Charles Etok Edwardsen Mitigation Bank

Prospectus

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In cooperation with:

March 5, 2019

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Acronyms and Abbreviations

AA	Assessment Area
ADF&G	Alaska Department of Fish and Game
ADN	Anchorage Daily News
ADOT&PF	Alaska Department of Transportation & Public Facilities
AKWAM	Alaska Wetlands Assessment Method
ATV	All-Terrain Vehicle
BEO	Barrow Environmental Observatory
BLM	Bureau of Land Management
CDM	Credit Debit Methodology
CEEMB	Charles Etok Edwardsen Mitigation Bank
CEC	Commission for Environmental Cooperation
CFR	Code of Federal Regulations
CWA	Clean Water Act
EIP	Ecosystem Investment Partners

EPA	Environmental Protection Agency
ESA	Endangered Species Act
HGM	Hydrogeomorphic
HUC	Hydrologic Unit Code
IBA	Important Bird Area
IHLC	Inupiat History Language and Culture
IRT	Interagency Review Team
IUCN	International Union for the Conservation of Nature and Natural Resources
LTMP	Long-Term Monitoring Plan
MBTA	Migratory Bird Treaty Act
MOA	Memorandum of Agreement
NABCI	North American Bird Conservation Initiative
NOAA	National Oceanic and Atmospheric Administration
NPR-A	National Petroleum Reserve - Alaska
NPS	National Park Service
NSB	North Slope Borough
PPS	Percentage of Possible Scores
RGL	Regulatory Guidance Letter
ROD	Record of Decision
TCF	The Conservation Fund
TLUI	Traditional Land Use Inventory
UAF	University of Alaska Fairbanks
UIC	Ukpeaġvik Iñupiat Corporation
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

PROSPECTUS (33CFR 332.8(d)(2)/ 40 CFR 230.98(d)(2)

EIP III Credit Co, LLC, a business entity of Ecosystem Investment Partners (EIP), in cooperation with Ukpeaġvik Iñupiat Corporation (UIC), is proposing to establish a wetlands mitigation bank near Utqiaġvik, Alaska (Figures 1 and 2). EIP will act as Sponsor, and UIC will be the landowner and Long Term Steward. This prospectus provides an overview of the proposed Charles Etok Edwardsen Mitigation Bank and is the basis for review by the U.S. Army Corps of Engineers (USACE), in consultation with the Interagency Review Team (IRT). This document follows the process laid out in 33 CFR § 332.8 Mitigation banks and in-lieu fee programs and the November 2015 Alaska District Prospectus Review Process and Checklist for Mitigation Banks and In-Lieu Fee Programs (Mitigation Bank Checklist).

Proposed Mitigation Bank Details:

Identification:	Charles Etok Edwardsen Mitigation Bank
Mitigation Type:	Preservation
General Location:	Avak Creek/Elson Lagoon, Frontal Beaufort Sea
Service Area:	Arctic Coastal Plain
	Hydrologic Unit Code (HUC)s 190601, 190602, 190603, 190604, 190605
Coordinates:	71°16'26.55"N, 156°30'34.21"W
Legal:	Township 22N, Range 17W, Sections 5, 6, 7, 8, 16, 17, 18. Range 18W, Section 1. Umiat Meridian

Total Acres Protected:	2,294.18
Total Acres of Aquatic Resources:	1,570.83
Total Credits Proposed:	1,123.34

1. Objectives [33 CFR § 332.8(d)(2)(i)]

The Charles Etok Edwardsen Mitigation Bank (CEEMB) contains 1570.83 acres of aquatic resources as shown in Table 1, including 1521.50 acres of palustrine aquatic resources, 3.90 acres of estuarine aquatic resources, 13.87 acres of riverine aquatic resources, 3.37 acres of lacustrine fringe aquatic resources, and 28.19 acres of small ponds (palustrine permanently flooded unconsolidated bottom) (Figure 3). There are also 723.35 acres of lakes and no uplands occur onsite.

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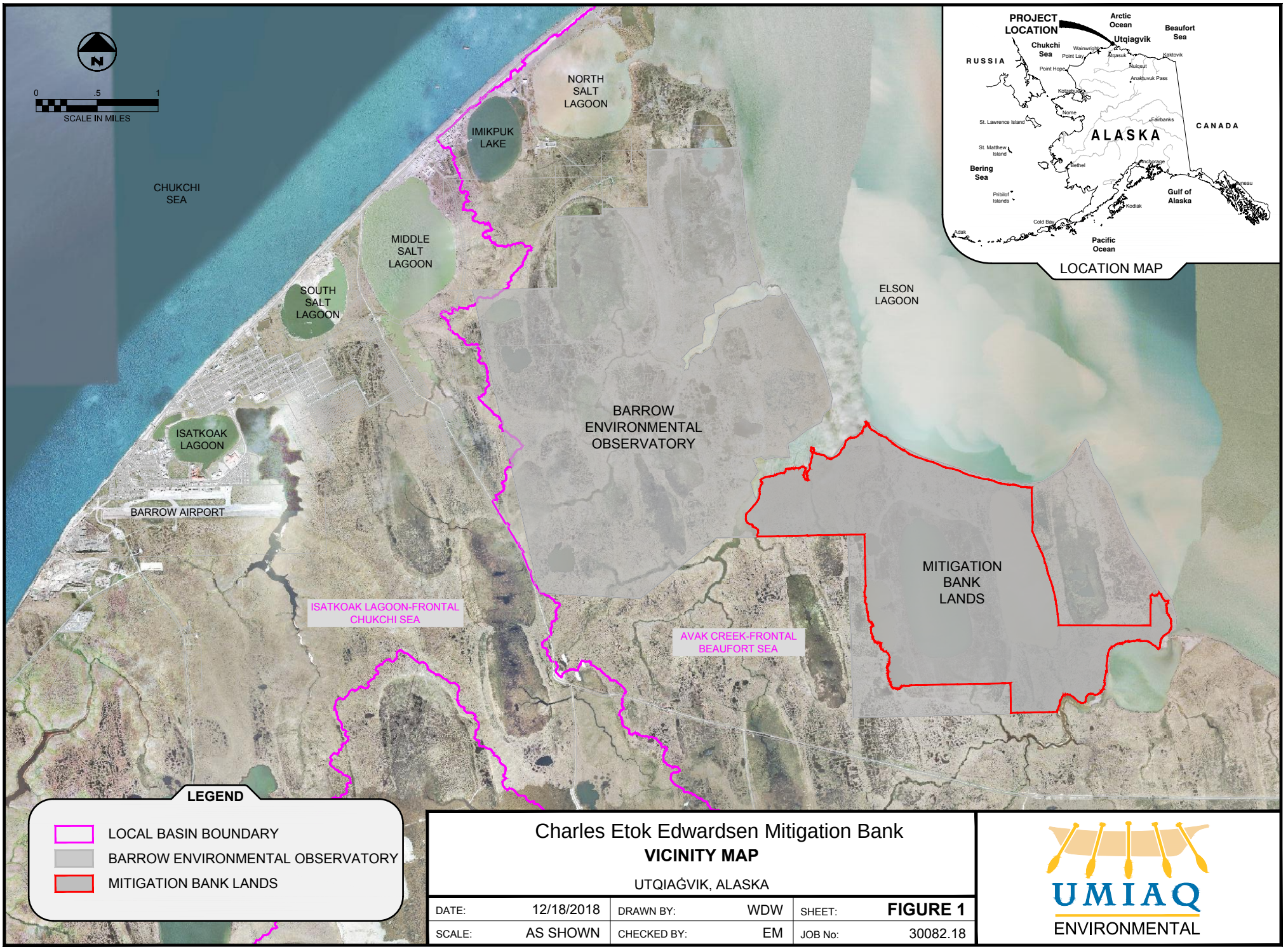

