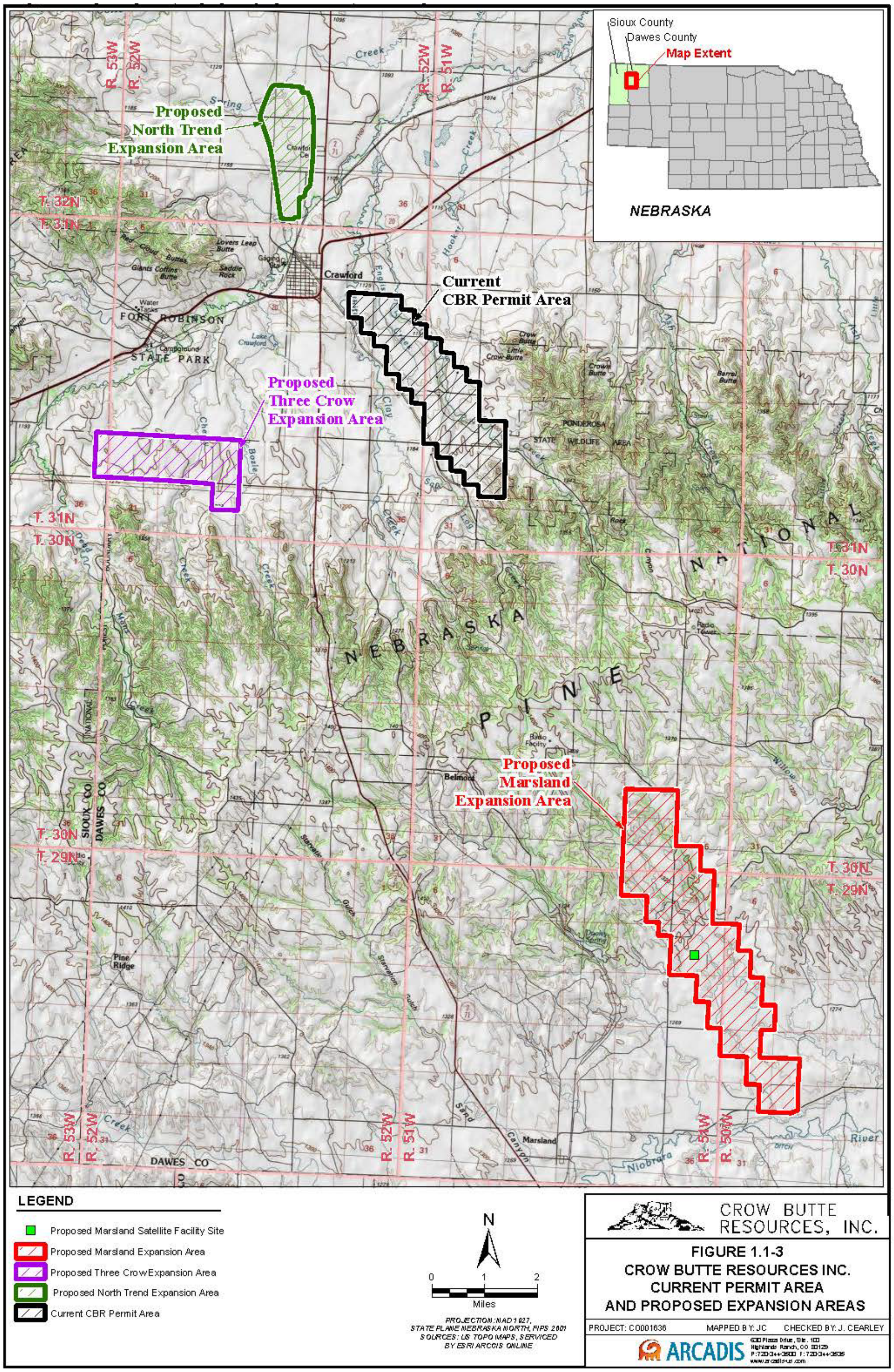
Source: CBR 2014, Figure 1.3-5

Figure 3. Above-Ground Processing Activities at a Typical ISR Facility



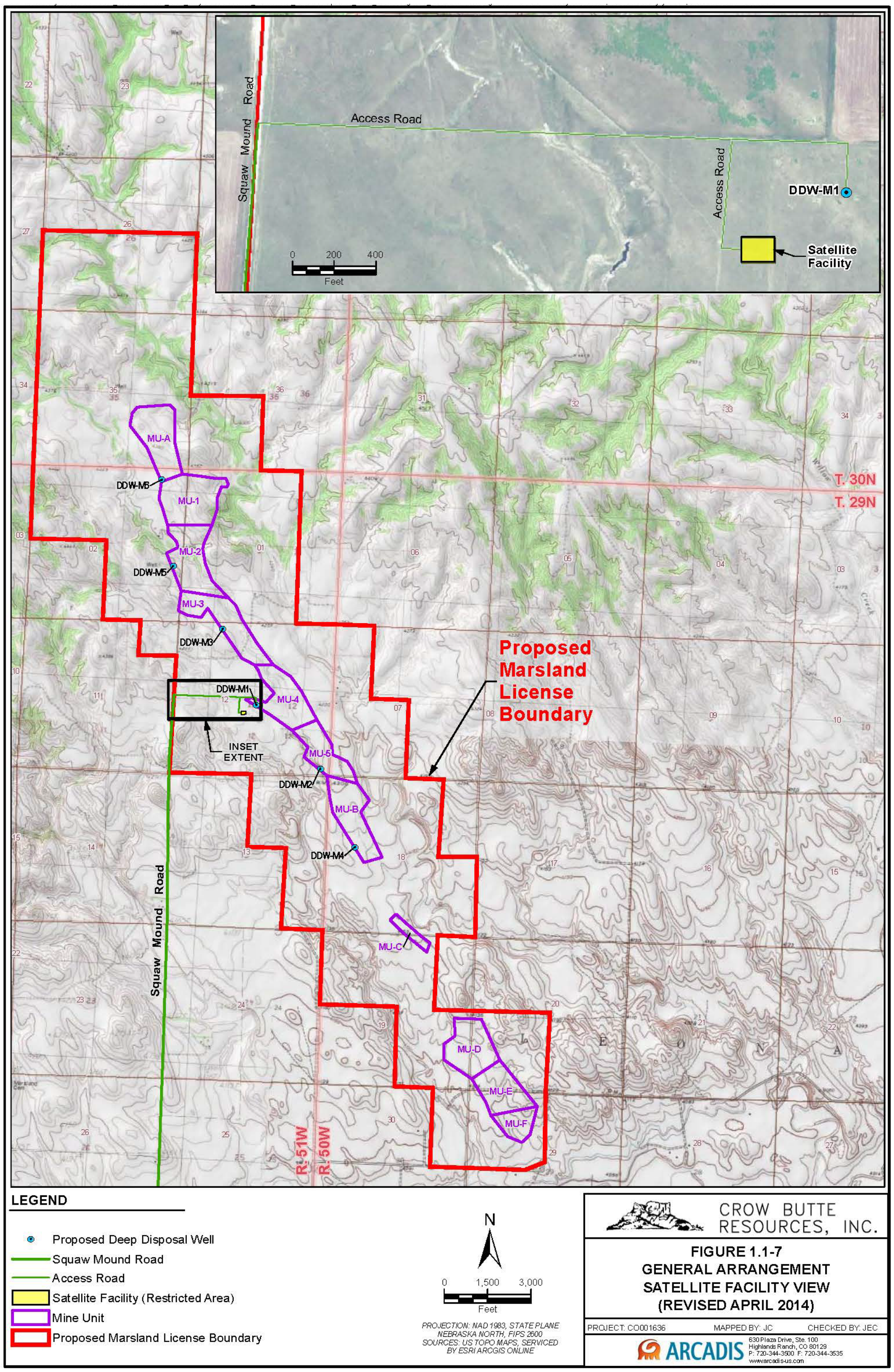
Source: NRC 2017a, Figure 2-2

Figure 4. General Location of the Marsland Expansion Area



Source: CBR 2014, Figure 1.1-3

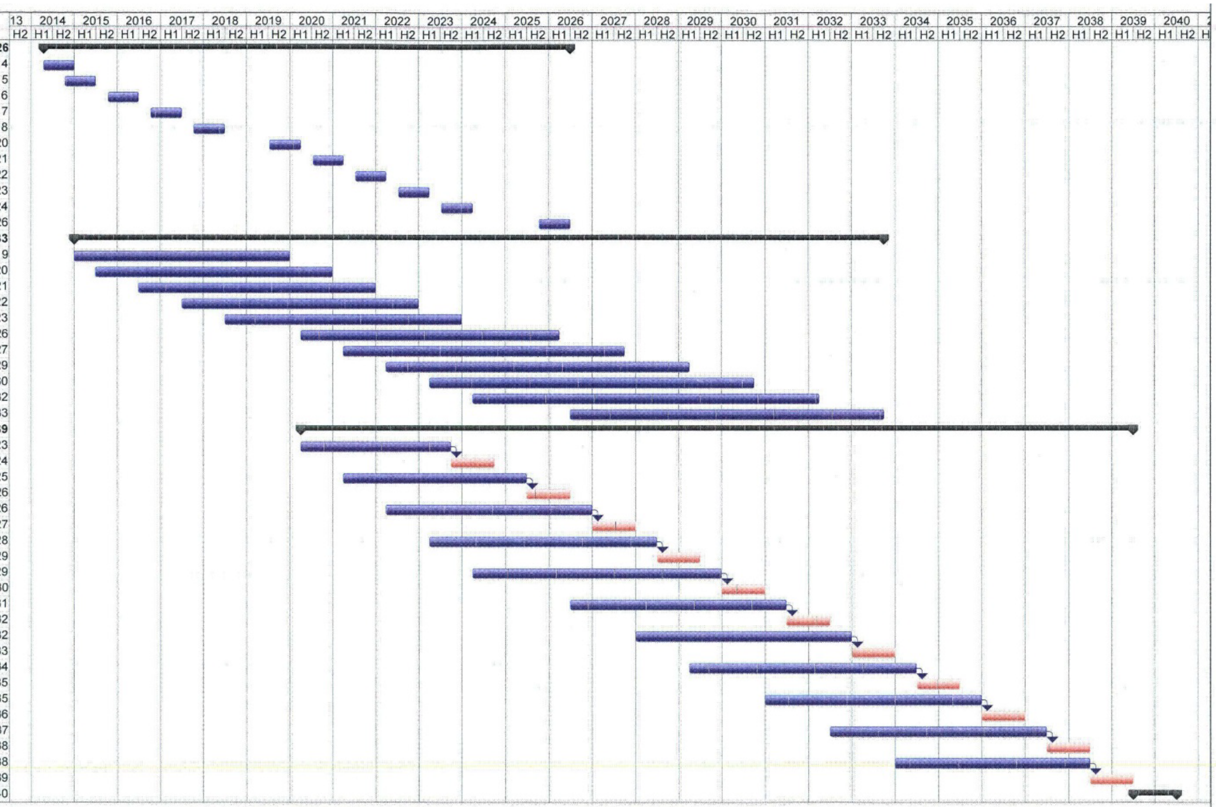
Figure 5. Proposed Mine Unit Locations on the MEA Site



Source: CBR 2014, Figure 1.1-7

Figure 6. Proposed Mining and Restoration Timeline for the MEA Site

ID	Task Name	Duration	Start	Finish
1	**Facility Construction**	**3184 days**	**Thu 4/17/14**	**Tue 6/30/26**
2	MU-1	185 days	Thu 4/17/14	Wed 12/31/14
3	MU-2	185 days	Wed 10/15/14	Tue 6/30/15
4	MU-3	186 days	Thu 10/15/15	Thu 6/30/16
5	MU-4	186 days	Fri 10/14/16	Fri 6/30/17
6	MU-5	186 days	Fri 10/13/17	Sat 6/30/18
7	MU-A	186 days	Tue 7/16/19	Tue 3/31/20
8	MU-B	185 days	Thu 7/16/20	Wed 3/31/21
9	MU-C	186 days	Thu 7/15/21	Thu 3/31/22
10	MU-D	186 days	Fri 7/15/22	Fri 3/31/23
11	MU-E	186 days	Fri 7/14/23	Sun 3/31/24
12	MU-F	186 days	Tue 10/14/25	Tue 6/30/26
13	**Production**	**4892 days**	**Thu 1/1/15**	**Fri 9/30/33**
14	MU-1	1304 days	Thu 1/1/15	Tue 12/31/19
15	MU-2	1437 days	Wed 7/1/15	Thu 12/31/20
16	MU-3	1436 days	Fri 7/1/16	Fri 12/31/21
17	MU-4	1435 days	Mon 7/3/17	Sat 12/31/22
18	MU-5	1435 days	Mon 7/2/18	Sun 12/31/23
19	MU-A	1565 days	Wed 4/1/20	Tue 3/31/26
20	MU-B	1696 days	Thu 4/1/21	Thu 9/30/27
