US Army Corps of Engineers
Omaha District

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT
&
FINDING OF NO SIGNIFICANT IMPACT

Upper Missouri River Basin Water Management
Plains Snow and Soil Moisture Monitoring Network
Montana, Wyoming, North Dakota, South Dakota & Nebraska

May 2020

Prepared by:
U.S. Army Corps of Engineers, Omaha District
Environmental Resources and Cultural Resources Section
Planning Branch, CENWO-PMA-C
1616 Capitol Avenue
Omaha, Nebraska 68102

DRAFT FINDING OF NO SIGNIFICANT IMPACT

Upper Missouri River Basin Water Management
Plains Snow and Soil Moisture Monitoring Network
Montana, Wyoming, North Dakota, South Dakota & Northern Nebraska

May 2020

In accordance with the National Environmental Policy Act (NEPA) and implementing regulations, a Programmatic Environmental Assessment (PEA) has been prepared for the proposed installation and modification of a soil moisture and plains snowpack monitoring network in the Upper Missouri River Basin (UMB) in Montana, Wyoming, North Dakota, South Dakota and Nebraska. The purpose of the proposed project is to provide sufficient data for various federal, state and local agencies to improve forecasting for respective operational needs. Specifically identified in the Water Resources Reform Development Act of 2014, the need for a soil moisture and plains snowpack monitoring network is required to reduce flood risk and improve river and water resource management in the UMB, restore and maintain existing mid- and high elevation snowpack monitoring sites operated under the SNOTEL program and to operate streamflow gages and related interpretive studies in the UMB under a cooperative program with the U.S. Geological Survey.

Two alternatives were analyzed, the No Action Alternative and the Action Alternative which includes the installation of approximately 360 new monitoring stations and the modification of approximately 180 existing monitoring stations. Technical and environmental criteria, as described in Section 3.2, would be applied to select each newly proposed site and limit adverse impacts on the human and natural environmental. Each individual new site installation and existing site modification would require a tiered environmental impact analysis in accordance with the Record of Environmental Consideration (REC) process identified in Appendix A. The No Action Alternative is carried through analysis in order to establish a baseline of present conditions and the future of the proposed project area without action.

The PEA and comments received from the resource agencies were used to determine whether the proposed action would require the preparation of an Environmental Impact Statement. All environmental, social, and economic factors relevant to the proposal were considered in this PEA. No significant adverse impacts to these resources are expected to occur. The proposed action will be in compliance with applicable environmental statutes.

It is my finding, based on the PEA, that the proposed federal activity will not have any significant adverse impacts on the environment and will not constitute a major federal action significantly affecting the quality of the human environment. Therefore, an Environmental Impact Statement will not be prepared.

Date: 12 May 2020

John Hudson, P.E.
Colonel, Corps of Engineers
District Commander

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List of Acronyms

AIRFA	American Indian Religious Freedom Act
APE	Area of Potential Effect
ARMPA	Approved Resource Management Plan Amendment
BLM	Bureau of Land Management
BMP	Best Management Practice
BOR	Bureau of Reclamation
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
DO	dissolved oxygen
EO	Executive Order
ES	Ecological Services (Office)
ESA	Endangered Species Act
ER	Engineer Regulation
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
HTRW	Hazardous, Toxic and Radioactive Waste
HUC	Hydrologic Unit Code
IPaC	Information for Planning and Consultation
LWCFA	Land and Water Conservation Fund Act
MBTA	Migratory Bird Treaty Act
MFWP	Montana Fish Wildlife and Parks
NAAQS	National Ambient Air Quality Standards
NCDC	National Climate Data Center
NEPA	National Environmental Policy Act
NGPC	Nebraska Game and Parks Commission
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWR	National Wildlife Refuge
NWS	National Weather Service
msl	mean sea level
O&M	operation and maintenance
PA	Programmatic Agreement
PEA	Programmatic Environmental Assessment
RCRA	Resource Conservation and Recovery Act
REC	Record of Environmental Consideration
ROW	right-of-way
SDGFP	South Dakota Game Fish and Parks
SDSU	South Dakota State University

SHPO	State Historic Preservation Office
SNODAS	Snow Data Assimilation System
SNOTEL	snow telemetry (NRCS System)
SUP	Special Use Permits
SWE	Soil Water Equivalent
TDS	Total Dissolved Solids
T&E	threatened and endangered
THPO	Tribal Historic Preservation Office
TMDL	Total Maximum Daily Load
UMB	Upper Missouri Basin
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VRI	Visual Resource Inventory
w/m^2	watt per square meter
WGFD	Wyoming Game and Fish Department
WIIN	Water Infrastructure Improvements for the Nation Act
WRRDA	Water Resources Reform and Development Act

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

Upper Missouri River Basin Water Management
Plains Snow and Soil Moisture Monitoring Network
Montana, Wyoming, North Dakota, South Dakota & Nebraska

May 2020

1. INTRODUCTION

The U.S. Army Corps of Engineers, Omaha District (Corps) has prepared this Programmatic Environmental Assessment (PEA) in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S. Code [USC] 4321 et. seq.); the President's Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] 1500 – 1508) (CEQ, 1992); and Engineer Regulation (ER) 200-2-2 (33 CFR 230) (USACE, 1988).

This PEA assesses the overall environmental effects of proposed actions that involve multiple individual projects and a large geographical area as described in the CEQ (2014) guidelines for *Effective Use of Programmatic NEPA Reviews*. Programmatic analyses have value by setting out the broad view of environmental impacts and benefits of a proposed decision, on which federal agencies can rely for site-specific, individual projects. Regulations 40 CFR §1500.4(i), §1502.4 and §1502.20 encourage the development of program-level NEPA documents and the use of tiering to eliminate repetitive discussion and focus on specific issues to a proposed action. For the overarching proposed action, the scope of the project and environmental impacts are evaluated in this PEA and each individual site would be documented in a Record of Environmental Consideration (REC) (Appendix A) that will be tiered from this PEA.

1.1 Project Background

Following the 2011 flood event on the Missouri River, the Corps and an Independent Review Team comprised of academic experts and officials from various federal agencies, determined that the Corps substantially underestimated the wet soil conditions in the plains and the plains snowpack in its water supply forecasts. One finding from the 2013 *Upper Missouri River Basin Monitoring Committee: Snow Sampling and Instrumentation Recommendations* interagency report was to improve snowpack and soil moisture monitoring in the upper Missouri River basin, specifically Montana, North Dakota, South Dakota, Nebraska and Wyoming. This report described existing federal and state data collection networks (mesonet) in the upper Missouri River basin that provide some information about soil moisture or snowpack as well as existing data collection networks that do not currently collect data on soil moisture and/or snowpack but may be modified to do so. Currently, there are approximately 180 existing mesonet sites in seven networks in the upper Missouri River basin that collect soil moisture and snowpack data, or may be modified to collect these data. An estimated additional 360 sites are required in order to provide the necessary quality of data to better inform runoff forecasting.

The data obtained from the network would be available for all federal, state and local agencies to use in the betterment of existing and new products for various efforts, such as river forecasting, flood outlooks, drought monitoring, water supply forecasts and fire hazard reporting.

From December 2018 through July 2019, instrumentation and measurement techniques were conducted by climatologists with the South Dakota State University (SDSU) in Brookings, South Dakota on SDSU's campus as funded by the Corps. This work was carried out in order to determine a variety of automated and manual observations to test the practicability and accuracy of different technologies before deployment of a full plains snowpack and soil moisture monitoring network in the UMB. Testbed experiments compared different technologies for measuring solar radiation, precipitation, snow depth, snow water equivalent and soil temperature and moisture. A summary of findings is in Section 3, and the complete SDSU Hydrologic Testbed Report may be found in Appendix B.

Five proof-of-concept sites were proposed to be updated in late Spring 2020. Updating existing stations at SDSU, as well as at Montana State University in Bozeman, Montana and the University of Wyoming in Sheridan, Wyoming were assessed in the *Pilot Study for the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network* EA and Finding of No Significant Impact (FONSI) (February 2020). Monitoring stations updated in Carrington, North Dakota and Eagle, Nebraska were not federally funded and therefore not subject to NEPA. The intent of the proof-of-concept effort was to further inform equipment selection and installation methods in a mesocom[1] study prior to implementation of a basin-wide scale. Updating the proof-of-concept monitoring stations is anticipated to be completed by late Summer 2020 so implementation of the basin-wide monitoring network could begin by late 2020.

1.2 Project Authority

The proposed project is authorized under the Water Resources Reform Development Act (WRRDA) of 2014, as amended by §1179(b) of the Water Infrastructure Improvements for the Nation Act (WIIN) of 2016. WRRDA14 included a requirement that the Secretary of the Army, in coordination with the Administrator of the National Oceanic and Atmospheric Administration (NOAA), the Chief of the Natural Resources Conservation Service (NRCS), the Director of the United States Geological Survey (USGS) and the Commissioner of the Bureau of Reclamation (BOR) carry out snowpack and soil moisture monitoring in the Upper Missouri River Basin (UMB). This included soil moisture and snowpack monitoring in the UMB to reduce flood risk and improve river and water resource management, to restore and maintain existing mid- and high elevation snowpack monitoring sites operated under the NRCS snow telemetry (SNOTEL) program and operating streamflow gages and related interpretive studies in the UMB under the USGS cooperative water program and the national streamflow information program. WIIN16 modified WRRDA14, designating the Corps as the lead federal agency.

1.3 Project Location

The plains area of the UMB, above Sioux City, Iowa, totals 270,000 square miles in the United States. NRCS soil moisture experts and National Weather Service (NWS) plains snow and river forecasting experts determined that soil moisture and plains snow monitoring sites should be installed in every watershed (Hydrologic Unit Code [HUC] 6) of the UMB. The geographic

[1] A mesocosm is an outdoor experiment under controlled conditions.

scope of this PEA generally consists of the 25 HUC 6 watersheds of the UMB in Montana, North Dakota, South Dakota and Wyoming and the northern portion of Nebraska (Fig 1). The project area encompasses the Missouri River from Sioux City, Iowa to Three Forks, Montana, including the Missouri River Mainstem System (System) comprised of six dams; Fort Peck, Garrison, Oahe, Big Bend, Fort Randall and Gavins Point. The System is regulated to serve the eight Congressionally-authorized purposes; 1) flood control, 2) water supply, 3) water quality, 4) navigation, 5) hydropower, 6) irrigation, 7) recreation and 8) fish and wildlife.

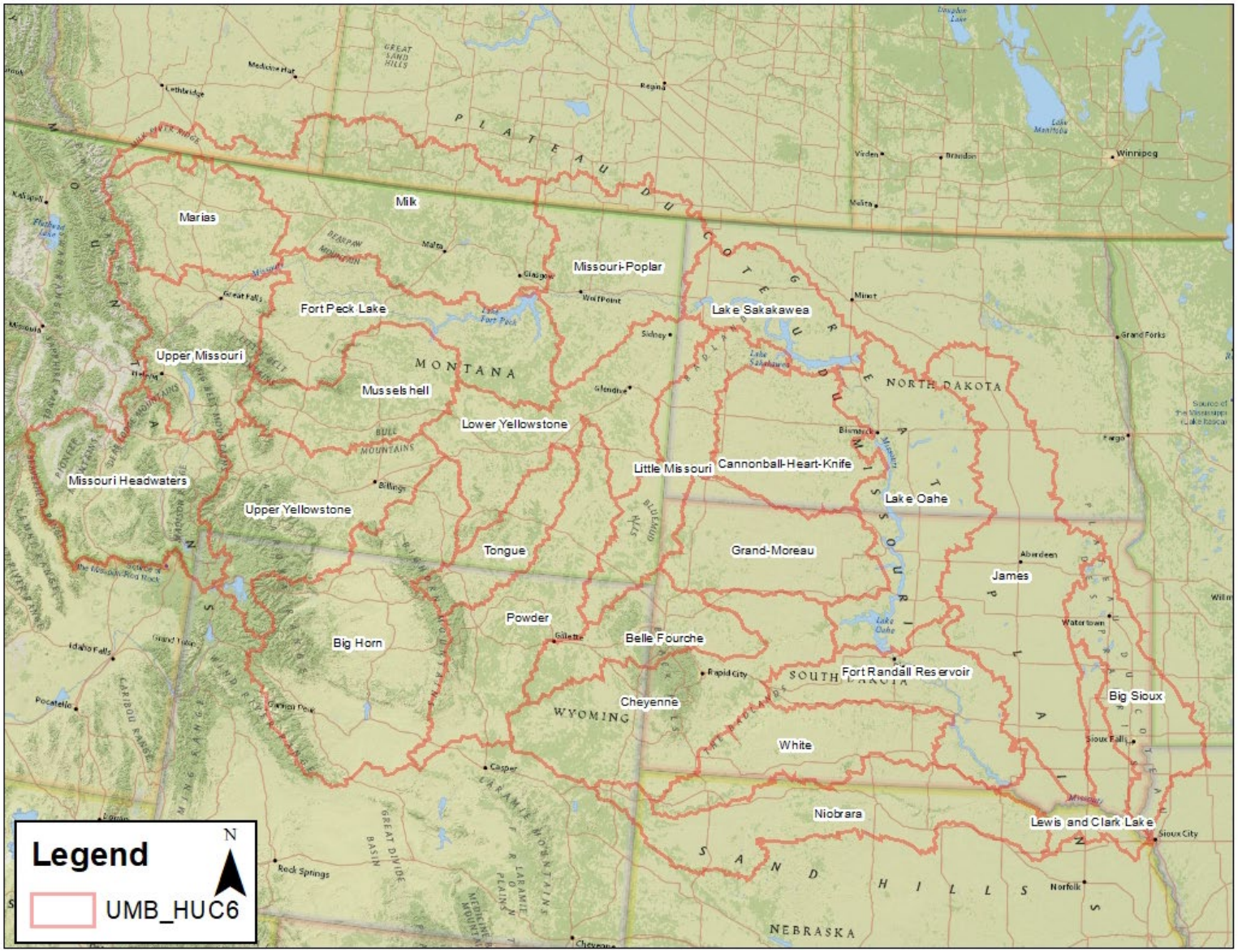

Figure 1. HUC 6 watersheds of the UMB in Montana, North Dakota, South Dakota, Wyoming and Nebraska

2. PURPOSE AND NEED

The purpose of the proposed project is to implement a soil moisture and plains snowpack monitoring network in order to provide sufficient data for various federal, state and local agencies to improve forecasting for respective operational needs. Specifically identified in WRRDA14, a soil moisture and plains snowpack monitoring network is needed to reduce flood risk and improve river and water resource management in the UMB, restore and maintain existing mid- and high elevation snowpack monitoring sites operated under the SNOTEL program and to operate streamflow gages and related interpretive studies in the UMB under a cooperative program with USGS.

3. ALTERNATIVES CONSIDERED

As mentioned in Section 1.1, SDSU conducted a testbed comparison of different instrumentation technologies to measure several meteorological variables. The purpose of this effort was to identify the most cost effective and accurate instrumentation to collect the desired level of meteorological data. This pilot process assisted in the overall development of the Preferred Alternative by screening equipment and methodologies ahead of mass deployment of the mesonet. The following synopsis details results of the Testbed Report, and the full report may be found in Appendix B.

Solar Shortwave Radiation

Solar irradiance, as measured by watt per square meter (W/m^2), was collected using a heated and an unheated pyranometer[2]. Heated pyranometers have an advantage over unheated devices in obtaining solar radiation measurements more accurately in winter conditions; unheated pyranometers may become buried in the snow and thus cannot collect solar radiation data, whereas heated pyranometers will self-maintain a snow-free sensor. Solar irradiance data is important for understanding the growing season and improves the accuracy of NOAA's Snow Data Assimilation System (SNODAS) which provides data on snow pack properties such as snow depth and snow water equivalent (SWE)[3].

Between the heated and the unheated pyranometer, it was determined that the unheated device resulted in underreporting of solar radiation; 21% of 5-minute average readings were underreported by 5%, daily average readings (24-hours) were underreported by 3%. The Testbed Report concluded that the minor added cost of utilizing a heated pyranometer over an unheated device would be worth the increase in data accuracy.

Precipitation

Four methods were assessed to measure precipitation; 1) an unheated tipping bucket rain gauge, which is typical of most mesonet stations and not designed to measure frozen precipitation, 2) an unheated tipping bucket with a 20-inch extended funnel which would retain snowfall until

[2] A pyranometer is a physical sensor which measures the sun's radiation on the surface of the earth over wavelengths known as the solar spectrum and converts the global solar radiation it receives into a measurable electric signal.

[3] SWE is the amount of water contained within the snowpack, effectively it is the depth of water that would theoretically result if the entire snowpack was melted instantaneously.

melt, thus providing some measure of frozen precipitation, 3) a weighing gauge that measures precipitation, regardless of freezing conditions, and 4) a prototype weighing gauge that measures precipitation regardless of freezing conditions, but at a reduced cost.

The Testbed Report discussed the complexity of measuring frozen precipitation, which for the UMB is imperative as much of the annual precipitation is in the form of snowfall. Determining the liquid equivalent of a single snowfall[4] is desired, but unattainable with an unheated tipping bucket as the snowfall would not be measured until ambient temperatures melt frozen precipitation collected. The purpose of adding an extended funnel to a tipping bucket was thought to decrease the loss of collected precipitation until melt occurs, as a normal tipping bucket may lose collected snowfall from wind conditions. Between the two tipping bucket gauges, it was concluded that precipitation within the months of snowfall (January through April), the tipping bucket without the extended funnel significantly underreported. The tipping bucket with the extended funnel generally provided more accurate reporting but significantly over-reported precipitation levels in the month of April. Rainfall biases tend to be negative as the tipping bucket requires enough rain to wet the gauge and to cause the bucket to record, at a minimum, 0.01 inches.

The weighing gauges tested measure precipitation in both frozen and liquid form at the time of fall by using an oil to prevent evaporation and alcohol to lower the freezing point of collected precipitation. This causes immediate melt to the snowfall in the gauge and is then weighed the same as rainfall. Weighing gauges are standard instruments for measuring rainfall; the prototype produced favorable results but SDSU noted that more data would be required to determine it as the best selection.

The Testbed Report recommended continued use of a tipping bucket alongside a weighing gauge as it adds redundancy and quality control to precipitation measurements.

Snow Depth and Snow Water Equivalent

Two methods were utilized to measure snow depth; the first method utilized a sonic snow depth sensor that was placed over a white board surrounded by unmowed grass. The white board was colored as such to reduce snowmelt and the surrounding unmowed grass provides a windbreak, reducing snow scour around the instrumentation. The second method include camera-monitored snow stakes that were 40 inches tall and hash-marked at each 1-inch interval. Imaging software can be utilized to monitor the snow stakes and measure snow depth, but for the purposes of the Testbed Report, manual observations were conducted.

SWE was determined by manual observations and no automated instrumentation was used for the Testbed Report.

Results of the sonic snow depth sensor indicated in overreporting of snow depth, in some cases by a margin of error of 5 inches. However, it was noted that the consistency of error could be

[4] Determining the liquid equivalent of a snowfall is different than determining SWE; a liquid equivalent of a snowfall provides a real-time measurement at the time of snowfall, verses SWE which assesses the amount of liquid equivalent to an accumulation of snowfall over a season (snowpack).

attributed to drifting and snow scouring as snow depth can vary greatly over short distances. Results from manual measurements of snow stakes concluded consistently lower snow depths, likely attributed to a "snow well" which is scouring immediately surrounding the stake, causing a biased low depth recording. Overall, the Testbed Report recommended two sonic sensors with a camera for quality control be utilized for the deployment of the mesonet.

Soil Moisture and Temperature

Soil temperature and moisture are typically measured utilizing a combination probe that dually measures moisture and temperature. Five conventional probes were installed at 5, 10, 20, 50 and 100 centimeters (cm) and one, 1-meter (m) unit that measures depths of 5, 10, 20, 30, 40, 50, 60, 75 and 100cm was also installed. The Testbed Report recommended use of the conventional probes installed at standard depths of 5, 10, 20, 50 and 100cm as results from the 1-meter unit were inconclusive.

3.1 Alternative 1: No Action

Under the No Action Alternative, no deployment of a mesonet network to monitor plains snowpack and soil moisture would occur. The approximate 180 existing sites would continue to be operated as currently designed. The updated proof-of-concept sites for the pilot study would collect data based on the upgraded equipment installed in the summer of 2020. The Corps, NRCS, USGS, BOR and NOAA would continue to collect data provided by these stations for forecasting respective operations in the UMB. However, the No Action Alternative would not meet the purpose and need described in Section 2.

The No Action Alternative is brought forward through analysis of environmental impacts as it provides a benchmark to compare environmental, social and economic impacts and benefits of an action alternative.

3.2 Alternative 2: Installation of 360 New Monitoring Stations and Modification of 180 Existing Monitoring Stations (Preferred Alternative)

The Preferred Alternative is Alternative 2, which includes the installation of approximately 360 additional individual station sites and modification of approximately 180 existing station sites for an entire network comprised of 500 to 600 sites over the 270,000 square miles of the UMB, targeting one monitoring station per 500 square miles. The existing 180 sites (Figure 2) are primarily soil moisture and meteorology sites that would be upgraded as necessary with identified equipment to include plains snow and soil moisture monitoring.

New sites would be located following an NRCS-developed, GIS-based, methodology that incorporates dominant soil type, topography and HUC-6 watersheds boundaries to fill in gaps within the existing network so that the sites have an appropriate density and distribution for both soil moisture and plains snow monitoring. Sections 3.2.1 and 3.2.2 describe the technical and environmental screening criteria that would be applied to each newly constructed site. Section 3.2.3 details the representative configuration of a typical plains snow pack and soil moisture monitoring station.

3.2.1 Physical Screening Criteria for Site Selection

In order to ensure that new monitoring sites are situated in a location that would allow for maximum utility and efficiency of the instrumentation and data collection, physical screening criteria has been developed and would be applied for each individual new site. Installation of new sites shall consider the following criteria:

a) Monitoring stations require siting at elevations below 5,500 feet mean sea level (msl) for plains snowpack monitoring; the mountainous areas of the most western portion of the UMB monitor mountain snowpack through NRCS' SNOTEL network (Figure 2).
b) Each monitoring station would require approximately one acre of an open, upland location free of bodies of water or wetlands, woody vegetation, pavement, artificial heat sources or structures of any kind.
c) The one acre area should be sited on flat ground, not to exceed a 10% slope, with representative ground cover appropriate to the natural setting.
d) The site must have the appropriate soil profile that has been determined and verified by a soil scientist.
e) No presence of physical obstructions, to include any object with a minimum of 10° horizontal aspect, should be located close enough to the site to cause interference or data collection interruption. Obstructions should be separated from the monitoring site a distance of at least 10-times their height (e.g, if a shrub is 5 feet tall, it should be 50 feet away).
    i. Sites should be clear of obstructions from east-southeast to west-northwest, or, viewing a compass 60° to 300°, so as to prevent shading of any kind on the solar radiation sensors.
f) Monitoring stations require a viable data transmission pathway.
g) Preferably, state and federal lands would be prioritized for siting new monitoring stations so as to reduce the need for real estate easements. Private lands would only be utilized on a willing-landowner basis that is comfortable with long-term deployment and maintenance of the monitoring station.

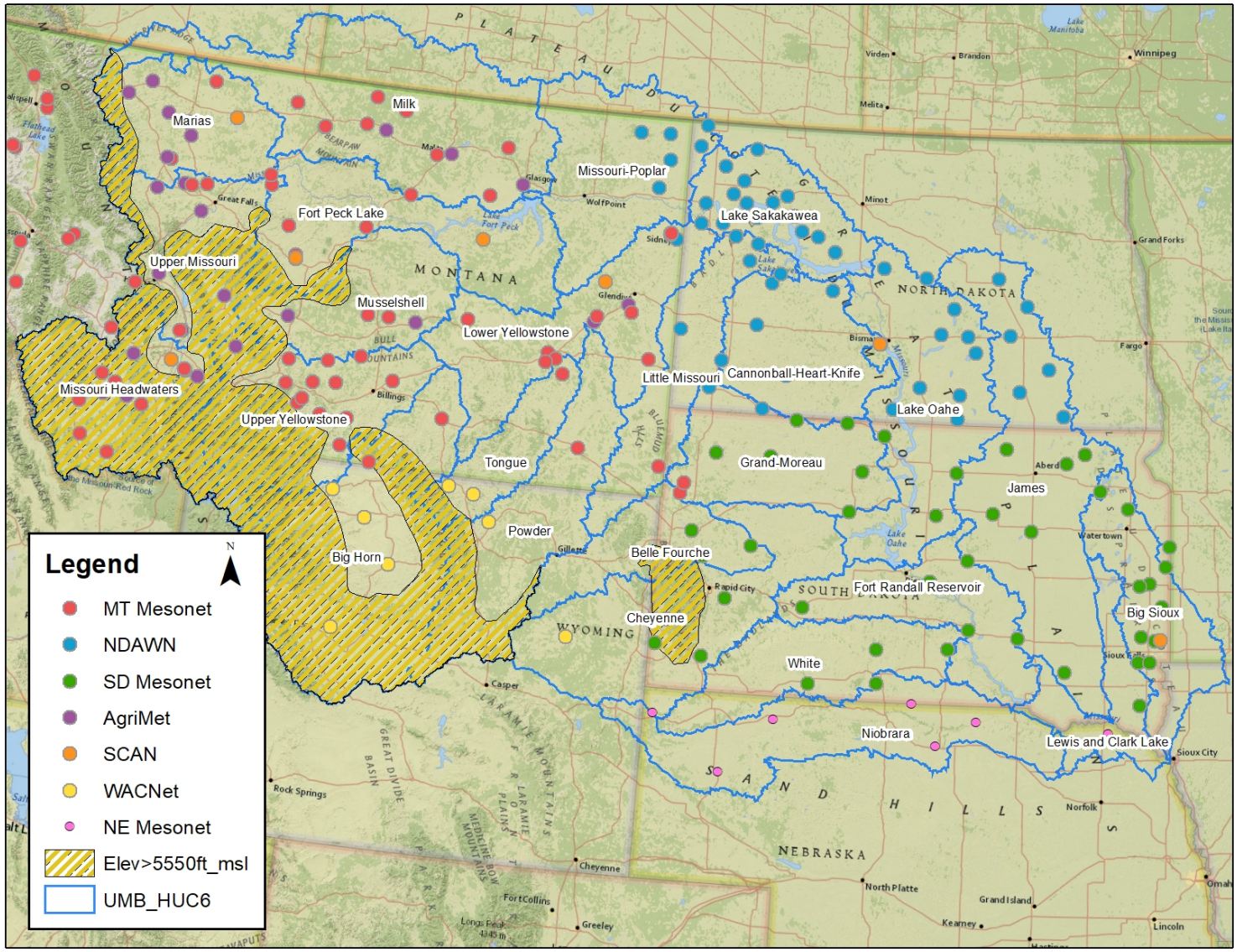

Figure 2. Existing stations within the UMB that have the potential to be updated for plains snowpack and soil moisture monitoring. Note the mountainous areas within the UMB (yellow hatch) are unsuitable for siting newly constructed snowpack and soil moisture monitoring stations as these areas are greater than 5,500 feet msl.

3.2.2 Environmental Screening Criteria for Site Selection

In order to ensure adverse environmental and social impacts are avoided and minimized to the greatest extent practicable, screening criteria would be applied for site selection of new monitoring stations. Installation of new sites shall consider the following criteria:

a) Should installation of a new site occur within a 100-year floodplain, coordination with the local floodplain administrator would be required and compliance with Executive Order (EO) 11988 must be demonstrated. Best available floodplain data shall be used to determine the 100-year floodplain elevation for final engineering design in accordance with 44 CFR Part 9. Any placement of fill in a designated floodway shall require a no-rise certification or equivalent documentation and approval.
b) Upland sites only would be utilized. No monitoring stations shall be sited in any wetland habitat type; this includes, but is not limited to, low-lying depressions, vernal pools, prairie pothole wetlands, marshes, wet meadows, fens, bogs and wooded draws.
c) Monitoring stations shall not be sited in any designated critical habitat of threatened and endangered species.
d) Monitoring stations shall avoid National Park Service (NPS) Designated Wilderness habitat or lands considered eligible for Designated Wilderness to the extent practicable. Should a monitoring station be proposed for placement within a Designated or eligible-Designated Wilderness, coordination with NPS shall occur to determine acceptability.
e) Monitoring stations shall avoid designated deer and elk winter ranges to the extent practicable. Should a monitoring station be proposed for placement in a known deer or elk winter range, coordination with the appropriate State game and fish agency shall occur to determine acceptability.
f) Monitoring stations shall avoid National Wildlife Refuges (NWR) to the extent practicable. Should a monitoring station be proposed for location on an NWR, coordination with the U.S. Fish and Wildlife Service (USFWS) shall occur and special use permits (SUP) and right-of-way (ROW) grants shall be obtained as required.
g) Monitoring stations shall not be sited on designated habitat for species of special concern or special status species (e.g. monitoring stations would not be sited on known sage grouse leks, primary sage grouse habitat management areas, native prairie or in sagebrush habitat).
h) Clearing, grubbing and removal of woody vegetation shall be minimized; sites should be positioned on flat, open areas as dense and woody vegetation may interfere with equipment function.
i) Monitoring stations shall avoid active and passive recreation sites to the extent practicable. Should a monitoring station be proposed for a location on a designated recreational area, appropriate coordination with the land-management agency shall occur to determine acceptability.
j) Where possible, monitoring stations should avoid placement on designated prime farmland. Sites affecting Prime Farmland shall comply with conditions imposed by NRCS.
k) Monitoring stations shall not be placed on any parcels with Hazardous, Toxic, and Radioactive Wastes (HTRW) as defined in Section 4.17 of this document.

l) Monitoring stations on public lands shall not be placed on designated visually sensitive areas as defined by the respective land management agency.
m) Monitoring stations shall not be placed in locations that would result in adverse effects to historic properties as defined in 36 CFR 800.16(1)(1).
n) Monitoring stations placed on public land would adhere to criteria set forth by the land management agency.

3.2.3 Updating and Installation of Monitoring Sites

Application of the physical and environmental screening criteria would initially be conducted through desktop methods and aerial imagery. Once a potential location has been successfully identified as a candidate site through remote process, subject matter experts would then physically inspect the location to ensure it meets all the necessary criteria for siting. Additional soil samples may be gathered at that time utilizing a soil probe truck. Upon confirmation that the area of interest is representative of a typical desired location, landowner agreements or easement acquisitions would follow.

Prior to installation, a site-specific REC (Appendix A) would be completed and the appropriate tribes, state and federal agencies and stakeholders would be coordinated with to ensure the individual monitoring station has obtained cultural clearance, and is consistent with all applicable environmental laws, regulations and policies.

As noted in Section 3.2.1, a one-acre location would be targeted for siting, though the physical footprint of the monitoring station is a 35’ diameter area protected with corral panel, chain link or barbed wire fencing secured with T-posts and wooden fence posts. Within this 35’ diameter area, one tower would be placed, with a height of approximately 30’ (10m). There are two types of towers that could be utilized. One tower option is a truss-style tower which would require a 36” x 36” x 48” concrete foundation and grounding rod. The second option would be a three-legged base with a mast, held in place by guy wires and stakes. This tower is a quick deployment piece of equipment as it would not require a concrete foundation (Figure 3). The selection of the type of tower to deploy for each site-specific monitoring station would be assessed in the REC.

Figure 3. Left photograph: truss-style tower; right photograph: quick-deploy tripod tower, also note the fencing around this tower is the desired corral panel fencing. Photos courtesy of Nathan Edwards, SDSU.