Charles Etok Edwardsen Mitigation Bank

VICINITY MAP

UTQIAĠVIK, ALASKA

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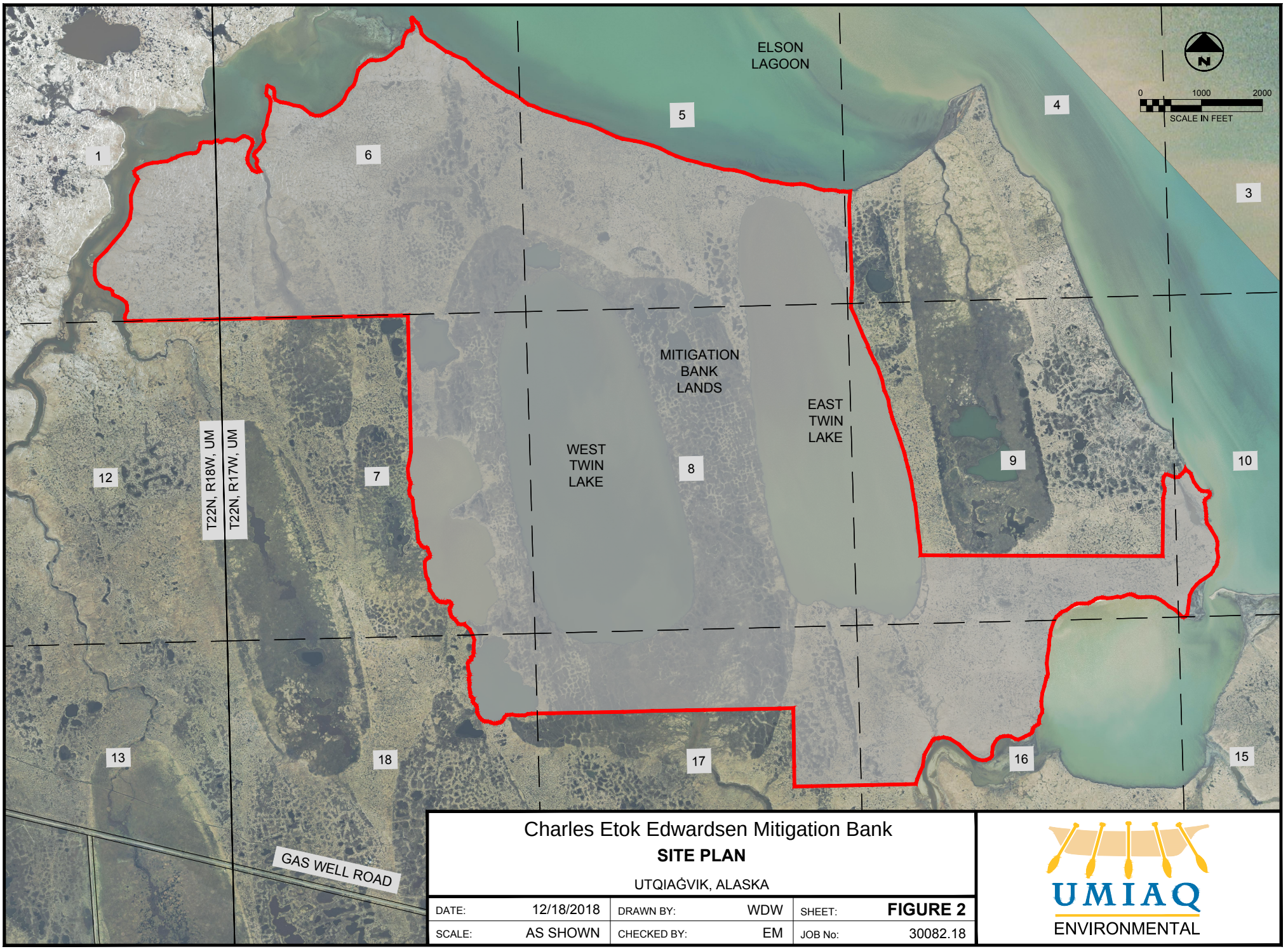