21	MU-C	1826 days	Fri 4/1/22	Sat 3/31/29
22	MU-D	1956 days	Mon 4/3/23	Mon 9/30/30
23	MU-E	2088 days	Mon 4/1/24	Wed 3/31/32
24	MU-F	1893 days	Wed 7/1/26	Fri 9/30/33
25	**Groundwater Restoration**	**5022 days**	**Wed 4/1/20**	**Thu 6/30/39**
26	MU-1	913 days	Wed 4/1/20	Sat 9/30/23
27	Stabilization Sampling	261 days	Mon 10/2/23	Mon 9/30/24
28	MU-2	1108 days	Thu 4/1/21	Mon 6/30/25
29	Stabilization Sampling	261 days	Tue 7/1/25	Tue 6/30/26
30	MU-3	1240 days	Fri 4/1/22	Thu 12/31/26
31	Stabilization Sampling	261 days	Fri 1/1/27	Fri 12/31/27
32	MU-4	1370 days	Mon 4/3/23	Fri 6/30/28
33	Stabilization Sampling	260 days	Mon 7/3/28	Fri 6/29/29
34	MU-5	1500 days	Mon 4/1/24	Sun 12/30/29
35	Stabilization Sampling	261 days	Tue 1/1/30	Tue 12/31/30
36	MU-A	1304 days	Wed 7/1/26	Mon 6/30/31
37	Stabilization Sampling	262 days	Tue 7/1/31	Wed 6/30/32
38	MU-B	1305 days	Mon 1/3/28	Fri 12/31/32
39	Stabilization Sampling	260 days	Mon 1/3/33	Sat 12/31/33
40	MU-C	1370 days	Mon 4/2/29	Fri 6/30/34
41	Stabilization Sampling	260 days	Mon 7/3/34	Sat 6/30/35
42	MU-D	1304 days	Wed 1/1/31	Mon 12/31/35
43	Stabilization Sampling	262 days	Tue 1/1/36	Wed 12/31/36
44	MU-E	1304 days	Thu 7/1/32	Tue 6/30/37
45	Stabilization Sampling	261 days	Wed 7/1/37	Wed 6/30/38
46	MU-F	1173 days	Mon 1/2/34	Wed 6/30/38
47	Stabilization Sampling	261 days	Thu 7/1/38	Thu 6/30/39
48	**Site Reclamation**	261 days	Fri 7/1/39	Sat 6/30/40