Also housed within this 35’ diameter footprint would be a weighting precipitation gauge with a 44” diameter shield facing west atop an 18”x18”x32” concrete foundation (Figure 4). A 40” deep post hole would be dug to place the soil moisture and temperature sensors in a soil plot to the south-southeast. A 40” x 40” snow board would be placed on the ground below the snow depth sensor to the northeast. While some trenching of conduit will be required from the tower to the precipitation gauge and snow depth sensors, no electrical utilities are required as these monitoring stations are solar powered and powered through cellular signal.

Figure 4. Weighing precipitation gauge, without a shield. Photo derived from Edwards & Behnke, 2019.

In addition, new monitoring stations may be equipped with air temperature sensors, relative humidity sensors, solar radiation sensors, cameras and wind monitors.

For the modification of the existing, approximately 180 monitoring stations, each site would be assessed for required equipment and instrumentation needs to bring the existing station to the

standard of a newly constructed station. Figure 5 presents a graphic of a typical monitoring station layout.

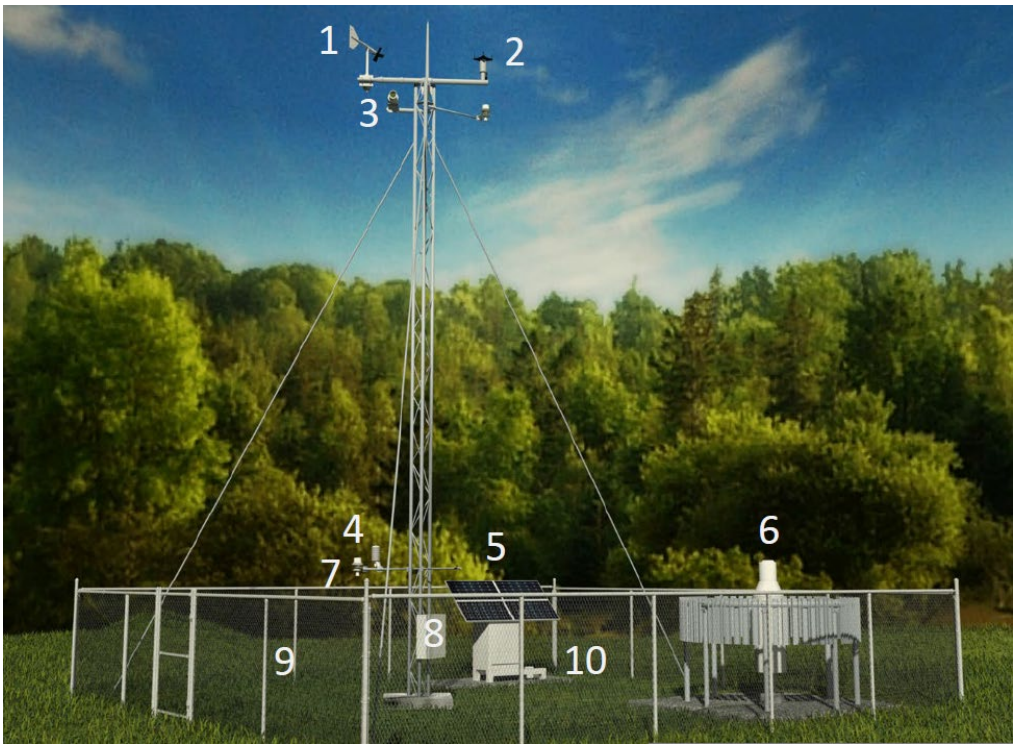

Figure 5. Representative configuration of a typical plains snowpack and soil moisture monitoring station: 1) wind monitor; 2) camera to measure snow depth; 3) air temperature sensor; 4) air temperature and humidity sensor; 5) solar radiation; 6) precipitation gauge; 7) snow depth; 8) pressure; 9) bare soil temperature and 10) soil moisture and temperature probe.

3.2.3.1 Operation and Maintenance of Monitoring Sites

At the time of writing, it is still unknown who the federal or state partner(s) will be for the implementation of the larger mass-deployment effort and which agency would be responsible for Operation and Maintenance (O&M).

No new access roads or upgrading of existing access roads are anticipated as part of retrofitting or installation activities. The approximate 180 existing monitoring sites have existing access. Site selection for new monitoring stations would be sited on areas with existing access. Therefore, no O&M activities associated with access roads are anticipated. O&M of the existing and new monitoring sites is not anticipated to increase public traffic. It is anticipated that O&M activities would occur at a minimum, once on an annual basis and potentially up to three times, as necessary to check, maintain and replace equipment and sensors.

4. EXISTING CONDITIONS AND ENVIRONMENTAL CONSEQUENCES

The current environmental conditions and the resources listed below provide information, where it exists, and references important information from previous documentation regarding current conditions.

Additionally, this section presents the probable consequences (i.e., adverse and beneficial effects) of the proposed action and its alternatives on selected resource categories as appropriate. An assessment of the environmental consequences provides the scientific and analytic basis for alternative comparison. Impacts are described in terms of duration and intensity:

Impact Duration: The following terms will be used to describe the duration of an impact.

1) Short-term: Temporary impacts caused by the construction and/or implementation of an alternative.
2) Long-term: Impact persists after the action has been completed and/or after the action is in full and complete operation.

Impact Intensity and Context:

1) Negligible: Impacts may occur, but the change would be localized and so small that it would not be of any measurable or perceptible consequence.

2) Minor: Impact could result in a change to a population or individuals of a species or to a portion of a habitat or resource. The change would be measurable but small, localized, and of little consequence to the resource.

3) Moderate: Impact could result in some change to a population or individuals of a species or habitat. The change would be measurable and of consequence, but would be of moderate scale and would occur over a limited area.

4) Major: Impact could result in a considerable change to a population or individuals of a species or resource or habitat. The change would be measurable, extensive, and would occur over a wide geographic area.

4.1 Physiography and Topography

Glaciers that extended southward from Canada to the northern U.S. during the last Ice Age defined the Missouri River basin's northeast boundary. Glacial lobes facilitated the flow of the Missouri River drainage towards the Mississippi River; prior to the influence of the glaciers, much of the upper Missouri River (near Pierre, South Dakota) drained northeastward towards the Hudson Bay. Basin topography within the UMB varies from glaciated mountain ranges to flat and rolling grasslands to wide floodplain valleys. Northern landscapes include level to gently rolling plains comprised predominantly of glacial till. The westernmost tributaries of the Missouri River begin near an elevation of 11,000 feet msl; flowing downstream and east through Montana, the Milk River flows into the Missouri River. The Yellowstone River converges with the Missouri River near the Montana/North Dakota border which is then joined by the Little Missouri, Knife, Cheyenne, Bad, Grand, Niobrara, Platte and Kansas Rivers from the right bank (west) of the Missouri River. The James River enters the Missouri River just north of Sioux City, Iowa. No major tributaries enter the Missouri River from the left bank (east). The basin's western rivers' (e.g. Yellowstone, Platte) primary source of flow are from spring snowmelt (National Research Council, 2002).

Ten distinct Level III ecoregions are situated within the UMB (Figure 6). Ecoregions are classified based on analyzing patterns of biotic and abiotic influences that affect or reflect differences in ecosystem quality and integrity. These classifications are based on similar geology, landforms, soils, vegetation, climate, land use, wildlife and hydrology (Omernick, 1987). The primary composition of the UMB is the Northwestern Great Plains and the Northwestern Glaciated Plains. General characteristics of the Northwestern Great Plains is a semiarid plain of shale and sandstone punctuated by buttes. Native grasslands have been largely replaced by agricultural fields, rangeland and grazing pastures. Northwestern Glaciated Plains is the transitional ecoregion between the Northwestern Great Plains and the Northern Glaciated Plains. This ecoregion is pocked with a moderately high concentration of semi-permanent and seasonal wetlands. The western most portion of the Missouri River basin is comprised of the Middle Rockies, characterized by steep-crested high mountains in coniferous forests, and the Wyoming Basin, which is a broad intermontane basin dominated by arid grasslands. The Nebraska Sandhills and the High Plains are found in the southern border of the UMB. The Nebraska Sandhills area is distinctly unique as it is one of the largest areas of grass stabilized sand dunes. Numerous lakes and streams are present in this ecoregion and it is primarily devoid of agricultural land uses. The High Plains is marked by smooth to slightly irregular plains, dominated by croplands.

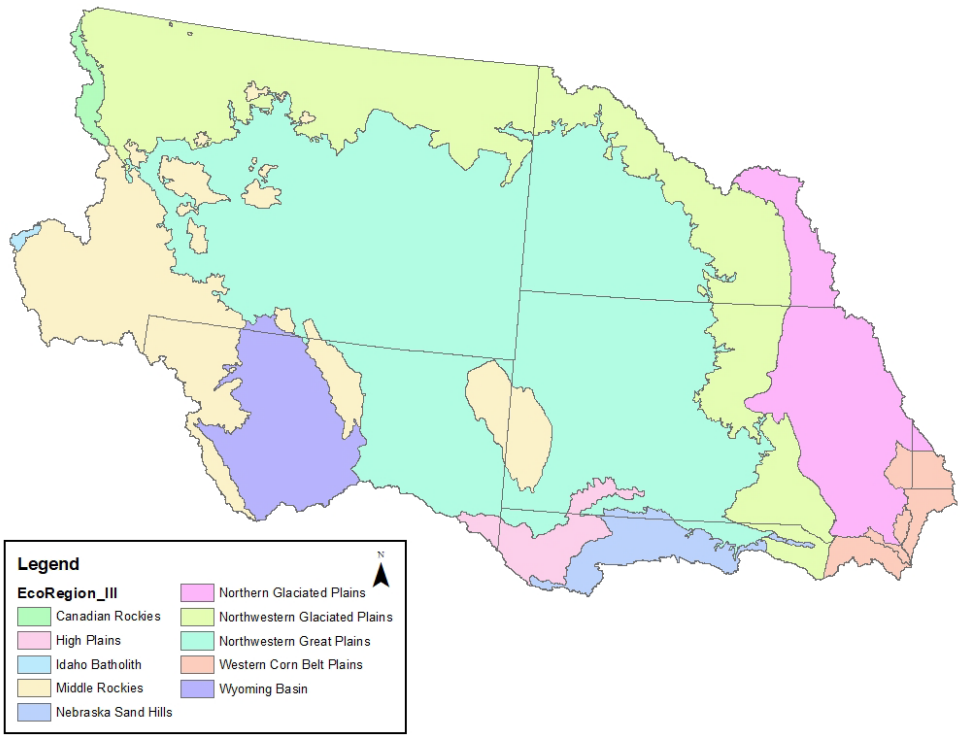

Figure 6. Level III Ecoregions of the UMB

4.1.1 No Action

Under the No Action Alternative, no changes to regional or localized physiography and topography would occur. The existing 180 stations would continue to operate as they presently exist, no modifications would occur to these monitoring sites. The proof-of-concept monitoring stations would be updated and collect relevant data from the upgraded equipment. No new monitoring sites would be added to the mesonet. Local, state and federal entities would continue to forecast conditions and make management decisions based off current data. The No Action Alternative would not meet the purpose and need.

4.1.2 Alternative 2 (Preferred Alternative)

Should the Preferred Alternative be implemented, no adverse impacts are anticipated to regional physiography and topography. Minor and long-term impacts would occur to the localized topography of each individual monitoring site location. The monitoring stations would permanently be situated across the UMB. Impacts would include minor clearing of low-growing vegetation and minor soil disturbance from grading the 35" diameter footprint to ensure level placement of the tower and monitoring equipment. Should the truss-style tower be utilized, a small concrete foundation pad would be poured. A small concrete pad may also be added for placement of the weighing gauges. Minor soil disturbance to trench conduit from the tower to monitoring equipment would also occur. Upon completion of installation of the monitoring station, the area would be re-vegetated with a native seed mix natural to the location. Each newly constructed monitoring site would require environmental analysis in a REC, which would detail site-specific benefits and impacts to topography and physiography.

4.2 Climate

Climate of the UMB experiences large temperature fluctuations, winters are generally cold and summers are hot; temperature extremes range from -60◦F to 120◦F (USACE, 2006). According to the *Climate Change Assessment for Water Resources Region 10* (USACE, 2015), Wang et al. (2009) assessed historical climate trends across the Nation, for the Missouri River region, a positive, statistically significant trend was observed for mean air temperature, specifically in the winter (December to February) and spring (March to May). Mean air temperature for the summer (June to August) observed a mild positive linear trend in the UMB. Palecki et al. (2005) examined historical precipitation from 1972 to 2002 from the National Climate Data Center (NCDC) 15-minute rainfall data. For the UMB, statistically significant decreases in fall and winter storm totals and duration were observed, while statistically significant increases in summer storm intensity were noted. Changes in extreme precipitation events have notably been the focus of a number of studies; for the UMB, a decreasing frequency in the 20-year storm event was approximated at -33% (Wang & Zhag, 2008) from 1977 to 1999. Mauget (2004) assessed 42 streamflow gages within the United States, 11 of which were located along the Missouri River. From 1939 to 1998, an increase in streamflow for the entire Missouri River basin was observed. The general consensus in recent literature indicates mild increases in temperature and streamflow within the entire Missouri River basin, with a clear consensus of a lengthening growing season while northern portions of the UMB show decreasing trends in precipitation and extreme precipitation events (USACE, 2015).

Projected climate trends for the Missouri River region resulted in a strong consensus of a continued upward trend in air temperatures over the next century. Studies reviewed agree on a variance from 39◦F to 46◦F (4◦ to 8◦C) increase in mean annual temperature by the latter half of the 21st Century for the entire Missouri River region. There are conflicting studies in regards to projected precipitation changes, extreme storm events and drought occurrences. Generally, studies indicate a wetter verses dryer climate for the Missouri River region but statistically significant evidence is lacking (USACE, 2015).

4.2.1 No Action

The No Action Alternative would have no negative impacts on climatic conditions of the proposed project area. However, recent scientific evidence shows that in some locations and as it relates to Corps projects, programs, operations and missions, climate change is shifting the climatological baseline regarding natural climate variability as well as the range of natural variability. As such, the Corps forecasts and makes management decisions on available data and based on assumptions of stationary climatic baselines which may no longer be appropriate for long-term projections (USACE, 2016). As discussed in Section 1.1, following the 2011 flood, the Independent Review Team determined that additional plains snowpack and soil moisture monitoring stations are needed throughout the UMB to provide additional and more accurate data in order for state and federal agencies to make better management decisions. As such, the No Action Alternative would not suit the purpose and need nor would it comply with WRRDA 14.

4.2.2 Alternative 2 (Preferred Alternative)

The Preferred Alternative would have no adverse or beneficial impacts on climatic conditions within the UMB; however, it would provide the necessary quality of data for local, state and federal agencies to make better-informed resource management decisions and increase the accuracy of forecasting.

4.3 Soils

Soil characteristics throughout the UMB are highly variable and are determined by surficial parent material. Soils result from climate influences, vegetation, geological material, relief and time. Soil characteristics are a key driver in monitoring station site selection. For this programmatic document, the NRCS conducted a desktop exercise using ArcGIS to refine the locations within the UMB of favorable soil types. Specifically, soils characteristics desired for monitoring station locations require parent material composed of alluvium, eolian, glacial, colluvium, lacustrine or residuum. Favorable clay content would be determined with an allowable standard deviation of plus/minus 5% from the site's determined target clay content. Clay content is imperative as it drives moisture-holding capacity. Four depth classes were established; shallow, moderately deep, deep and very deep. Monitoring stations sited on shallow soils would have less than 50 centimeters (cm) of substrate above root-restrictive material (i.e. bedrock or hard pan). Sites placed on moderately deep soils would have between 50 and 100cm of soil above root-restrictive material, stations situated on deep soils would have between 100 and 150cm of soil above root-restrictive material and stations sited on very deep soils would have greater than 150cm of soil above root-restrictive material. Topographic position within the landscape as it relates to slope and morphology is also assessed to determine if a monitoring station would accumulate runoff.

4.3.1 No Action

Under the No Action Alternative, no new monitoring stations would be constructed and no existing stations would be upgraded. No direct adverse or beneficial impacts would occur; however, indirect adverse impacts to soil may occur in that water resource managers would be unable to make more accurate forecasts; thus be unable to reduce risk from impacts of potential flooding. Flooding may induce excessive soil erosion, scouring and bank failure of the Missouri

River or other streams and rivers that are managed by local, state or federal agencies within the UMB watershed.

4.3.2 Alternative 2 (Preferred Alternative)

Under the proposed project, work would involve minor clearing of ground cover and low-growing vegetation in order to accommodate a 900 sq. ft. area for each individual station. Where small concrete foundations are necessary for towers, the area would be graded to establish a level surface to pour the concrete and place the equipment. Upon completion of installation of equipment, any bare soil would be revegetated with a native seed mix resonant to the site location. Adverse impacts are considered negligible and temporary.

For each site-specific REC, NRCS WebSoil Survey would be consulted to determine the type of soil present and should any soils be classified as prime farmland. The U.S. Department of Agriculture (USDA) considers prime farmland to be land that has the best combination of physical and chemical characteristics that is readily available for producing crops. Prime farmland has the soil quality, growing season and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods. Prime farmlands are not excessively erodible or saturated with water for a long period, nor do they flood frequently, or are protected from flooding. The Farmland Protection Policy Act, finalized in 1994, is intended to minimize the impact federal actions have on farmland and unnecessary and irreversible conversion of farmland to non-agrarian uses. If impacts to prime farmland are unavoidable, an assessment on form AD-1006 would be completed and submitted to the local NRCS office. Any conditions imposed by NRCS would be complied with.

4.4 Wetlands

The Corps and the U.S. Environmental Protection Agency (EPA) have defined wetlands as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions" (Federal Register 1982 and Federal Register 1980). The Corps' Regulatory Program regulates Section 404 of the Clean Water Act (CWA) for permitting deposition or fill of waters of the United States and wetlands with a "significant nexus" to waters of the United States.

Generally, wetlands in the UMB consist primarily of freshwater forested/shrub wetlands and freshwater emergent wetlands located in the floodplains of rivers and their tributaries. Other sensitive wetland habitat types, such a prairie potholes, may be found throughout the landscape and not necessarily associated with riparian habitats.

4.4.1 No Action

Should the No Action Alternative occur, no impacts, adverse or beneficial, would occur to wetlands. Operations and management decisions from local, state and federal entities would continue based off existing monitoring stations and available meteorological data.

4.4.2 Alternative 2 (Preferred Alternative)

As discussed in Section 3.2.2, wetland locations are explicitly screened out for siting snowpack and soil moisture monitoring stations. Upland locations only would be utilized. For each individual site assessed in a REC, GIS, National Wetlands Inventory maps and aerial imagery would be used to determine wetland and waterbody locations and these areas would be deemed unsuitable. During the physical site visit, field verification would occur to ensure no wetlands are present within the area of interest. Due to the screening criteria, wetlands would be entirely avoided and therefore no adverse impacts to this resource would occur as a result of implementation of the Preferred Alternative.

4.5 Water Quality

In accordance with the CWA (33 U.S.C. §1251), states, Tribes, or the EPA must develop standards for their jurisdiction. Pursuant to the CWA, water quality consists of three components: 1) designated and existing uses, 2) water quality criteria necessary to protect these uses, and 3) an anti-degradation policy (40CFR Part 131.6; USACE, 2008). Surface and groundwater water quality standards have been set forth by the Montana Water Quality Act and the CWA to include parameters such as pollutants, temperature and dissolved oxygen levels. In accordance with Section 303(d) of the CWA, states must identify surface waters that do not meet EPA-approved water quality standards. These affected waters must be placed on a 303(d) list which requires these waters to have total maximum daily load (TMDL) developed. A TMDL is based on the maximum amount of a pollutant that a body of water can receive and still meet water quality standards set forth and on an allocation of that pollutant amount among various sources.

For the 2016 Water Quality Assessment Report for the state of Montana, only 43% of river and streams have been assessed and approximately 82% of lakes, ponds and reservoirs have been assessed. Of those waterbodies, approximately 85% are considered impaired, with nearly 95% of those impaired waterbodies needing TMDLs. A host of impairment sources were listed, with habitat and flow alterations, sediment, nutrients, heavy metals and total dissolved solids (TDS) being the primary causes of impairment to Montana's waterbodies. Impairments of Montana's waterbodies impact agricultural, aquatic life, drinking water and primary contact recreation designated use groups (EPA, 2016).

The most recent water quality assessment report for Wyoming was in 2014; only 16% of Wyoming's rivers and streams have been assessed and approximately 6% of lentic[5] habitats have been assessed. Of those assessed waterbodies, 9% of stream miles are considered impaired and 33% of lentic habitats were considered impaired. The largest contributor to impairment of Wyoming's waterbodies was fecal coliform, with heavy metals, sediment, and flow alterations also causing impairment. Designated uses that have been impaired include aquatic life other than fish, cold water fishery, drinking water, non-game fish, recreation and warm water fishery groups (EPA, 2014).

[5] still, freshwater waterbodies such as lakes, ponds and reservoirs

North Dakota has assessed 100% of the state's streams and rivers and 87% of lentic waterbodies. Of those assessed waters, approximately 8% of streams and rivers are considered impaired and 73% of lentic waterbodies are classified impaired. The largest threat to rivers and streams in North Dakota is resultant of agrarian practices such as grazing in riparian areas, animal feeding operations and crop production. Atmospheric deposition of methylmercury is the largest cause for impairment of lentic waterbodies in North Dakota (EPA, 2016).

The state of South Dakota has conducted water quality assessments on approximately 6% of its streams and rivers and 18% of lentic waterbodies. Of those assessed, approximately 79% of the rivers and streams and lentic waterbodies are considered impaired. Major causes of impairment to streams and rivers identified included turbidity, pathogens (*E. coli*) and TSS, primarily due to agrarian practices. Of the 11 state designated use categories, 10 are classified impaired; primarily warmwater and coldwater fisheries as well as immersion and limited contact recreational waters. Major causes of impairment in lentic waterbodies of South Dakota assessed included mercury in fish tissue, algal blooms and low dissolved oxygen (DO). All 10 of the designated use categories for lentic waterbodies are impaired to some degree; coldwater and warmwater fisheries are severely impaired (EPA, 2016).

For the entire state of Nebraska, approximately 13% of the streams and rivers and approximately 51% of lentic waterbodies have been assessed. Of those assessed, 60% of the streams and rivers and 91% of lentic waterbodies are classified impaired. Primary causes for impairment on streams and rivers include *E. coli*, heavy metals and pesticides. Of the six designated uses categories for streams and rivers in Nebraska, all are considered impaired; however, aesthetics and agricultural water supply are minimally impaired (<2%). For lentic waterbodies in Nebraska, primary causes of impairment include algal blooms, mercury and nutrients. Four of the five designated use categories for ponds, reservoirs and lakes are impaired; however, only the aquatic life designated use is majorly impaired (90% of lentic water bodies are considered impaired for aquatic life) (EPA, 2016).

4.5.1 No Action

Should the No Action Alternative be implemented, no impacts to water quality are anticipated. The states, Tribes and EPA would continue to assess the condition of water quality of water bodies within their respective states as they presently do. The Corps, and other local, state and federal entities, would continue to make management decisions based on available data provided from the existing monitoring stations.

4.5.2 Alternative 2 (Preferred Alternative)

The Preferred Alternative would have no direct adverse or beneficial impacts on water quality. As noted in Section 3.2.2, newly constructed monitoring stations would only be sited in upland locations and this project is not considered to be water dependent. The proposed project may have indirect, beneficial effects to water quality in that water resource managers would be able to make more accurate forecasts; thus be able to reduce the potential impacts associated with flooding. Flooding may have negative impacts on water quality; as the water inundates urban and agricultural landscapes, debris, surface runoff and contaminants will often enter the waterway.

With an increase in quality and quantity of data, managers may better forecast and offset potential flooding events.

4.6 Air Quality

Federal air quality policies are regulated through the Clean Air Act (CAA). In accordance with this act, the EPA has established National Ambient Air Quality Standards (NAAQS) for criteria pollutants considered harmful to public health and the environment. The criteria pollutants include carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide, and particulate matter. The EPA is required to designate counties or air basins as in attainment or nonattainment for each criteria pollutant. Attainment means that an area is meeting or is below a given safe standard set by the EPA for the particular criteria pollutants. If an area is in nonattainment (the levels of a particular pollutant exceed EPA standards) the state must develop an implementation plan to achieve compliance. Once in compliance with the NAAQS, the area becomes a maintenance area.

The EPA has issued regulations addressing the applicability and procedures for ensuring that federal activities comply with the CAA. The EPA Final Conformity Rule requires federal agencies to ensure that federal actions in designated nonattainment or maintenance areas conform to an approved or promulgated state implementation plan or federal implementation plan to ensure that a federal action would not cause a new violation of the NAAQS, contribute to any increase in the frequency or severity of violations of existing NAAQS, or delay the timely attainment of any NAAQS or other attainment milestones. If a project results in a total net increase in pollutant emissions that is less than the applicable *de minimis* threshold established in 40 CFR 93.153(b), detailed conformity analyses are not required. AIRNow.gov is a website launched by EPA in 2005 with national participation. This tool is used to relay real-time data to members of the public as well as predict conditions several hours into the future. Ambient monitoring at the time of writing indicates that the five states within the UMB are meeting established NAAQS and considered in attainment.

4.6.1 No Action

Under the No Action Alternative, no new soil moisture and snow pack monitoring stations would be constructed and the existing monitoring stations would continue to operate and collect data as they presently do. The proof-of-concept monitoring stations would be updated and collect relevant data from the upgraded equipment. Management decisions would be made from current available information. No impacts to air quality are anticipated under the No Action Alternative.

4.6.2 Alternative 2 (Preferred Alternative)

There would be no impacts to air quality as a result of this project. No heavy equipment would be required to install or update monitoring stations.

4.7 Noise

Under the Noise Control Act of 1972 and its amendments (Quiet Communities Act of 1978; U.S.C. Title 42, Parts 4901-4918), states have the authority to regulate environmental noise by which governmental agencies must comply with in addition to community noise policies and regulations. Noise conditions in the UMB vary dependent upon land use. Generally, monitoring stations would likely be sited in rural settings where ambient noise conditions may be comprised

of light traffic, trains, heavy equipment and machinery for agricultural operations or potentially in areas where recreational use may be conducted seasonally, such as hiking, hunting, fishing and boating. Thus, the noise condition is anticipated to be relatively low, which is characteristic of a natural setting with infrequent intrusions of man-made noise.

4.7.1 No Action

Under the No Action Alternative, no new soil moisture and snow pack monitoring stations would be constructed and the existing monitoring stations would continue to operate and collect data as they presently do. The proof-of-concept monitoring stations would be updated and collect relevant data from the upgraded equipment. No impacts to ambient noise conditions within the UMB are anticipated under the No Action Alternative.

4.7.2 Alternative 2 (Preferred Alternative)

The Preferred Alternative is not anticipated to have any impacts on noise conditions of the UMB as no heavy machinery is required for installation or updating of monitoring stations.

4.8 Fish and Wildlife

Distribution of species corresponds with the ecoregion boundaries discussed in Section 4.1, which are areas defined by ecological homogeneity and thus parallel the presence or absence of like-assemblages supported by similarities of the soil, physiography, climate and hydrology of a given ecoregion.

Composition of native fish and wildlife species of the UMB are generally remnant of those species associated with Great Plains habitat. Within the entire Missouri River basin, there are an estimated 150 species of fish, 300 species of birds and variety of large mammals such as elk (*Cervus canadensis*), whitetail deer (*Odocoileus virginianus*), bison (*Bison bison*) and mountain lion (*Puma concolor*); small mammals such as prairie dogs (*Cynomys spp*.) and river otter (*Lontra canadensis*); generalist species such as coyote (*Canis latrans*), raccoon (*Procyon lotor*) and opossum (*Didelphis virginiana*); and reptiles and amphibians such as the prairie rattlesnake (*Crotalus viridis*) and tiger salamander (*Ambystoma mavortium*).

4.8.1 No Action

Under the No Action Alternative, no existing sites would be updated and no new sites would be constructed. The proof-of-concept monitoring stations would be updated and collect relevant data from the upgraded equipment. Federal, state and local entities would continue to make management decisions based on the current available data. The No Action Alternative would have no impacts, beneficial or adverse, on fish and wildlife of the UMB.

4.8.2 Alternative 2 (Preferred Alternative)

Should the Preferred Alternative be implemented, negligible and temporary impacts associated with human presence of updating or installing new monitoring stations could occur to resident wildlife. Updating and installation activities would likely cause mobile wildlife to disperse the area as a result of human presence and visual and auditory disruptions. It is anticipated wildlife would return to the area upon completion of installation activities. No adverse impacts to aquatic species are anticipated, as discussed in Section 3.2.2, riparian, wetland and aquatic habitats would be completely avoided.

For each site-specific REC, coordination with the appropriate State game and fisheries agency and the USFWS would occur to ensure impacts to fish and wildlife resources are minimized.

4.9 Migratory Birds and Raptors

The bald eagle (*Haliaeetus leucocephalus*) was federally listed as a threatened species under the Endangered Species Act (ESA) (7 U.S.C. § 136, 16 U.S.C § 1531) in 1973 though they were officially declared as endangered prior to the ESA in 1967. On August 9, 2007, the bald eagle was removed from the federal list of threatened and endangered species but continues to be protected under the Bald and Golden Eagle Protection Act (16 U.S.C. § 668-668d), Migratory Bird Treaty Act (MBTA) (16 U.S.C. § 703-712, though §709 is omitted) and the Lacey Act (16 U.S.C. § 701). Bald eagles are known to inhabit forested areas along the Missouri River. These birds tend to construct their nests in mature trees near aquatic habitats, especially in cottonwood trees. Bald eagle nests are typically easy to identify due to their large size and their height (they can be eight feet or more in diameter and 12 feet or more in height). They feed primarily on fish and crippled waterfowl, but may feed on upland game birds and other birds, carrion, and small rodents.

All federal agencies are subject to the provisions of the MBTA which regulates the take of any migratory bird species. If a Corps project is expected to impact any migratory bird species, coordination with the USFWS is typically initiated in order to minimize impacts to these species. The UMB falls within the Central Flyway Route which merges easterly towards the Mississippi Flyway as it follows along the Missouri River.

4.9.1 No Action

Under the No Action Alternative, no existing monitoring stations would be upgraded and no new soil moisture and snow pack monitoring stations would be constructed within the UMB. The proof-of-concept monitoring stations would be updated and collect relevant data from the upgraded equipment. No direct or indirect adverse or beneficial impacts to migratory birds and raptors would be anticipated.

4.9.2 Alternative 2 (Preferred Alternative)

Should the Preferred Alternative be implemented, negligible and temporary impacts may occur to migrating birds and raptors should any tree clearing be required. As discussed in Section 3.2.2, clearing of woody vegetation would be avoided and minimized to the extent practicable. Woody vegetation creates an obstruction that may interfere with equipment functionality and accuracy. As such, areas with dense vegetation are avoided. The site-specific RECs would consider any minor tree clearing that may occur to accommodate the 900-sq. ft. station and would be conducted outside migrating birds and raptors nesting seasons. Generally, Neotropical passerine birds nest in this region from April 1 to September 10 and raptors nest from February 1 to April 5. Any tree clearing that could not avoid these windows would require a qualified biologist to conduct surveys not more than 5 days prior to proposed tree removal activities. As part of the site-specific REC, local State fish and game agencies and the respective USFWS office would be contacted and coordinated with to ensure no long-term, negative impacts would occur to migrating birds or raptors.