Charles Etok Edwardsen Mitigation Bank

SITE PLAN

UTQIAĠVIK, ALASKA

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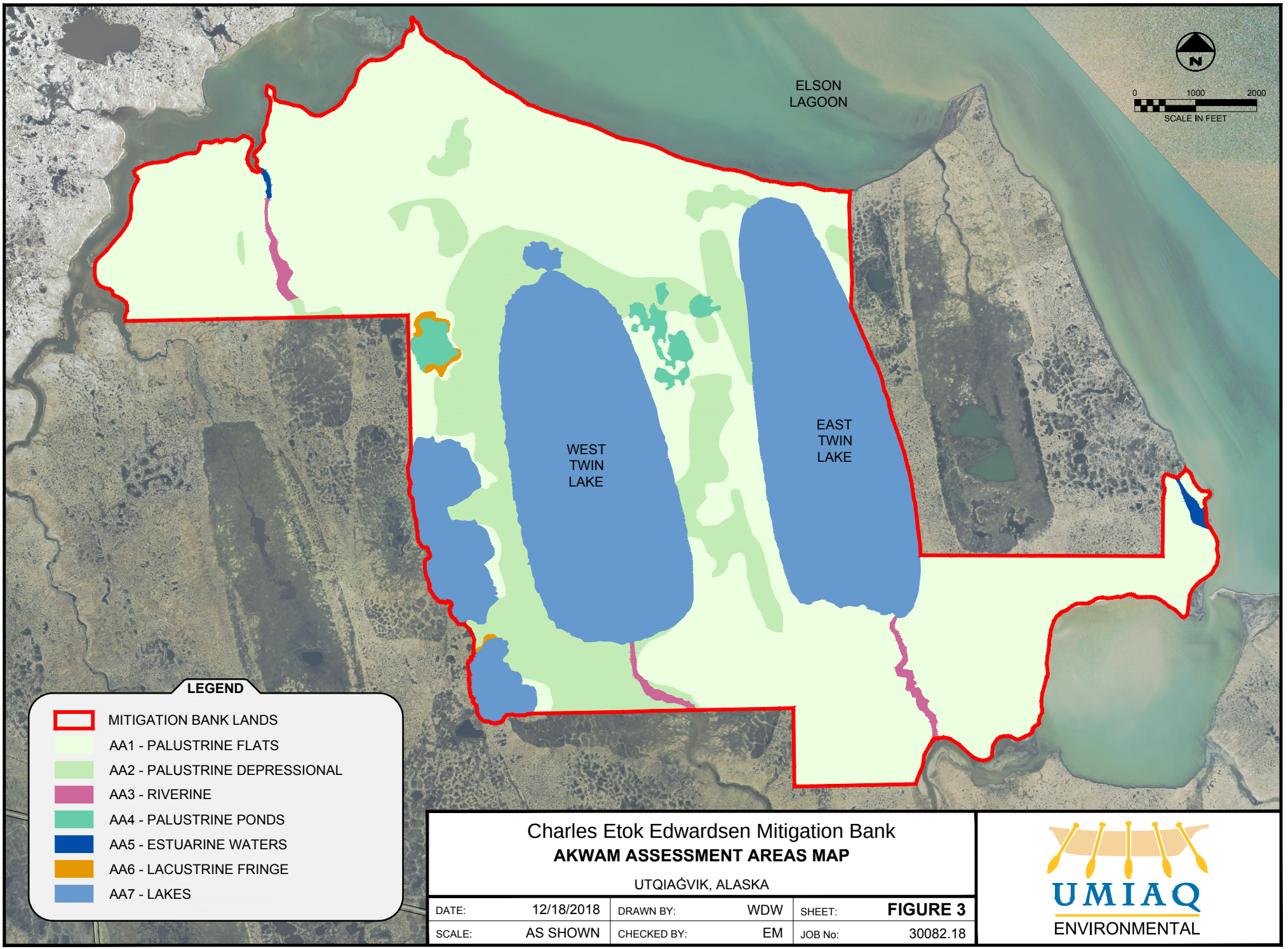

Charles Etok Edwardsen Mitigation Bank

AKWAM ASSESSMENT AREAS MAP

UTQIAĠVIK, ALASKA

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Table 1: Aquatic Resources in the CEEMB

Aquatic Resource Type	Acreage
Palustrine	1,521.50
Estuarine	3.90
Riverine	13.87
Lacustrine Fringe	3.37
Small Ponds	28.19
TOTAL[1]	**1,570.83**

[1] *Lakes are not included in this total.*

Preservation of wetlands is proposed as the method of compensation. The CEEMB was evaluated for preservation using a watershed approach and has been determined to be high priority for preservation because of its position in the landscape; it meets habitat requirements for important mammals, birds, and fish, and it is worth preserving based on threats of development observed at the watershed level.

2. Establishment and Operation [33 CFR § 332.8(d)(2)(ii)]

The proposed CEEMBC will be established as a private entrepreneurial bank by EIP (the Sponsor), in cooperation with UIC, subject to USACE approval. The CEEMB property is currently owned by UIC who, at the direction of the Sponsor, will record a Declaration of Restrictive Covenant over the property in the Barrow Recording District, Third Judicial District and assist with management as the Long-Term Steward. EIP has entered into a lease agreement with UIC and will be performing wetlands bank management services in accordance with the executed lease dated August 30, 2018.

Upon approval of the CEEMB by USACE, the Sponsor will open up one or more phases for operation, establish and fund the appropriate financial assurances, place permanent land restrictions for the open phases, and commence selling the first release of credits. Concurrently, boundary marking, monitoring, and maintenance activities will begin and continue throughout the life of the bank with an appropriate non-wasting stewardship endowment funded and in place.