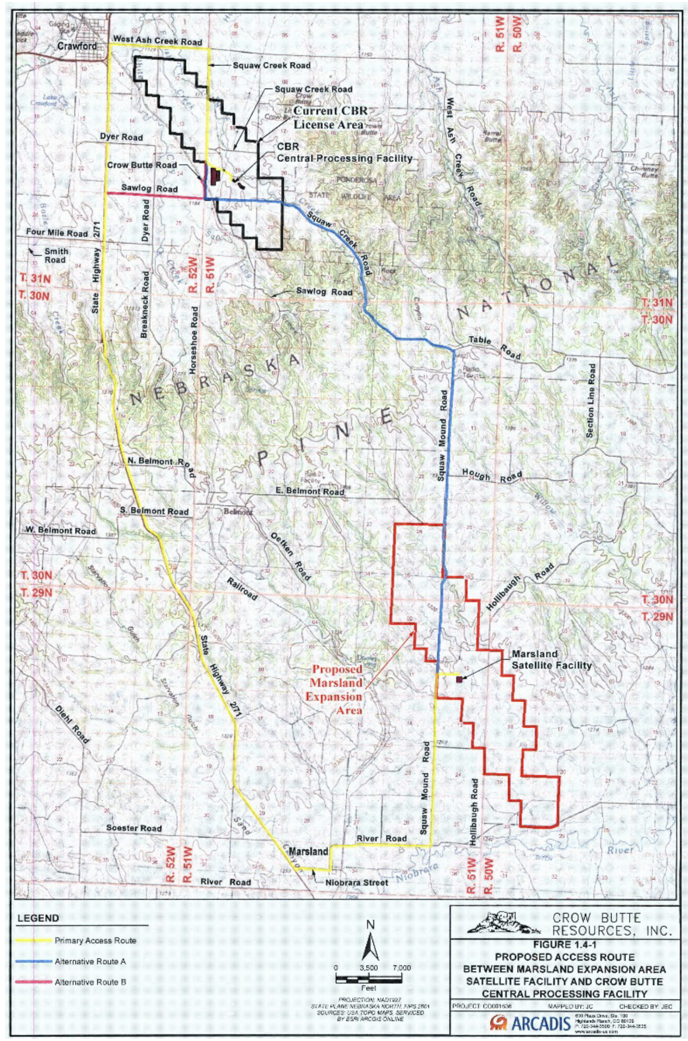


Project: Marsland Expansion Area
Date: Wed 5/22/13

Task · Split · Milestone · Summary · Project Summary · External Tasks · External Milestone · Inactive Task · Inactive Milestone · Inactive Summary · Manual Task · Duration-only · Manual Summary Rollup · Manual Summary · Start-only · Finish-only · Progress · Deadline