Several studies have correlated a direct impact between communication towers and avian mortality. Specifically, a variety of factors may contribute to or decrease the likelihood of bird collisions. These factors may include location of placement in the landscape, daily weather conditions, tower height, tower lighting and the use of guy wires.

The USFWS Migratory Bird Program has produced recommended best management practices (BMPs) for the design, siting, construction, operation, maintenance and decommissioning of communication towers (USFWS, 2018). USFWS recommends towers should not be more than 199 feet above ground level in order to provide adequate airspace between the top of a tower and average bird flight height. The tower height for the proposed monitoring stations is 30 feet above ground level. USFWS also recommends using free-standing towers to eliminate the need for guy wiring. As indicated in Section 3.2.3, two tower models may be utilized, one of which requires staking and guy wires. However, due to the relatively short height of the towers, it is not anticipated that guy wiring less than 30 foot above ground level would conflict with the required airspace of average bird flight height. Furthermore, the USFWS recommends no tower lighting where Federal Aviation Administration (FAA) regulations and standards permit. Lighting systems on towers may cause birds to become disoriented or may attract birds to the tower, thus increasing the likelihood of bird collisions. Lighting towers is not anticipated to be required for any new installation or modification of existing sites. The proposed project would fit within these USFWS recommendations; therefore, should the Preferred Alternative be implemented, negligible and temporary impacts are anticipated to occur to migrating birds and raptors.

4.10 Threatened, Endangered and Candidate Species and Special Status Species

In accordance with Section 7 of the ESA (7 U.S.C. § 136, 16 U.S.C. § 1531), scoping letters were sent to the USFWS Ecological Services (ES) offices in Nebraska, Wyoming, North Dakota, South Dakota and Montana on November 2, 2019 to request a species list of threatened and endangered species and critical habitats that may be present within the UMB. Additionally, the USFWS Information for Planning and Consultation (IPaC) website was consulted to obtain information on federally-listed threatened and endangered species. IPaC identified five mammals, five birds, one amphibian, eight fish, seven invertebrates, six plants and one candidate species and one proposed threatened species and nine critical habitats that may occur within the UMB (Table 1).

Responses received from the Wyoming and Nebraska ES Offices (dated 21 November and 25 November 2019, respectively) noted the proposed action may be in compliance with the ESA, though new information should be coordinated with these offices. A response from South Dakota ES, dated 12 November 2019 noted that native prairie habitat should be avoided, and provided GIS data layers of known, unbroken native prairie habitat for reference. A response from Montana ES, dated 10 December 2019 stated that effective 23 December 2019, the meltwater lednian stonefly (*Lednia tumana*) and the western glacier stonefly (*Zapada glacier*), both aquatic species in alpine streams and springs were determined threatened under the ESA. Additionally, it was also noted that the greater sage grouse (*Centrocercus urophasianus*) is no longer considered a candidate for listing under the ESA, contingent on the implementation of the North Dakota Greater-Sage Grouse Approved Resource Management Plan Amendment ([ARMPA] Bureau of

Land Management (BLM), 2015). The ARMPA categorized major threats to sage grouse populations and provides allocation decisions for priority and general sage grouse habitat management areas on BLM lands. The USFWS also recommended avoidance of designated greater sage grouse habitat. Furthermore, Montana ES recommended avoidance of NWRs to the extent practicable and should a monitoring station request to be sited on USFWS-administered lands, coordination and obtainment of SUPs and ROW grants would be required. A response was received from the North Dakota ES on 17 December 2019, a list of potential threatened and endangered species within the state of North Dakota and an IPaC report were provided. The USFWS in North Dakota also requested additional coordination should any information change. Coordination for updating and installing site-specific monitoring stations would be conducted as part of an individual REC for each site. Reference Appendix C for all coordination.

Scoping letters were also sent to the State game and fish departments in Nebraska, Wyoming, North Dakota, South Dakota and Montana on 2 November 2019 to solicit feedback on the proposed project. Wyoming Game and Fish Department (WGFD) provided a response dated 2 December 2019, citing no concerns with terrestrial or aquatic resources. Nebraska Game and Parks Commission (NGPC) responded in a letter dated 2 December 2019 and provided a list of state-listed species as well as noting concurrence with the Corps' approach for environmental screening criteria. The South Dakota Department of Game, Fish and Parks (SDGFP) responded in a letter dated 19 November 2019 and stated that should SDGFP-managed lands be considered for siting monitoring stations, coordination with SDGFP would need to occur to ensure there are no specific use restrictions in place and that environmentally sensitive features would be avoided. The Montana Fish, Wildlife and Parks (MFWP) also provided a response in a letter dated 4 December 2019 and noted a concern on siting monitoring stations on deer and elk winter range dependent upon the level of disturbance of and the frequency of access. MFWP also concurred with the Corps' consideration of viewshed when scoping sites. No response was received from the North Dakota Game and Fish Department. Reference Appendix C for all coordination.

Table 1. Section 7 listed threatened, endangered and candidate species within the UMB (Note: this list excludes listed species within mountainous regions of the UMB- which are not part of the proposed action area).

Common Name	Scientific Name	Status	State(s) Present					Critical Habitat				
			Montana	North Dakota	South Dakota	Wyoming	Nebraska	Montana	North Dakota	South Dakota	Wyoming	Nebraska
Black-footed Ferret	*Mustela nigripes*	Endangered	X		X	X						
Canada Lynx	*Lynx canadensis*	Threatened	X			X		X			X	
Grizzly Bear	*Ursus arctos horribilis*	Threatened	X			X						
Northern American Wolverine	*Gulo gulo luscus*	Proposed Threatened	X			X						
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	X	X	X	X	X					
Preble's Meadow Jumping Mouse	*Zapus hudsonius preblei*	Threatened				X						
Interior Least Tern	*Sterna antillarum*	Endangered	X	X	X	X	X					
Piping Plover	*Charadrius melodus*	Threatened	X	X	X	X	X	X	X	X		
Red Knot	*Calidris canutus rufa*	Threatened	X	X	X							
Whooping Crane	*Grus americana*	Endangered	X	X	X	X	X					
Yellow-billed Cuckoo	*Coccyzus americanus*	Threatened	X			X					X	
Wyoming Toad	*Bufo hemiophrys baxteri*	Endangered				X						
Bonytail	*Gila elegans*	Endangered				X						
Colorado Pikeminnow	*Ptychocheilus lucius*	Endangered				X						
Bull Trout	*Salvelinus confluentus*	Threatened	X					X				
Kendall Warm Springs Dace	*Rhinichthys osculus thermalis*	Endangered				X						
Humpack Chub	*Gila cypha*	Endangered				X						
Pallid Sturgeon	*Scaphirhynchus albus*	Endangered	X	X	X	X	X					
Razorback Sucker	*Xyrauchen texanus*	Endangered				X						
Topeka Shiner	*Notropis Topeka*	Endangered			X		X					X
Higgins Eye	*Lampsilis higginsii*	Endangered			X							
Scaleshell Mussel	*Leptodea leptodon*	Endangered			X		X					
American Burying Beetle	*Nicrophorus americanus*	Endangered			X		X					
Lednian Stonefly	*Lednia tumana*	Threatened	X									
Western Glacier Stonefly	*Zapada glacier*	Threatened	X									
Dakota Skipper	*Hesperia dacotae*	Threatened		X	X				X	X		
Poweshiek Skipperling	*Oarisma Poweshiek*	Endangered		X	X					X		
Blowout Penstemon	*Penstemon haydenii*	Endangered				X	X					
Colorado Butterfly Plant	*Gaura neomexicana coloradensis*	Threatened				X					X	
Desert Yellowhead	*Yermo xanthocephalus*	Threatened				X					X	
Leedy's Roseroot	*Rhodiola integrifolia leedyi*	Threatened			X							
Ute Ladies'-tresses	*Spiranthes diluvialis*	Threatened	X			X	X					
Western Prairie Fringed Orchid	*Platanthera praeclara*	Threatened		X	X	X	X					
Whitebark Pine	*Pinus albicaulis*	Candidate	X			X						

4.10.1 No Action

Under the No Action Alternative, no direct adverse or beneficial impacts would occur to species listed under Section 7 of the ESA or other special status species. The existing 180 stations would continue to operate and provide the quality and type of data as they currently do. The updated proof-of-concept sites for the pilot study would collect data based on the upgraded equipment

installed in the summer of 2020. No new monitoring stations would be constructed in the UMB to monitor soil moisture and plains snow pack. The No Action Alternative would not serve the purpose and need of the proposed project and would not provide resource managers with a higher level of data to improve the weather and climate forecasting than what is currently available.

4.10.2 Alternative 2 (Preferred Alternative)

Should the Preferred Alternative be implemented, coordination with the appropriate USFWS ES office and State game and fish agency for each monitoring station placement would occur as part of the REC. Effects determinations on listed species with potential to be located within an area where a new monitoring station would be constructed or where existing stations would be upgraded would be coordinated during site specific implementation. Generally, impacts to threatened and endangered species and designated critical habitat is anticipated to be negligible to minor. As discussed in Section 3.2.2, environmental screening criteria include avoidance of designated critical habitat and other sensitive species habitat. Impacts to potential listed species would likely be indirect and temporary effects associated with human disturbance during updating and installation activities. These effects include auditory and visual disturbances from human presence. Heavy machinery is not required for updating or new installation activities. Once a monitoring station has been updated or installed, it is expected that listed species would return to the area. No impacts to aquatic species are anticipated as monitoring stations would be sited in upland habitats only. Comments received during initial scoping from the USFWS and the State game and fish agencies were incorporated into the environmental screening criteria.

Comments received from USFWS and State game and fish agencies following the agency and public review (from 31 March through 01 May 2020) of the Draft Final PEA were generally supportive of the proposed project. The NGPC stated that the Draft PEA adequately addressed state and federally listed species within the programmatic context in a letter dated April 30, 2020. MFWP provided a letter dated 01 May 2020 that stated the draft PEA has a sound list of considerations for site selection and would be open to coordinating with the Corps in determining site locations proposed for MFWP-managed lands.

4.11 Vegetation

Vegetation of the UMB correlates with the ecoregions discussed in Section 4.1. Generally, composition of native vegetation within the action area would include species associated with shortgrass, tallgrass and mixed grass prairies. Typical graminoids present include western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), blue grama (Bouteloua gracilis), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), inland saltgrass (*Distichilis spicata*) and sand dropseed (*Sporabolus airoides*). Forbs and shrubs include coneflower species (*Echinacea spp.*), leadplant (*Amorpha canescens*), western ragweed (*Ambrosia psilostachya*), snowberry (*Symphoricarpos occidentalis*) and sagebrush (*Artemisia tridentate*). Common tree species include cottonwood species (*Populus spp.*), willow species (*Salix spp.*), green ash (*Fraxinus pennsylvanica*) and eastern redcedar (*Juniperus virginiana*).

Much of the native habitat within the UMB has been fragmented from agricultural practices such as grazing and crop production. Other anthropomorphic activities such as oil and gas exploration

and development, wind and solar energy development and mining have also severely altered the historic condition of the Great Plains. Invasive species outcompete native species and have an adverse impact to the structure and diversity of native vegetation resources. Notable common invasive species that occur within the UMB include saltcedar (*Tamarix spp.*), knapweeds (*Centaruea spp*.), Eurasian watermilfoil (*Myriophyllum spicatum*), leafy spurge (*Euphoribia esula*), purple loosestrife (*Lythrum salicaria*), curly leaf pondweed (*Potamogeton crispus*) and Canada thistle (*Cirsium arvense*).

4.11.1 No Action

Under the No Action Alternative, no direct or indirect impacts are anticipated to occur. The existing 180 stations would continue to operate and provide the quality and type of data as they presently do. The updated proof-of-concept sites for the pilot study would collect data based on the upgraded equipment installed in the summer of 2020. No new monitoring stations would be constructed in the UMB to monitor soil moisture and plains snow pack.

4.11.2 Alternative 2 (Preferred Alternative)

Should the Preferred Alternative be implemented, negligible and temporary impacts would occur to localized vegetation within the approximate 900-sq. ft. monitoring station footprint from minor clearing of ground cover and low-growing vegetation. Upon completion of installation or updating of equipment, any bare soil would be revegetated with a native seed mix resonant to the site location. Furthermore, as discussed in Section 3.2.2, clearing of woody vegetation would be avoided and minimized to the extent practicable. Woody vegetation creates an obstruction that may interfere with equipment functionality and accuracy. As such, areas with dense vegetation are avoided.

No heavy construction equipment would be required for installation and updating activities, therefore, potential spread of invasive species is minimized to passenger vehicles used to transport personnel to the monitoring station location. BMPs such as washing passenger vehicles prior to entering the monitoring station location would be conducted to minimize the potential for transporting invasive flora species.

4.12 Socioeconomics and Environmental Justice

According to the U.S. Census Bureau (USCB), the state of Montana has just over 1 million residents and is primarily composed of Caucasians (88.6%). The largest minority group of Montana is represented by American Indian and Alaska Native (6.4%) with six of the seven federally-recognized Tribal Reservations occurring east of the Rocky Mountain. African American, Asian and Pacific Islander races compose less than 1% each of the total population. An estimated 93.2% of Montana's population has obtained a high school diploma or equivalent and 31.2% of Montana's population has obtained a Bachelor's degree or higher. The median household income is approximately $52,500 with 13% of the population considered at or below the poverty line (USCB, 2019).

The state of North Dakota has an estimated 762,000 residents, with 87% of the population composed of Caucasian-identifying race. Approximately 5.5% of the residents are considered American Indian and Alaska Native, 3.4% of the residents are African American and 3.9% are

Hispanic or Latino. An estimated 92.5% of North Dakota's population have a high school diploma or equivalent and 29.5% of the residents have obtained a Bachelor's degree or higher. The median household income is approximately $63,500 with 10.7% of the population considered at or below the poverty line (USCB, 2019). North Dakota has five federally-recognized tribes; the Turtle Mountain Band of Chippewa Indians, Standing Rock Sioux Tribe, Spirit Lake Nation, Sisseton-Wahpeton Oyate and Mandan, Hidatsa Arikara Nation (also known as Three Affiliated Tribes).

The state of South Dakota has an estimated 884,600 residents, with 84.4% of the population composed of Caucasians. Approximately 9% of the residents are considered American Indian and Alaska Native, 2.4% of the residents are African American and 4.1% are Hispanic or Latino. An estimated 91.7% of South Dakota's population have a high school diploma or equivalent and 28.5% of the residents have obtained a Bachelor's degree or higher. The median household income is approximately $56,500 with 13.1% of the population considered at or below the poverty line (USCB, 2019). South Dakota has eight federally-recognized tribes; the Cheyenne River Sioux Tribal Council, Crow Creek Sioux Tribe, Flandreau Santee Sioux Tribe, Lower Brule Sioux Tribe, Oglala Sioux Tribe, Rosebud Sioux Tribe, Sisseton-Wahpeton Sioux Tribe, Yankton Sioux and Standing Rock Sioux Tribe.

The state of Wyoming has an estimated 578,800 residents, with 92.6% of the population composed of Caucasians. Approximately 2.7% of the residents are considered American Indian and Alaska Native, 1.3% of the residents are African American and 10.1% are Hispanic or Latino. An estimated 92.9% of Wyoming's population have a high school diploma or equivalent and 26.9% of the residents have obtained a Bachelor's degree or higher. The median household income is approximately $62,300 with 11.1% of the population considered at or below the poverty line (USCB, 2019). Wyoming has two federally-recognized tribes; the Arapahoe Tribe of the Wind River Reservation and Shoshone Tribe of the Wind River Reservation.

The state of Nebraska has an estimated 1,900,000 residents, with 88.3% of the population composed of Caucasians. Approximately 1.5% of the residents are considered American Indian and Alaska Native, 5.1% of the residents are African American and 11.2% are Hispanic or Latino. An estimated 91.1% of Nebraska population have a high school diploma or equivalent and 31.3% of the residents have obtained a Bachelor's degree or higher. The median household income is approximately $59,100 with 11% of the population considered at or below the poverty line (USCB, 2019). Nebraska has six federally-recognized tribes; the Iowa Tribe of Kansas and Nebraska, Omaha Tribe of Nebraska, Ponca Tribe of Nebraska, Sac and Fox Nation of Missouri, Kansas and Nebraska, Santee Sioux Nation and Winnebago Tribe of Nebraska.

4.12.1 No Action

Should the No Action Alternative be implemented, long-term indirect and adverse impacts could occur to communities through increased flood risk. Specifically, those communities and populations within the UMB that are positioned in regulatory floodplains (e.g. 100-year floodplain) are at higher risk. As discussed in Section 4.2, general consensus from the scientific community regarding projected climate trends in the Missouri River watershed indicate continued increases in streamflow. Under the No Action Alternative, the existing 180 stations

would continue to operate and provide the quality and type of data as they presently do. The updated proof-of-concept sites for the pilot study would collect data based on the upgraded equipment installed in the summer of 2020. However, retrofitting the existing data stations and installation of new monitoring stations in the UMB would not occur. No instrumentation to reliably collect data on soil moisture and plain snowpack would be available to provide the necessary quality of data to better inform runoff forecasting.

4.12.2 Alternative 2 (Preferred Alternative)

Should the Preferred Alternative be implemented, long-term, indirect benefits could occur to the socioeconomic condition of the UMB. The data obtained from the network would be available for all federal, state and local agencies to use in the betterment of existing and new products for various efforts, such as river forecasting, flood outlooks, drought monitoring, water supply forecasts and fire hazard reporting. This quantity and quality of data would assist resource managers in decision making to reduce potential flood risk, thus indirectly preventing flood-induced damages.

4.13 Land Use

Land use within the UMB is comprised of residential, commercial, urban and agricultural settings. Public land within the UMB is owned and managed primarily by State fish and game agencies, BLM, BOR, the Corps, USFWS, USFS and NPS. Coordination with these agencies occurred to develop this PEA as well as the REC (Appendix A) that would be utilized to continue to facilitate coordination with land mangers during individual site selection for new stations or retrofitting existing stations.

4.13.1 No Action

Under the No Action Alternative, the mass deployment of the UMB plains snowpack and soil moisture monitoring network would not occur. The existing 180 stations would continue to operate and provide the quality and type of data as they presently do. The updated proof-of-concept sites for the pilot study would collect data based on the upgraded equipment installed in the summer of 2020. No new monitoring stations would be constructed in the UMB to monitor soil moisture and plains snow pack. The No Action Alternative would have no direct or indirect effect on land use.

4.13.2 Alternative 2 (Preferred Alternative)

The Preferred Alternative is anticipated to have long-term and negligible impacts to land use. Within the localized footprint of the monitoring station, the area would convert its land use to support the mesonet. It is anticipated the mesonet would be permanent in order to collect decades-worth of data for the period of record. As indicated in Section 3.2.1, preferably, state and federal lands would be prioritized for siting new monitoring stations so as to reduce the need for real estate easements. Private lands would only be utilized on a willing-landowner basis that is comfortable with long-term deployment and maintenance of the monitoring station.

For individual sites proposed to occur on public lands, coordination with the appropriate land manager would occur as part of the REC. During scoping, agencies such as NPS, U.S. Forest Service (USFS) and BLM have stated support for the proposed project, and noted that SUP

would be required for installation, operation and maintenance activities. Any permits or special considerations from the land management agency would be obtained and adhered to.

Should the site be determined to be no longer needed, the area would be reclaimed and land use would be reverted back to its prior existing condition.

4.14 Cultural Resources

Cultural resources is a general term accounting for both the material and social fabric of the human environment. Tangible cultural resources include districts, sites, buildings, structures, and objects. Commonly, tangible cultural resources include prehistoric Native American archeological sites, historic archeological sites, both designed and coincidental landscapes—such as public gardens or battlefields—structures such as bridges and trails, and buildings. When tangible cultural resources possess the quality of significance and the necessary aspects of integrity to convey their significance, as defined in 36 CFR 60.4, they are historic property. The National Historic Preservation Act of 1966 (NHPA) requires that an agency account for the effects of projects involving Federal land, funds, or permitting.

Compliance with the NHPA (as codified in Title 54 of the United States Code), and other applicable laws and regulations require Federal agencies to take into account the effects of their undertakings on historic properties within the proposed undertaking's area of potential effect (APE) under the Section 106 process outlined in 34 CFR Part 800. Completing the Section 106 process typically involve studies to identify historic property. These studies often require archival searches, remote sensing, and field surveys to identify if any tangible cultural resources are present. Any tangible cultural resources identified are evaluated for significance and integrity to determine if they are historic property. Where historic properties are identified, efforts are made to avoid them, avoid causing adverse effects, and preserve them in place. If any historic property cannot be avoided and would be adversely affected, an appropriate mitigation plan must be implemented.

4.14.1 No Action

Under the No Action Alternative, no adverse or beneficial impacts would occur to cultural resources. Potential indirect adverse impacts to cultural resources may occur in that water resource managers would be unable to make more accurate forecasts; thus be unable to reduce the potential for impacts associated with flooding. Flooding may induce excessive soil erosion, scouring and bank failure of the Missouri River or other streams and rivers that are managed by local, state or federal agencies within the UMB watershed which may expose cultural resource sites.

4.14.2 Alternative 2 (Preferred Alternative)

As allowed by 36 CFR 800.4(b)(2), the identification and evaluation of historic property would be phased using the REC, as discussed in Section 3.2.2, to ensure the identification, evaluation, and appropriate consultation is conducted before final selection. Programmatic Agreements (PA) may be executed with interested and appropriate State Historic Preservation Offices (SHPO) and Tribal Historic Preservation Offices (THPO) to streamline the Section 106 process. Where no PA is in place, the full process described in 36 CFR Part 800 would be utilized to account for

historic property. In either case, the site selection criteria preclude selection of a location that would result in adverse effects to historic property; therefore, Alternative 2 would not result in adverse impacts to cultural resources. Beneficial impacts are possible through the alleviation of the potential indirect adverse impacts described in the No Action Alternative, Section 4.14.1.

4.15 Recreation

Passive and active recreational activities occur on federal- and state-managed lands throughout the UMB. WMAs and NWRs primarily offer passive recreational opportunities such as primitive camping, hunting, fishing, hiking, backpacking, wildlife observation and photography. Other public lands such as Corps projects and State fish and game agency properties may allow for active recreational opportunities such as boating, horseback riding, rifle and archery ranges, golf courses and swimming beaches.

4.15.1 No Action

Under the No Action Alternative, the mass deployment of the UMB plains snowpack and soil moisture monitoring network would not occur. The existing 180 stations would continue to operate and provide the quality and type of data as they presently do. The updated proof-of-concept sites for the pilot study would collect data based on the upgraded equipment installed in the summer of 2020. No new monitoring stations would be constructed in the UMB to monitor soil moisture and plains snow pack. The No Action Alternative would have no effect on designated recreational areas.

4.15.2 Alternative 2 (Preferred Alternative)

Screening criteria outlined in Section 3.2.2 identifies avoidance to the extent practicable of recreational areas. Should any proposed locations for new monitoring stations on designated recreational areas occur, the appropriate land management agency would be coordinated with as part of the site-specific REC. Should the land management agency determine the recreational site is acceptable for siting a new monitoring station, any SUP or conditional provisions would be adhered to in order to ensure minimizing impacts to recreational resources. If possible, the monitoring stations should be clearly marked on any recreational maps or digital resources available to the public.

4.16 Aesthetics

A viewshed is an area of particular scenic or historic value that is visible to an observer from a fixed vantage point. Public lands and some historic properties must consider the aesthetic impact a proposed project may have so as to not devalue the intrinsic importance of an area. Within the UMB, BLM-managed lands utilize the Visual Resource Inventory (VRI) method for quantifying and qualifying visual resources. The VRI includes a scenic quality rating, sensitivity level analysis and distance zone delineation to compute a Class assignment. Class I is reserved for special areas where congressional or administrative decisions outside of the land use planning process were made to preserve the natural characteristics of the site. Class II through IV are assigned by the agency with Class II lands having the greatest relative visual value and IV lands having the lowest relative visual value.

NPS-managed lands within the UMB utilize a VRI process that classifies scenic quality based on the view rather than an area based on physiographic properties. Based on the outcome of the

scenic quality assessment, viewed landscapes are assigned a scenic inventory value from very low to very high. The USFS does not have a separate process for quantifying visual impacts, but the Scenery Management System is utilized to inventory and analyze scenery in national forests to establish visual resource goals and objectives. Scenic attractiveness classes are developed to determine the relative scenic condition of the landscape, these three classes include Class A: Distinctive; Class B: Typical; and Class C: Indistinctive. The Corps has its own specific procedures for conducting a VRI, though these guidelines are not mandatory in their application.

In addition to general aesthetics and a visual impact analysis conducted under NEPA, Section 106 of the NHPA requires federal agencies to assess visual impacts of an undertaking and its effect on historic properties.

4.16.1 No Action

Under the No Action Alternative, the mass deployment of the UMB plains snowpack and soil moisture monitoring network would not occur. The existing 180 stations would continue to operate and provide the quality and type of data as they presently do. The updated proof-of-concept sites for the pilot study would collect data based on the upgraded equipment installed in the summer of 2020. No new monitoring stations would be constructed in the UMB to monitor soil moisture and plains snow pack. The No Action Alternative would have no effect on visual resources.

4.16.2 Alternative 2 (Preferred Alternative)

Should the Preferred Alternative be implemented, impacts to the viewshed are anticipated to be minor and long-term. The extent of the impact is dependent upon the location of the station and the adjacent topography. As indicated in Section 3.2.1, siting of new monitoring stations would occur on relatively flat surfaces. The general landscape surrounding the monitoring station would determine the distance of visibility.

To consider the maximum potential viewshed impact, the formula $d_l = \sqrt{2Rh} \approx 3.57 * \sqrt{h}$ where ***h*** (30 feet) is the tower height and ***R*** is the radius of the earth (3,958.8 miles) was utilized to calculate a maximum line of sight distance which assumes only the tower height and does not take into consideration localized topography which may obstruct viewshed impacts. The estimated maximum potential line of site impact is approximately 6.7 miles which assumes no visual obstructions of any kind between an observer and the monitoring station. Generally, it is anticipated that the visual impact would be significantly less for new monitoring stations as it is unlikely that any one site selected would be completely absent of topographic variation and landscape features such as vegetation.

Dependent upon the monitoring station location, varying VRI methodologies may be applied. For example, if a new monitoring station is requested to be sited on BLM-managed lands, BLM's VRI methodology would be applied to conduct a visual impact assessment.

In addition to a VRI conducted in compliance with NEPA, visual impacts under Section 106 would also be assessed to ensure no adverse effects occur to historic properties. These assessments would be conducted as part of the REC for each individual monitoring site.

4.17 Hazardous, Toxic and Radioactive Waste

HTRW includes any material listed as a hazardous substance under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; 42 U.S.C. 9601[14]). Hazardous substances regulated under CERCLA include hazardous wastes under §3001 of the Resource Conservation and Recovery Act (RCRA; 42 U.S.C. 6921 et seq.), hazardous substances identified under §311 of the CAA (33 U.S.C. 1321), toxic pollutants designated under §307 of the CWA (33 U.S.C. 1317), hazardous air pollutants under §112 of the CAA (42 U.S.C. 7412) and imminently hazardous chemical substances or mixtures on which EPA has taken action under Section 7 of the Toxic Substance Control Act (15 U.S.C 2606); these do not include petroleum or natural gas unless already included in the above categories.

4.17.1 No Action

Should the No Action Alternative be implemented, no impacts to potential HTRW conditions would occur. The mass deployment of the UMB plains snowpack and soil moisture monitoring network would not occur. The existing 180 stations would continue to operate and provide the quality and type of data as they presently do. The updated proof-of-concept sites for the pilot study would collect data based on the upgraded equipment installed in the summer of 2020. No new monitoring stations would be constructed in the UMB to monitor soil moisture and plains snow pack.

4.17.2 Alternative 2 (Preferred Alternative)

Under the Preferred Alternative, should the Corps acquire any Real Estate interests, Environmental Site Assessments would be conducted in accordance with ER 1165-2-132 HTRW Guidance for Civil Works Projects. Should any potential locations have the presence of hazardous substances as classified above in Section 4.17, the proposed location would be deemed unsuitable for siting a monitoring station. No impacts are anticipated to occur to potential HTRW sites within the UMB.

5. CUMULATIVE IMPACTS

The combined incremental effects of human activity are referred to as cumulative impacts (40 CFR 1508.7). While these incremental effects may be insignificant on their own, accumulated over time and from various sources, they can result in serious degradation to the environment. The cumulative impact analysis must consider past, present and reasonably foreseeable actions in the study area. The analysis also must include consideration of actions outside of the Corps, to include other state and federal agencies. As required by NEPA, the Corps has prepared the following assessment of cumulative impacts related to the alternatives being considered in this PEA.

Past Actions

As discussed in Section 1.1, following the 2011 flood event on the Missouri River, the Corps and an Independent Review Team comprised of academic expertise and officials from various federal agencies, determined that the Corps substantially underestimated the wet soil conditions in the plains and the plains snowpack in its water supply forecasts. Presently, there are approximately 180 existing mesonet sites in seven networks in the upper Missouri River basin that collect soil moisture and snowpack data, or may be modified to collect these data. An estimated additional

360 sites are required in order to provide the necessary quality of data to better inform runoff forecasting.

From December 2018 through July 2019, instrumentation and measurement techniques were conducted by climatologists with the SDSU to determine a variety of automated and manual observations to test the practicability and accuracy of different technologies before deployment of a full plains snowpack and soil moisture monitoring network in the UMB. The complete SDSU Hydrologic Testbed Report may be found in Appendix B.

Present Actions

Five proof-of-concept sites are anticipated to be updated in Spring 2020. Updating existing stations at SDSU, as well as at Montana State University in Bozeman, Montana and University of Wyoming in Sheridan, Wyoming were assessed in the *Pilot Study for the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network* EA and Finding of No Significant Impact (FONSI)(February 2020). Monitoring stations updated in Carrington, North Dakota and Eagle, Nebraska were not federally funded and therefore not subject to NEPA. The intent of the proof-of-concept effort was to further inform equipment selection and installation methods in a mesocom study prior to implementation of a basin-wide scale. Updating the proof-of-concept monitoring stations is anticipated to be completed by late Summer 2020 so implementation of the overall monitoring network could begin by late 2020.

Reasonably Foreseeable Actions

Following the proof-of-concept monitoring sites that will be updated or installed by Spring 2020; approximately 30 existing sites have been identified for retrofitting for the overall larger mesonet effort and these activities may begin in late 2020. Following FY2020, dependent upon fiscal budgeting priorities, it is anticipated the existing monitoring stations within the UMB would be prioritized to be retrofitted first before any new installation of the approximately 360 sites would occur in subsequent fiscal years.

At the time of writing, it is still unknown who the federal or state partner(s) will be for the implementation of the larger mass-deployment effort and which agency would be responsible for O&M.

Cumulative Impacts

The proposed installing and retrofitting of plains snowpack and soil moisture monitoring stations are not anticipated to have incremental or cumulative adverse impacts to the resource categories discussed in Section 4. Beneficial cumulative and incremental impacts may occur to certain resources should the mesonet project be implemented. Cumulative benefit to the socioeconomic condition in the UMB could occur as a result of the data obtained from the network which would be available for all federal, state and local agencies to use in the betterment of existing and new products for various efforts, such as river forecasting, flood outlooks, drought monitoring, water supply forecasts and fire hazard reporting. This would assist resource management agencies in making operational decisions to reduce the flood risk to communities within the UMB. Additional incremental benefit to resources such as soils, cultural resources and water quality may also occur as the ability to minimize flooding risk increases. Flooding may induce excessive

soil erosion, scouring and bank failure of the Missouri River or other streams and rivers that are managed by local, state or federal agencies within the UMB watershed. Flooding may also have negative impacts on water quality; as the water inundates urban and agricultural landscapes, debris, surface runoff and contaminants will often enter the waterway. With an increase in quality and quantity of data, managers may better forecast and offset potential flooding events.