The work plan for the CEEMB involves several establishment tasks to be completed within the first year, including:

- Task 1: Mark the property boundaries in prominent access locations with signs indicating that the site is private and permanently protected property.
- Task 2: Post signs at prominent points along trails.
- Task 3: Post signs along edge of the mitigation bank reminding users that wetlands are sensitive.
- Task 4: Communicate with the public about the CEEMB's status as a mitigation site, and that the site has been preserved in perpetuity.

Annual monitoring during the CEEMB's operational life will involve a qualitative assessment of the condition of aquatic resources and upland buffers, monitoring of the restrictive covenants, and signage on the CEEMB. The monitoring period will extend for 5 years following approval of the mitigation plan.

The Sponsor will monitor the site and provide reports to USACE no later than December 31st on year 1, year 3, and year 5 of the monitoring period. The monitoring report will follow the same protocol specified

in the Regulatory Guidance Letter of October 10, 2008, (RGL No. 08-03), including also the following information:

- Photographs taken from the southwest corner of the CEEMB (most likely ATV access), along the edge of Elson Lagoon, and at any points showing worn ATV trails.
- Aerial photographs taken every 2-3 years, as available, showing percent of vegetation cover when compared to previous aerial photograph.
- Aerial photograph showing the current location of coastline and erosion/ recession of the coastline which may have occurred since approval of the Mitigation Plan.
- A written description of the condition of the aquatic resources and their buffers.
- A written description of the status of the restrictive covenants
- A description of any work to replace signage or adaptive management requirements.
- A qualitative assessment to determine if adaptive management is needed. If adaptive management is deemed appropriate. The report will describe the plan and actions to accomplish adaptive management.

USACE may extend the monitoring period beyond 5 years and require additional monitoring reports if USACE determines from the reports submitted during the 5-year monitoring period that performance standards are not being met and baseline conditions are not being maintained. After bank closure, long term management will begin. The long-term management strategy for the CEEMB is described in Section 5.

3. Proposed Service Area [33 CFR § 332.8(d)(2)(iii)]

The Environmental Protection Agency (EPA) has identified and published ecoregion maps, areas where ecosystems (and the type, quality, and quantity of environmental resources) are generally similar. Designed to serve as a spatial framework for the research, assessment, and monitoring of ecosystems and ecosystem components, ecoregions denote areas of similarity in the mosaic of biotic, abiotic, terrestrial, and aquatic ecosystem components with humans being considered as part of the biota (CEC 2006). Wetlands within the CEEMB are representative of those on the Arctic Coastal Plain of Alaska, and are within EPA's level III Ecoregion 2.2.1, "Arctic Coastal Plain" (ACP). The ACP stretches westward across the northern coast of Alaska from Point Lay on the coast of the Chukchi Sea coast to Mackenzie Bay in Canada. Several watersheds, or hydrologic units, exist within the ACP (Figure 4).

The U.S is divided and sub-divided into successively smaller hydrologic units which are identified by a unique hydrologic unit code (HUC) based on classification in the hydrologic unit system (USGS 2018). CEEMB is within the Utqiaġvik unit (HUC 190602). The ACP exists within the following HUCs:

- Western Arctic HUC 190601
- Utqiaġvik (Barrow) Alaska HUC 190602
- Colville River HUC 190603
- Prudhoe Bay HUC 190604
- Eastern Arctic HUC 190605

It is proposed that projects within the ACP, and therefore within the above HUCs, be allowed to acquire the requisite mitigation at the CEEMB.

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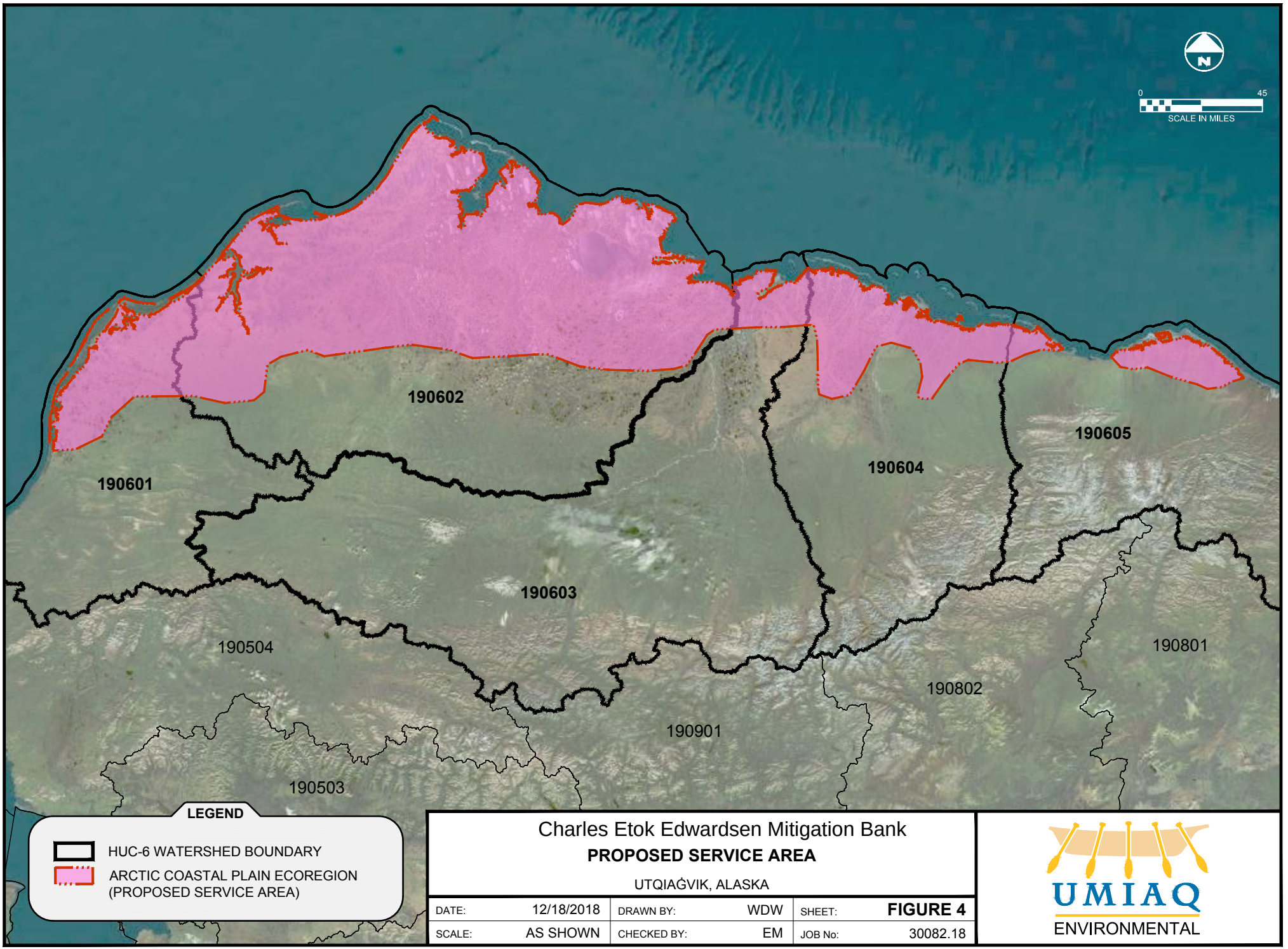