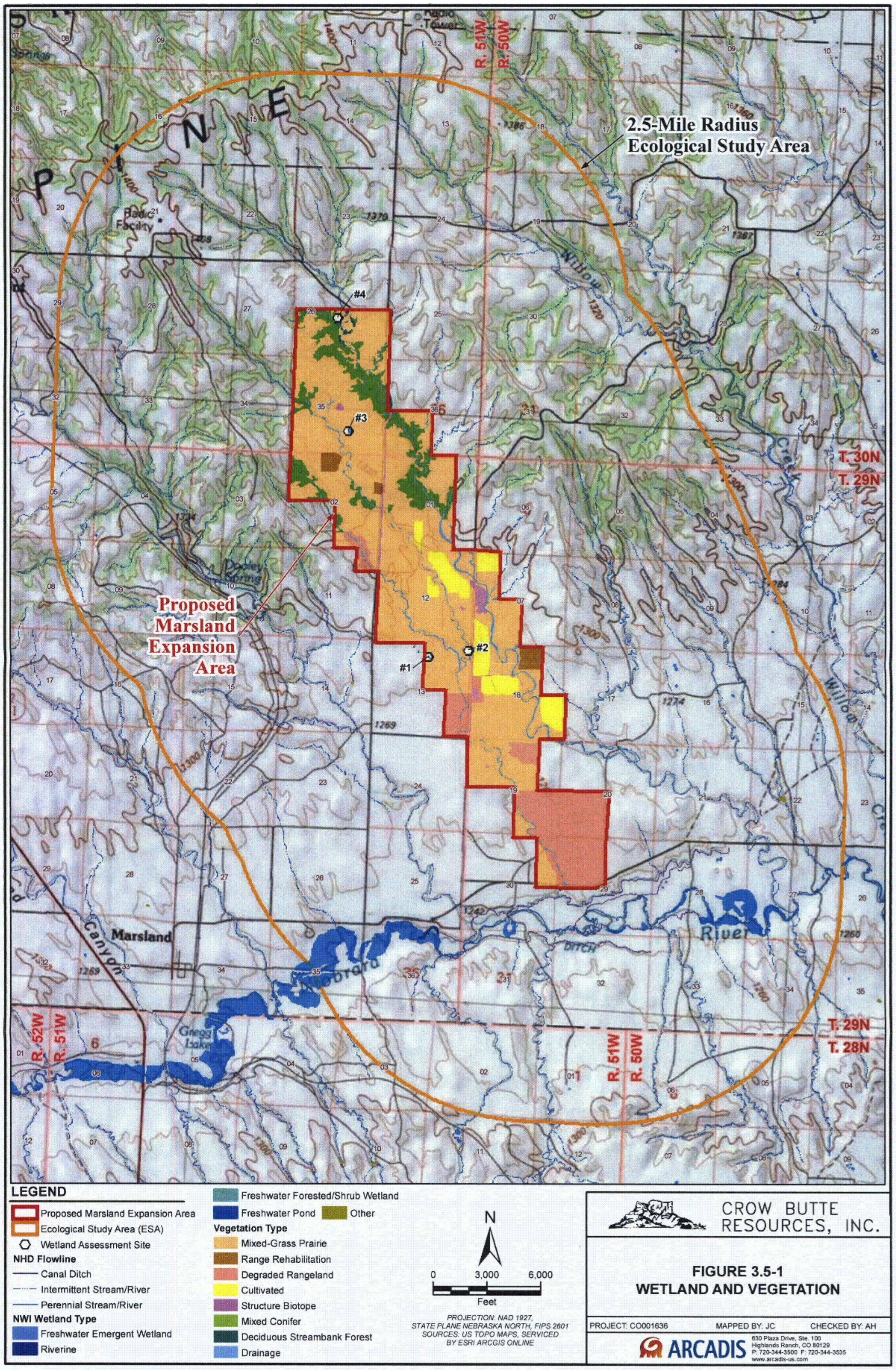
Source: CBR 2014, Figure 1.1-6

Figure 7. Proposed Access Route Between MEA Site and Satellite Facility at Existing Crow Butte License Area



Source: CBR 2014, Figure 1.4-1

Figure 8. Vegetation Types on the MEA Site



Source: CBR 2014, Figure 3.5-1

Figure 9. Wetland Determination Data Form for Qualified Wetlands

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Marsland Site #1 City/County: Marsland Sampling Date: June 9, 2011

Applicant/Owner: Cameco State: NE Sampling Point: ____

Investigator(s): Lisa Martin & Matt Martin Section, Township, Range: 13, T29N R51W

Landform (hillslope, terrace, etc.): rolling hills - depression Local relief (concave, convex, none): ____ Slope (%): ____

Subregion (LRR): LRR G Lat: 643552.82E Long: 4706079.50 N Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation no, Soil no, or Hydrology no significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation no, Soil no, or Hydrology no naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland? Yes ____ No ____
Hydric Soil Present?	Yes ____ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover (Areal)	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5' radius)			
1. Eleocharis sp	35	yes	OBL
2. Taraxacum officinale	1	no	
3. Veronica sp.	1	no	
4. Poa sp.	1	no	
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover	38		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum ____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC–): 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	1	x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ✓ Dominance Test is >50%
- __ Prevalence Index is ≤3.0[1]
- __ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- __ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: Eleocharis [illegible]

Photo # 100_1127 100_1128

US Army Corps of Engineers Great Plains – Interim Version

Source: HWA 2012, Appendix B–1

SOIL

Sampling Point: ______

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
5	10YR 3/1						Clay	Rooting Zone
5-10	10YR 2/1						Cly Loam	
0-3	7.5YR 3/1						Clay loam	2ND Sample from Center of
3-14	7.5YR 3/1		5YR 4/6	1%	C			Slightly mucky Pond

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- N Histosol (A1)
- N Histic Epipedon (A2)
- N Black Histic (A3)
- N Hydrogen Sulfide (A4)
- __ Stratified Layers (A5) (**LRR F**)
- N 1 cm Muck (A9) (**LRR F, G, H**)
- N Depleted Below Dark Surface (A11)
- N Thick Dark Surface (A12)
- N Sandy Mucky Mineral (S1)
- N 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- __ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- N Sandy Gleyed Matrix (S4)
- N Sandy Redox (S5)
- N Stripped Matrix (S6)
- N Loamy Mucky Mineral (F1)
- N Loamy Gleyed Matrix (F2)
- N ~~Depleted Matrix (F3)~~
- Y Redox Dark Surface (F6)
- N Depleted Dark Surface (F7)
- N Redox Depressions (F8)
- N High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- __ 1 cm Muck (A9) (**LRR I, J**)
- __ Coast Prairie Redox (A16) (**LRR F, G, H**)
- N Dark Surface (S7) (**LRR G**)
- __ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- N Reduced Vertic (F18)
- N Red Parent Material (TF2)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- Y Surface Water (A1)
- Y High Water Table (A2)
- Y Saturation (A3)
- N Water Marks (B1)
- N Sediment Deposits (B2)
- N Drift Deposits (B3)
- N Algal Mat or Crust (B4)
- N Iron Deposits (B5)
- N Inundation Visible on Aerial Imagery (B7)
- N Water-Stained Leaves (B9)
- N Salt Crust (B11)
- N Aquatic Invertebrates (B13)
- N Hydrogen Sulfide Odor (C1)
- N Dry-Season Water Table (C2)
- N Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- N Presence of Reduced Iron (C4)
- N Thin Muck Surface (C7)
- __ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- __ Surface Soil Cracks (B6)
- __ Sparsely Vegetated Concave Surface (B8)
- __ Drainage Patterns (B10)
- __ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Geomorphic Position (D2)
- __ FAC-Neutral Test (D5)
- __ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): 0
Water Table Present?	Yes ✓	No ____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: tadpoles