6. COMPLIANCE WITH OTHER ENVIRONMENTAL LAWS

American Indian Religious Freedom Act (AIRFA) of 1978, 42 U.S.C. 1996. *In compliance*. AIRFA protects the rights of Native Americans to exercise their traditional religions by ensuring access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. Access to sacred sites by Tribal members would not be affected.

Bald and Golden Eagle Protection Act, 16 U.S.C. Sec. 668, 668 note, 669a-668d. *In compliance*. This act prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions for the scientific or exhibition purposes, for religious purposes of Indian Tribes, or for the protection of wildlife, agriculture or preservation of the species. The proposed project would have no adverse effects on the bald eagle.

Clean Air Act, as amended, 42 U.S.C. 185711-7., et seq. *In compliance*. The purpose of this act is to protect public health and welfare by the control of air pollution at its source and to set forth primary and secondary National Ambient Air Quality Standards to establish criteria for states to attain, or maintain. No effect to ambient air quality conditions are anticipated as a result of updating or installing plains snowpack and soil moisture monitoring stations.

Clean Water Act, as amended, (Federal Water Pollution Control Act) 33 U.S.C. 1251., et seq. *In compliance*. The objective of this act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (33 U.S.C. 1251). The updating or installation of monitoring stations is not water dependent and would occur in upland areas. No effect to water quality is anticipated from the installation and updating of the monitoring sites.

Comprehensive Environmental Response Compensation and Liability Act (CERCLA). *In compliance*. Typically CERCLA is triggered by (1) the release or substantial threat of a release of a hazardous substance into the environment; or (2) the release or substantial threat of a release of any pollutant or contaminant into the environment which presents an imminent threat to the public health and welfare. To the extent such knowledge is available, 40 CFR Part 373 requires notification of CERCLA hazardous substances in a land transfer. This project may involve real estate transaction; this could include acquisition of land in fee title or easements. Real estate proposed for acquisition that requires the expenditure of federal dollars would require Environmental Site Assessments in accordance with ER 1165-2-132 HTRW Guidance for Civil Works Projects.

Endangered Species Act, as amended, 16 U.S.C. 1531, et seq. *In compliance*. Section 7 (16 U.S.C. 1536) states that all federal departments and agencies shall, in consultation with and with the assistance of the Secretary of the Interior, ensure that any actions authorized, funded, or

carried out by them do not jeopardize the continued existence of any threatened or endangered (T&E) species, or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary to be critical. This project has been coordinated with the USFWS. Reference Appendix C and Section 4.10 for coordination history with the USFWS and State game and fish agencies for this programmatic effort. Each individual REC shall coordinate with the appropriate USFWS ES office and State game and fish agency to make effect determinations of potential listed species within the area for upgrading or constructing new monitoring stations.

Environmental Justice (EO 12898). *In compliance*. Federal agencies shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States. The project does not disproportionately impact minority or low-income populations.

Farmland Protection Policy Act (Subtitle I of Title XV of the Agriculture and Food Act of 1981), effective August 6, 1984. *In compliance*. This act instructs the Department of Agriculture, in cooperation with other departments, agencies, independent commissions, and other units of the federal government, to develop criteria for identifying the effects of federal programs on the conversion of farmland to nonagricultural uses. A letter dated 01 November 2019 was sent to representative NRCS offices of each of the five states; one response from South Dakota was received on 17 December 2019. South Dakota NRCS indicated that the proposed mesonet is likely to have no impact on prime farmland due to the nature of the work and the ability to revert the site to its prior use by simply removing equipment. As part of the REC, each individual site would be assessed to ensure impacts to unique and prime farmland would be minimized. Where unique or prime farmland exists, an AD-1006 form would be submitted to the local NRCS office and the project would comply with any conditions imposed by NRCS.

Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1(12), et seq. *Not applicable*. The act establishes the policy that consideration be given to the opportunities for outdoor recreation and fish and wildlife enhancement in the investigating and planning of any Federal navigation, flood control, reclamation, hydroelectric or multi-purpose water resource project, whenever any such project can reasonably serve either or both purposes consistently. The purpose of this project will not negatively impact recreational use of the river.

Fish and Wildlife Coordination Act, 16 U.S.C. 661, et seq. *Not applicable*. Coordination with USFWS under the Fish and Wildlife Coordination Act is applicable for water resource development projects. As discussed in Section 4.1, only upland sites would be utilized and no monitoring stations would be placed within riparian, wetland or aquatic habitats. However, coordination with the USFWS and State game and fish agencies has occurred for this programmatic effort and coordination would continue for site-specific RECs.

Floodplain Management (EO 11988). *In compliance*. EO 11988 requires federal agencies provide leadership and take action to reduce the risk of flood loss, minimize the impact of floods

on human safety, health and welfare, and restore and preserve the natural and beneficial values served by floodplains. These requirements apply in carrying out its responsibilities for 1) acquiring, managing, and disposition of federal lands and facilities; 2) providing federally undertaken, financed, or assisted construction and improvements; and 3) conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities. This project would not adversely affect the flood holding capacity or flood surface profiles of any stream, as such the project is in compliance with the requirements of EO 11988.

Invasive Species (EO 13751, EO 11987). *In compliance.* The project would be conducted in accordance with EO 13112, as amended by EO 13751. This EO seeks to prevent the introduction of invasive species and authorizes control of said species to minimize economic, ecological and human health impacts. This EO directs all federal agencies to address invasive species concerns and refrain from actions likely to increase invasive species problems. EO 13751 amends EO 13112 to direct continuation of coordination for federal prevention and control efforts. This order also maintains and expands the National Invasive Species Council and further incorporates considerations of human and environmental health, climate change, technological innovation and other emerging priorities into federal efforts to address invasive species in a cost-efficient manner. EO 11987 directs agencies to restrict the introduction of exotic species into the natural ecosystems on lands and waters which they own, lease or hold for purpose of administration and encourages state and local governments as well as private citizens to prevent the introduction of exotic species in natural ecosystems of the United States.

This project would comply with the above EOs through the use of BMPs, such as cleaning and inspecting equipment prior to transportation to each individual location and after installation activities have concluded. For each site-specific REC, coordination with the appropriate County Weed Board would occur to inform the action agency what potential invasive and noxious weeds or pests may be present and measures to avoid the further spread of invasive species.

Land and Water Conservation Fund Act (LWCFA), as amended, 16 U.S.C. 4601-4601-11, et seq. *Not applicable.* Planning for recreation development at Corps projects is coordinated with the appropriate states so that the plans are consistent with public needs as identified in the State Comprehensive Outdoor Recreation Plan. The Corps must coordinate with the NPS to ensure that no property acquired or developed with the assistance from this act will be converted to other than outdoor recreation uses. If conversion is necessary, approval of NPS is required, and plans are developed to relocate or re-create affected recreational opportunities. No lands involved in the proposed project were acquired or developed with LWCFA funds.

Migratory Bird Treaty Act of 1918 as amended, 16 U.S.C. 703-711, et seq. *In compliance*. The MBTA of 1918 is the domestic law that affirms, or implements, the United States' commitment to four international conventions with Canada, Japan, Mexico and Russia for the protection of shared migratory bird resources. The MBTA governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts and nests. The take of all migratory birds is governed by the MBTA's regulation of taking migratory birds for educational, scientific, and recreational purposes and requiring harvest to be limited to levels that prevent

over utilization. EO 13186 (2001) directs executive agencies to take certain actions to implement the act. Tree clearing activities would be avoided and minimized to the extent practicable. Where tree clearing activities are required, they would take place outside of the migrating nesting season, Generally, Neotropical passerine birds nest in this region from April 1 to September 10 and raptors nest from February 1 to April 5. Should any tree clearing be required that could not avoid these windows, a qualified biologist would conduct surveys not more than 5 days prior to proposed tree removal activities. Additionally, impacts to migrating birds have been minimized as the proposed project complies with USFWS guidelines for BMPs of communication towers. No impacts to migrating birds are anticipated.

National Environmental Policy Act (NEPA), as amended, 42 U.S.C. 4321, et seq. *In compliance*. This PEA has been prepared for the proposed action and to satisfy the NEPA requirement. In accordance with 32 CFR § 651.19, a REC has been developed (Appendix A) to document environmental compliance for each individual site. An Environmental Impact Statement is not required.

National Historic Preservation Act, as amended, 16 U.S.C. 470a, et seq. *In compliance*. The proposed REC process would ensure that the effect of the undertaking on any historic property is taken into account prior to the approval of the expenditure of any Federal funds through phased identification and evaluation as allowed in 36 CFR 800.4(b)(2). There would be no adverse effect to historic property or adverse impacts to cultural resources under the Preferred Alternative.

Noise Control Act of 1972, 42 U.S.C. 4901, et seq. *In compliance*. There is no anticipated impact to the noise condition of the project areas under the Preferred Alternative.

North American Wetlands Conservation Act, 16 U.S.C. Sec. 4401 et seq. *Not applicable.* This act establishes the North American Wetlands Conservation Council (16 U.S.C. 4403) to recommend wetlands conservation projects to the Migratory Bird Conservation Commission. Section 9 of the Act (16 U.S.C. 4408) addresses the restoration, management, and protection of wetlands and habitat for migratory birds on federal lands. Federal agencies acquiring, managing, or disposing of federal lands and waters are to cooperate with USFWS to restore, protect, and enhance wetland ecosystems and other habitats for migratory birds, fish and wildlife on their lands, to the extent consistent with their mission and statutory authorities.

Protection of Wetlands (EO 11990). *In compliance*. Federal agencies shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agencies' responsibilities.

Rivers and Harbors Act, 33 U.S.C. 401, et seq. *In compliance*. This act prohibits the unauthorized obstruction or alteration of any navigable water of the United States. This section provides that the construction of any structure in or over any navigable water of the United States, or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters is unlawful unless the work has been recommended by the

Chief of Engineers and authorized by the Secretary of the Army. A Section 10 permit is not required for Corps projects, nor would the proposed project alter navigable waters in any way.

Watershed Protection and Flood Prevention Act, 16 U.S.C. 1101, et seq. *In compliance*. This act authorizes the Secretary of Agriculture to cooperate with states and other public agencies in works for flood prevention and soil conservation, as well as the conservation, development, utilization and disposal of water. This act imposes no requirements on Corps Civil Works projects.

Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271, et seq. *Not applicable.* This act establishes that certain rivers of the Nation, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. As part of the environmental screening criteria defined in Section 3.2.2, siting of monitoring stations would specifically avoid areas designated as a wild or scenic river. The proposed mesonet would have no anticipated impacts to wild and scenic rivers or areas that are eligible for listing.

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8. PREPARER

This PEA and the associated Finding of No Significant Impact (FONSI) was prepared by Ms. Rebecca Podkowka, Environmental Resource Specialist. The address of the preparer is: U.S. Army Corps of Engineers, Omaha District; PMA-C, 1616 Capitol Avenue, Omaha, Nebraska 68102.

Prepared By: _____ Date: _____
Rebecca Podkowka
Environmental Resources Specialist

Reviewed By: _____ Date: _____
John Shelman
Environmental Resources Specialist

Approved By: _____ Date: _____
Aaron Quinn
Acting Chief, Environmental & Cultural
Resources Section

US Army Corps of Engineers

Upper Missouri River Basin Plains Snowpack
& Soil Moisture Monitoring Network

State

Record of Environmental Consideration

Month, Year

☐ **Existing/Retrofit**
☐ **New**

Project Name: Serial No./Naming Convention

Project Location: County, State; Latitude: XXXX, Longitude: XXXX

Project Description: (Describe the nature of work required, to include installation techniques. Discuss any vegetation clearing and grubbing activities, grading activities and ground disturbing activities and when project implementation would occur in detail. Provide a graphical depiction of the site location. Indicate landowner/land manager of monitoring station location. Note that any monitoring station location on public lands will adhere to criteria set forth by the land management agency.)

Original NEPA Documentation: This Record of Environmental Consideration (REC) is tiered from the *Programmatic Environmental Assessment & Finding of No Significant Impact for the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network in Montana, Wyoming, North Dakota, South Dakota & Nebraska* was signed on XX XX, 2020 by the U.S. Army Corps of Engineers (Corps), Omaha District Commander. The original document may be found at XXX.

Rationale Determining Appropriateness of a REC

☐ The proposed action is Categorically Excluded from NEPA requirements.

☐ The proposed action is currently being adequately assessed in NEPA document that is currently being developed (as per ER 200-2-2) and the actions pertaining to this project are likely to be determined do not present the potential for significant adverse effects to the human environment, be injurious to the public interest, or adversely affect the Corps ability to meet its authorized purposes.

☐ Reevaluation of the project specific potential environmental effects has been completed as demonstrated within the attached Record of Environmental Consideration.

_____
Date

_____
Eric Laux, Chief
Cultural and Environmental Resources
Section (CENWO-PMA-C)

US Army Corps of Engineers

Upper Missouri River Basin Plains Snowpack
& Soil Moisture Monitoring Network

State

Section I: Compliance Review for Environmental Laws

A. National Historic Preservation Act (54 U.S.C. 3001, et seq.)

☐ No potential to affect historic properties. **(Review Concluded)**
☐ No potential historic properties present. **(Review Concluded)**

There is always the possibility that previously unsuspected archeological remains may be uncovered during the process of project construction. In the unlikely event of an unanticipated discovery of cultural resources, work will halt immediately and contact will be made with a Corps archeologist. The work would not continue until a qualified archeologist inspects the find. If it is determined that the discovery requires further consultation, the Corps will consult with the State Historic Preservation Office.

☐ No historic properties present (concurrence on file). **(Review Concluded)**
☐ Historic properties present within the project location.
- ☐ Determination of No Historic Properties Affected (concurrence on file). **(Review Concluded)**
- ☐ Historic properties affected.
  - ☐ No Adverse Effect determination (concurrence on file).
    - ☐ Project conditions are required (see Section V). **(Review Concluded)**
  - ☐ Historic properties adversely affected.
    - ☐ Resolution of adverse effect complete (MOA on file).
      - ☐ Project conditions are required (see Section V). **(Review Concluded)**
    - ☐ Resolution unable to be reached. Project cannot be constructed. **(Review Concluded)**

Comments: Correspondence/Consultation/References:

B. Endangered Species Act (16 U.S.C. 1531, et seq.)

☐ No listed species and/or critical habitat are present in areas affected directly or indirectly by the Federal Action. The U.S. Fish and Wildlife Service was informed of a *no effect* determination on Month/Day/Year. **(Review Concluded)**

☐ Listed species and/or critical habitat are present in areas affected directly or indirectly by the Federal Action.
- ☐ *May affect, not likely to adversely affect* threatened and endangered species or designated critical habitat concurrence provided by the U.S. Fish and Wildlife Service. **(Review Concluded)**

Comments:

Correspondence/Consultation/References:

C. Clean Water Act (33 U.S.C. 1251., et seq.)

☐ No Waters of the United States would be adversely affected directly or indirectly by the project. **(Review Concluded)**

☐ Waters of the United States would be affected by the proposed project.
- ☐ Project requires Section 404/401.
  - ☐ Permits/certifications will be obtained. **(Review Concluded)**

Comments:

Correspondence/Consultation/References:

D. Fish and Wildlife Coordination Act (16 U.S.C. 661, et seq.)

☐ Project is not located in or affects a waterway/body of water. **(Review Concluded)**

☐ Project affects, controls or modifies a waterway/body of water.
- ☐ Coordination with the U.S. Fish and Wildlife Service was conducted.
  - ☐ No recommendations offered by the U.S. Fish and Wildlife Service. **(Review Concluded)**
  - ☐ Recommendations provided by the U.S. Fish and Wildlife Service. Special conditions apply, see Section V. **(Review Concluded)**

Comments:

Correspondence/Consultation/References:

E. Clean Air Act (42 U.S.C. 185711-7., et seq.)

☐ No significant air quality emissions would result from the proposed project and no National Ambient Air Quality Standards would be exceeded. **(Review Concluded)**

☐ Project is located in an attainment area. **(Review Concluded)**

☐ Project is located in a non-attainment area.
- ☐ Coordination with the appropriate state administrating agent was conducted.
  - ☐ No recommendations offered by state administrating agent. **(Review Concluded)**
  - ☐ Recommendations provided by the state administrating agent. Special conditions apply, see Section V. **(Review Concluded)**

Comments:

Correspondence/Consultation/References:

F. Migratory Bird Treaty Act (16 U.S.C. 703-711, et seq.)

☐ No take of migratory birds would occur from the project. **(Review Concluded)**

☐ Project has potential to take migratory birds.
- ☐ Coordination with the U.S. Fish and Wildlife Service was conducted.
  - ☐ No recommendations were offered by the U.S. Fish and Wildlife Service. **(Review Concluded)**
  - ☐ Recommendations were offered by the U.S. Fish and Wildlife Service. Special conditions apply, see Section V. **(Review Concluded)**

Comments: Correspondence/Consultation/References:

G. Bald and Golden Eagle Protection Act (16 U.S.C. Sec. 668-668d.)

☐ No take of bald or golden eagles would occur from this project.

☐ Project has potential to take bald or golden eagles.
- ☐ Coordination with the U.S. Fish and Wildlife Service was conducted.
  - ☐ No recommendations were offered by the U.S. Fish and Wildlife Service. **(Review Concluded)**
  - ☐ Recommendations were offered by the U.S. Fish and Wildlife Service. Special conditions apply, see Section V. **(Review Concluded)**

Comments: Correspondence/Consultation/References:

H. Noise Control Act (42 U.S.C. 4901, et seq.)

☐ No permanent noise would result from the proposed project. **(Review Concluded)**

Comments: Correspondence/Consultation/References:

I. Farmland Protection Policy Act (7 U.S.C. 4201-4209)

☐ Project does not affect prime or unique farmland. **(Review Concluded)**

☐ Project causes unnecessary or irreversible conversion of prime or unique farmland.
- ☐ Coordination with the Natural Resource Conservation Service was conducted.
  - ☐ Farmland Conversion Impact Rating, Form AD-1006 was completed.
    - ☐ No special conditions apply. **(Review Concluded)**
    - ☐ Special conditions apply. See Section V. **(Review Concluded)**

Comments:

Correspondence/Consultation/References:

J. Wild and Scenic Rivers Act (16 U.S.C. 1271, et seq.)

☐ Project is not along and does not affect a designated Wild or Scenic River. **(Review Concluded)**

☐ Project is along or causes an effect to a designated Wild or Scenic River.
- ☐ Project determined to adversely affect a Wild or Scenic River by the National Park Service or the U.S. Forest Service. Project cannot be constructed. **(Review Concluded)**
- ☐ Project does not adversely affect a designated Wild or Scenic River.
  - ☐ No special conditions apply. **(Review Concluded)**
  - ☐ Special conditions apply. See Section V. **(Review Concluded)**

Comments:

Correspondence/Consultation/References:

K. Hazardous, Toxic and Radioactive Waste (42 U.S.C. 9601[14]; 15 U.S.C 2606)

☐ This project will not involve any real estate transactions. **(Review Concluded)**

☐ This project will require a real estate transaction.
- ☐ A Phase I Environmental Site Assessment was conducted.
  - ☐ No presence, or potential for contamination of hazardous, toxic and radioactive wastes were found. **(Review Concluded)**

☐ The presence of, or potential for contamination from hazardous, toxic and radioactive wastes were found.

☐ Project elected termination of site selection. Project cannot be constructed. **(Review Concluded)**

☐ A Phase II Environmental Site Assessment was conducted.

☐ Phase II Environmental Site Assessment determined no presence or potential for contamination of hazardous, toxic and radioactive waste. No special conditions apply. **(Review Concluded)**

☐ Special conditions apply. See Section V. **(Review Concluded)**

Comments: Correspondence/Consultation/References:

Section II: Compliance Review for Executive Orders

A. Executive Order 11988 (Floodplains)

☐ Outside of floodplain and no effect on floodplain or flood levels. **(Review Concluded)**

☐ Located in floodplain or effects on floodplain or flood levels.

- ☐ No adverse effect on floodplain. **(Review Concluded)**
- ☐ Possible adverse effects associated with investment in the floodplain, occupancy or modification of the floodplain. 8-step process is complete.
  - ☐ No special conditions are required. **(Review Concluded)**
  - ☐ Project conditions are required. See explanation in Section V. **(Review Concluded)**

Comments:

Correspondence/Consultation/References:

B. Executive Order 11990 (Wetlands)

☐ Project does not occur within or effect wetlands. **(Review Concluded)**

☐ Located in wetlands or effects wetlands.

- ☐ Beneficial impact on wetlands. **(Review Concluded)**
- ☐ Possible adverse effect associated with constructing in or near a wetland. 8-step process is complete.
  - ☐ No special conditions are required. **(Review Concluded)**
  - ☐ Project conditions are required. See explanation in Section V. **(Review Concluded)**

Comments:

Correspondence/Consultation/References:

C. Executive Order 12898 (Environmental Justice)

☐ No low income or minority population in, adjacent to or affected by the project. **(Review Concluded)**

☐ Low income or minority population in, adjacent to or affected by the project.

- ☐ No disproportionately high or adverse impact on low income or minority population. **(Review Concluded)**
- ☐ Possible disproportionally high or adverse effect to low income or minority population.
  - ☐ No special conditions are required. **(Review Concluded)**
  - ☐ Project conditions are required. See explanation in Section V. **(Review Concluded)**

Comments: Correspondence/Consultation/References:

D. Executive Order 13751 & 11987 (Invasive Species)

☐ The proposed project would not contribute to the introduction or spread of invasive species. **(Review Concluded)**

☐ The proposed project has the potential to contribute to the spread or introduction of invasive species.

- ☐ The use of project-specific best management practices mitigates the potential introduction and spread of invasive species. **(Review Concluded)**

Comments: Correspondence/Consultation/References:

Section III: Other Environmental Issues

Describe other potential environmental concerns not clearly falling under a law or Executive Order (e.g Visual Resource Inventory), reference environmental screening criteria in Attachment X to ensure the project meets conditions set forth as applicable.

Section IV: Extraordinary Circumstances

Based on review of compliance with other environmental laws and Executive Orders, and in consideration of other environmental factors, review the project for extraordinary circumstances.

Note: A "Yes" under any circumstance may require the preparation of a stand-alone Environmental Assessment or Environmental Impact Statement.

Yes	No	
☐	☐	(i) The scope is greater than normally experienced for the particular action being implemented.
☐	☐	(ii) The proposed action has a high level of controversy.
☐	☐	(iii) Potential for degradation, even though slight, of an already degraded condition.
☐	☐	(iv) Employment of unproven or unique technology.
☐	☐	(v) Presence of hazardous or toxic substances at levels which exceed Federal, state, or local regulations or standards.
☐	☐	(vi) Potential for adverse effects on health or safety.
☐	☐	(vii) Potential to violate federal, state, local, or tribal law.
☐	☐	(viii) Potential for significant cumulative impacts when the proposed action is combined with other past, present, and reasonably foreseeable future actions, even though the impacts of the proposed action may not be significant by themselves.
☐	☐	(ix) Potential to adversely affect special status habitats or species.

Section V: Special Project Conditions

A. General Comments

B. Project Conditions

C. Monitoring Requirements

South Dakota Mesonet-US Army Corps of Engineers
Upper Missouri River Basin Plains
Hydrological Testbed Report

Nathan Edwards, SD Mesonet Director, nathan.edwards@sdstate.edu
Ruben Behnke, SD Mesonet Research Climatologist

During the winter of 2018-2019, several instrumentation and measurement technique tests were performed in Brookings, SD (N44.3250, W96.7685, 499.9 m) as part of the Hydrological Testbed Experiment as described in the Statement of Work in the original agreement between the SD Mesonet and the United States Army Corps of Engineers (USACE). These data were collected beginning in December 2018 and continued until July 1, 2019. The specific variables and data are summarized below by meteorological variable.

Testbed Comparisons and Sensor Technologies

A major part of the testbed experiment was to compare different technologies for each of the variables. Many meteorological variables can be measured using a range of different methods, most of which involve different levels of technology, which are most often intended to increase the level of automation and improve accuracy. In general, the higher the degree of automation, the more an instrument costs. However, the accuracy of a particular weather instrument is not necessarily dependent on its technological sophistication.

Incoming Solar Shortwave Radiation (heated vs. unheated)
Solar radiation data were collected using a heated and an unheated pyranometer. The purpose of this comparison was to determine the effect of frost, snow cover, and dew on solar radiation readings. Typically, pyranometers are not heated due to power considerations and due to the fact that the demand for solar radiation historically is during the growing season only. Solar radiation, however, can add to the accuracy of the SNODAS (Snow Data Assimilation System) model used by NOAA's National Operational Hydrologic Remote Sensing Center. Recent instrumentation offerings draw just 15 mA at 12 Volts direct current allowing for accurate assessment of solar radiation even in winter when subject to snow without significant power consumption. Identical pyranometers (Apogee SP230 photovoltaic), one with the heater on and one with the heater off were deployed.

Precipitation
The typical mesonet station utilizes an unheated tipping bucket rain gauge. It is not designed to measure frozen precipitation. The portion of the snow retained in the funnel is recorded after the fact when it melts. The following automated sensors were deployed:

1. Unheated tipping bucket rain gauge (Texas Electronics TE-525 with 6" inch orifice)
2. Same as above but with a 20-inch extended funnel to retain snowfall until melt
3. Weighing precipitation gauge to measure precipitation at the time of fall regardless of freezing conditions (Hourly Precipitation Data Network Fisher-Porter)
4. A prototype weighing gauge with technology similar to above but at much reduced cost (Apogee SG-400).

All data was collected at 5-minute resolution with the exception of the Fisher-Porter which is 15-minute resolution.

Additionally, a daily manual measurement of precipitation (National Weather Service Coop station using the 8" standard rain gauge) was done at the testbed as well.

Snow Depth
Two approaches were taken to measure snow depth.

The first is the sonic snow depth sensor (Campbell Scientific SR50A sampled every 5 minutes). This was placed over a white snow board surrounded by unmowed grass as is common practice in manual observation. The reasoning is that white paint serves to reduce melt, the level board surface produces a cleaner signal and the unmowed grass surrounding it prevents scouring.

The second is the camera-monitored snow stakes. These six 40" tall stakes were marked with 1" bands separated by 1" and monitored by a camera (Campbell Scientific CCFC). The original intention was that the snow depth determined by imaging software could obtain more, albeit less precise measurements than the sonic sensor (manual interpretation of the images was done in lieu of automated processing for purposes of this test). Photographs were done on a daily basis.

Additionally, daily manual NWS Coop station measurements of snow depth were performed.

Snow Water Equivalent
While no automated instruments directly measured snow water equivalent (SWE), weekly manual observations were done using the USACE method for completeness.

Soil Temperature & Moisture
Soil temperature and moisture are most often measured using a combination probe (usually some type of reflectometer for moisture and a thermistor for temperature) that is inserted horizontally into the soil profile at a specified depth. While these sensor types have been thoroughly tested and are the industry standard, a new product that integrates nine sensors into a single 1-meter "screw-in" unit promising easier installation is now on the market (Campbell Scientific Soil VUE10). The unit uses similar technology for measurement (time domain reflectometer and thermistor).

Five conventional probes (Stevens HydraProbe II coaxial dielectric reflectometers) were installed at the common depths of 5, 10, 20, 50, and 100 cm to measure soil temperature and moisture (volumetric water content) at these depths.

A 1-meter "screw-in" unit (Campbell Scientific SoilVUE10) with measurement depths of 5, 10, 20, 30, 40, 50, 60, 75 and 100 cm was installed as an addition late in the study.

All soil moisture and temperature data were sampled at 5-minute resolution.

Testbed Results

Incoming Solar Shortwave Radiation: Heated vs. Unheated
Solar radiation data from heated and unheated sensors were compared for both average 5-minute solar radiation (W/m^2) and total daily radiation fluxes ($MJ/m^2/day$). **Figure 1** shows an example of sensor shading as a result of snow accumulation.

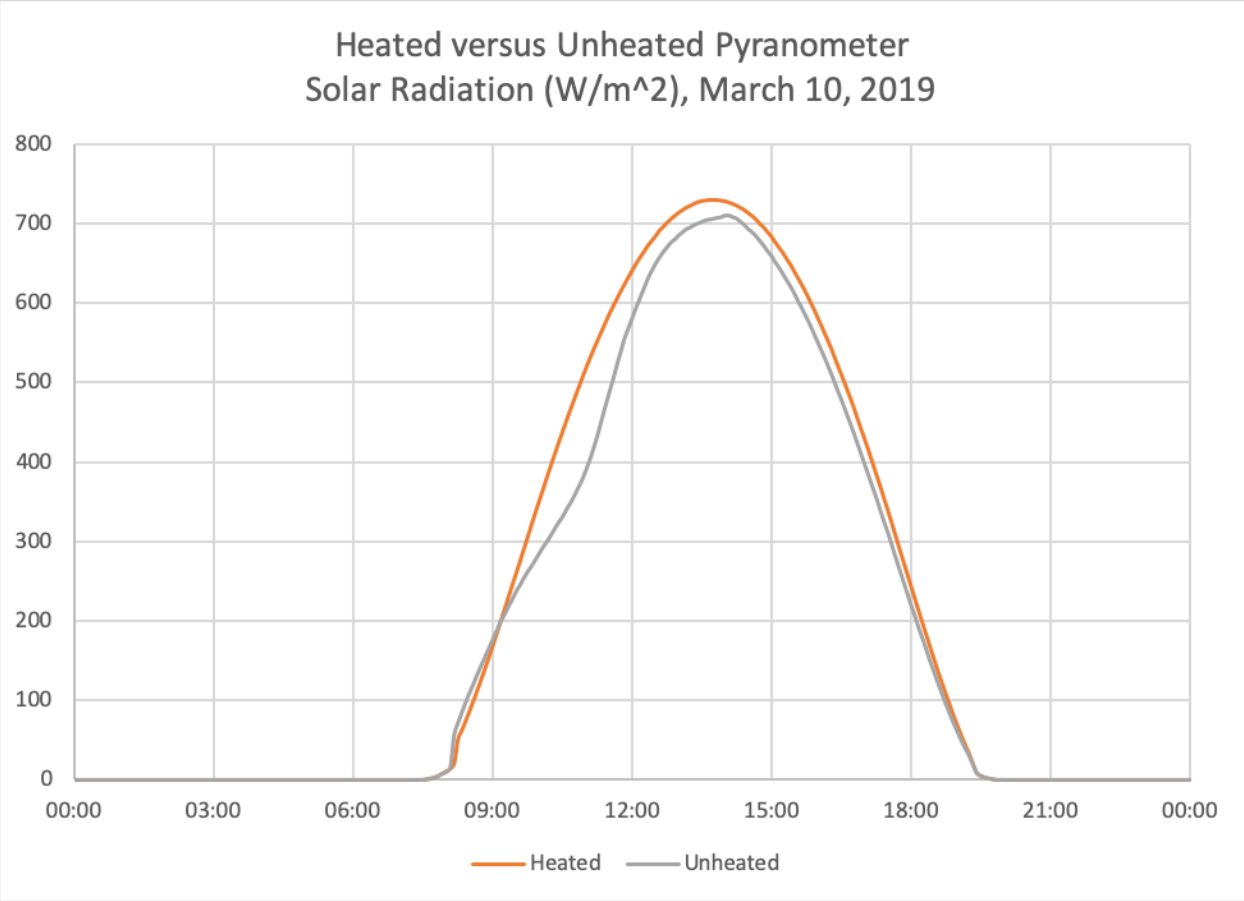


Figure 1. Example of underreporting of solar radiation following snowfall (7.8% daily total in this case following a 4.6 inch snowfall event).