Charles Etok Edwardsen Mitigation Bank

PROPOSED SERVICE AREA

UTQIAĠVIK, ALASKA

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4. Need and Feasibility [33 CFR § 332.3(d)(2)(iv), § 332.4(c)(3)]

The CEEMB was strategically selected using a watershed approach to preserve the quantity and quality of aquatic resources in the ACP watersheds. Factors considered in selecting this property included the presence of high-functioning wetlands with ecological importance to their watershed, the presence of threats to the property, and the importance of this property for preservation in the ACP watersheds. Specific attributes of the property meet the watershed needs and make this property appropriate and practicable for compensatory mitigation, including:

- Undeveloped high-functioning palustrine and estuarine wetlands within a frontal Beaufort Sea watershed;
- Unique and sensitive habitat for migratory birds (Important Bird Area), Species of Greatest Conservation Need (ADF&G 2015), species protected under the Endangered Species Act (ESA) (1973), and terrestrial species;
- Within a watershed which drains to an anadromous waterbody with three species of anadromous fish important for subsistence purposes;
- The property contains one critical site listed by the North Slope Borough (NSB) Department of Inupiat History Language and Culture (IHLC) on the Traditional Land Use Inventory (TLUI) (Nageak 2018);
- The area is in the path of development that would likely destroy the property's aquatic resources and their functions;
- Permanent protection and long-term management is available by the landowner (UIC) and Sponsor (EIP); and
- High priority for protection and long-term stewardship in the watershed evaluated with available quantitative assessment tools and best professional judgement.

Preservation and long-term stewardship of the CEEMB site is a priority because the functions provided by the site's aquatic resources are under threat from development. Scientific research installations are currently encroaching the CEEMB site and will increase in abundance as the community grows and expands inland. Oil, gas, and mineral development already exists nearby and could occur within the CEEMB or expand and compromise the Site's aquatic resources if it is not protected and cared for.

The land is currently owned by UIC and is within the Barrow Environmental Observatory (BEO), which has supported marine and terrestrial scientific research since 1947. The BEO is managed by UIC Science, who provides technical and logistical management and support services to scientific research teams. UIC Science is based nearby and employees familiar with the CEEMB lands will play a role in ongoing monitoring and maintenance.

Oil and gas rights under the CEEMB site are reserved to the United States and it is not practicable to acquire the subsurface rights. However, within the National Petroleum Reserve – Alaska (NPR-A), there is a federally-designated one-mile buffer from the coastline where exploratory well drill pads, production well drill pads, or a central processing facility for oil or gas are not allowed (BLM 2013). In the event that these lands are precluded from this buffer because surface rights are privately held, the avoidance, minimization and mitigation measures of the Clean Water Act (CWA) 404 program would require development to occur outside of the restrictive covenant.

The following factors were considered in selecting the CEEMB:

- Plant Communities: The plant communities are established, largely undisturbed, and will have low vulnerability to change after the site is preserved.
- Invasive Exotic/Noxious Species: The vulnerability of the site to colonization by invasive exotic or noxious species is low because there are few recruitment sources nearby, the site has low suitability for establishment, and the size of the property reduces edge effects.
- Water Quality: The vulnerability of the mitigation site to experience degraded water quality is low because the site is undisturbed and the surrounding land uses are largely undisturbed.
- Water Quantity: The vulnerability of the mitigation site to negative hydrological conditions is low because the Beaufort Sea coast and local hydrology are unlikely to change in the foreseeable future.
- Indirect Impacts: The vulnerability of the mitigation to indirect impacts is low because the site is large and bounded by lands under ownership and control of UIC.
- Direct Impacts: The vulnerability of the mitigation site to direct impacts will be non-existent because the protections to be implemented (i.e., management by Long-Term Steward and restrictive covenant) will eliminate the potential for impacts.

In June 2018, USACE and the EPA signed a Memorandum of Agreement (MOA) concerning *Mitigation Sequence for Wetlands in Alaska under Section 404 of the Clean Water Act*. According to the MOA, "Compensation for impacts to [permafrost wetlands] should be provided, if practicable, through in-kind rehabilitation, enhancement, or preservation since there is greater certainty these methods of compensation will successfully offset permitted impacts" (USACE & EPA 2018). However, the MOA also recognizes that in areas of permafrost, restoring, enhancing, or establishing in-kind wetlands for compensatory mitigation may not be practicable due to the technical limitations. Permafrost wetlands are either frozen or not, making them difficult or impossible to replace once thawed or damaged (USACE & EPA 2018). Currently, there are no wetlands mitigation banks on the North Slope of Alaska which preserve permafrost wetlands. The proposed CEEMB will offer a much needed resource for projects which involve filling these unique wetlands in Arctic Alaska.