US Army Corps of Engineers — Great Plains – Interim Version

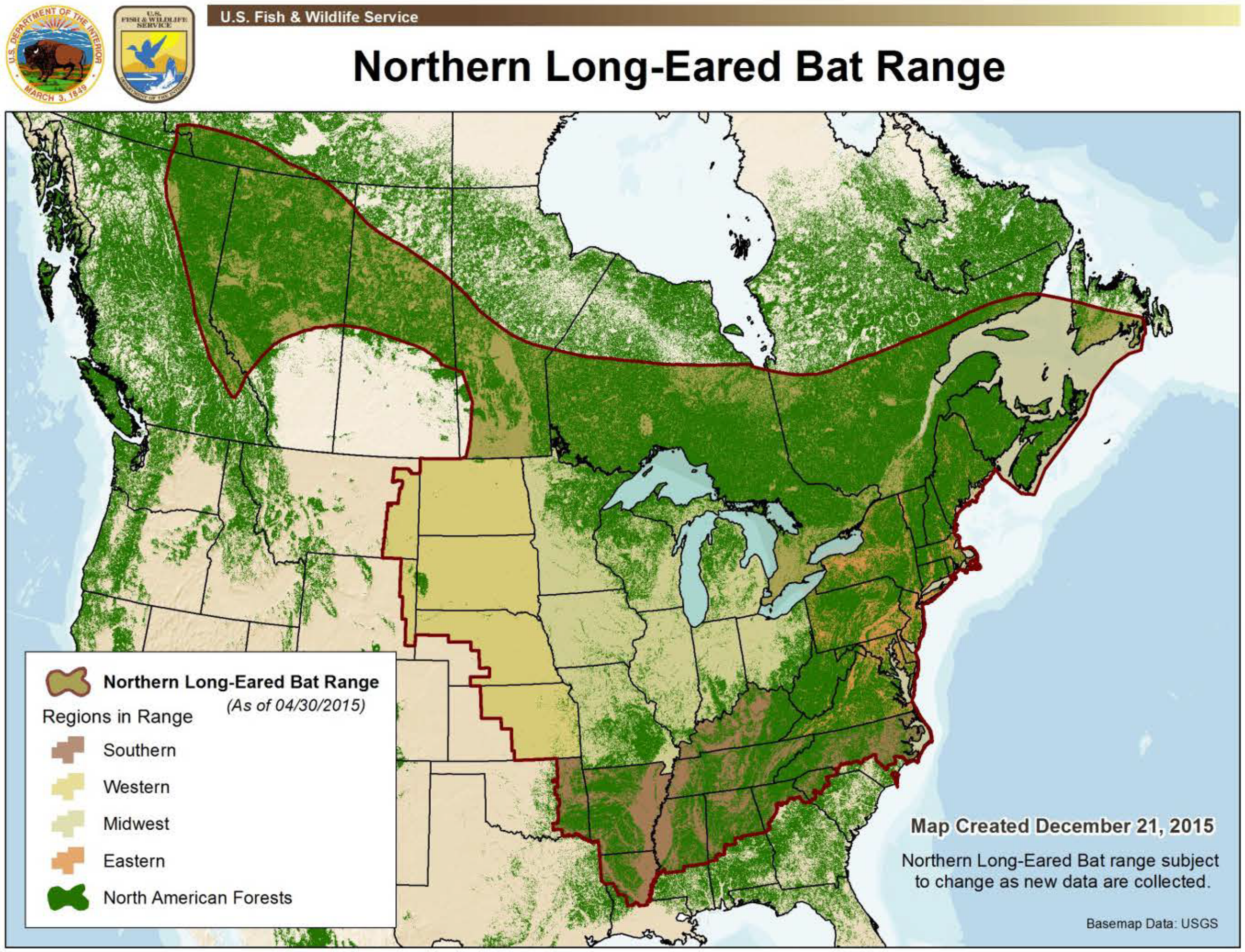
Source: HWA 2012, Appendix B–1

Figure 10. Ephemeral Wetland on the MEA Site

Figure 10. Ephemeral wetland (top) used for breeding by plains spadefoot toads. Numerous spadefoot in larvae form (tadpoles) (bottom) were found at this location on June 7, 2011.

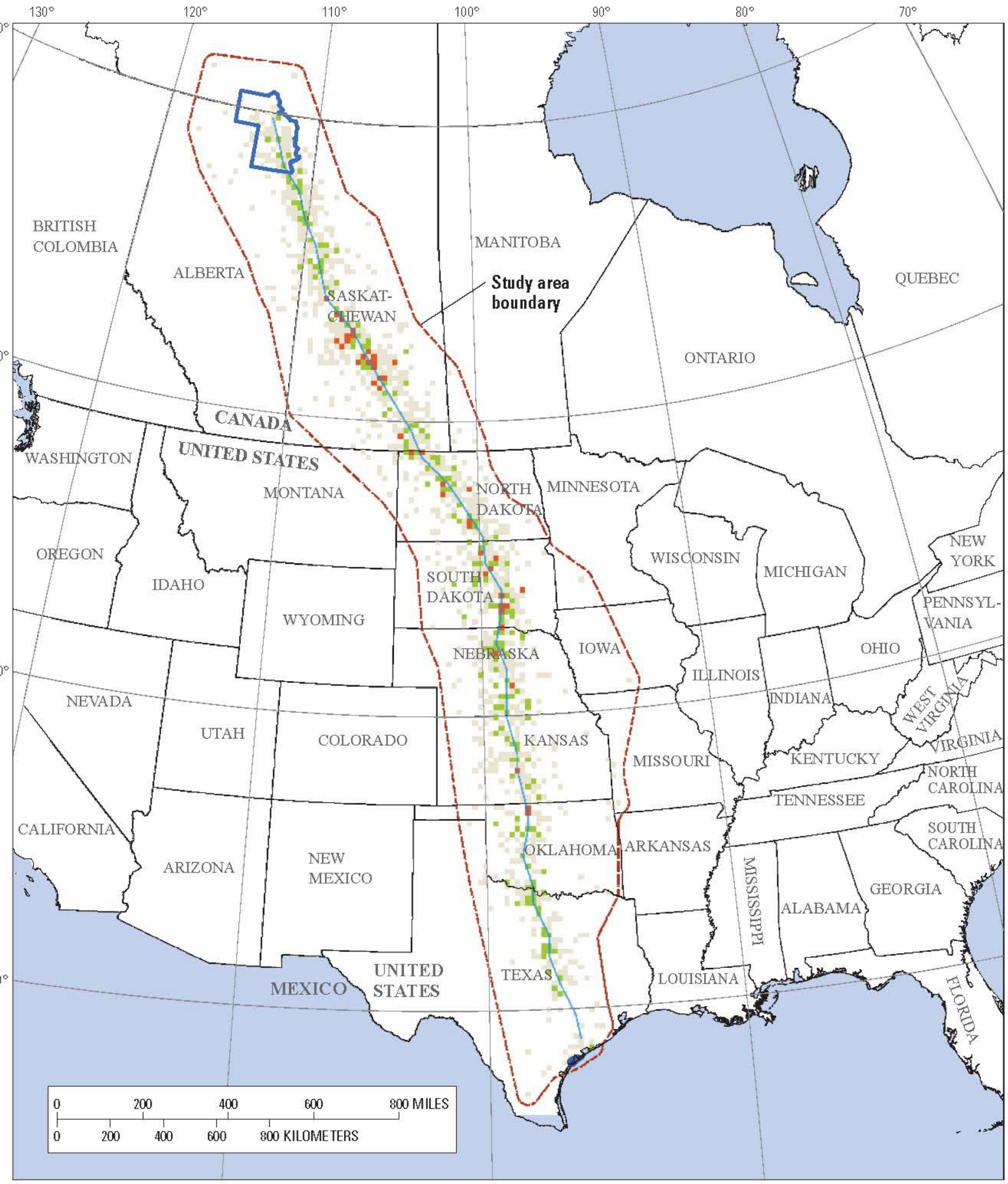
Source: HWA 2012, Figure 10

Figure 11. Range of the Northern Long-Eared Bat



Source: FWS 2016, Figure 2.1

Figure 12. Areas Within the Migration Corridor of Whooping Cranes Identified With Varying Levels of Stopover Site Use Intensity by Pearse et al. (2015)