Histograms of percent difference for average 5-minute observations and total daily solar radiation are shown in **Figure 2**. Variation between the pyranometers is much higher for average minute readings than for total daily radiation. Over 21% of average 5-minute observations vary by more than 5%, while this drops to less than 3% for total daily solar radiation.

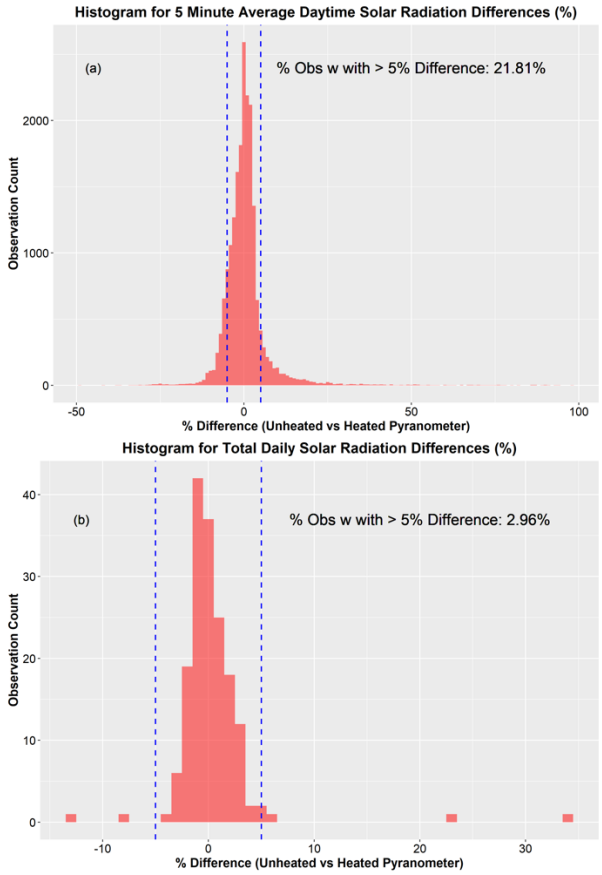


Figure 2. **(a)** Histogram of average 5-minute solar radiation differences (%) between the heated and unheated pyranometers, for daytime only. **(b)** Histogram of average total daily solar radiation differences (%) between the heated and unheated pyranometers. Variation between the two pyranometers is very high for 5-minute averages, but becomes much lower for daily totals, as biases among individual 15-minute periods are averaged out.

Tipping Bucket Rain Gauge Precipitation: Unmodified vs. Extended Funnel

A major complicating factor for precipitation is the fact that the Upper Missouri River Basin receives much of its annual precipitation in the form of snow. The liquid equivalent of frozen precipitation at the time of fall is desired. This is not possible with the common unheated tipping bucket rain gauge because frozen precipitation that is collected in the funnel is prone to being blown away before it melts. When it does melt, it takes place after the fact.

While it cannot address the delayed melt (impossible on solar power), the concept of an extended funnel was proposed to address the issue of loss of collected precipitation until it melts. **Table 1** shows monthly total precipitation as measured by the unheated tipping bucket gauges with and without a 20-inch funnel extension (as compared to the Fisher-Porter). **Figure 3** compares 15-minute performance of the two tipping buckets. While one would expect the winter precipitation totals of the unmodified gauge to be underreported, it should be noted that the catch of the unmodified tipping bucket rain gauge might have been impacted by its proximity to the extended funnel gauge (adjusted May 8).

Month	Actual (F-P)	Tipping	Tipping_Ext
Jan	0.42	0.05	0.42
Feb	0.6	0.23	0.42
Mar	5.26	4.90	5.35
Apr	5.8	3.88	7.26
May	3.12	3.35	3.59
June	2.01	2.08	2.18

Table 1. Monthly totals for unheated tipping bucket rain gauge with and without extended funnel (compared to Fisher-Porter). Precipitation in months with snowfall (January through April) is significantly underreported by the tipping bucket gauge as would be expected (see text). The gauge with the extended funnel generally did better; however, it significantly over-reported April precipitation.

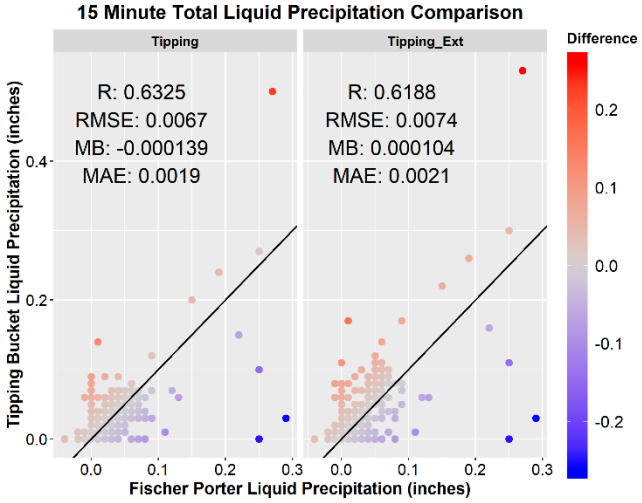


Figure 3. Bias and goodness of fit statistics between the Fisher-Porter and the tipping bucket rain gauges with and without the funnel extension.

Weighing Precipitation Gauge

The instrument of choice for measurement of precipitation both solid and liquid at the time of fall is the weighing precipitation gauge (in this case a Fisher-Porter). Weighing gauges use an oil to prevent evaporation and alcohol to lower the freezing point of the collected precipitation. This melts any snow that falls into the gauge, and the water equivalent is then measured by weight the same as rain.

Daily precipitation performance differences compared with the tipping bucket gauges (**Figure 4**) are significant. Note that on a daily time scale, the tipping buckets appear to under report precipitation during snowfall (as one would expect) and over report rainfall (when that snow melts).

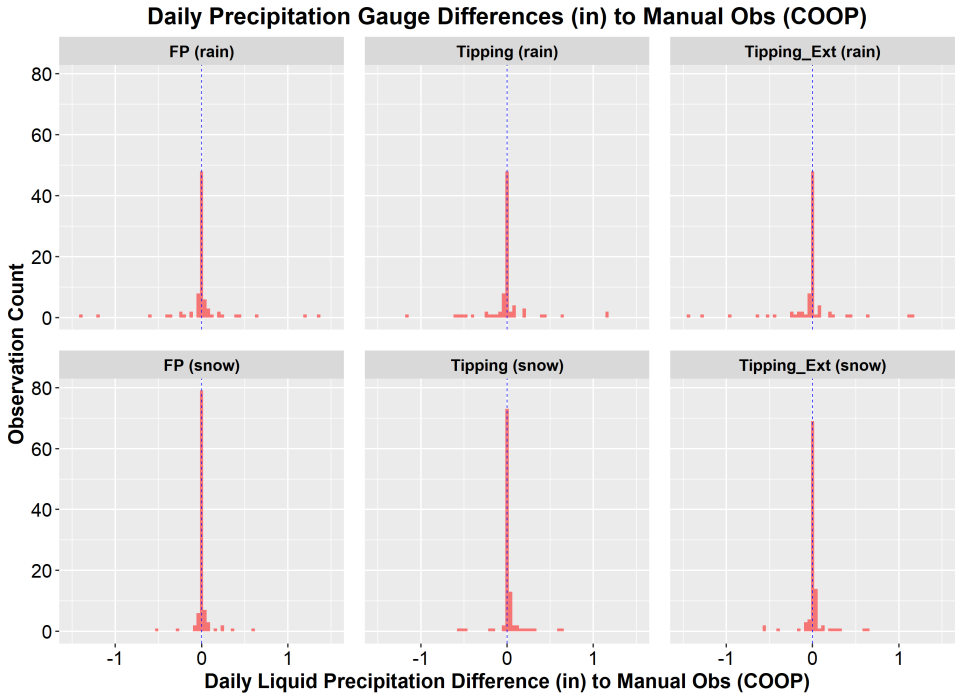


Figure 4. Histograms showing the daily variation in liquid water equivalent for both snow and rainfall events for the weighing gauge, the unmodified tipping bucket, and the extended tipping bucket in comparison to the manual measurement.

Weighing Precipitation Gauge: Apogee SG-400

A new gauge on the market, the Apogee SG-400 promises lower unit cost than a typical weighing precipitation gauge. The load cell that the manufacturer will be offering changed part way through testing. This unit has improved performance over the previous load cell but there is limited data collected from it. **Figure 5** shows its performance compared with the Fisher-Porter.

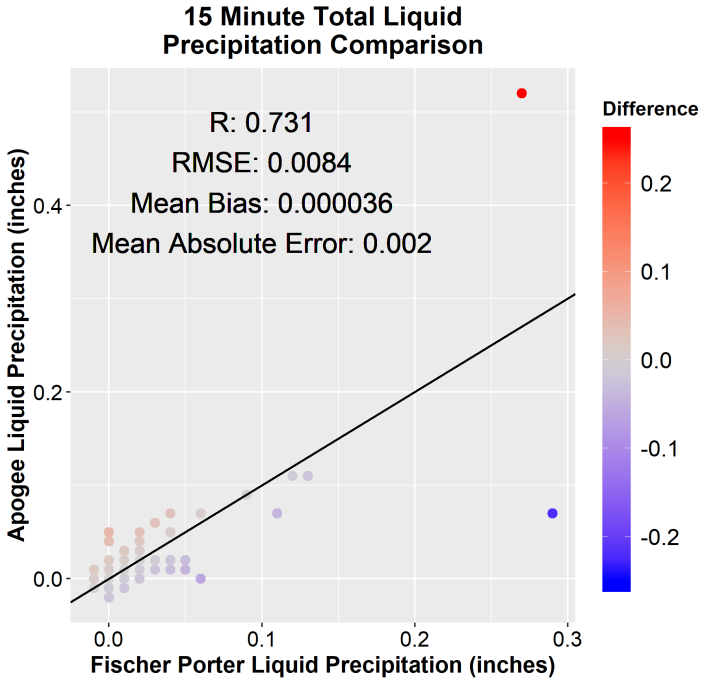


Figure 5. Bias and goodness of fit statistics between the Apogee SG-400 and the Fisher-Porter.

Sonic Snow Depth vs Snow Stake Snow Depth

Snow depth as measured by a single sonic snow depth sensor was compared against the depths as recorded by six snow stakes set 25 to 50 feet from the weather station, and recorded by a camera. The depths for each stake and hour were then recorded manually. **Figure 6** shows the results of this test. Nearly all the recorded sonic sensor depths were higher than the snow stake depths, by as much as 5". The exception was a group of lower values in April.

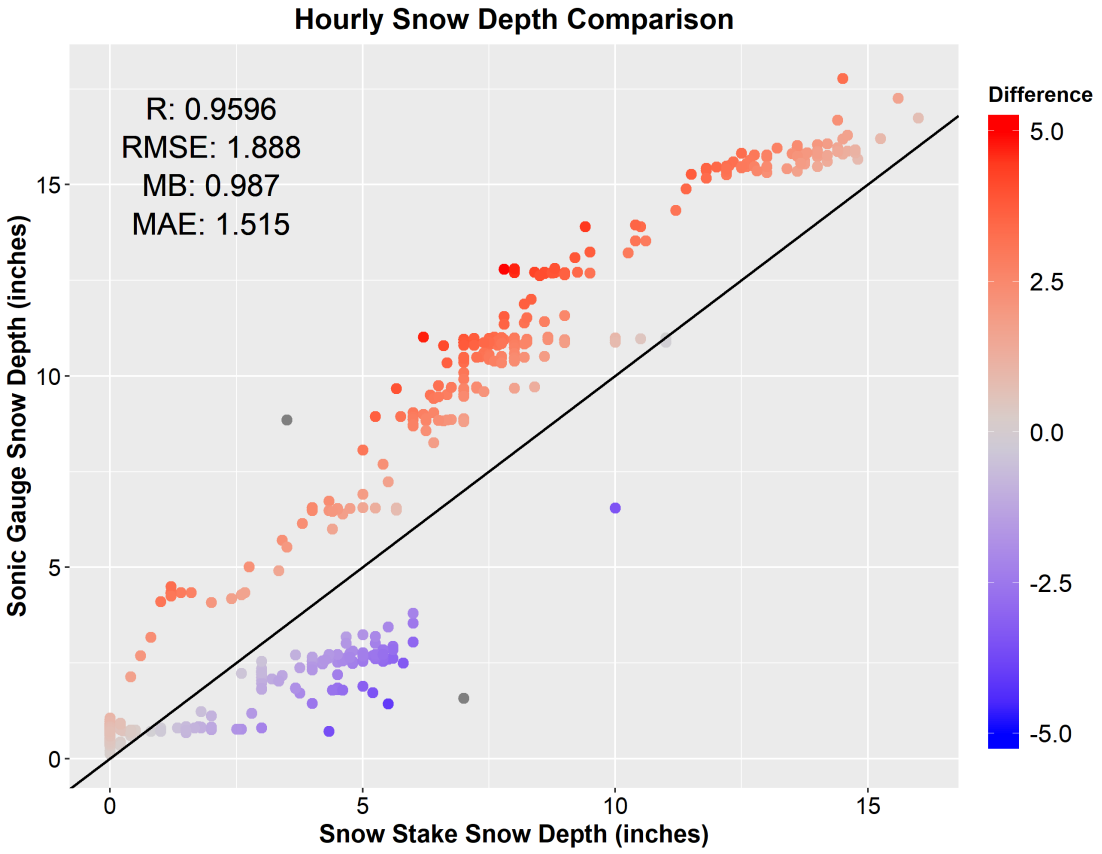


Figure 6. Scatterplot showing the difference between the sonic depth sensor and the ***average*** snow depth from the snow stakes. The sonic sensor nearly always recorded higher depths than the stakes.

As consistent and large as these differences are, it does not mean there is error in the sonic sensor. Snow depth varies significantly over short distances, as wind causes drifting and scouring of the snow. As is characteristic of the area of concern, the testbed was located in an open, grassy field, where winds were often significantly stronger than they would be in a more sheltered location. This resulted in very large variations in snow depth. The other possibility is the difference in measurement surface (snow board vs. grass).

To illustrate this variability, **Figure 7** shows snow depth among the snow stakes used for a period in mid-March when deep snow cover existed. Over the entire period, variations in the snow depth among the stakes ranged as high as 10". When the snow began to melt, some stakes were located on bare grass, while others had over 10" of snow remaining. The stakes were located a maximum of 25 feet from each other.

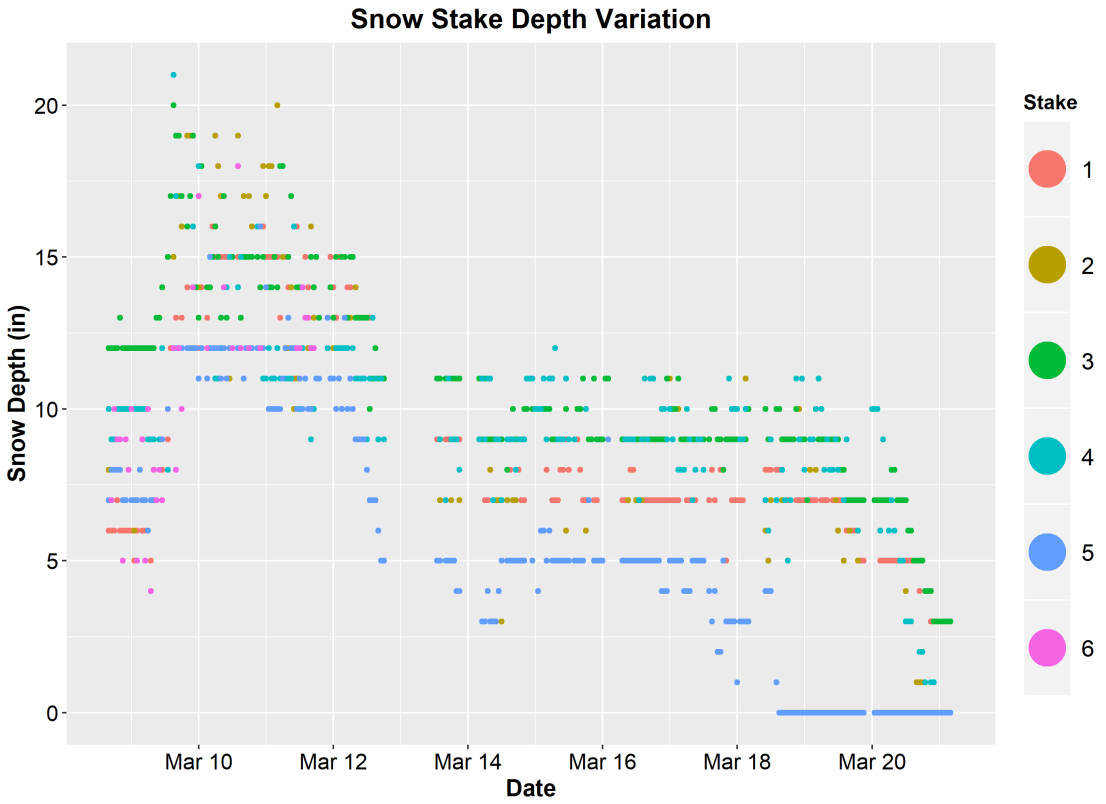


Figure 7. Scatterplot showing the variation in snow depths among the snow stakes. Variation up to 10" exists among the stakes, even though they were never more than 25 feet apart.

Daily Manual (COOP) Snow Depths vs Sonic and Snow Stake Instruments

Manual measurements of snow depth occur daily at 8:00 am. **Figure 8** compares this daily measurement against the average daily snow depths measured from the sonic sensors and the snow stakes. Here, the manual measurements are consistently lower than the stake measurements, and especially the sonic measurements by as much as 8".

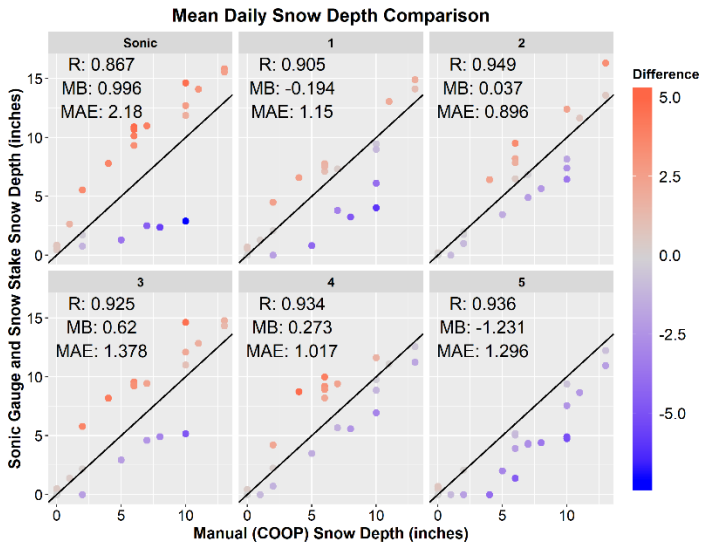


Figure 8. Scatterplots comparing the sonic snow depths and the daily stake snow depths (1 to 5) to the manual observations made every morning at 8:00 am. The manual observations are consistently 4" lower than the sonic snow depths and 2" lower than the stake depths.

Soil Temperature and Soil Moisture

The Campbell SoilVUE10 was installed as a late addition alongside the Stevens HydraProbes at depths of 5, 10, 20, 50, and 100 cm (SoilVUE10 data from other depths were recorded but not used). The HydraProbes have performed without incident. The SoilVUE10 does not yet have enough data collected from which to draw a conclusion.

Discussion

Incoming Solar Shortwave Radiation

The difference in measured solar radiation on 5 minute intervals between an unheated and a heated pyranometer is significant, where over 21% of daytime observations varied by greater than 5%. While it is important to consider the fact that not all observed differences are likely due to a heated/unheated instrument, and may be due to slight differences in how accurate the leveling of the pyranometers was, little else would cause such a large difference.

Although correlations were high and mean biases and other goodness of fit statistics showed excellent agreement, the threshold of 5% difference was not met. The added cost in both price and power of the heated sensor is low and the gains are measureable. The use of a heated solar radiation sensor seems well advised.

Precipitation

The standard instrument for measuring rainfall is a weighing gauge. The old, but proven Fisher-Porter gauge was used as the control for most comparisons in this study. The current mark of the Apogee SG-400 looks promising, but more data is needed. The largest problem with this gauge's measurements is the tendency to lose mass, either from evaporation from the bucket or from errors in the instrumentation. The manufacturer has stated that the next iteration of the instrument will solve this issue by firmware compensation. It will take little time to validate this.

The Fisher-Porter and – to some degree – all other gauges of this type, show similar variations in its data. Uncertainty in long-term accumulations can be offset by resetting accumulations daily (a common practice with this instrumentation) and not permitting negative daily values. The addition of a low-power precipitation detection sensor could differentiate small but real precipitation totals from spurious signals and warrants further investigation.

The tipping bucket gauges performed as expected compared to the Fisher-Porter. The rainfall biases tend to be negative, as the tipping bucket gauge requires enough rain to: 1) wet the gauge, and 2) cause the tipping bucket inside to record at least 0.01". Further, tipping buckets are well known to underestimate total rainfall during high rainfall rates. However, given the uncertainty in a weighing gauge, a tipping bucket produces a more certain observation of rain than does a weighing gauge (for small events, or during the beginning of a long event). Continued use of a tipping bucket alongside the weighing precipitation gauge is relatively inexpensive and serves a purpose. In addition, it adds some redundancy to an important and difficult-to-quality-control variable.

Snow Depth

The most accurate and common method to measure snow depth is manual assessment of depth at multiple locations. This is the NWS COOP method and the method used in this study. As seen in this study, very high spatial variation in snow depth is common. Therefore, if an observer measures snow in a consistent location, but that location is not representative of the area, a non-representative depth will be reported. The same problem exists with the stakes and the sonic snow depth sensors.

The solution to this is to obtain as many samples as possible from as large an area as possible. This could consist of multiple sonic sensors or snow stakes. An important issue with snow stakes, however, is that a "snow well" can develop around the stake, leading to what will likely be a biased low depth recording (top picture below, front stake). In other cases, such as in the bottom picture below, snow will collect on one side of the stake, making determination of the exact snow depth difficult. While manual interpretation of camera pictures can be time consuming, it is the most accurate and can be reserved for cases where two sonic sensors at a station disagree. It is recommended that two sonic sensors with a camera for quality control be used for the determination of snow depth. Only the most recent photos need to be kept in this scenario, which greatly reduces data handling. Having these images available on the mesonet's public website is advisable to allow data users to validate reported snow depths that are questionable. Snow stakes that can survive long-term deployment in the sun and elements will be needed.

Figure 9. Snow stake field as viewed by Campbell CCFC camera (cropped images). Stakes use 1-inch black bands with 1-inch spacing.

As expected, the sonic sensors performed very reliably, but two important installation issues arise: 1) maintenance of the grass around the snow board, and 2) installation of the snow board so that it stays in place year-round. One reason the testbed sonic sensor recorded higher snow depths than the stakes was that the snow board lifted up well over an inch through the winter, and did not maintain a level profile. Further, very tall grass that falls over the board may be read as snow by the sensor or cause drifting on a board situated deep inside the grass canopy. Despite these issues, the sonic sensor is a very reliable instrument when installed properly and consistently. The snow board should be surrounded by natural ground cover that is uncut except when heights reach over 18 inches. Additionally, a pristine snow observation field with a radius of about 15 feet around the station is well advised. Corral panel fencing is suggested to maintain the integrity of the snow observation field and introduce minimal drifting.

A camera with an adequate operating temperature (-40 C), low power consumption for solar applications, a wide field of view for snow stake viewing and affordable cost is an issue. The Campbell Scientific CCFC that was used for the testbed study was satisfactory, albeit expensive. Other options are being investigated.

Additionally, both snow depth and snow water equivalent should be measured at the mesonet station manually by local personnel on a weekly or biweekly basis.

Tipping Bucket Rain Gauge Extension
The testbed included an unheated tipping bucket with 20-inch extension. This is intended to address only long-term totals (e.g. monthly totals). With just 4 months of data, a conclusion cannot be drawn as to its utility.

Soil Temperature and Moisture
Not enough data has been collected from the SoilVUE10 to make conclusions. It offers the potential to provide highly accurate readings, but more testing is needed. At this point, large-scale deployments of more traditional sensors (Campbell Scientific CS-655, Stevens HydraProbe II, Dynamax ML3 Theta Probe, etc.) at standard depths of 5, 10, 20, 50, and 100 cm is advisable. The HydraProbe's extensive deployment nationally and in the basin and its reliable track record make it particularly well suited for this application.

Equipment Recommendations
See appendix for complete sensor and equipment recommendations. Listed for some are more than one option with preferred options in green. A tri-leg will work better for some mesonets and a truss tower will work better for others. Sensor continuity within any given mesonet will also be important to its efficient operation, so options that have little or no impact on data quality or inter-comparability have been offered. Sensors not adequate to the mission (e.g. thermometers that do not record below -40°C) are assumed to be replaced. What follows are items of particular note.

Pricing
All pricing presented here is without any education or bulk discount and in many cases includes the approximations of what a particular network will need to conform. Shipping is not factored in either.

Precipitation
While a shield was not included in the testbed study due to the fact that gauges used for validation were unshielded, it is requested by National Weather Service personnel that gauges be deployed with Alter shields. These devices add complexity to installation as well as cost (around $1000) but improve catch, particularly of snow and during windy conditions.

Figure 9. Weighing precipitation gauge.

The Apogee SG-400 has undergone some revisions but is entering production. It has a lot in common technologically with the OTT Pluvio2 L and should be considered for its considerably lower cost. This will be outweighed for some networks by the efficiencies that equipment continuity within their networks affords (NDAWN and AgriMet already field OTT Pluvio2 L gauges).

Temperature/Humidity
As was seen last winter, thermometers that operate only to -40 C are not sufficient. The table contains two options for temperature and humidity, both of which would be able to measure a record low CONUS temperature (previously recorded in Montana).

Figure 10. Temperature and relative humidity sensors with aspirated shield (credit: Apogee Instruments)

Solar Radiation
Daily totals of unheated pyranometers were seen to be impacted slightly in the testbed study. The cost difference is negligible. Considering an upgrade to heated pyranometers would be well advised for a mesonet pondering significant changes but is not necessary.

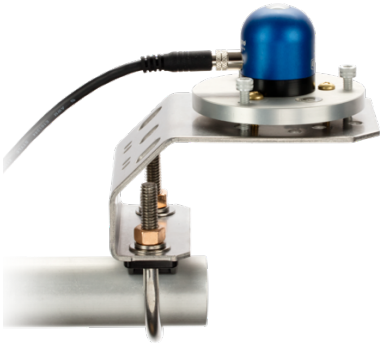


Figure 11. Heated solar radiation sensor (credit: Campbell Scientific).

Wind Speed/Direction
All mesonets in the UMRBP field RM Young wind monitors that are identical or nearly so. That said they will need retrofitting for deployment at 10 m.

Figure 12. Wind speed/direction sensor (credit: Campbell Scientific).

Snow Depth

The sonic snow depth sensor used in the study performed well, but numbered only one. NWS personnel have requested dual snow depth sensors with a camera for human verification.

Figure 13. Snow depth sensor (credit: Campbell Scientific).

Soil Temperature/Moisture

Three very similar sensors are deployed in the UMRBP. Additionally, almost all soil stations are instrumented at 5, 10, 20, 50 and 100 cm.

Figure 14. Soil temperature/moisture sensor (Stevens Water).

Tower

A traditional tower and quick-deploy, concrete-free tri-leg tower were evaluated. The tri-leg is significantly more expensive but saves money in concrete work, excavator rental fees and labor.

It may also be more landowner friendly with its lower visual footprint and its lack of concrete. There are Mesonets (NDAWN, etc.) that have made the traditional tower work well, however.

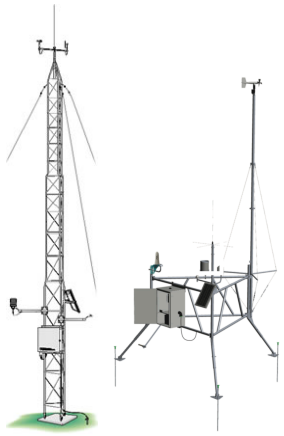


Figure 15. Towers (credit: Campbell Scientific, Forest Technology Systems)

Power
100 Watts of solar panel backed by 220 Amp hours of battery were selected. This ensures flexibility with camera options.

Camera
The different approaches taken with cameras in the testbed were not conclusive. It is suggested that a decision on selection of cameras be deferred until more cost effective, but workable solutions can be found.

Contigency
A contingency of 10% was included.

Total Equipment Cost
$31,100
(not including bulk discount, educational discount, shipping or labor)

Labor
It is estimated that a station could be prepped and installed in a week by an experienced crew of three (slightly more without the tri-leg tower).

Siting
For best results, new stations mesonet stations should be located cooperatively by mesonet managers to ensure proper weather siting and NRCS personnel for proper soil siting. Mesonet land use agreements will need to be made with landowners. NRCS soil pits will need to be dug to characterize the soil of the site.

Travel
Lodging, meals and miles must be included as well.