5. Ownership Arrangements and Long-Term Management Strategy [§ 332.8(d)(2)(v)]

5.1. Site Protection Instrument

The CEEMB property is currently owned by UIC. To permanently protect the site. UIC will record a Declaration of Restrictive Covenant in the Barrow Recording District, Third Judicial District, at the direction of the Sponsor.

Oil and gas on the CEEMB are reserved to the United States. As such, it is not practicable for EIP to acquire the subsurface rights. Within the National Petroleum Reserve-Alaska (NPR-A) Integrated Activity Plan, there is a federally-designated one-mile buffer from the coastline where exploratory well drill pads, production well drill pads, or a central processing facility for oil or gas are not allowed (BLM 2013). In the event that these lands are precluded from this buffer because surface rights are privately held, the avoidance, minimization and mitigation measures would require development to occur outside of the restrictive covenant.

5.2. Long-Term Management

Management activities (both short term and long term) on the CEEMB will be implemented to ensure the integrity of the site's aquatic resources in accordance with the restrictive covenants. The Sponsor (EIP) will be responsible for managing and maintaining the site for as long as the bank is open with credits

remaining. As the Long-Term Steward, UIC will have the primary responsibility for monitoring and maintaining the CEEMB after the Bank is closed and will be the holder of the associated Non Wasting Stewardship Endowment. The Sponsor and UIC as the Long-Term Steward will recognize the rights of USACE to enforce the terms of the Restrictive Covenants. The Long Term Management Plan (LTMP) includes the continuous monitoring of the site, replacement of signage, enforcement of the restrictive covenants, and, if the integrity is compromised, adaptive management in consultation with USACE.

The Long-Term Steward and USACE may meet and confer from time to time, upon the request of any one of them, to revise the LTMP to better meet management objectives and preserve the habitat and conservation values of the CEEMB. Any proposed changes to the LTMP shall be discussed with USACE and the Long-Term Steward. Any proposed changes will be designed with input from all parties. Amendments to the LTMP shall be approved by USACE in writing and shall be implemented by the Long-Term Steward.

If the USFWS determines, in writing, that continued implementation of the LTMP would jeopardize the continued existence of a state or federally listed species, any written amendment to this LTMP, determined by the USFWS as necessary to avoid jeopardy, shall be a required management component and shall be implemented by the Long-Term Steward.

In an event of dispute between USACE and the Long-Term Steward concerning interpretation and application of the LTMP, USACE shall consider comments from EIP and/or information provided by an independent review. If the dispute is a result of the Long-Term Steward failing to implement the tasks described in this plan and is notified of such failure in writing by USACE, the Long-Term Steward shall have 90 days to cure such failure. If failure is not cured within 90 days, USACE may designate a replacement Long-Term Steward in writing. Upon written notice of replacement, the Long-Term Steward shall tender all money and property to the new Long-Term Steward and shall be discharged from all duties and responsibilities.

If the land is compromised (through illegal dumping, building or other land disturbance), the work of maintenance will be to remove the compromise and restore the land. If this happens, a discussion will occur with USACE as to the proper restoration of the issue. This maintenance will be ongoing into long term management. No additional maintenance other than what is described herein is anticipated.

To support ongoing monitoring and maintenance at the CEEMB, EIP will provide funds to UIC for a non-wasting endowment fund, which will be sufficient to generate the annual income needed to meet the costs to maintain the site. This endowment will be maintained by the Long-Term Steward in an approved financial institution of the Long-Term Steward's choice.

6. Sponsor Qualifications [33 CFR § 332.8(d)(2)(vi)]

The Sponsor, EIP, has successfully permitted, constructed and managed over 40 mitigation banks in 10 Corps Districts nationally. Information on these projects can be found at: https://ecosystempartners.com/endangered-species-stream-and-wetland-mitigation-banks/.

In addition, EIP's team of 12 principals and staff bring a wealth of knowledge and experience in all of the aspects required for successful project design, establishment and implementation. EIP's Managing Partner Nick Dilks has extensive experience in land conservation finance and real estate. Prior to founding EIP, he spent 10 years with The Conservation Fund, most recently as its Vice President for Real Estate, completing some of TCF's most complex and innovative transactions. EIP's Director of Operations, David Urban has

successfully permitted, designed, and operated over 50 mitigation banks and restoration projects in Chicago, Rock Island, Detroit, Omaha, Mobile, New Orleans, Jacksonville, Norfolk, Philadelphia, Huntington, Louisville, Pittsburgh, St Paul, Sacramento, Los Angles, Galveston and Ft. Worth districts of the USACE. More on the EIP team at: https://ecosystempartners.com/.

7. Ecological Suitability [33 CFR § 332.8(d)(2)(vii)(A)]

The resources to be preserved at the CEEMB provide important physical, hydrological, chemical, and biological function to the ACP watersheds.

Preservation of the CEEMB is a priority in part due to the important habitat which is provided by this site to species protected by the State of Alaska and the U.S. government. The CEEMB provides habitat to three species listed as threatened under the ESA, 29 regularly occurring Species of Greatest Conservation Need (ADF&G 2015), and countless avian species protected by the Migratory Bird Treaty Act (MBTA) (1918). The CEEMB is within the Planning Area and Moderate Use Area for the USFWS' Steller's Eider Conservation Plan for Barrow, Alaska (2004), which "recognizes that cumulative loss and degradation of eider habitat in this [use area] could detrimentally affect recovery of Steller's eiders" (USFWS 2004).

The field survey for the Baseline Assessment (Appendix A) included the CEEMB and surrounding lands within the BEO (ABR 2015). Wetlands were determined, boundaries were interpreted, and wetlands and waters were classified by dominant vegetation and water regime. An aquatic site assessment (functional assessment) was performed to define environmental conditions, characteristics, and develop wetland functional classes.