Base map from Esri and is used herein under liscence (500 meter resolution).
Univeral Transverse Mecator projection, zones 13–14 N
North American Datum of 1983 (NAD 83)

EXPLANATION

Whooping crane migration corridor

Low intensity

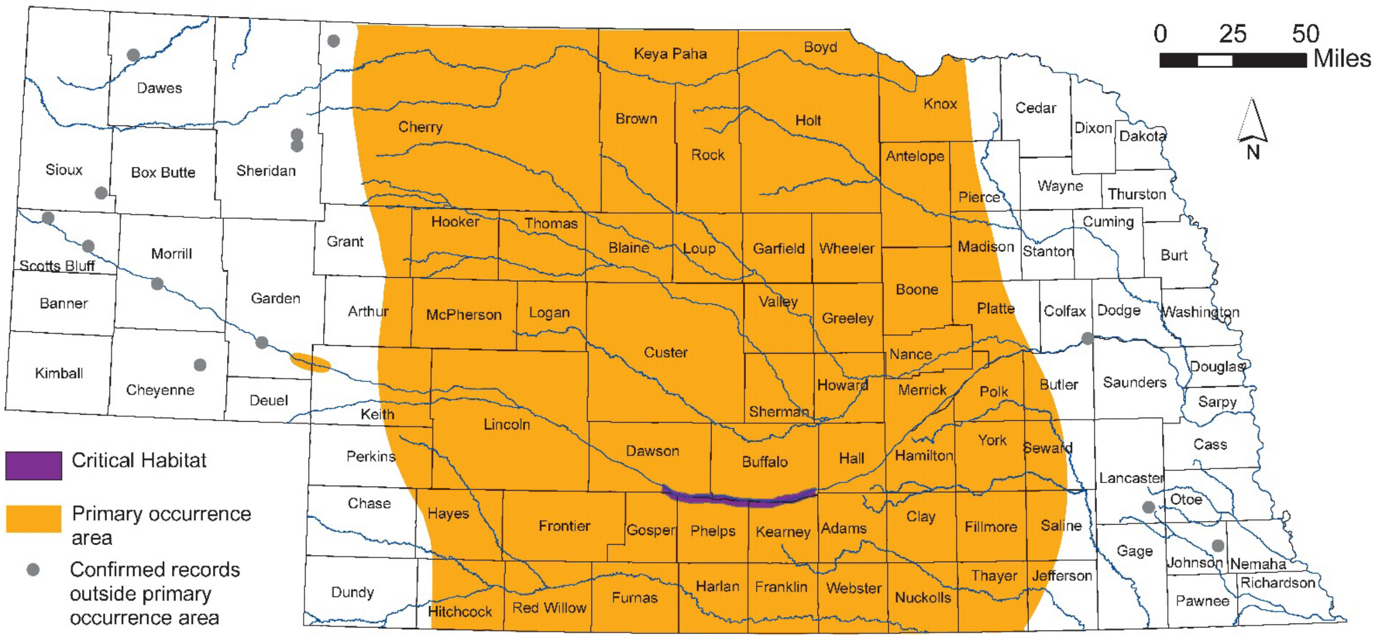
Core intensity

Extended-use core intensity

Centerline

Source: Pearse et al. 2015, Figure 5

Figure 13. Whooping Crane Migration Use Areas and Designated Critical Habitat in Nebraska by NNHP (2013)



The primary occurrence area is a modification of the area identified by the U.S. Fish and Wildlife Service (USFWS) as encompassing 95% of documented Whooping Crane migratory stopovers between 1975 and 2007. The modification consisted of incorporating additional locations known to have repeated use. Data source: USFWS. State-specific Nebraska flyway for Whooping Crane. Vector digital data Unpublished shapefile received October 27, 2008 from USFWS, Region 6, Grand Island, NE.

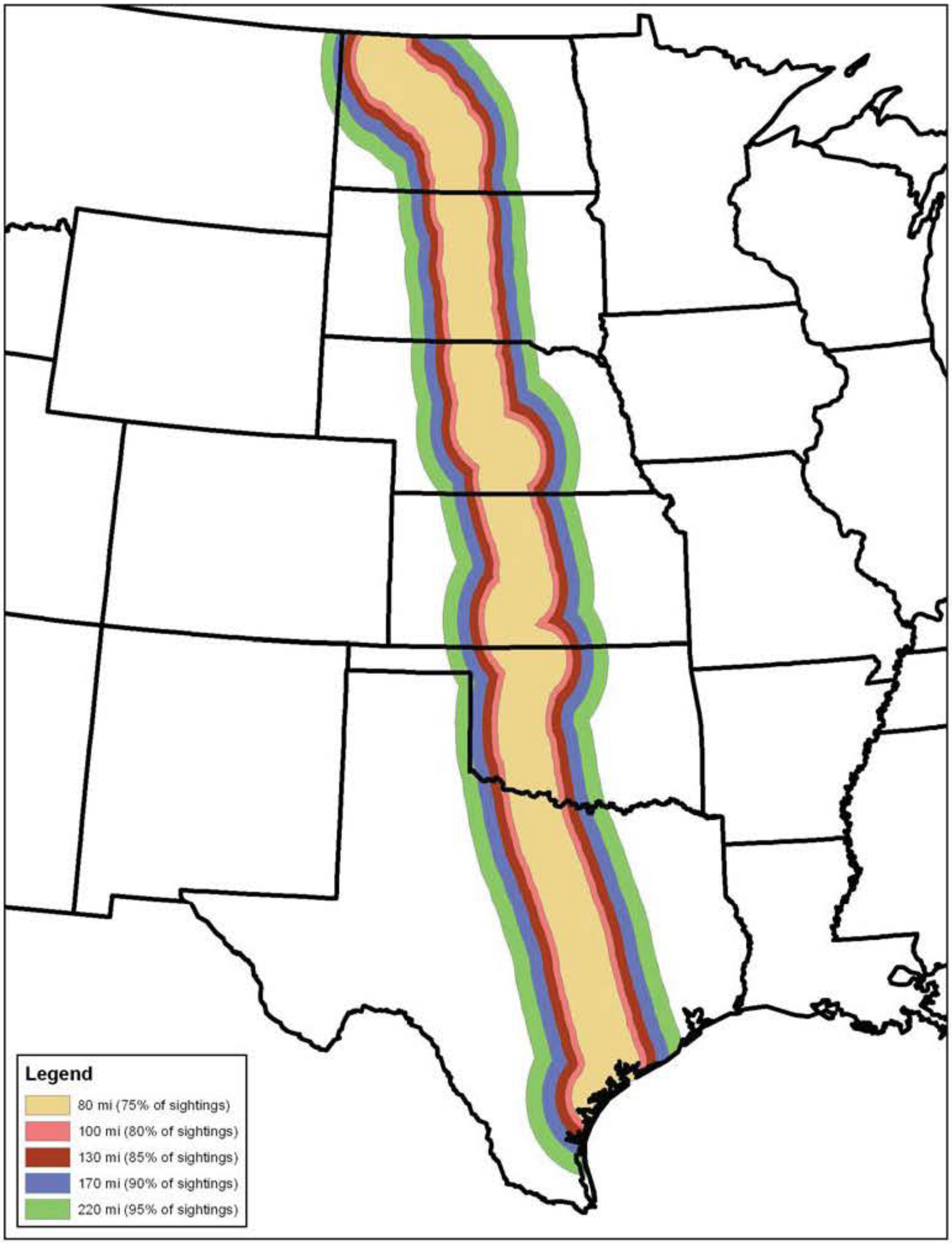
Critical Habitat areas are considered essential for the conservation of a listed species. Data source: U.S. Fish and Wildlife Service, Region 2. 2003. Whooping Crane critical habitat. Vector digital data. Downloaded October 29, 2008 from http://crithab.fws.gov.