APPENDIX

Sensors (recommendations highlighted in green)

Parameter	Interval	Observations	Sensor Height/Depth	Sensor Type	Sensor Example	Pricing	Comments
precipitation	5-minute	total	1 - 1.5 m	weighing precipitation gauge, shielded	OTT Pluvio2 L, shield, mount, pedestal	$4800	NDAWN and AgriMet sensor
precipitation	5-minute	total	1 - 1.5 m	weighing precipitation gauge, shielded	Apogee SG-400, NovaLynx shield, pipe, concrete	????	new, possible low cost alternative
temperature/humidity	5-minute	average of 3 s samples	1.5 - 2 m	PRT thermometer, capacitive hygrometer, shielded, fan aspirated	Apogee ST-300-SS, EE08-SS, fan aspirated shield	$1100	-60 to +80 C, fan aspirated, more accurate for about the same cost
temperature/humidity	5-minute	average of 3 s samples	1.5 - 2 m	integrated PRT thermometer/capacitive hygrometer, shielded	Vaisala HMP155A, shield	$1000	-80 to + 60 C, accurate enough, NDAWN, NE Mesonet sensor
solar radiation	5-minute	average of 3 s samples	-	heated thermopile pyranometer, mount	Campbell Scientific CS320	$500	more accurate, heated, same cost
solar radiation	5-minute	average of 3 s samples	-	silicon cell pyranometer, mount	LI-COR LI200	$500	accurate enough, NDAWN, NE Mesonet, AgriMet sensor
wind speed/direction	5-minute	unit vector average direction, maximum speed and average scalar speed of 3 s samples	10 m	integrated propeller anemometer/vane	Young 05108 (or 05103)	$1400	all use the 05108 except AgriMet which uses the similar 05103, all would need to be recabled for 10 m
snow depth	5-minute	sample	2 m	sonic distance sensor	Campbell Scientific SR50AT (set of 2)	$2250	over snow board surrounded by unmowed grass
soil moisture/temperature	5-minute	sample	5, 10, 20, 50, 100	integrated coaxial impedence dielectric reflectometer/thermistor	Stevens HydraProbe II (set of 5)	$2100	SD Mesonet sensor
soil moisture/temperature	5-minute	sample	5, 10, 20, 50, 100	integrated time domain reflectometer/thermistor	Delta-T ThetaProbe ML3 (set of 5)	????	NE Mesonet sensor
soil moisture/temperature	5-minute	sample	5, 10, 20, 50, 100	integrated time domain reflectometer/thermistor	Campbell Scientific CS655 (set of 5)	$1300	NDAWN sensor
					SUB-TOTAL	12,150	

Other Equipment

Equipment	Details	Pricing	Comments
tower	Universal Towers UT30 10 m truss tower with base, guys, grounding kit	$1500	excavation and 1.5 yards of concrete needed (likely to add $2,000 plus labor)
tower	FTS 10 m tri-leg tower with grounding	$5500	no concrete needed
mounting structures	sensor crossarms, hardware, etc. for either tower	$700	
precipitation gauge base	OTT 1.5 m precipitation gauge pedestal, shield, mounting hardware, base for either gauge	$1900	18"Lx18"Wx40"D concrete foundation needed (likely to add $500 plus labor), potential for saving here without decreased performance
fencing	12 ft corral panel fencing	$1500	
modem	Sierra Wireless RV50(X), data cable, antenna cable, high gain antenna, mount	$900	
wind cabling	Young surge suppression junction box, cable	$250	needed to recable 05108 (or 05103) to 10 m
power	2x50 W solar panels with mounts (FTS), regulator (Morning Star), 2x110 Ah deep cycle batteries	$2000	
datalogger	Campbell Scientific CR6 (or CR1000X), terminal strip	$2000	needs will require further discussion on a network-by-network basis
enclosure(s)	enclosures (depending on the tower)	$400	
camera	make and model to be determined	$1000	
contingency	10%	$2800	
	SUB-TOTAL	$18,950	

From:	heather_rice@nps.gov on behalf of IMRextrev, NPS
To:	Podkowka, Rebecca L CIV USARMY CENWO (USA)
Cc:	Daniel Niosi; Christine Gabriel
Subject:	[Non-DoD Source] Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Network Programmatic EA
Date:	Thursday, December 12, 2019 10:11:10 AM

Dear Ms. Podkowka,

The National Park Service (NPS) has reviewed the November 1, 2019 scoping letter for the U.S. Army Corps of Engineers' Programmatic Environmental Assessment (PEA), for the proposed deployment of the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Network in the states of Montana, Wyoming, North Dakota, South Dakota and northern Nebraska. We appreciate your early solicitation of public landowner agency design considerations and restrictions for these sites, as well as potential screening criteria for site locations.

Within the Upper Missouri River Basin project boundary, there are numerous national park units, National Natural Landmarks (NNLs), National Historic Landmarks (NHLs), and National Trails. At this time, because of the programmatic nature of the environmental assessment, it's not possible to provide specific screening criteria for these areas, as each will need to be considered individually based on the area's unique characteristics. However, to help you determine whether any of the proposed monitoring sites could be located in or nearby areas managed or administered by the NPS, we've created a geographic information system (GIS), map. The map also shows designated wilderness areas within the national park units identified. This map can be reached using this link: Blockedhttps://arcg.is/14yTSz.

Note that there are three NNLs that are considered sensitive and are, therefore, not shown on this map. These three NNLs are in the following counties: (1) Bridger Fossil Area in Carbon County, MT (paleontological resources on the Crow Reservation); (2) Cloverly Formation Site in Big Horn County, MT (paleontological resources on the Crow Reservation); and (3) Wegener Woods in Warren County, MO (located on private land and the landowner does not want the location shared unless necessary).

In addition, there is no readily available geo-spatial data for the NHLs that fall within North Dakota, South Dakota and northern Nebraska; therefore, these NHLs are not shown on the map provided. The general locations of NHLs in these states can be found at: Blockedhttps://en.wikipedia.org/wiki/List_of_U.S._National_Historic_Landmarks_by_state

Last, there is a RAWS station located in Big Horn Canyon National Recreation Area (near Barry's Landing in Montana). This station is not shown on the map provided, but is referenced on the MesoWest website at: Blockedhttps://mesowest.utah.edu/.

If you anticipate locating a monitoring site within or near any of the areas identified on the map provided, please contact the following people to help facilitate further discussion between the Corps and specific area managers and landowners:

- For consultation related to areas in the states of Montana and Wyoming: Heather Rice, Environmental Quality Team, NPS Region Serving Department of Interior Regions 6, 7, and 8, at 303-969-2975 orHeather_Rice@nps.gov.

For consultation related to areas in the states of North Dakota, South Dakota, and northern Nebraska: Christine Gabriel, Regional Environmental Coordinator and NEPA Lead, NPS Region Serving Department of Interior Regions 3, 4, and 5, at either 402-661-1844 (office) or 651-767-2554 (cell) or Christine_Gabriel@nps.gov.

We look forward to working with the Corps as the PEA process moves forward.

Regards,

National Park Service
NPS Region External Review Team
Serving DOI Regions 6, 7, and 8
imrextrev@nps.gov

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
1616 CAPITOL AVENUE
OMAHA NE 68102-4901

NOV 01 2019

Planning, Programs, and Project Management Division

U.S. FISH AND WILDLIFE SERVICE

Based on the information provided, you may consider this project to be in compliance with the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 *et seq.* The project should be reanalyzed by our office if any new information indicates there may be effects to protected species or their habitats.

Date: 11-21-19 Signature: FOR Field Supervisor

U.S. Fish and Wildlife Service - Wyoming ES Office
~~5353 Yellowstone Road, Suite 308A~~
~~Cheyenne, WY 82009~~
334 Parsley Blvd Cheyenne WY 82007
Phone (307) 772-2374
Fax (307) 772-2358

06E13000-2020-CPA0013

Mr. Tyler Abbott, Field Supervisor
U.S. Fish and Wildlife Service
334 Parsley Blvd
Cheyenne, WY 82007

Dear Mr. Abbott:

The Omaha District, U.S. Army Corps of Engineers (Corps) is in the process of conducting a Programmatic Environmental Assessment (PEA) in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S. Code [USC] 4321 et. seq.); the President's Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] 1500 – 1508) (CEQ, 1992); and Engineer Regulation (ER) 200-2-2 (33 CFR 230) (USACE, 1988). This PEA will assess the overall environmental effects of the proposed deployment of the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network in the States of Montana, Wyoming, North Dakota, South Dakota and northern Nebraska. Programmatic analyses have value by setting out the broad view of environmental impacts and benefits of a proposed decision, to which federal agencies can rely on for site-specific, individual projects. Dependent on the findings of the PEA, each individual monitoring site would be documented in a Record of Environmental Consideration (REC) that will be tiered from this PEA.

Following the 2011 flood event on the Missouri River, the Corps and an Independent Review Team comprised of academic expertise and officials from various federal agencies, determined that the Corps substantially underestimated the wet soil conditions in the plains and snowpack in the plains area of the upper Missouri River basin (UMB) in its water supply forecasts. The team recommended to improve snowpack and soil moisture monitoring in the UMB.

The proposed project is authorized under the Water Resources Reform Development Act (WRRDA) of 2014, as amended by §1179(b) of the Water Infrastructure Improvements for the Nation Act (WIIN) of 2016. WRRDA14 included a requirement that the Secretary of the Army (the Corps), in coordination with the Administrator of the National Oceanic and Atmospheric Administration (NOAA), the Chief of the Natural Resources Conservation Service (NRCS), the Director of the United States Geological Survey (USGS) and the Commissioner of the Bureau of Reclamation (BOR) to carry out snowpack and soil moisture monitoring in the UMB. NRCS soil moisture experts and National Weather Service (NWS) plains snow and river forecasting experts determined that soil moisture and plains snow monitoring sites should be installed in every watershed (Hydrologic Unit Code [HUC] 6) of the UMB. The project area generally consists of the 25 HUC 6 watersheds of the UMB in Montana, North Dakota, South Dakota, Wyoming and the northern portion of Nebraska (Enclosure 1). This would include construction of an estimated 360 monitoring sites and updating approximately 180 existing monitoringT sites within seven networks in the UMB in order to provide the necessary quality of data to better inform runoff forecasting.

A Testbed Report was conducted by the South Dakota State University to determine a variety of automated and manual instrumentation and observations to test the practicability and accuracy of different technologies before deployment of a full plains snowpack and soil moisture monitoring network in the UMB. Testbed experiments compared different technologies for measuring solar radiation, precipitation, snow depth, snow water equivalent and soil temperature and moisture. Instrumentation and methodology is still being refined, but generally, the overall footprint of each site would be 10 x 10 meters (m) with a 10m tall tower. Each station would be equipped with a solar radiation sensor, tipping bucket and weighing bucket gauges, wind speed/direction sensor, snow depth sensor and/or snow sensor, soil moisture/temperature probe, solar panel backed by 220 amp hours of battery and potentially a camera. See Enclosure 2 for a conceptual setup of a typical weather station.

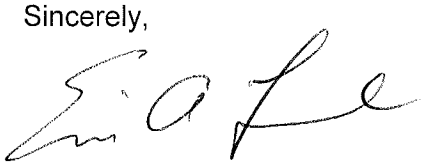
The data obtained from the network would be available for all federal, state and local agencies to use in the betterment of existing and new products for various efforts, such as river forecasting, flood outlooks, drought monitoring, water supply forecasts and fire hazard reporting.

In addition to soliciting comments in accordance with §1501.7 of NEPA, the Corps is also gauging interest from public landowner agencies regarding potential design considerations should a station be sited on public lands as well as any public lands that should be restricted from consideration during site selection. Screening criteria for site selection for the 360 new sites is still being developed but weather stations would not be placed in wetlands or other sensitive habitats or in areas where it would negatively impact the viewshed.

Finally, in accordance with the Endangered Species Act, please provide us with a list of threatened, endangered or candidate species that may be affected by the proposed habitat project and any information on the possible beneficial or adverse effects of the proposed project on these species. A response would be appreciated within 30 days of the receipt of this letter.

If you have any questions or require additional information, please contact Ms. Rebecca Podkowka at (402) 995-2677 or at Rebecca.L.Podkowka@usace.army.mil.

Sincerely,



Eric A. Laux, PMP
Chief, Environmental & Cultural Resources

Enclosures

Director's Office
PO Box 200701
Helena, MT 59620-0701
(406) 444-3186
Ref: DO058-20
May 1, 2020

Department of the Army
Corps of Engineers, Omaha District
Attn: Ms. Rebecca Podkowka
1616 Capitol Avenue
Omaha, NE 68102-4901

RE: Draft Programmatic Environmental Assessment and Finding of No Significant Impact for Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network

Dear Ms. Podkowka:

Thank you for the opportunity to comment on the Draft Programmatic Environmental Assessment (PEA) addressing the deployment of additional snow and soil moisture monitoring sites in the Upper Missouri River Basin.

Montana Fish, Wildlife & Parks (FWP) is generally supportive of this effort to gather and disseminate more and better information to support runoff predictions. Several water coalitions and area alliances also have shown support for gathering more data.

The list of considerations for site selection in the PEA is sound and FWP does not foresee any serious concerns. However, most of FWP's Fishing Access Sites (FAS) are too small to accommodate one of these stations. If a site is anticipated to fall on an FAS or other FWP property, suitability would need to be evaluated on a site-by-site basis. We would be open to investigating a site to determine whether the equipment would be appropriate or would hinder the mission and purposes of a specific site.

Thank you for allowing FWP the opportunity to comment. We look forward to working with you further on this effort. If you have any questions, please contact Deb O'Neill at (406) 444-3755 or doneill@mt.gov.

Sincerely,

Martha Williams
Director

United States Department of Agriculture **Forest Service** **Region One**

Northern Region
26 Fort Missoula Road
Missoula, MT 59804

File Code: 2520
Date: April 1, 2020

Rebecca Podkowka
Department of the Army
Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 68102-4901
Rebecca.L.Podkowka@usace.army.mil

Dear Ms. Podkowka:

Thank you for soliciting the Forest Service's feedback on the proposed expansion of the soil and snowpack (i.e. Mesonet) monitoring network across the Upper Missouri River Basin (UMRB).

In general, the Forest Service **supports expansion of the network** onto National Forest System (NFS) lands. Mesonet stations have the potential to augment multiple aspects of forest and rangeland management, including but not limited to: grazing permit administration; prescribed burn window identification; wildfire fire danger forecasting; and enhanced management of operational windows for timber harvest activities. Beyond these activity-specific benefits from the expanded monitoring network, expansion of Mesonet infrastructure onto NFS lands may also improve understanding of microclimatic influences on vegetation expression and understanding of hillslope-scale hydrologic processes that could, in turn, guide resource management following more intensive analysis.

Please note that the Forest Service is not in the position to offer any financial, technical, or personnel resources to assist in network expansion at this time. However, we are happy to coordinate with your office to facilitate the development and long-term operation of these sites and anticipate a wide range of benefits for our agency, our partners and the public.

Due to the broad area across which new Mesonet stations may be installed and the current uncertainty in installation locations, the Forest Service has limited capacity to provide coarse filter design features for the ACOE's programmatic EA. Nonetheless, the following guidelines apply to all new Mesonet station installations proposed on NFS lands in the UMRB:

- New Mesonet station installations on NFS lands in the UMRB would be subject to all regulatory provisions outlined within the Forest or Grassland Plan governing the specific administrative unit where the station or stations would be installed. To proceed forward, please notify the Forest Service of proposed station locations with as much detail as possible, including identifying the legal description, Forest Service administrative unit, proposed access to the sites, and details regarding how the site will be installed, maintained and operated. The Northern Region (R1) Regional Office is available to assist in contacting and coordinating with individual Forest Service units once a proposal is received.

- All stations would need to be evaluated through the Forest Service's special use permitting process, which would require NEPA analysis to ensure compliance with all relevant laws, regulation, and policy. Cost recovery fees may be assessed to help the Forest Service complete NEPA and prepare authorizations (36 CFR 251.58). Through the NEPA analyses associated with the special uses planning process, specific Mesonet site locations may need to be adjusted to avoid or mitigate undesired resource consequences associated with the installation and long-term maintenance of the station.

- The Forest Service will be the one to prepare any special use permits that authorize the use and occupancy of NFS lands for any forthcoming Mesonet stations. We will likely waive or exempt any of the annual land use fees. Experience has shown that other government agencies are accustomed to and often desire to negotiate specific terms and conditions within a permit and that has proven to add complications and delays. The Forest Service has pre-approved permit templates that are customized for specific uses which are rarely appropriate or acceptable to alter the standard language (FSH 2709.011, sec 14). Once a proposal is received, upon request, we can share a sample permit so that there are no surprises on what will be needed to authorize a Mesonet site.

- New station installations would likely be prohibited in designated protected areas. These areas include but are not limited to: Congressionally designated Wilderness, Wilderness Study Areas, Wild and Scenic River corridors, and designated roadless areas. Furthermore, we encourage the sites to be designed as to blend in and reasonably harmonize with the surrounding areas.

Please keep us apprised as project planning and implementation activities progress. Contact Andy Efta, R1 Regional Hydrologist (james.efta@usda.gov, 406-329-3447), or Molly Puchlerz, R1 Lands/Special Uses Assistant Program Manager (molly.puchlerz@usda.gov, 406-329-3601), as needed.

Sincerely,

CHRISTOPHER S SAVAGE
RRM Director

cc: Molly Puchlerz, James Efta, Brian Sweatland, Brandon Smith, Chris Savage, Vince Archer, Julie Schaefers, Joe Alexander

United States Department of the Interior
Fish and Wildlife Service
Ecological Services
Montana Field Office
585 Shepard Way, Suite 1
Helena, Montana 59601-6287
Phone: (406) 449-5225, Fax: (406) 449-5339

ENDANGERED, THREATENED, PROPOSED AND CANDIDATE SPECIES
MONTANA COUNTIES*
Endangered Species Act

October 8, 2019

C = Candidate
LT = Listed Threatened
LE = Listed Endangered
P = Proposed
PCH = Proposed Critical Habitat
CH = Designated Critical Habitat
XN = Experimental non-essential population

*Note: Generally, this list identifies the counties where one would reasonably expect the species to occur, not necessarily every county where the species is listed

County/Scientific Name	Common Name	Status
BEAVERHEAD		
Spiranthes diluvialis	Ute Ladies' Tresses	LT
Ursus arctos horribilis	Grizzly Bear	LT
Lynx canadensis	Canada Lynx	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
BIG HORN		
Mustela nigripes	Black-footed Ferret	LE
BLAINE		
Scaphirhynchus albus	Pallid Sturgeon	LE
Mustela nigripes	Black-footed Ferret	LE
Charadrius melodus	Piping Plover	LT
BROADWATER		
Spiranthes diluvialis	Ute Ladies' Tresses	LT
Lynx canadensis	Canada Lynx	LT
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
CARBON		
Lynx canadensis	Canada Lynx	LT, CH
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Zapada glacier	Western Glacier Stonefly	P
Pinus albicaulis	Whitebark Pine	C

County/Scientific Name	Common Name	Status
CARTER		
Grus americana	Whooping Crane	LE
Myotis septentrionalis	Northern Long-eared Bat	LT
CASCADE		
Scaphirhynchus albus	Pallid Sturgeon	LE
Lynx canadensis	Canada Lynx	LT
Calidris canutus rufa	Red Knot	LT
Charadrius melodus	Piping Plover	LT
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
CHOUTEAU		
Scaphirhynchus albus	Pallid Sturgeon	LE
Lynx canadensis	Canada Lynx	LT
Charadrius melodus	Piping Plover	LT
Calidris canutus rufa	Red Knot	LT
Ursus arctos horribilis	Grizzly Bear	LT
CUSTER		
Scaphirhynchus albus	Pallid Sturgeon	LE
Sterna antillarum athalassos	Interior Least Tern	LE
Grus americana	Whooping Crane	LE
Myotis septentrionalis	Northern Long-eared Bat	LT
DANIELS		
Grus americana	Whooping Crane	LE
Charadrius melodus	Piping Plover	LT
DAWSON		
Scaphirhynchus albus	Pallid Sturgeon	LE
Sterna antillarum athalassos	Interior Least Tern	LE
Grus americana	Whooping Crane	LE
Charadrius melodus	Piping Plover	LT
Myotis septentrionalis	Northern Long-eared Bat	LT
DEER LODGE		
Salvelinus confluentus	Bull Trout	LT, CH
Ursus arctos horribilis	Grizzly Bear	LT
Lynx canadensis	Canada Lynx	LT
Calidris canutus rufa	Red Knot	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
FALLON		
Grus americana	Whooping Crane	LE
Myotis septentrionalis	Northern Long-eared Bat	LT
Charadrius melodus	Piping Plover	LT
FERGUS		
Scaphirhynchus albus	Pallid Sturgeon	LE
Lynx canadensis	Canada Lynx	LT
Pinus albicaulis	Whitebark Pine	C

County/Scientific Name	Common Name	Status
FLATHEAD		
Salvelinus confluentus	Bull Trout	LT, CH
Ursus arctos horribilis	Grizzly Bear	LT
Silene spaldingii	Spalding's Campion	LT
Lynx canadensis	Canada Lynx	LT, CH
Coccyzus americanus	Yellow-billed cuckoo (western pop.)	LT
Gulo gulo luscus	Wolverine	P
Lednia tumana	Meltwater Lednian Stonefly	P
Pinus albicaulis	Whitebark Pine	C
GALLATIN		
Spiranthes diluvialis	Ute Ladies' Tresses	LT
Lynx canadensis	Canada Lynx	LT, CH
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
GARFIELD		
Scaphirhynchus albus	Pallid Sturgeon	LE
Grus americana	Whooping Crane	LE
Charadrius melodus	Piping Plover	LT, CH
Sterna antillarum athalassos	Interior Least Tern	LE
GLACIER		
Ursus arctos horribilis	Grizzly Bear	LT
Lynx canadensis	Canada Lynx	LT, CH
Salvelinus confluentus	Bull Trout	LT, CH
Gulo gulo luscus	Wolverine	P
Lednia tumana	Meltwater Lednian Stonefly	P
Zapada glacier	Western Glacier Stonefly	P
Pinus albicaulis	Whitebark Pine	C
GOLDEN VALLEY		
Lynx canadensis	Canada Lynx	LT
Calidris canutus rufa	Red Knot	LT
Pinus albicaulis	Whitebark Pine	C
GRANITE		
Lynx canadensis	Canada Lynx	LT, CH
Ursus arctos horribilis	Grizzly Bear	LT
Salvelinus confluentus	Bull Trout	LT, CH
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
HILL		
JEFFERSON		
Spiranthes diluvialis	Ute Ladies' Tresses	LT
Lynx canadensis	Canada Lynx	LT
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
JUDITH BASIN		
Lynx canadensis	Canada Lynx	LT
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C

County/Scientific Name	Common Name	Status
LAKE		
Ursus arctos horribilis	Grizzly Bear	LT
Howellia aquatilis	Water Howellia	LT
Silene spaldingii	Spalding's Campion	LT
Lynx canadensis	Canada Lynx	LT, CH
Salvelinus confluentus	Bull Trout	LT, CH
Coccyzus americanus	Yellow-billed cuckoo (western pop.)	LT
Gulo gulo luscus	Wolverine	P
Lednia tumana	Meltwater Lednian Stonefly	P
Pinus albicaulis	Whitebark Pine	C
LEWIS AND CLARK		
Ursus arctos horribilis	Grizzly Bear	LT
Lynx canadensis	Canada Lynx	LT, CH
Salvelinus confluentus	Bull Trout	LT, CH
Calidris canutus rufa	Red Knot	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
LIBERTY		
Calidris canutus rufa	Red Knot	LT
Ursus arctos horribilis	Grizzly Bear	LT
Pinus albicaulis	Whitebark Pine	C
LINCOLN		
Acipenser transmontanus	White Sturgeon (Kootenai River Pop.)	LE
Ursus arctos horribilis	Grizzly Bear	LT
Silene spaldingii	Spalding's Campion	LT
Lynx canadensis	Canada Lynx	LT, CH
Salvelinus confluentus	Bull Trout	LT, CH
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
MADISON		
Spiranthes diluvialis	Ute Ladies' Tresses	LT
Lynx canadensis	Canada Lynx	LT
Calidris canutus rufa	Red Knot	LT
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
McCONE		
Scaphirhynchus albus	Pallid Sturgeon	LE
Charadrius melodus	Piping Plover	LT, CH
Sterna antillarum athalassos	Interior Least Tern	LE
Grus americana	Whooping Crane	LE
Myotis septentrionalis	Northern Long-eared Bat	LT
MEAGHER		
Lynx canadensis	Canada Lynx	LT
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
MINERAL		
Ursus arctos horribilis	Grizzly Bear	LT
Lynx canadensis	Canada Lynx	LT
Salvelinus confluentus	Bull Trout	LT, CH
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C

County/Scientific Name	Common Name	Status
MISSOULA		
Ursus arctos horribilis	Grizzly Bear	LT
Howellia aquatilis	Water Howellia	LT
Lynx canadensis	Canada Lynx	LT, CH
Salvelinus confluentus	Bull Trout	LT, CH
Coccyzus americanus	Yellow-billed cuckoo (western pop.)	LT
Calidris canutus rufa	Red Knot	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
MUSSELSHELL		
PARK		
Lynx canadensis	Canada Lynx	LT, CH
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
PETROLEUM		
Scaphirhynchus albus	Pallid Sturgeon	LE
Calidris canutus rufa	Red Knot	LT
PHILLIPS		
Scaphirhynchus albus	Pallid Sturgeon	LE
Charadrius melodus	Piping Plover	LT, CH
Mustela nigripes	Black-footed Ferret	LE, XN
Grus americana	Whooping Crane	LE
Sterna antillarum athalassos	Interior Least Tern	LE
Calidris canutus rufa	Red Knot	LT
PONDERA		
Charadrius melodus	Piping Plover	LT
Ursus arctos horribilis	Grizzly Bear	LT
Lynx canadensis	Canada Lynx	LT, CH
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
POWDER RIVER		
Grus americana	Whooping Crane	LE
Scaphirhynchus albus	Pallid Sturgeon	LE
Myotis septentrionalis	Northern Long-eared Bat	LT
POWELL		
Ursus arctos horribilis	Grizzly Bear	LT
Lynx canadensis	Canada Lynx	LT, CH
Salvelinus confluentus	Bull Trout	LT, CH
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
PRAIRIE		
Scaphirhynchus albus	Pallid Sturgeon	LE
Sterna antillarum athalassos	Interior Least Tern	LE
Grus americana	Whooping Crane	LE
Myotis septentrionalis	Northern Long-eared Bat	LT
Charadrius melodus	Piping Plover	LT

County/Scientific Name	Common Name	Status
RAVALLI		
Salvelinus confluentus	Bull Trout	LT, CH
Lynx canadensis	Canada Lynx	LT
Coccyzus americanus	Yellow-billed cuckoo (western pop.)	LT
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
RICHLAND		
Scaphirhynchus albus	Pallid Sturgeon	LE
Charadrius melodus	Piping Plover	LT, CH
Sterna antillarum athalassos	Interior Least Tern	LE
Grus americana	Whooping Crane	LE
Myotis septentrionalis	Northern Long-eared Bat	LT
ROOSEVELT		
Scaphirhynchus albus	Pallid Sturgeon	LE
Charadrius melodus	Piping Plover	LT, CH
Sterna antillarum athalassos	Interior Least Tern	LE
Grus americana	Whooping Crane	LE
Calidris canutus rufa	Red Knot	LT
Myotis septentrionalis	Northern Long-eared Bat	LT
ROSEBUD		
Sterna antillarum athalassos	Interior Least Tern	LE
Scaphirhynchus albus	Pallid Sturgeon	LE
Grus americana	Whooping Crane	LE
SANDERS		
Ursus arctos horribilis	Grizzly Bear	LT
Lynx canadensis	Canada Lynx	LT
Salvelinus confluentus	Bull Trout	LT, CH
Silene spaldingii	Spalding's Campion	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
SHERIDAN		
Charadrius melodus	Piping Plover	LT, CH
Grus americana	Whooping Crane	LE
Sterna antillarum athalassos	Interior Least Tern	LE
Calidris canutus rufa	Red Knot	LT
SILVER BOW		
Salvelinus confluentus	Bull Trout	LT
Ursus arctos horribilis	Grizzly Bear	LT
Lynx canadensis	Canada Lynx	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
STILLWATER		
Lynx canadensis	Canada Lynx	LT, CH
Charadrius melodus	Piping Plover	LT
Calidris canutus rufa	Red Knot	LT
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C

County/Scientific Name	Common Name	Status
SWEET GRASS		
Lynx canadensis	Canada Lynx	LT, CH
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
TETON		
Ursus arctos horribilis	Grizzly Bear	LT
Lynx canadensis	Canada Lynx	LT, CH
Calidris canutus rufa	Red Knot	LT
Charadrius melodus	Piping Plover	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
TOOLE		
Calidris canutus rufa	Red Knot	LT
Ursus arctos horribilis	Grizzly Bear	LT
Pinus albicaulis	Whitebark Pine	C
TREASURE		
No listings at this time		
VALLEY		
Scaphirhynchus albus	Pallid Sturgeon	LE
Sterna antillarum athalassos	Interior Least Tern	LE
Grus americana	Whooping Crane	LE
Charadrius melodus	Piping Plover	LT, CH
Calidris canutus rufa	Red Knot	LT
Myotis septentrionalis	Northern Long-eared Bat	LT
WHEATLAND		
Lynx canadensis	Canada Lynx	LT
Ursus arctos horribilis	Grizzly Bear	LT
Gulo gulo luscus	Wolverine	P
Pinus albicaulis	Whitebark Pine	C
WIBAUX		
Scaphirhynchus albus	Pallid Sturgeon	LE
Sterna antillarum athalassos	Interior Least Tern	LE
Grus americana	Whooping Crane	LE
Myotis septentrionalis	Northern Long-eared Bat	LT
Charadrius melodus	Piping Plover	LT
YELLOWSTONE		
Grus americana	Whooping Crane	LE
Calidris canutus rufa	Red Knot	LT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Dakota Ecological Services
420 South Garfield Avenue, Suite 400
Pierre, South Dakota 57501-5408

IN REPLY REFER TO:
SNOW AND SOIL
MOISTURE
MONITORING

November 12, 2019

Mr. Eric A. Laux, PMP
Chief, Environmental & Cultural Resources
U.S. Army Corps of Engineers
1616 Capitol Avenue
Omaha, Nebraska 68102-4901

Dear Mr. Laux:

This letter is in response to your request dated November 1, 2019, for a list of threatened endangered, or candidate species protected under the Endangered Species Act of 1973 (16 U.S.C. 153 *et seq.*) (ESA) as related to your agency's Programmatic Environmental Assessment (PEA) regarding deployment of the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network in the State of Montana, Wyoming, North Dakota, South Dakota and northern Nebraska. The monitoring network is composed of snow and soil moisture monitoring stations scattered throughout the above-listed states; plans include improvements to 180 existing monitoring stations and construction of 360 new ones.

We presume you have already sought state-specific information from the other states harboring these monitoring stations; this response contains information specific to South Dakota.

Per your letter, the locations of the 360 new monitoring stations are yet to be determined, though you have indicated these stations will not be placed in wetlands or other sensitive habitats. In South Dakota, native prairie is a particularly important habitat to avoid. In addition to the intrinsic value of diverse native prairie plant communities, these areas represent a fraction of the prairie acres that once existed in the state. These habitats harbor numerous native wildlife species, some of which cannot survive outside the native plant community and are experiencing significant declines. The likely location of these grasslands in eastern South Dakota has been identified by Bauman et al. (2016). This publication and data layers may be obtained online at: https://openprairie.sdstate.edu/data_land-easternSD/1/. Recently, unbroken prairie sites have also been identified in western South Dakota – see: https://openprairie.sdstate.edu/data_land-westernSD/3/.

For a list of ESA-protected species and critical habitats that occur in South Dakota, please see our office website for a county-by-county tabulation: https://www.fws.gov/mountain-prairie/es/SouthDakota/SpeciesByCounty_2017.pdf.

You may also wish to use our national Information for Planning and Consultation (IPaC) website: https://ecos.fws.gov/ipac/. As project locations are identified in all of the states listed above, this tool will help you determine which species/habitat may be of concern at project sites, and provides additional information about our agency's trust resources such as migratory birds.

Once project locations are known and you have a list of potentially impacted species from either our county list or IPaC, we recommend you access our national website's endangered species page: https://www.fws.gov/endangered/?ref=topbar. This national public database harbors documents pertinent to every listed species including federal register documents (e.g. listing rules, critical habitat designations) that describe habitats, species locations, threats, and more. Species status assessments, if completed for a given species, often provide updated information to older documents on these pages.

If your agency, or your designated representative, subsequently determines that one or more of the proposed monitoring station projects "may adversely affect" listed species in South Dakota, you will need to request formal consultation from this office. If a "may affect - not likely to adversely affect" determination is made, please submit that to our office for concurrence. If a "no effect" determination is made, further consultation may not be necessary; however, we request a copy of those determinations.

If changes are made in the project plans or operating criteria, or if additional information becomes available, the Service should be informed so that the above determinations can be reconsidered.

The Service appreciates the opportunity to provide comments. If you have any questions on these comments, please contact Natalie Gates of this office at (605) 224-8693, Extension 227.

Sincerely,

Scott Larson

Scott Larson
Field Supervisor
South Dakota Field Office

Literature Cited

Bauman, P., B. L. Carlson, and T. Butler. 2016. Quantifying undisturbed (native) lands in eastern South Dakota:2013. South Dakota State University.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Dakota Ecological Services
420 South Garfield Avenue, Suite 400
Pierre, South Dakota 57501-5408

IN REPLY REFER TO:
SNOW AND SOIL
MOISTURE
MONITORING

November 12, 2019

Mr. Eric A. Laux, PMP
Chief, Environmental & Cultural Resources
U.S. Army Corps of Engineers
1616 Capitol Avenue
Omaha, Nebraska 68102-4901

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We presume you have already sought state-specific information from the other states harboring these monitoring stations; this response contains information specific to South Dakota.