The most common wetland types at the site can be described as Palustrine Semipermanently Flooded Persistent Emergent (PEM1F), Palustrine Seasonally Flooded/Saturated Persistent Emergent meadow (PEM1E), and Palustrine Saturated Persistent Emergent meadow (PEM1B). The ABR report (ABR 2015) (Appendix A) provides details about the 41 plots assessed over the property. One of the important characteristics of this site is the persistence of the vegetative communities and their undisturbed nature.

The PEM1F and PEM1E wetlands are a component of lowland areas surrounding lakes or within a drained lake basin. The PEM1F wetland type is most commonly a patterned feature with wetter areas occupying micro-lows. The PEM1F areas consist of moist high zones and the wet depressions. The microtopographic depressions are typically dominated by wetland obligate sedges including water sedge (*Carex aquatilis*), tall cottongrass (*Eriophorum angustifolium*), and red cottongrass (*E. russeolum*). Areas with surface water support stands of Arctic pendant grass (*Arctophila fulva*). The moist wetland types also support a variety of sedges and limited dwarf shrub cover including tealeaf willow (*Salix pulchra*), oval-leaf willow (*S. ovalifolia*), and least willow (*S. rotundifolia*). PEM1E has a plant community composition very similar to that of PEM1F, with wet micro-low and more mesic micro-high zones. PEM1E was differentiated from PEM1F through aerial photo interpretation; it has less surface water visible in the imagery. PEM1F and PEM1E are present as depressional areas and flats, respectively, on this property. Soils are typically histic epipedons with a high-water table and saturation to the surface.

The other very common vegetative community as this site is PEM1B, which are present as flats on this property. The plant communities are dominated by a variety of emergent species including Arctic sweet coltsfoot (*Petasites frigidus*), Arctic woodrush (*Luzula nivalis*), *Carex aquatilis*, *Eriophorum angustifolium*, and *L. confusa*. The dwarf shrub *Salix rotundifolia* is occasionally codominant. This wetland was typically

associated with raised convex slope features occurring on banks along the coast or along the margins of lake basins. The hydric soil indicators Alaska Redox and positive reaction to alpha, alpha-dipyridol were present. In addition, saturation was observed within the top 12 inches of the soil profile.

Several variations on the wetlands described above occur throughout the CEEMB: Palustrine Permanently Flooded Persistent Emergent Marshes (PEM1H), Palustrine Temporary-Tidal Persistent Emergent (PEM1S), Palustrine Permanently Flooded Unconsolidated Bottom Ponds (PUBH), Riverine Intermittent Vegetated Streambed (R4SB7), and Estuarine Intertidal Irregularly Flooded Unconsolidated Shore (E2USP).

The PEM1H wetlands are permanently flooded lacustrine fringe wetlands within the study area, which are present as depressional wetlands on this property. The plant community is dominated by *Arctophila fulva* and Pallas' buttercup (*Ranunculus pallasii*), with a thick floating mat of obligate wetland mosses. Soils are histosols or histic epipedons with permanent surface water.

The Palustrine Temporary-Tidal Persistent Emergent (PEM1S) wetlands are tidally influenced freshwater types which occur on the raised coastline of the study area and are present as flats on this property. This community type supports an emergent vegetation mat that includes scurvygrass (*Cochlearia officinalis*), *Eriophorum angustifolium*, northern woodrush (*Luzula confusa*), Fisher's tundragrass (*Dupontia fisheri*), and *Arctophila fulva*. PEM1S usually occurs on raised convex banks that support moist wetland communities. Histic epipedons are a common hydric soil type. Primary hydrologic indicators (e.g., saturation) were absent at the time of sampling, but the secondary hydrology indicators shallow active layer (shallow aquitard) and FAC neutral test were present.

The PUBH ponds occur throughout the bank site and are shallow open water areas without islands but may have polygonised margins.

The R4SB7 areas within the site occur within flats and depressional wetlands areas of the site and function as outflows to Ikpik Slough and the Mayeoak River system. The dominant emergent vegetation is *Carex aquatilis*, *Eriophorum* spp., *Arctophila fulva* and *Hippuris vulgaris.* In ABR 2015 these areas were described as palustrine wetlands (PEM1F, PEM1E). In reviews of the site's aerial imagery through time several areas were noted to exhibit outflow characteristics. Three were identified as being more similar to Riverine Intermittent Vegetated Streambed than PEM1E or PEM1F.

The E2USP features were mapped immediately adjacent to the nearshore marine waters of Ikpik Slough. At the time of the field survey, these E2USP waters had no direct surface water connection to the nearshore marine waters, but EC values were out of range of the meter used (> 20,000 µS/cm), indicating the salt concentration of the water exceeds that of freshwater (Riverine and Palustrine) systems. Waters are saline with an irregularly flooded regime receiving salt water input during storm surges.

Wetlands in the CEEMB were evaluated on wetland functions that were specific to the Arctic Coastal Plain and rated highest in providing the following functions: sediment/ nutrient/ toxicant removal, educational/ scientific/ recreational/ subsistence use, fish habitat suitability, and threatened and endangered species support. Upon evaluation, wetlands were assigned a category I, II, or III according to their overall functional capacity, following the guidelines in the USACE Ratios for Compensatory Mitigation (USACE 2014). According to the Baseline Assessment, 98.6% of the study area is considered category I, which is defined as wetlands that (1) provide documented habitat for threatened and endangered species; (2)

represent a high quality example of a rare wetland type; (3) are rare within a given region; (4) provide habitat for very sensitive or important wildlife or plants; and/or (5) are undisturbed and contain ecological attributes that are impossible or difficult to replace within a human lifetime, if at all (ABR 2015). The list of regularly occurring wildlife species within the BEO includes 35 birds and 9 mammals, which is considered highly diverse according to functional classification performed in the Baseline Assessment (ABR 2015). Of these species, 24 of the 35 birds and 5 of the 9 mammals have been identified by the ADF&G as Species of Greatest Conservation Need (ADF&G 2015).