Confirmed records are current through Fall 2010 (Source: USFWS, Region 6).

Map produced by the Nebraska Natural Heritage Program, Nebraska Game and Parks Commission, July 6, 2011.

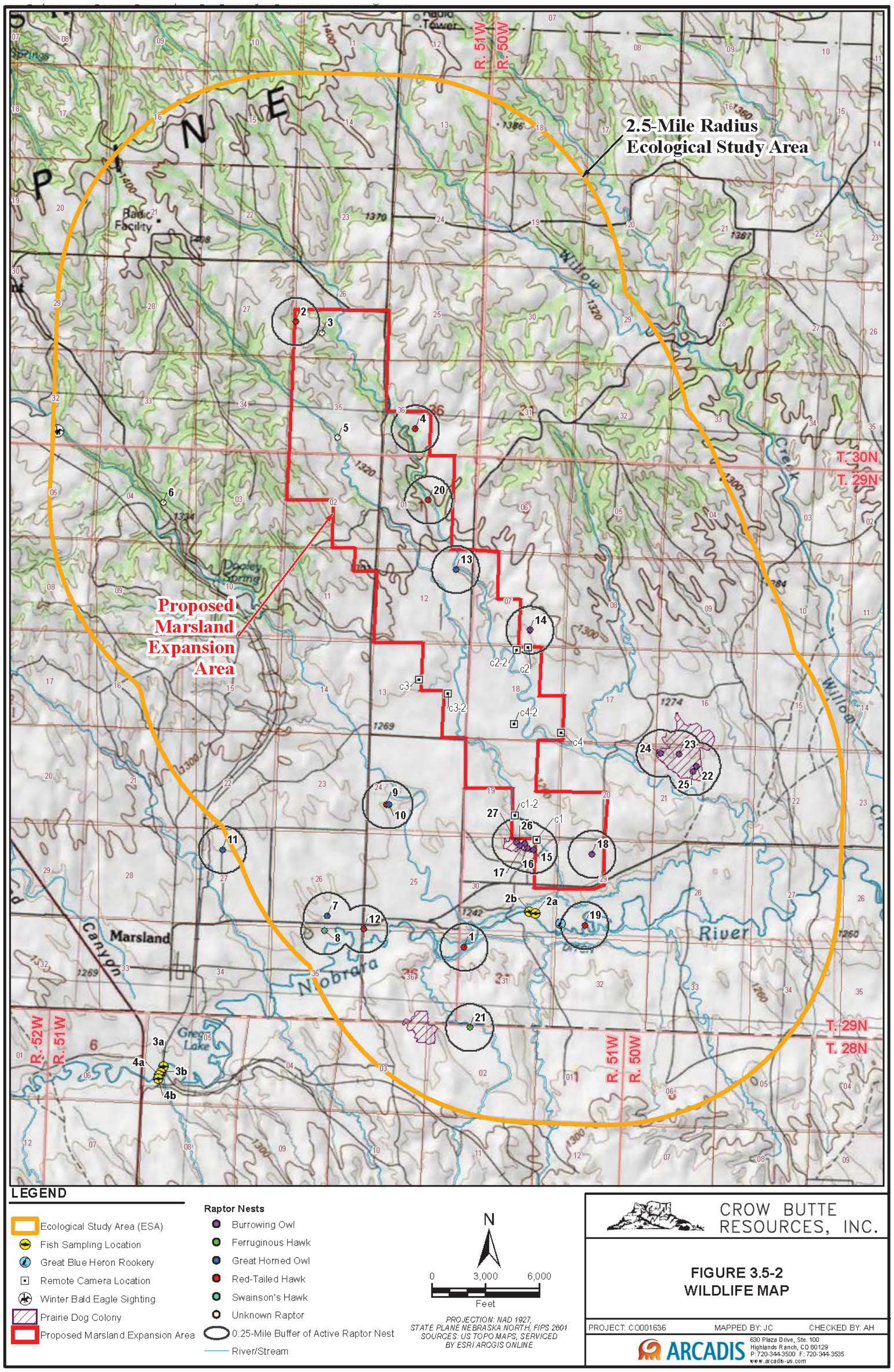
Source: NNHP 2013

Figure 14. Whooping Crane Migration Corridor With 95 Percent Confidence Interval



Source: FWS 2009, Figure 2; Ninety-five percent confidence interval whooping crane migration corridor based on 1,858 confirmed sightings through spring 2007.

Figure 15. Prairie Dog Colonies and Bird Nests and Rookeries on the MEA Site



Source: CBR 2014, Figure 3.5-2

Appendix B. Endangered Species Act Section 7 Consultation History

The U.S. Nuclear Regulatory Commission (NRC) staff has previously consulted with the U.S. Fish and Wildlife Service (FWS) under Section 7 of the Endangered Species Act of 1973, as amended (ESA) related to Source Materials License No. SUA-1534. The following sections briefly describe these consultations.

B.1. License Renewal of the Existing Crow Butte License Area

The NRC renewed Source Materials License No. SUA-1534 in 2014 to authorize CBR to receive, acquire, possess, and transfer byproduct, source, and special nuclear material at the existing Crow Butte license area through November 5, 2024, under the terms specified in the license. In connection with the NRC staff's license renewal review, the staff determined that license renewal would have no effect on federally listed species and critical habitats under the FWS's jurisdiction. The NRC documented this determination in a letter to the FWS dated January 22, 2015. The FWS concurred with the NRC's "no effect" determination in a letter dated February 9, 2015. Table B–1 lists the relevant communications related to this consultation.