Per your letter, the locations of the 360 new monitoring stations are yet to be determined, though you have indicated these stations will not be placed in wetlands or other sensitive habitats. In South Dakota, native prairie is a particularly important habitat to avoid. In addition to the intrinsic value of diverse native prairie plant communities, these areas represent a fraction of the prairie acres that once existed in the state. These habitats harbor numerous native wildlife species, some of which cannot survive outside the native plant community and are experiencing significant declines. The likely location of these grasslands in eastern South Dakota has been identified by Bauman et al. (2016). This publication and data layers may be obtained online at: https://openprairie.sdstate.edu/data_land-easternSD/1/. Recently, unbroken prairie sites have also been identified in western South Dakota – see: https://openprairie.sdstate.edu/data_land-westernSD/3/.

For a list of ESA-protected species and critical habitats that occur in South Dakota, please see our office website for a county-by-county tabulation: https://www.fws.gov/mountain-prairie/es/SouthDakota/SpeciesByCounty_2017.pdf.

You may also wish to use our national Information for Planning and Consultation (IPaC) website: https://ecos.fws.gov/ipac/. As project locations are identified in all of the states listed above, this tool will help you determine which species/habitat may be of concern at project sites, and provides additional information about our agency's trust resources such as migratory birds.

Once project locations are known and you have a list of potentially impacted species from either our county list or IPaC, we recommend you access our national website's endangered species page: https://www.fws.gov/endangered/?ref=topbar. This national public database harbors documents pertinent to every listed species including federal register documents (e.g. listing rules, critical habitat designations) that describe habitats, species locations, threats, and more. Species status assessments, if completed for a given species, often provide updated information to older documents on these pages.

If your agency, or your designated representative, subsequently determines that one or more of the proposed monitoring station projects "may adversely affect" listed species in South Dakota, you will need to request formal consultation from this office. If a "may affect - not likely to adversely affect" determination is made, please submit that to our office for concurrence. If a "no effect" determination is made, further consultation may not be necessary; however, we request a copy of those determinations.

If changes are made in the project plans or operating criteria, or if additional information becomes available, the Service should be informed so that the above determinations can be reconsidered.

The Service appreciates the opportunity to provide comments. If you have any questions on these comments, please contact Natalie Gates of this office at (605) 224-8693, Extension 227.

Sincerely,

Scott Larson

Scott Larson
Field Supervisor
South Dakota Field Office

Literature Cited

Bauman, P., B. L. Carlson, and T. Butler. 2016. Quantifying undisturbed (native) lands in eastern South Dakota:2013. South Dakota State University.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Montana Ecological Services Office
585 Shephard Way, Suite 1
Helena, Montana 59601-6287

In Reply Refer To:
M.06 Corps (I)
06E11000-2020-TA-0093; 06E11000-2020-CPA-0003

December 10, 2019

Eric Laux
Chief, Environmental and Cultural Resources
U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 68102-4901

Dear Mr. Laux:

Thank you for your November 1, 2019, letter soliciting U.S. Fish and Wildlife Service (Service) comments regarding a U.S. Army Corps of Engineers (Corps) Programmatic Environmental Assessment (PEA). The PEA is under preparation to assess effects of proposed deployment of the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network (Project) in the States of Wyoming, Montana, North Dakota, South Dakota, and northern Nebraska. We received the letter on November 12, 2019. This response only pertains to the Montana portion of the proposed Project, and is provided by the Service under the authority of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543), the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250), as amended, and the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712), as amended.

The Project would include construction of an estimated 360 monitoring stations and updating approximately 180 existing monitoring stations within 25 Hydrologic Unit Code watersheds of the Upper Missouri Basin in the five states listed above. A general Project area map was provided with the November 1, 2019, letter, which encompassed a portion of Montana west of the Continental Divide, and most of Montana east of the Continental Divide.

Threatened and Endangered Species

The proposed Project area contains much of Montana; only general proposed/existing monitoring station locations were provided in the letter. Information regarding specific listed, proposed, and candidate threatened and endangered species and designated critical habitat that may be present in the Project area and at specific proposed or existing monitoring station locations can be obtained by the Corps using the Service's Information for Planning and Consultation (IPaC) system at: https://ecos.fws.gov/ipac/. Additionally, the Montana Ecological Services Office maintains statewide and county-based lists of listed, proposed, and candidate threatened and endangered species and designated critical habitat that are updated monthly and available here: https://www.fws.gov/montanafieldoffice/Endangered_Species/Listed_Species.html. We have

enclosed the October 2019, Montana county-based list for your convenience.

Please note that on November 21, 2019, the Service determined threatened species status under the ESA for the meltwater lednian stonefly (*Lednia tumana*) and the western glacier stonefly (*Zapada glacier*), both aquatic species using alpine streams and springs. The effective date for this listing is December 23, 2019. These species may continue to be shown as "proposed" on IPaC and Montana lists until updated.

If a Federal agency authorizes, funds, or carries out a proposed action, the responsible Federal agency, or its delegated agent, is required to evaluate whether the action "may affect" listed species or critical habitat. If the Federal agency or its designated agent determines the action "may affect, is likely to adversely affect" listed species or critical habitat, the responsible Federal agency shall request formal section 7 consultation with this office. If the evaluation shows a "may affect, not likely to adversely affect" determination, concurrence from this office is required. If the evaluation shows a "no effect" determination for listed species or critical habitat, further consultation is not necessary. If a private entity receives Federal funding for a construction project, or if any Federal permit or license is required, the Federal agency may designate the fund recipient or permittee as its agent for purposes of informal section 7 consultation. The funding, permitting, or licensing Federal agency is responsible to ensure that its actions comply with the ESA, including obtaining concurrence from the Service for any action that may affect a threatened or endangered species or designated critical habitat.

We recommend that biological assessments and other such evaluations include the following:

1. A description of the project.
2. A description of the specific area that may be affected by the action.
3. The current status, habitat use, and behavior of listed and proposed threatened and endangered species and status of designated and proposed critical habitat(s) in the project area.
4. Discussion of the methods used to determine the information in Item 3.
5. An effects analysis of the action for listed and proposed threatened and endangered species and designated and proposed critical habitats, including an analysis of any cumulative effects.
6. Coordination/mitigation measures that will reduce/eliminate adverse impacts to listed and proposed threatened and endangered species and designated and proposed critical habitats.
7. The expected status of listed and proposed threatened and endangered species and designated and proposed critical habitats in the future (short and long term) during and after project completion.
8. A determination of "May affect, likely to adversely affect", "May affect, not likely to adversely affect", or "No effect" for listed species and critical habitat.
9. A determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species and critical habitat.
10. Citation of literature and personal contacts used in developing the assessment.

Candidate species are those placed on the candidate list for future action, meaning those species do not receive statutory protection under the ESA. They are reviewed annually by the Service to

determine if they continue to warrant listing or to reassess their listing priority. Ideally, sufficient threats can be removed to eliminate the need for listing. If threats are not addressed or the status of the species declines, a candidate species can move up in priority for a listing proposal. Federal agencies and non-Federal applicants can conference with the Service pursuant to section 7(a)(4) of ESA to ensure that their actions do not negatively impact candidate species. Some Federal agencies provide the same level of protection to candidate species as proposed or listed species and take appropriate measures to avoid impacts. While not required, we encourage this approach.

Bald and Golden Eagles

Eagle nests or territories may occur within the Project vicinity. Specific nest location data are maintained by the Montana Natural Heritage Program (MTNHP) and can be obtained by contacting MTNHP at 1515 East 6th Avenue, Box 201800, Helena, Montana 59620-1800, (406) 444-5354. If active eagle nests are present within 0.5 mile of the Project, we recommend that the proponent comply with seasonal construction timing restrictions and construction/development distance buffers specified in the 2007 Service and 2010 Montana Fish, Wildlife and Parks (FWP) guidance discussed below in order to avoid/minimize the risk for eagle take.

The bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) are protected from a variety of harmful actions via take prohibitions in both the Migratory Bird Treaty Act[1] (16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d). The BGEPA, enacted in 1940 and amended several times, prohibits take of bald eagles and golden eagles, including their parts, nests, young or eggs, except where otherwise permitted pursuant to Federal regulations. Incidental take of eagles from actions such as electrocutions from power lines or wind turbine strikes are prohibited unless specifically authorized via an eagle incidental take permit from the Service. BGEPA provides penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." BGEPA defines take to include the following actions: "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The Service expanded this definition by regulation to include the term “destroy” to ensure that “take” also encompasses destruction of eagle nests. Also the Service defined the term disturb which means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

[1] On December 22, 2017, the Department of the Interior’s (DOI) Office of the Solicitor Memorandum M-37050 titled The Migratory Bird Treaty Act Does Not Prohibit Incidental Take https://www.doi.gov/sites/doi.gov/files/uploads/m-37050.pdf) concludes that the MBTA’s prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do the same apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs. The MBTA list of protected species includes bald and golden eagles, and the law has been an effective tool to pursue incidental take cases involving eagles. However, the primary law protecting eagles is the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S. Code § 668), since the bald eagle was delisted under the Endangered Species Act in 2007. Memorandum-37050 does not affect the ability of the Service to refer entities for prosecution that have violated the take prohibitions for eagles established by the BGEPA.

The Service has developed guidance for the public regarding means to avoid take of bald and golden eagles:

- The 2007 *National Bald Eagle Management Guidelines* serve to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of BGEPA may apply. They provide conservation recommendations to help people avoid and/or minimize such impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by the BGEPA.
  https://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf

The Service also has promulgated new permit regulations under BGEPA:

- New eagle permit regulations, as allowed under BGEPA, were promulgated by the Service in 2009 (74 FR 46836; September 11, 2009) and revised in 2016 (81 FR 91494; December 16, 2016). The regulations authorize the limited take of bald and golden eagles where the take to be authorized is associated with otherwise lawful activities. These regulations also establish permit provisions for intentional take of eagle nests where necessary to ensure public health and safety, in addition to other limited circumstances. The revisions in 2016 included changes to permit issuance criteria and duration, definitions, compensatory mitigation standards, criteria for eagle nest removal permits, permit application requirements, and fees in order to clarify, improve implementation and increase compliance while still protecting eagles.
  https://www.gpo.gov/fdsys/pkg/FR-2016-12-16/pdf/2016-29908.pdf

The Service's Office of Law Enforcement carries out its mission to protect eagles through investigations and enforcement, as well as by fostering relationships with individuals, companies, industries and agencies that have taken effective steps to avoid take, including incidental take of these species, and encouraging others to implement measures to avoid take. The Office of Law Enforcement focuses its resources on investigating individuals and entities that take eagles without identifying and implementing all reasonable, prudent and effective measures to avoid that take. Those individuals and entities are encouraged to work closely with Service biologists to identify available protective measures, and to implement those measures during all activities or situations where their action or inaction may result in the take of an eagle(s).

In addition to Service guidance, the 2010 Montana Bald Eagle Management Guidelines: An Addendum to Montana Bald Eagle Management Plan (1994) developed by FWP also provides guidance for avoiding and minimizing the risk for eagle take.
http://fwp.mt.gov/fwpDoc.html?id=44181

Migratory Birds

The proposed Project may result in potential effects to migratory birds. To the extent practicable, necessary vegetation clearing, grubbing, and filling construction activities should be scheduled so as to avoid and minimize impacts to nesting birds, if present in the Project area. Active nests may not be removed. The Service has developed, and continues to revise and develop, general and industry-specific conservation measures for avoiding and minimizing

impacts to birds (https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php). We recommend that the proposed Project consider and incorporate these measures into project design, construction, and documentation as appropriate. Certain activities may require a permit from the Service's Migratory Bird Management Division. Please contact the Region 6 Migratory Bird Permits Office if you are uncertain if activities may result in purposeful take of migratory birds, eggs, or nests. Additional information about permits can be found at http://www.fws.gov/migratorybirds/mbpermits.html.

Greater Sage-Grouse

For your information, the greater sage-grouse, no longer considered a candidate for listing under the ESA, may also occur in the vicinity of the proposed Project in sagebrush, sagebrush-grasslands, wetland and riparian areas, and associated agricultural lands. This species is managed by the State of Montana (FWP and Department of Natural Resources and Conservation [DNRC]) as well as by the U.S. Bureau of Land Management (BLM) on BLM-administered lands.

We recommend consultation with these agencies regarding locations of sage-grouse leks and other important habitat in the Project vicinity. Some Project sites may occur within greater sage-grouse general or core habitat as mapped by the State of Montana, and greater sage-grouse General Habitat Management Areas or Priority Habitat Management Areas as delineated by the BLM. We recommend reviewing the Montana Sage-Grouse Habitat Conservation Program website (https://sagegrouse.mt.gov/) and interactive map to assist in determining where designated greater sage-grouse habitat occurs relative to proposed Project locations. We recommend that proposed Project activities be coordinated with the Montana DNRC, Conservation and Resource Development Division, regarding any applicable required compliance with Montana Executive Order 12-2015 and the Montana sage-grouse conservation strategy, as well as with the BLM regarding compliance with sage-grouse considerations specified in the Resource Management Plan for any BLM-administered lands that are traversed by the proposed Project.

Service Property Interests

As part of the National Wildlife Refuge System (NWRS), the Service administers fee title Refuge Waterfowl Production Areas and wetland, grassland, and wildlife management easements (including Easements for Wildlife Habitat Conservation, Easements for Waterfowl Management Rights, Easements for Waterfowl Habitat Protection, Easements for Waterfowl Habitat Conservation, etc.) throughout Montana. We advise that you review county plat maps to determine if the proposed Project, rights of way (ROW), and appurtenant infrastructure would cross Service property interests. If so, we recommend that all property interests within the NWRS be avoided during Project construction. If this is not possible, special use permits (SUP) or ROW grants may be necessary for construction activity that would cross NWRS property interests. Service issuance of SUPs or ROW grants is subject to the final determination of a Refuge compatibility review process, and would trigger NEPA compliance, as well as ESA section 7 consultation(s), if applicable. The refuge compatibility review process may add time to the overall Project review process.

Other Comments:

- We recommend coordination with FWP at 1420 East Sixth Ave., P.O. Box 200701, Helena, Montana 59620-0701, (406) 444-2535, and the MTNHP at 1515 East 6th Avenue, Box 201800, Helena, Montana 59620-1800, (406) 444-5354. Both of these agencies may be able to provide updated, site-specific information regarding current fish, wildlife, and sensitive plant resources occurring in the proposed project area, as well as specific project-related recommendations.
- The Service suggests the Project be designed to avoid and minimize impacts to wetland areas, stream channels and surrounding vegetation to the greatest extent possible. Direct, indirect and cumulative impacts, along with future activities required to maintain these improvements, should be analyzed.
- Sensitive resources that should be considered in siting Project facilities include threatened, endangered, and candidate species and their habitat, eagle and other migratory bird species nesting and habitat; sage-grouse nesting and habitat; wetlands; ephemeral, intermittent and permanent streams; naturally wooded draws; sagebrush habitat; and native prairie. Additional recommendations include: install and maintain appropriate erosion control measures to reduce sediment transport to adjacent wetlands and stream channels; enact best management practices to avoid and minimize the spread of noxious weeds and other undesirable exotic plant species within the proposed Project area; confine the disturbed areas as much as possible, especially in or near sensitive resources such as native prairie, sagebrush habitat, wooded draws, wetlands, streams, prairie dog towns, and grouse leks; and; revegetate disturbed areas with appropriate native species obtained from local sources, as possible.

We appreciate the opportunity to review the November 1, 2019, letter and associated project materials. If you require further information, please contact Jeff Berglund at jeff_berglund@fws.gov or (406) 449-5225, extension 206.

Sincerely,

For

Jodi L. Bush
Office Supervisor

Enclosure: (Endangered, Threatened, Proposed and Candidate Species Montana Counties, October 8, 2019)

Received 07 May

South Dakota Department of Game, Fish and Parks

South Dakota Department of Environment and Natural Resources

Joe Foss Building
523 East Capitol Avenue
Pierre, South Dakota 57501

May 1, 2020

Mr. Eric A. Laux, PMP
Chief, Environmental & Cultural Resources
U.S. Army Corps of Engineers
1616 Capitol Avenue
Omaha, Nebraska 68102-4901

Dear Mr. Laux:

This letter is in response to a request for comments for the April 2020 Draft Programmatic Environmental Assessment (DPEA) and the April 2020 Draft Finding of No Significant Impact. South Dakota has been very supportive of developing the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network in the State of Montana, Wyoming, North Dakota, South Dakota and Nebraska.

We have reviewed the DPEA, and we offer our support for the preferred alternative. This alternative proposes the installation of 360 new monitoring sites and modification of 180 existing sites for the Upper Missouri River Basin plains snowpack and soil moisture monitoring network. Governor Noem, her predecessors, and South Dakota's Congressional delegation have long been advocating for such a monitoring system to assist in the management of the Missouri River mainstem dams to prevent and reduce flooding. We want to thank you for allowing us the opportunity to review and offer our support for this important monitoring network.

Sincerely,

Kelly R Hepler

Kelly Hepler, Secretary
Department of Game Fish and Parks

Hunter Roberts, Secretary
Department of Environment and Natural Resources

cc: Governor Kristi Noem
Senator John Thune
Senator Mike Rounds
Representative Dusty Johnson

Received 07 May

USDA United States Department of Agriculture Forest Service Rocky Mountain Region

1617 Cole Blvd
Lakewood, CO 80401
303-275-5350
Fax: 303-275-5366

File Code: 2530
Date: April 23, 2020

John Hudson, P.E.
Colonel, Corps of Engineers, District Commander
U.S. Army Corps of Engineers, Omaha District
ATTN: PMA-C
1616 Capitol Avenue
Omaha, NE 68102

Dear Colonel Hudson:

Thank you for the opportunity to respond to the draft Programmatic Environmental Analysis (PEA) for the deployment of the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network received on March 31, 2020. The USDA's Forest Service Rocky Mountain Region has the following comments.

Siting of new monitoring stations on National Forest System land will require a Special Use Authorization, including site-specific resource protection measures, issued by the individual forest or grassland on which the station is proposed to be sited. Because the draft PEA lacks site-specificity, the forest or grassland would then conduct a site-specific analysis for the categorical exclusion of the activity. If the site-specific analysis determines there would be no extraordinary circumstances, then the authorization may be excluded from further analysis in an Environmental Assessment or an Environmental Impact Statement under the following category:

Approval, modification, or continuation of minor special uses of National Forest System lands that require less than five contiguous acres of land. Examples include but are not limited to:

i. Approving the construction of a meteorological sampling site; 36 CFR § 220.6(e)(3)

Additionally, the draft PEA describes the potential for a phased approach to the 34 CFR Part 800 Section 106 process as well as Programmatic Agreements with State and Tribal Historic Preservation Offices. However, it is not clear how the U.S. Army Corps of Engineers will engage with the land managing agencies of proposed monitoring sites to begin the coordination required to complete Section 106 requirements or Programmatic Agreements.

Given the potential for multiple Rocky Mountain Region units to be involved, we are willing to help the U.S. Army Corps of Engineers with some of the regional coordination and communication on the project, as needed. Additionally, in National Forest System lands without current soil moisture monitoring sites the Forest Service would be interested in working with the U.S. Army Corps of Engineers to identify potential new installation sites.

If you have questions, please contact Natural Resource Specialist Karen Vyverberg at karen.vyverberg@usda.gov or 303-941-6316.

Sincerely,

BUNNI MACEO Digitally signed by BUNNI MACEO Date: 2020.04.23 16:19:23 -06'00'

STEVE M. LOHR
Director

cc: Karen Vyverberg, Bunni Maceo, Eric Schroder, Molly Westby, Matthew Custer, Truman Barton Lander

United States Department of the Interior

BUREAU OF RECLAMATION
Great Plains Regional Office
P.O. Box 36900
Billings, MT 59107-6900

IN REPLY REFER TO:
GP-4200
2.1.4.13/2.1.4.17

DEC 17 2019

Eric A. Laux
Chief, Environmental and Cultural Resources
Department of the Army
Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 68102-4901

Subject: Upper Missouri River Basin (UMRB) Water Management Plains Snow and Soil Moisture Monitoring Network Programmatic Environmental Assessment (PEA)

Dear Mr. Laux:

On November 12, 2019, the Bureau of Reclamation Missouri Basin Region received your November 1, 2019 letter describing a PEA to be conducted by the Corps of Engineers (Corps) for proposed deployment of the UMRB Water Management Plains Snow and Soil Moisture Monitoring Network (Network). As we understand, the PEA will assess overall environmental effects of proposed deployment of the UMRB Network proposed in Montana, Wyoming, North Dakota, South Dakota and northern Nebraska.

On November 14, 2019, Reclamation contacted and left a phone message to Ms. Rebecca Podkowka indicating we look forward to working with the Corps on this PEA. Additionally, Reclamation is glad to offer cooperative assistance in the form of expertise, reviews, comments, data, lands information, and in other ways of help to the Corps. Each of the states named above are located within Reclamation's Missouri Basin Region.

Mr. Bud Fazio, Environmental and Cultural Resources Group Supervisor will be the primary Reclamation contact for the PEA and he may be reached at bfazio@usbr.gov or 406 247-7638. Additionally, Mr. Patrick Erger, Hydrology and Water Operations Group Supervisor, will be the Reclamation contact for hydrology, engineering and site feasibility and he may be reached at perger@usbr.gov or 406 247-7755.

We appreciate the opportunity to work with the Corps on this issue.

Sincerely,

For Michael S. Black
Regional Director

United States Department of the Interior

BUREAU OF RECLAMATION
Nebraska-Kansas Area Office
1706 West Third Street
McCook, NE 69001-2159

IN REPLY REFER TO:

NK-Timm
2.1.4.13 GF

DEC 17 2019

Corps of Engineers, Omaha District
Attention: Rebecca L. Podkowka
1616 Capitol Avenue
Omaha, NE 68102-4901

Subject: Request for Comment, Programmatic Environmental Assessment for Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network, Niobrara River Basin, Nebraska

Dear Ms. Podkowka:

Thank you for inquiring about screening criteria for updating or implementing new snow and soil moisture monitoring site on public lands. The U.S. Bureau of Reclamation (Reclamation), Missouri Basin Office does administer lands within the Niobrara River Basin proposed in the project description. The following criteria pertains to Reclamation lands administered by this office within Brown, Cherry, Sheridan, Rock, and Dawes Counties, Nebraska.

1. Site-specific locations for new monitoring sites would need to be fully evaluated by Reclamation for compliance with Federal environmental laws.
2. Reclamation properties are managed through partnership agreements. Any modification to or implementation of new snow or soil monitoring sites requires coordination with Reclamation partners. Please notify this office and we will coordinate directly with our partners.
3. Any proposal to use Reclamation administered lands cannot interfere with Reclamation's project purposes; i.e. the ability to deliver water. Location of monitoring sites should avoid Reclamation's dams, canals and lateral systems. The canals and laterals are typically narrow (50 to 100 feet wide), linear features, sometimes with buried pipes. A monitoring site that is 10 x 10 meters may complicate our ability to manage our facilities.
4. Location of new monitoring sites should avoid sensitive resources such as cultural areas, protected habitat, wetlands, floodplains, etc. Reclamation properties have been known to have threatened and endangered species such as American burying beetle (*Nicrophorus americanus*), Western prairie fringed orchid (*Platanthera praeclara*), blowout penstemon (*Penstemon haydenii*), Ute ladies'-tresses (*Spiranthes diluvials*), piping plover (*Charadrius melodus*), whooping crane (*Grus americana*), pallid sturgeon (*Scaphirhynchus albus*), Topeka shiner (*Notrophis topeka*), and Northern long-eared bat (*Myotis septentrionalis*).

5. Reclamation does not advise placement of any new monitoring site within areas designated for recreational activities, such as campgrounds or picnic sites.

6. Reclamation will require a special use authorization and associated fees in accordance with 43 Code of Federal Regulations 429, to identify the operator, maintenance, length of time, etc., of the monitoring site.

If you have any questions on this matter, please contact Jeanette Timm, jtimm@usbr.gov or (308) 345-1028.

Sincerely,

Aaron M. Thompson

Aaron M. Thompson
Area Manager

bc: NK-Simpson
NK-Timm

WBR:JTimm:rbodeman:12/17/2019:308-345-1028
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USDA United States Department of Agriculture
Forest Service
Rocky Mountain Region
1617 Cole Blvd
Lakewood, CO 80401
303-275-5350
Fax: 303-275-5366

File Code: 2530
Date: March 25, 2020

Eric Laux
Chief, Environmental and Cultural Resources Section
U.S. Army Corps of Engineers, Omaha District
Attn: PMA-C
1616 Capitol Avenue
Omaha, NE 68102

Dear Mr. Laux:

Thank you for the opportunity to respond to the scoping letter received on February 21, 2020, for the Programmatic Environmental Analysis (EA) for the deployment of the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network. The USDA's Forest Service, Rocky Mountain Region, has the following comments and questions.

We do not believe there would be overlap with any delegated critical habitat for an Endangered Species Act (ESA) species but anticipate that the EA would take a closer look at the potential overlap. There may be other non-ESA sensitive species and/or habitats that we usually request other federal agencies review for impacts in their National Environmental Policy Act when the project overlaps on National Forest System lands, such as plants and animals that we give special management toward. The current Regional Forester Sensitive Species list for the Rocky Mountain Region can be found here. We request other agencies be aware of these lists and need for evaluation and note each Forest Service region has their own Regional Forester sensitive species list.

There does not yet appear to be any description of expected human activity at and around the monitoring sites. Loss of habitat area can be one concern, depending on the particulars of the site-specific location and species involved. An even greater concern can be the access issues and related human activity.

The siting criteria does take historic properties into account under 36 CFR 800.16(1)(1), which will require the completion of the National Historic Preservation Act Section 106 in potential siting of a station.

Below is a series of questions that may be addressed in the EA, but for which the current information provided did not specify:

- Are new roads expected, or upgrading of existing roads?
- How frequently will the roads by used for monitoring and maintenance activities?
- How much road system is proposed and will it cross sensitive areas or habitats?
- Will the roads possibly increase non-project public traffic too?

- How frequently will monitoring personnel be at the site doing what kinds of activities relative to sensitive times for sensitive wildlife?
- Is the Corps planning to do any surveys for protected or sensitive resources prior to project implementation?
- Will these sites be fenced off to exclude cattle grazing? On some National Forest System lands there are few, if any, pastures which are not grazed each year.

These are some early considerations based only on the scoping letter and siting criteria. Given the potential for multiple Rocky Mountain Region units to be involved based on the map, we are willing to help the Corps with some of the regional coordination and communication on the project, as needed. In units without current soil moisture monitoring sites, the Forest Service would be interested in working with the U.S. Army Corps of Engineers to identify potential new installation sites.

If you have questions, please contact Karen Vyverberg, Natural Resources Specialist, at karen.vyverberg@usda.gov or 303-941-6316 or Steve Lohr, Director, Renewable Resources, at steve.lohr@usda.gov or 303-275-5014.

Sincerely,

STEVE M. LOHR
Director, Renewable Resources

cc: Karen Vyverberg

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of Oceanic and Atmospheric Research
Earth System Research Laboratory
325 Broadway – David Skaggs Research Center
Boulder, Colorado 80305-3337

April 10, 2020

John Remus
Chief, Missouri River Basin Water Management Division
U.S. Army Corps of Engineers, Northwestern Division
1616 Capitol Avenue, Suite 365
Omaha, NE 68102

RE: Value of Upper Missouri River Basin Monitoring Network to NOAA/NIDIS

Dear Mr. Remus:

I recently had a conversation with Kevin Grode regarding the installation process for the USACE Soil Moisture and Plains Snow Monitoring Network in the Upper Missouri River Basin (UMB Network). I am the Executive Director of NOAA's National Integrated Drought Information System (NIDIS), and we are keenly interested in your efforts to establish the UMB Network.

I am writing today to share with you some of the specific reasons that the UMB Network is of high importance to NIDIS and to NOAA more generally. These reasons hinge not only on the value of the soil moisture data that will be derived from the network (examples provided in #1-4 below), but also the value of the network's operations and management as a strategic proof-of-concept for the NIDIS-sponsored National Coordinated Soil Moisture Monitoring Network (NCSMMN) initiative (addressed in #5 below).

1. Drought Early Warning

NIDIS' mission is to provide an effective drought early warning system that integrates information on key indicators of drought in order to make usable, reliable, and timely forecasts of drought conditions and impacts at both national and regional levels. The 2018 NIDIS Reauthorization Act specifically highlighted soil moisture as one of the key indicators to be monitored and integrated, reflecting the growing recognition of the crucial importance of soil moisture to early drought detection, as well as the relative paucity of available soil moisture products. The planned UMB Network, providing state-of-the-art soil moisture data and furthermore in a region of the country with low current monitoring density, will greatly contribute to NIDIS's drought early warning capability, as well as to broader efforts to reduce societal risks from hazards such as drought, flood and fire.

2. Satellite Verification and Validation

In situ soil moisture monitoring data provides critical information with which to independently verify, validate, and calibrate satellite-based and other remote sensing approaches and outputs. In so doing, the in situ data helps to maximize the value and utility of these non-local data sources. In turn, improved satellite and remote sensing products significantly extend our ability to deliver reliable gridded information across regions with limited on-site data collection. In this way, a build-out such as the planned UMB Network will not only provide important data for the UMB region, but in addition will help to compensate for lack of data in other underserved regions of the country.

3. NOAA's National Water Model

The National Water Model (NWM) is a major state-of-the-art hydrological forecasting model developed by NOAA's Office of Water Prediction. The NWM forecasts streamflow, soil moisture, and other hydrologic quantities over the continental U.S. at 1 km to 250 m spatial resolutions with lead times ranging from hours to weeks. The prediction capability of the NWM depends on accurate observational information on land surface conditions as well as atmospheric conditions. Ensuring the NWM uses the best available information on land surface conditions - including soil moisture - and continuing to improve the NWM are both high priorities for NOAA. The planned UMB Network represents a significant potential contribution to this effort.

4. Other Research and Applications Uses of the Data

More generally, the high-quality, point-based soil measurements from the planned UMB Network will give researchers at NOAA and elsewhere the ability to assess large-scale soil moisture patterns, and to address a range of research, forecasting, and application needs. In addition to supporting drought monitoring, preparedness, and response, these soil moisture and related observations have the potential to contribute and benefit such disparate areas as:

- Hydrological modeling and forecasting (one example is the NWM detailed in #3 above, another is the NOAA River Forecast Centers' hydrological modeling)
- Climate modeling and forecasting (e.g., the NOAA CPC outlooks)
- Wildfire management
- Ecosystem services management
- Electrical grid operations risk management
- Crop yield forecasting
- Irrigation scheduling

5. Proof-of-concept for the National Coordinated Soil Moisture Monitoring Network

Beyond the specific value of the soil moisture data, the planned UMB Network represents a strategic proof-of-concept for a NIDIS priority initiative: the National Coordinated Soil Moisture Monitoring Network (NCSMMN). The NCSMMN is a multi-agency, multi-institution effort within the United States dedicated to aggregating and standardizing soil moisture observational data from the various in situ monitoring networks across the U.S., and integrating that data with remotely-sensed and modeled data for the generation of useful real-time products to help reduce

societal risks from natural hazards such as a drought, and to benefit a wide range of user groups. A core concept of the NCSMMN is that it will not replace existing monitoring programs, but instead will leverage and support those independent programs through technical assistance, coordination, and resources. The NCSMMN will further support the strategic build-out of new in situ monitoring stations, with an emphasis on addressing underserved areas. The UMB network is a clear opportunity for the NCSMMN, working with our various state and federal mesonet partners, to demonstrate the feasibility of our distributed yet coordinated approach. As such, it represents an early test case for such things as: metadata standards development, site selection methodologies, and data management and data sharing protocols.