B.2. Proposed In Situ Uranium Recovery at the Marsland Expansion Area

In 2013, the NRC staff contacted the FWS to request information on federally listed, proposed, and candidate species and critical habitats that may be in the vicinity of the proposed Marsland Expansion Area (MEA) site. The FWS responded by letter dated March 7, 2013. The FWS's response indicated that the whooping crane (*Grus americana*) may occur or be affected by the proposed action. The FWS's letter also provided information on State-listed species of concern and fish and wildlife resources protected under other statutes.

In 2017, the NRC used the FWS's Environmental Conservation Online System (ECOS) Information for Planning and Conservation (IPaC) system to obtain an updated list of potentially present federally listed species and critical habitats in the action area. The list included the whooping crane and the northern long-eared bat (*Myotis septentrionalis*). The northern long-eared bat became federally threatened in 2015; thus, it was not included in the FWS's previous list of potentially affected species. By email dated February 26, 2018, the FWS provided an expanded list of species that the NRC staff should consider in its analysis of potential effects of the proposed action. The expanded list included red knot (*Calidris canutus rufa*) and black-footed ferret (*Mustela nigripes*) in addition to the whooping crane and northern long-eared bat. The FWS's email also included information specific to each species to help the NRC complete its effects analysis. The FWS provided additional information on the whooping crane by email dated March 20, 2018. This biological evaluation has been prepared to document the NRC staff's analysis and conclusions regarding these species, and this consultation remains ongoing at this time. Table B–1 lists the relevant communications related to this consultation to date.

Table B-1. Correspondence Related to Past ESA Section 7 Consultations

Date	Sender and Recipient	Description	ADAMS Accession No.[(a)]
February 8, 2013	K. Hseuh (NRC) to M. George (FWS)	Request for information regarding federally listed species and critical habitats in the vicinity of the proposed MEA ISR project	ML12334A369
March 7, 2013	M. George (FWS) to K. Hseuh (NRC)	Reply to request for information regarding federally listed species and critical habitats in the vicinity of the proposed MEA ISR project	ML13080A302
January 22, 2015	L. Chang (NRC) to J. Cochnar (FWS)	Request for concurrence with "no effect" determination for Crow Butte license renewal	ML15022A217
February 9, 2015	E. Hines (FWS) to L. Change (NRC)	Concurrence with the NRC's "no effect" determination for Crow Butte license renewal	ML15044A080
September 22, 2017	Nebraska Ecological Services Field Office (FWS) to B. Grange (NRC)	Official species list for proposed MEA ISR expansion project	ML17265A111
February 26, 2018	A. Ciurej (FWS) to J. Quintero (NRC)	Comments to assist the NRC's completion of ESA effects analysis for the proposed MEA ISR expansion	ML18078A057
March 20, 2018	A. Ciurej (FWS) to J. Quintero (NRC)	Information on the whooping crane relevant to the proposed MEA ISR expansion	ML18088A009

[(a)] These documents can be accessed through the NRC's Agencywide Documents Access and Management System (ADAMS) at http://adams.nrc.gov/wba/.

Appendix C. Whooping Crane Survey Protocol

Whooping Crane Fact Sheet

Whooping Cranes in Flight

Foraging Whooping Cranes

Adult with juvenile

The Whooping Crane (*Grus americana*) is a federal and state listed endangered migratory species. The Whooping Crane was federally listed as endangered in 1967. Major river systems used by whooping cranes in Nebraska include the Platte, Loup, Republican, and Niobrara rivers. Additionally, a 3-mile-wide, 56-mile-long reach of the Platte River between Lexington and Denman, Nebraska, has been federally designated as critical habitat for whooping cranes. (Information from U.S. Fish and Wildlife Service)

Whooping Crane (*Grus americana*)
Order: *Gruiformes*
Family: *Gruidae*

Status: State and Federally Endangered. **Description:** L 52"(132 cm) W 87"(221 cm). Sexes similar but males are larger. White body with red and black facial markings. Yellow bill and long dark legs. Immature is white with tawny head and neck, and reddish-brown mottling on rest of body. **Habitat:** In Nebraska is found along the Platte Valley, with its wide slow moving river and associated sandbars and islands. Nearby wet meadows, croplands, and marshlands are important for foraging. **Status/Range:** Occasional spring and fall migrant along Platte Valley. 90% of sightings within 30 miles of Platte River, and 80% occurred between Lexington and Grand Island. **Call:** Shrill "*ker-loo-ker-lee-loo*" trumpet. **Comments:** Endangered. Management and protection programs slowly succeeding.

Similar: Sandhill Crane, Snow Geese, and especially American White Pelicans in flight:
(Information from Nebraska Game and Parks Commission website)

American White Pelican

The Whooping Crane is the tallest bird in North America and one of the rarest birds in the world. Whooping cranes are vulnerable to accidents during migration. Each spring they travel north from their wintering grounds around Aransas National Wildlife Refuge in Texas to their breeding grounds in Wood Buffalo National Park in central Canada (2,400 miles). Each fall this route is reversed. Their journey traverses eastern Montana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma and Texas. In Nebraska, they stop to rest and feed on the Platte, North and Middle Loup and Niobrara rivers. (International Recovery Plan, Whooping Crane *Grus americana*; Third revision, 2007).

January 2012

Whooping Crane Survey Protocol

Whooping Cranes can be disturbed by sight (human figures, equipment within sight) and sound (loud equipment, banging, etc.) that are abnormal (roadway traffic is normal), therefore surveys are needed to ensure disturbance is minimized.

Dates of Survey:

- Spring Migration: March 6 – April 29
- Fall Migration: October 9 – November 15
- When construction activities are occurring, surveys should be conducted daily during these two time frames.

Time of Survey:

- Survey project each day within one hour of start of workday, with at least one survey done no later than 10 am. Record start and stop time.
- Survey area within 0.5 miles of project using binoculars or spotting scope.

If Whooping Cranes are not seen during the morning survey, work may begin after completion of the survey.

If Whooping Cranes are spotted within 0.5 miles of the active construction:

- Do not start work. Contact the Commission[1] or the U.S. Fish and Wildlife Service[2] (Service) for further instruction.
- Stop work if seen at times other than the morning survey, and contact the Commission and the Service, as above.
- Work can begin or resume if birds move off and are greater than 0.5 miles from the construction/activity area; record sighting, bird departure time, and work start time on survey form.

[1] Nebraska Game and Parks Commission Point of Contact:
Michelle Koch, Environmental Analyst Supervisor, (402) 471-5438
OR
Joel Jorgensen, Nongame Bird Program Manager, (402) 471-5440

[2] U.S. Fish and Wildlife Service, Nebraska Field Office Point of Contact:
Matt Rabbe, Fish & Wildlife Biologist, (308) 382-6468 ext. 205
OR
Eliza Hines, Assistant Field Supervisor, (308) 382-6468 ext. 20

January 2012