As I hope I have made clear, we see a tremendous value in the UMB Monitoring Network, and we look forward to continued partnership with you and the organizations that will assume network operations and management. Please let me know if you would like additional information on any of these topics.

Sincerely,

Genoveva Deheza
Executive Director
National Drought Information System (NIDIS)/NOAA

CC: Kevin Grode, USACE

Director's Office
PO Box 200701
Helena, MT 59620-0701
(406) 444-3186
Fax (406) 444-4952
Ref: DO324-19
December 4, 2019

Department of the Army
Corps of Engineers, Omaha District
Attention: Rebecca Podkowka
1616 Capitol Avenue
Omaha, NE 68102-4901

RE: Programmatic Environmental Assessment for deployment of Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network

Dear Ms. Podkowka:

Thank you for the opportunity to comment on the Programmatic Environmental Assessment (PEA) addressing the deployment of additional snow and soil moisture monitoring sites in the Upper Missouri River Basin.

Montana Fish, Wildlife & Parks (FWP) is generally supportive of this effort to gather and disseminate more and better information for runoff predictions. One concern we have is the potential for disturbance to deer and elk winter range. Depending on how frequently the sites need to be accessed in the winter, this may not be an issue. We are amenable to erecting these structures on some FWP lands, depending on the location, and would be happy to work with you on selecting suitable sites.

Additionally, we are pleased to see that you will be considering viewsheds when scoping sites, as this is important to the recreating public in Montana, and would need to be considered if a location is chosen on or near FWP lands.

Thank you for allowing FWP the opportunity to comment. For further work on this effort, or if you have any questions, please contact Deb O'Neill at (406) 444-3755 or doneill@mt.gov.

Sincerely,

Mike Volesky
Chief of Operations

C: Deb O'Neill, RMU
Beth Shumate, Parks
FWP Regional Supervisors (Regions 3-7)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
North Dakota Ecological Services Field Office
3425 Miriam Avenue
Bismarck, ND 58501-7926
Phone: (701) 250-4481 Fax: (701) 355-8513
http://www.fws.gov/northdakotafieldoffice/endspecies/endangered_species.htm

In Reply Refer To: December 05, 2019
Consultation Code: 06E15000-2020-SLI-0065
Event Code: 06E15000-2020-E-00255
Project Name: Upper Missouri River Basin Water Management

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

North Dakota Ecological Services Field Office
3425 Miriam Avenue
Bismarck, ND 58501-7926
(701) 250-4481

Project Summary

Consultation Code: 06E15000-2020-SLI-0065

Event Code: 06E15000-2020-E-00255

Project Name: Upper Missouri River Basin Water Management

Project Type: LAND - FLOODING

Project Description: Major watersheds in North Dakota

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/47.467854499772926N100.45225386596228W

Counties: Adams, ND | Barnes, ND | Benson, ND | Billings, ND | Bottineau, ND | Bowman, ND | Burke, ND | Burleigh, ND | Cass, ND | Cavalier, ND | Dickey, ND | Divide, ND | Dunn, ND | Eddy, ND | Emmons, ND | Foster, ND | Golden Valley, ND | Grand Forks, ND | Grant, ND | Griggs, ND | Hettinger, ND | Kidder, ND | LaMoure, ND | Logan, ND | McHenry, ND | McIntosh, ND | McKenzie, ND | McLean, ND | Mercer, ND | Morton, ND | Mountrail, ND | Nelson, ND | Oliver, ND | Pembina, ND | Pierce, ND | Ramsey, ND | Ransom, ND | Renville, ND | Richland, ND | Rolette, ND | Sargent, ND | Sheridan, ND | Sioux, ND | Slope, ND | Stark, ND | Steele, ND | Stutsman, ND | Towner, ND | Traill, ND | Walsh, ND | Ward, ND | Wells, ND | Williams, ND

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Birds

NAME	STATUS
Least Tern *Sterna antillarum* Population: interior pop. No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8505	Endangered
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *Grus americana* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

Fishes

NAME	STATUS
Pallid Sturgeon *Scaphirhynchus albus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7162	Endangered

Insects

NAME	STATUS
Dakota Skipper *Hesperia dacotae* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1028	Threatened
Poweshiek Skipperling *Oarisma poweshiek* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9161	Endangered

Flowering Plants

NAME	STATUS
Western Prairie Fringed Orchid *Platanthera praeclara* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1669	Threatened

Critical habitats

There are 3 critical habitats wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Dakota Skipper *Hesperia dacotae* https://ecos.fws.gov/ecp/species/1028#crithab	Final
Piping Plover *Charadrius melodus* https://ecos.fws.gov/ecp/species/6039#crithab	Final
Poweshiek Skipperling *Oarisma poweshiek* https://ecos.fws.gov/ecp/species/9161#crithab	Final

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

Due to your project's size, the list below may be incomplete, or the acreages reported may be inaccurate. For a full list, please contact the local U.S. Fish and Wildlife office or visit https://www.fws.gov/refuges/refugelocatormaps.
The following FWS National Wildlife Refuge Lands and Fish Hatcheries lie fully or partially within your project area:

FACILITY NAME	ACRES
Devils Lake Wetland Management District **Devils Lake Wetland Management District** 221 2nd Street Nw Suite 2 Devils Lake, ND 58301-2963 (701) 662-8611 https://www.fws.gov/refuges/profiles/index.cfm?id=62580	24,600
Arrowwood National Wildlife Refuge **Arrowwood National Wildlife Refuge** 7780 10th Street Se Pingree, ND 58476-9511 (701) 285-3341 https://www.fws.gov/refuges/profiles/index.cfm?id=62510	26,100
Audubon National Wildlife Refuge **Audubon National Wildlife Refuge** 3275 11th Street Nw Coleharbor, ND 58531-9419 (701) 442-5474 https://www.fws.gov/refuges/profiles/index.cfm?id=62540	56,000
Long Lake National Wildlife Refuge **Long Lake National Wildlife Refuge** 12000 353rd Street Se Moffit, ND 58560-9740 (701) 387-4397 https://www.fws.gov/refuges/profiles/index.cfm?id=62522	40,000

FACILITY NAME	ACRES
Kulm Wetland Management District **Kulm Wetland Management District** P.O. Box E Kulm, ND 58456-0170 (701) 647-2866 https://www.fws.gov/refuges/profiles/index.cfm?id=62630	4,870
J. Clark Salyer National Wildlife Refuge **J. Clark Salyer National Wildlife Refuge** 681 Salyer Road Upham, ND 58789-9307 (701) 768-2548 https://www.fws.gov/refuges/profiles/index.cfm?id=62620	70,900
Des Lacs National Wildlife Refuge **Des Lacs National Wildlife Refuge** 42000 520th St Nw Kenmare, ND 58746 (701) 385-4046 https://www.fws.gov/refuges/profiles/index.cfm?id=62570	0
Lostwood Wetland Management District **Lostwood Wetland Management District** 8315 Highway 8 Kenmare, ND 58746-9046 (701) 848-2722 https://www.fws.gov/refuges/profiles/index.cfm?id=62573	31,300
Rabb Lake National Wildlife Refuge **Rabb Lake National Wildlife Refuge** C/o J. Clark Salyer Nwr 681 Salyer Road Upham, ND 58789-9307 (701) 768-2548 https://www.fws.gov/refuges/profiles/index.cfm?id=62625	256
Rock Lake National Wildlife Refuge **Rock Lake National Wildlife Refuge** C/o Devils Lake Wmd 221 Second Street Nw, Suite 2 Devils Lake, ND 58301-2963 (701) 662-8611 https://www.fws.gov/refuges/profiles/index.cfm?id=62589	155

FACILITY NAME	ACRES
Rose Lake National Wildlife Refuge **Rose Lake National Wildlife Refuge** C/o Devils Lake Wmd 221 Second Street Nw, Suite 2 Devils Lake, ND 58301-2963 (701) 662-8611 https://www.fws.gov/refuges/profiles/index.cfm?id=62590	843
School Section Lake National Wildlife Refuge **School Section Lake National Wildlife Refuge** C/o J. Clark Salyer Nwr 681 Salyer Road Upham, ND 58789-9307 (701) 768-2548 https://www.fws.gov/refuges/profiles/index.cfm?id=62626	352
Valley City Wetland Management District **Valley City Wetland Management District** 11515 River Road Valley City, ND 58072-9619 (701) 845-3466 https://www.fws.gov/refuges/profiles/index.cfm?id=62532	0
Sibley Lake National Wildlife Refuge **Sibley Lake National Wildlife Refuge** C/o Valley City Wmd 11515 River Road Valley City, ND 58072-9619 (701) 845-3466 https://www.fws.gov/refuges/profiles/index.cfm?id=62523	830
Silver Lake National Wildlife Refuge **Silver Lake National Wildlife Refuge** C/o Devils Lake Wmd 221 Second Street Nw, Suite 2 Devils Lake, ND 58301-2963 (701) 662-8611 https://www.fws.gov/refuges/profiles/index.cfm?id=62591	5,710

FACILITY NAME	ACRES
Slade National Wildlife Refuge **Slade National Wildlife Refuge** C/o Long Lake Nwr 12000 353rd Street Se Moffit, ND 58560-9740 (701) 387-4397 https://www.fws.gov/refuges/profiles/index.cfm?id=62524	3,000
Stewart Lake National Wildlife Refuge **Stewart Lake National Wildlife Refuge** C/o Lake Ilo Nwr 489 102 Avenue Sw Dunn Center, ND 58626 (701) 548-8110 https://www.fws.gov/refuges/profiles/index.cfm?id=62576	638
Tewaukon National Wildlife Refuge **Tewaukon National Wildlife Refuge** 9754 143-1/2 Avenue Se Cayuga, ND 58013-9764 (701) 724-3598 https://www.fws.gov/refuges/profiles/index.cfm?id=62660	18,800
Sunburst Lake National Wildlife Refuge **Sunburst Lake National Wildlife Refuge** C/o Long Lake Nwr 12000 353rd Street Se Moffit, ND 58560-9740 (701) 387-4397 https://www.fws.gov/refuges/profiles/index.cfm?id=62528	329
Upper Souris National Wildlife Refuge **Upper Souris National Wildlife Refuge** 17705 212th Avenue Nw Berthold, ND 58718-9666 (701) 468-5467 https://www.fws.gov/refuges/profiles/index.cfm?id=62680	31,600

FACILITY NAME	ACRES
Willow Lake National Wildlife Refuge **Willow Lake National Wildlife Refuge** C/o J. Clark Salyer Nwr 681 Salyer Road Upham, ND 58789-9307 (701) 768-2548 https://www.fws.gov/refuges/profiles/index.cfm?id=62627	5,170
Assistant Regional Director-Fish And Aquatic Conservation **Assistant Regional Director-Fish And Aquatic Conservation** Denver Federal Center P.O. Box 25486 Denver, CO 80225-0486 (303) 236-4580 https://www.fws.gov/offices/Directory/OfficeDetail.cfm?OrgCode=60140	199
Valley City National Fish Hatchery **Valley City National Fish Hatchery** 11515 River Road Valley City, ND 58072-9619 (701) 845-3464 https://www.fws.gov/offices/Directory/OfficeDetail.cfm?OrgCode=62220	118

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Bittern *Botaurus lentiginosus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/6582	Breeds Apr 1 to Aug 31
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere

NAME	BREEDING SEASON
Baird's Sparrow *Ammodramus bairdii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5113	Breeds May 20 to Aug 15
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black Tern *Chlidonias niger* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Brewer's Sparrow *Spizella breweri* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9291	Breeds May 15 to Aug 10
Buff-breasted Sandpiper *Calidris subruficollis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9488	Breeds elsewhere
Burrowing Owl *Athene cunicularia* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9737	Breeds Mar 15 to Aug 31
Chestnut-collared Longspur *Calcarius ornatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 10
Clark's Grebe *Aechmophorus clarkii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Dec 31

NAME	BREEDING SEASON
Dunlin *Calidris alpina arcticola* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Ferruginous Hawk *Buteo regalis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/6038	Breeds Mar 15 to Aug 15
Franklin's Gull *Leucophaeus pipixcan* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Golden Eagle *Aquila chrysaetos* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Hudsonian Godwit *Limosa haemastica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Lark Bunting *Calamospiza melanocorys* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 10 to Aug 15
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Lewis's Woodpecker *Melanerpes lewis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Long-billed Curlew *Numenius americanus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5511	Breeds Apr 1 to Jul 31
Long-eared Owl *asio otus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3631	Breeds Mar 1 to Jul 15

NAME	BREEDING SEASON
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds May 1 to Jul 31
Mccown's Longspur *Calcarius mccownii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9292	Breeds May 1 to Aug 15
Nelson's Sparrow *Ammodramus nelsoni* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Sep 5
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Semipalmated Sandpiper *Calidris pusilla* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Smith's Longspur *Calcarius pictus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Sprague's Pipit *Anthus spragueii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8964	Breeds May 10 to Aug 31
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

NAME	BREEDING SEASON
Yellow Rail *Coturnicops noveboracensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9476	Breeds May 15 to Sep 10

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ “Proper Interpretation and Use of Your Migratory Bird Report” before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)

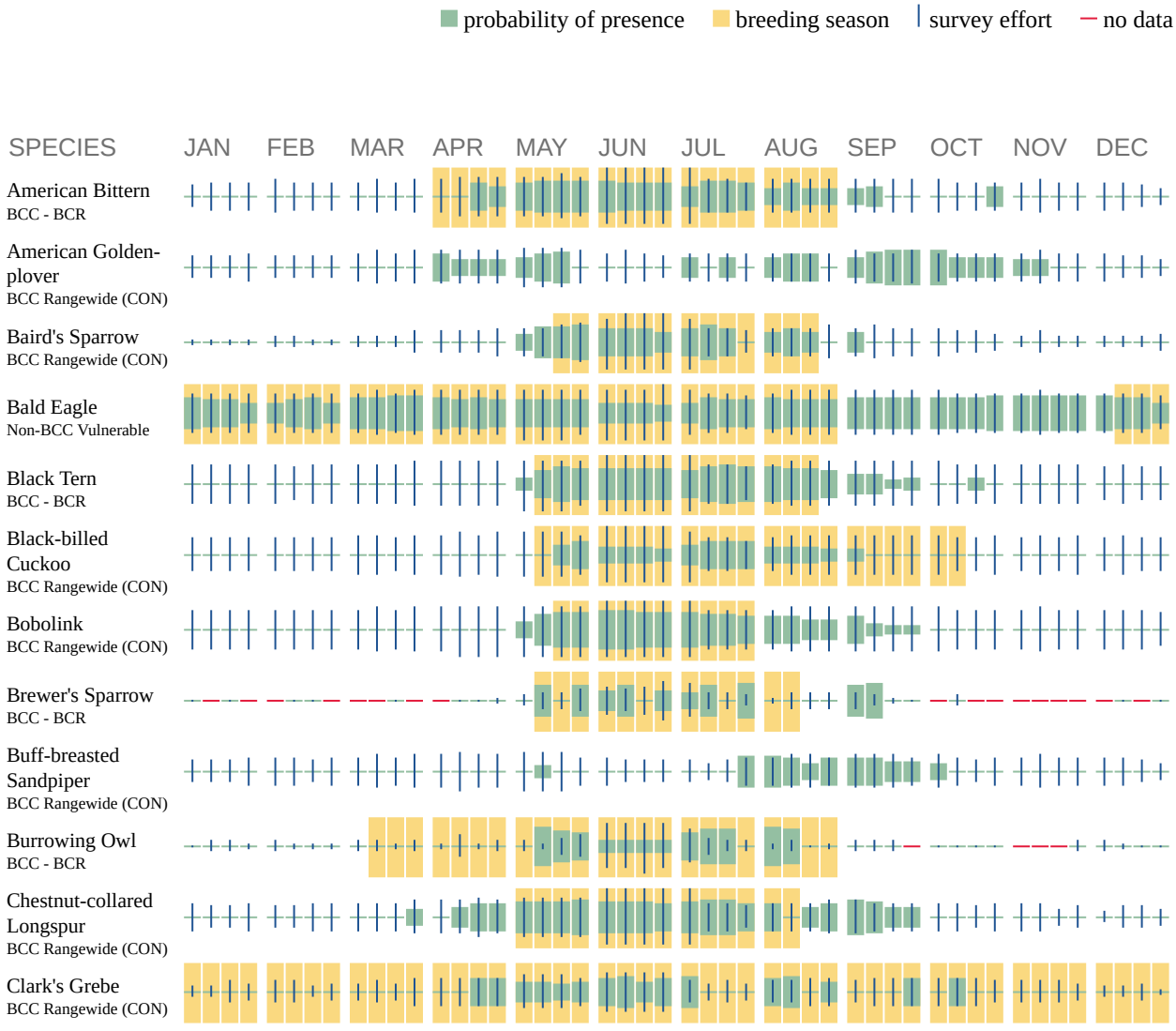
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.




SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Dunlin
BCC - BCR
Ferruginous Hawk
BCC - BCR
Franklin's Gull
BCC Rangewide (CON)
Golden Eagle
BCC - BCR
Hudsonian Godwit
BCC Rangewide (CON)
Lark Bunting
BCC - BCR
Lesser Yellowlegs
BCC Rangewide (CON)
Lewis's Woodpecker
BCC Rangewide (CON)
Long-billed Curlew
BCC Rangewide (CON)
Long-eared Owl
BCC Rangewide (CON)
Marbled Godwit
BCC Rangewide (CON)
Mccown's Longspur
BCC Rangewide (CON)
Nelson's Sparrow
BCC Rangewide (CON)
Red-headed Woodpecker
BCC Rangewide (CON)
Ruddy Turnstone
BCC - BCR
Semipalmated Sandpiper
BCC Rangewide (CON)
Short-billed Dowitcher
BCC Rangewide (CON)
Smith's Longspur
BCC - BCR
Sprague's Pipit
BCC Rangewide (CON)
Willet
BCC Rangewide (CON)
Yellow Rail
BCC Rangewide (CON)

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.
Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical

Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

Due to your project's size, the list below may be incomplete, or the acreages reported may be inaccurate. For a full list, please contact the local U.S. Fish and Wildlife office or visit https://www.fws.gov/wetlands/data/mapper.HTML

LAKE

- L1ABG
- L1ABGh
- L1UBHh
- L1UBG
- L1UBGh
- L1UBGx
- L1UBH
- L1UBKx
- L2AB1G
- L2ABF
- L2ABFd
- L2ABFh
- L2ABFx
- L2ABG

NORTH Dakota | Water Commission

Be Legendary.™

received
05-Dec-2019

November 29, 2019

Eric A. Laux
Chief, Environmental & Cultural Resources
Dept. of the Army
Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 68102-4901

Dear Mr. Laux:

This is in response to your request for a review of the environmental impacts associated with the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network project located in the States of Montana, Wyoming, North Dakota, South Dakota and northern Nebraska.

The proposed project has been reviewed by State Water Commission staff, and the following comments are provided:

- The North Dakota Atmospheric Resource Board (ARB) has been involved in communications regarding this project, and intends to be involved further as this project progresses. Please contact Darin Langerud for further at 701-328-4751 for any questions regarding this comment.

- Projects occurring below the ordinary high-water mark of the Missouri River would require a sovereign land permit from the State Engineer. Please contact Ashley Persinger at apersinger@nd.gov for any questions regarding this comment.

Thank you for the opportunity to provide review comments. Should you have further questions, please contact me at 701-328-4970 or stevebest@nd.gov.

Sincerely,

Steven Best
Planner III

SB:dm/1570

From: Dolberg, Jill
To: Podkowka, Rebecca L CIV USARMY CENWO (USA)
Subject: [Non-DoD Source] draft Programmatic Environmental Assessment for the Upper Missouri River Basin Water Management Network
Date: Thursday, April 23, 2020 4:51:02 PM

Dear Rebecca,

We are in receipt of a letter dated April 6, 2020 from Bradley Thompson, Chief of the Planning Branch of the Army Corps of Engineers requesting comments on a draft Programmatic Environmental Assessment (PEA) for the proposed Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network in Montana, Wyoming, North Dakota, South Dakota and Nebraska.

I didn't see anything that caused me immediate concern for the historic properties in northern Nebraska. After the flooding we experienced in March 2019, monitoring of soil moisture and snow melt seems like a critical mission. Please communicate with us as the project moves further along.

Thank you!

Jill Dolberg

Jill Dolberg
Deputy State Historic Preservation Officer

_____

1500 R Street
Lincoln, Nebraska 68508-1651

t . 402-471-4773 | c . 402-525-4927
jill.dolberg@nebraska.gov <mailto:jill.dolberg@nebraska.gov> | history.nebraska.gov
<Blockedhttps://urldefense.proofpoint.com/v2/url?u=https-3A__history.nebraska.gov_&d=DwMFAg&c=Cu5g146wZdoqVuKpTNsYHeFX_rg6kWhlkLF8Eft-wwo&r=EhOq4f93tPoAvKzk-4IZKA&m=iAartIx2AsDF7iCA53f326cRlAitYxzLcpBbxnQfjiw&s=NVNhMISyWvWhpNeLIK9xx2A0sxRTfBAZLjPrTZHfi_I&e=>

Preserving the Past. Building the Future

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3A__www.instagram.com_historynebraska_&d=DwMFAg&c=Cu5g146wZdoqVuKpTNsYHeFX_rg6kWhlkLF8Eft-wwo&r=EhOq4f93tPoAvKzk-4IZKA&m=iAartIx2AsDF7iCA53f326cRlAitYxzLcpBbxnQfjiw&s=eB_CtBqnKsPkNRPl02Ss7HO1xizadb-xl75UaSDpF90&e=>

USDA

United States Department of Agriculture

received
06-Jan-2020

December 17, 2019

Mr. Eric A. Laux, PMP
Chief, Environmental and Cultural Resources
Department of the Army
Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, Nebraska 68102-4901

RE: Environmental Review for:
Construction of Upper Missouri River Basin Water Supply Monitoring Sites Project

Dear Mr. Laux:

Thank you for the opportunity to provide Farmland Protection Policy Act (FPPA) review of this project.

The photograph of the conceptual setup of a typical weather station makes it evident that no permanent modifications of the land will be required. It appears that the site could easily be reverted to its prior use by simply removing the equipment. The project as outlined will have **no impact** on prime or important farmland.

If you have any questions, please contact me at (605) 858-6670.

Sincerely,

Tim Nordquist

TIM NORDQUIST
Conservationist Agronomist

cc:
Nathan Jones, State Soil Scientist, NRCS, Huron SO
Lance Smith, Acting State Resource Conservationist, NRCS, Huron SO

Natural Resources Conservation Service
414 E Stumer Road, Suite 700
Rapid City, SD 57701
Voice: 605.858.6670 Fax: 855.256.2553

From:	Turner, Dylan R
To:	Podkowka, Rebecca L CIV USARMY CENWO (USA)
Subject:	[Non-DoD Source] USFWS response to Draft Programmatic Environmental Assessment for the proposed Upper Missouri River Basin (UMB) Water Management Plains Snow and Soil Moisture Monitoring Network
Date:	Thursday, April 30, 2020 3:47:02 PM

Hi Rebecca,

We have reviewed the draft Programmatic Environmental Assessment for the proposed Upper Missouri River Basin (UMB) Water Management Plains Snow and Soil Moisture Monitoring Network and we do not have any additional comments at this time.

Thank you!

Dylan Turner

Fish and Wildlife Biologist

U. S. Fish and Wildlife Service

Ecological Services South Dakota Field Office

420 South Garfield Avenue, Suite 400

Pierre, South Dakota 57501

Phone: (605) 224-8693 ext. 233

SOUTH DAKOTA DEPARTMENT OF
GAME, FISH AND PARKS
523 EAST CAPITOL AVENUE | PIERRE, SD 57501

November 19, 2019

Eric A. Laux
Department of the Army
Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 68102-4901

RE: Snow and Soil Moisture Monitoring Network PEA comments

Dear Eric,

The Department of Game, Fish and Parks has reviewed the abovementioned PEA letter and have the following comments.

In the event that any SD Dept. of Game, Fish and Parks owned lands are proposed as sites to locate a monitoring station, before approving such sites SDGFP would need to ensure: (1) there are no specific use restrictions in place that would prohibit a site development (e.g. easements or rights by third parties), (2) environmentally sensitive lands and features are avoided (e.g. native prairie [PUDLs], wetlands, sensitive plant communities, or cultural resources sites), and (3) the proposed monitoring station would not interfere with, impede, or diminish the primary authorized use of the GFP lands (e.g. hunting, fishing, wildlife habitat, or other public recreation opportunities).

After the proposed site locates are determined, we also recommend that a search of the SD Natural Heritage Database be conducted for rare, threatened or endangered species and communities that may be present in the area.

If you have any questions, please feel free to contact me at 605-773-4345.

Sincerely,

Casey Heimerl

Casey Heimerl
Wildlife Biologist
523 East Capitol Avenue
Pierre, SD 57501
Casey.Heimerl@state.sd.us

USDA United States Department of Agriculture
Forest Service
Rocky Mountain Region
1617 Cole Blvd
Lakewood, CO 80401
303-275-5350
Fax: 303-275-5366

File Code: 2530
Date: April 23, 2020

John Hudson, P.E.
Colonel, Corps of Engineers, District Commander
U.S. Army Corps of Engineers, Omaha District
ATTN: PMA-C
1616 Capitol Avenue
Omaha, NE 68102

Dear Colonel Hudson:

Thank you for the opportunity to respond to the draft Programmatic Environmental Analysis (PEA) for the deployment of the Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network received on March 31, 2020. The USDA's Forest Service Rocky Mountain Region has the following comments.

Siting of new monitoring stations on National Forest System land will require a Special Use Authorization, including site-specific resource protection measures, issued by the individual forest or grassland on which the station is proposed to be sited. Because the draft PEA lacks site-specificity, the forest or grassland would then conduct a site-specific analysis for the categorical exclusion of the activity. If the site-specific analysis determines there would be no extraordinary circumstances, then the authorization may be excluded from further analysis in an Environmental Assessment or an Environmental Impact Statement under the following category:

Approval, modification, or continuation of minor special uses of National Forest System lands that require less than five contiguous acres of land. Examples include but are not limited to:

i. Approving the construction of a meteorological sampling site; 36 CFR § 220.6(e)(3)

Additionally, the draft PEA describes the potential for a phased approach to the 34 CFR Part 800 Section 106 process as well as Programmatic Agreements with State and Tribal Historic Preservation Offices. However, it is not clear how the U.S. Army Corps of Engineers will engage with the land managing agencies of proposed monitoring sites to begin the coordination required to complete Section 106 requirements or Programmatic Agreements.

Given the potential for multiple Rocky Mountain Region units to be involved, we are willing to help the U.S. Army Corps of Engineers with some of the regional coordination and communication on the project, as needed. Additionally, in National Forest System lands without current soil moisture monitoring sites the Forest Service would be interested in working with the U.S. Army Corps of Engineers to identify potential new installation sites.

If you have questions, please contact Natural Resource Specialist Karen Vyverberg at karen.vyverberg@usda.gov or 303-941-6316.

Sincerely,

STEVE M. LOHR
Director

cc: Karen Vyverberg, Bunni Maceo, Eric Schroder, Molly Westby, Matthew Custer, Truman Barton Lander

WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006

Phone: (307) 777-4600 Fax: (307) 777-4699

wgfd.wyo.gov

December 2, 2019

WER 14313.00
U.S. Army Corps of Engineers
Programmatic Environmental Assessment
Upper Missouri River Basin Water Management
Plains Snow and Soil Moisture Monitoring Network
Statewide

Rebecca Podkowka
Department of the Army
Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 68102

Dear Ms. Podkowka,

The staff of the Wyoming Game and Fish Department (Department) has reviewed the notice for the proposed Programmatic Environmental Assessment Upper Missouri River Basin Water Management Plains Snow and Soil Moisture Monitoring Network. We have no terrestrial wildlife or aquatic concerns pertaining to this project.

Thank you for the opportunity to comment.

Sincerely,

Amanda Withroder
Habitat Protection Supervisor

AW/mf

cc: U.S. Fish and Wildlife Service
Chris Wichmann, Wyoming Department of Agriculture, Cheyenne

From:	Amanda Withroder
To:	Podkowka, Rebecca L CIV USARMY CENWO (USA)
Cc:	Matthew Fry
Subject:	[Non-DoD Source] Re: Action Requested: UMB Plains Snow and Soil Moisture Draft Programmatic EA for Agency Review (UNCLASSIFIED)
Date:	Tuesday, March 31, 2020 4:22:12 PM

Hi Rebbeca,

Thank you for including the Department in this PEA review. We do not have any wildlife concerns.

On Tue, Mar 31, 2020 at 11:24 AM Podkowka, Rebecca L CIV USARMY CENWO (USA) <Rebecca.L.Podkowka@usace.army.mil <mailto:Rebecca.L.Podkowka@usace.army.mil> > wrote:

CLASSIFICATION: UNCLASSIFIED

Good Afternoon,

The U.S. Army Corps of Engineers has prepared a draft Programmatic Environmental Assessment (PEA) for the proposed Upper Missouri River Basin (UMB) Water Management Plains Snow and Soil Moisture Monitoring Network in Montana, Wyoming, North Dakota, South Dakota and Nebraska and it is now available for public and agency review at Blockedhttps://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/13937.

This PEA assesses the overall environmental effects of updating existing monitoring stations and installing new monitoring stations within the UMB to collect data on plains snowpack and soil moisture. The purpose of the proposed action is to provide sufficient data for various federal, state and local agencies to improve forecasting for management decisions and operational needs. Currently, there are approximately 180 existing mesonet sites in the upper Missouri River basin that collect soil moisture and snowpack data, or may be modified to collect these data. An estimated additional 360 sites are required in order to provide the necessary quality of data to better inform runoff forecasting.

The PEA broadly assesses the environmental impacts of proposed actions that involve multiple individual projects and a large geographical area as described in the Council on Environmental Quality (2014) guidelines for Effective Use of Programmatic NEPA Reviews. Programmatic analyses have value by setting out the broad view of environmental impacts and benefits of a proposed decision, on which federal agencies can rely for site-specific, individual projects. Regulations 40 CFR §1500.4(i), §1502.4 and §1502.20 encourage the development of program-level NEPA documents and the use of tiering to eliminate repetitive discussion and focus on specific issues to a proposed action. For the overarching proposed action, the scope of the project and environmental impacts are evaluated in this PEA and each individual site would be documented in a Record of Environmental Consideration (Appendix A of the PEA) that will be tiered from this PEA.

I am requesting comments, questions or concerns from you and your representative agencies on the draft PEA no later than 1 May 2020.

Respectfully,

Rebecca Podkowka
Environmental Resource Specialist
U.S. Army Corps of Engineers
CENWO-PM-AC
1616 Capitol Avenue
Omaha, NE 68102
Phone: 402-995-2677

CLASSIFICATION: UNCLASSIFIED

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Amanda Withroder
Habitat Protection Program
Wyoming Game & Fish Department
5400 Bishop Blvd.
Cheyenne, WY 82006
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(307) 777-4587 office
(307) 399-3590 cell

amanda.withroder@wyo.gov <mailto:amanda.withroder@wyo.gov>

Conserving Wildlife, Serving People