The North Slope of Alaska provides nesting, breeding, and rearing habitat for millions of migratory birds. The site is between two Important Bird Areas (IBA) as designated by Audubon Alaska, the Chukchi Sea Nearshore IBA and the Barrow Canyon and Smith Bay IBA (Audubon Alaska 2014). Two of the bird species which find breeding, nesting, and rearing habitat within the mitigation site are Steller's and spectacled eiders, both of which are listed as threatened under the ESA. Steller's and spectacled eiders are also categorized as vulnerable on the International Union for the Conservation of Nature and Natural Resources (IUCN) Red List and the NatureServe Explorer Global Status, which catalog species' risk of global extinction when evaluated by their published criteria (IUCN 2018, NatureServe 2018). Additionally, both eiders are listed on the North American Bird Conservation (NABCI)'s State of the Birds 2016 Watch List as a species of high conservation concern (NABCI 2016).

The CEEMB is also within the range of polar bear which are also listed as threatened under the ESA and categorized as vulnerable on the IUCN Red List. Polar bear barrier island critical habitat exists opposite of Elson Lagoon along the Plover Islands, and within Elson Lagoon at locations south of the CEEMB. The site itself does not contain denning habitat, as the wetlands have generally low topographic relief (ABR 2015).

Habitat also exists within the CEEMB for the yellow-billed loon, which has been considered for listing under the ESA beginning in 2004. The U.S Fish and Wildlife Service (USFWS) determined in 2014 that the yellow-billed loon is not warranted for listing, but it remains a priority species for the USFWS Alaska Region (USFWS 2014). In early 2015, a land trade between the Bureau of Land Management (BLM) and UIC was considered in which BLM would gain surface rights of approximately 3,200 acres just south of the CEEMB boundary, in order to protect yellow-billed loon habitat (BLM and UIC Meeting, February 2015).

The CEEMB is within the Avak Creek-Frontal Beaufort Sea watershed (HUC 1906020201). Avak Creek flows southeast from Ikroavik Lake, discharging into Iko Bay of Elson Lagoon. Avak Creek is an anadromous waterbody listed in the Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes (Anadromous Waters Catalog) (ADF&G 2018). In Avak Creek, broad whitefish, least cisco, and sockeye salmon are known to be present, all of which are categorized by ADF&G as Species of Greatest Conservation Need.

In addition to providing important habitat, the CEEMB is uniquely located in an area with cultural and potential archaeological significance. The community of Utqiaġvik is located adjacent to the NPR-A, approximately 250 miles west of the Arctic National Wildlife Refuge (Arctic Refuge), and approximately 205 miles north of the Gates of the Arctic National Park and the Noatak National Preserve. Across Elson Lagoon from the CEEMB lies the Birnirk National Historic Landmark, also known as Pigniq. The landmark is composed of 19 mounds on beach ridges made up of ancient sod houses, meat caches, and cultural debris (UAF 2016). Technology developed at this site, and other similar sites, supported rapid population expansion across the arctic regions of North America and Greenland (NPS 2018). No comprehensive archaeological study has been completed at the CEEMB, however lands around Elson Lagoon contain

multiple sites listed on the NSB's TLUI which is an inventory of historic, archaeological, and cultural sites within the NSB (NSB 2014). One such site known as Tikiġaaġruk is within the CEEMB, and contains a historical summer hunting camp, duck hunting area, and a site used by reindeer herders (Nageak 2018).

8. Water Rights [33 CFR § 332.8(d)(2)(vii)(B)]

UIC holds surface rights, including water rights in and around the CEEMB. Precipitation and erosion on the coastal edges of the CEEMB occurs naturally and will not be controlled by the Sponsor or UIC. Upon recording the Restrictive Covenant, neither onsite nor offsite hydrological disturbance is expected to affect the bank.

9. Preservation Criteria [33 CFR § 332.3(h)]

This project meets the five criteria for preservation identified in 33 CFR § 332.3(h):

(i) The resources to be preserved provide important physical, chemical, or biological functions for the watershed;

The CEEMB contains valuable aquatic resources, provides important functions and services, and contributes to the protection and sustainability of the ACP watersheds. This area contains pristine wetlands that retain sediment, nutrients, and remove toxicants, regulate flood flow, provide erosion control and shoreline stabilization, maintain the soil thermal regime, provide and export organic matter, support fish, avian, and mammal habitat including habitat for threatened and endangered species, and provide important scientific and subsistence use.

(ii) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available;

As detailed in Section 7, 69% of birds and 56% of mammals which are regularly occurring within the CEEMB have been identified in Alaska's Wildlife Action Plan as Species of Greatest Conservation Need (ADF&G 2015). Three of these species that regularly occur within the site are listed as threatened under the ESA, including the polar bear, Steller's eider, and spectacled eider. Polar bear barrier island critical habitat exists opposite of Elson Lagoon along the Plover Islands, and within Elson Lagoon at locations south of the CEEMB. These birds and mammals are reliant on the aquatic resources provided in the CEEMB for their habitat.

The adjacent Avak Creek is an anadromous waterbody listed in the Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes (Anadromous Waters Catalog) (ADF&G 2018). It is typical of anadromous fishery streams throughout the ACP. In Avak Creek, broad whitefish, least cisco, and sockeye salmon are known to be present, all of which are categorized by ADF&G as Species of Greatest Conservation Need.

The site provides important bird habitat that is typical of the ACP. It is proximate to and between a series of IBAs as designated by Audubon Alaska (Audubon 2014). It is immediately adjacent to both the Chukchi Sea Nearshore and Barrow Canyon and Smith Bay IBAs, which are immediately adjacent to the "ecologically similar" Ledyard Bay to Icy Cape and Beaufort Sea Nearshore IBAs. The bank site is proximate

to the Teshekpuk Lake Area IBA, as well as the "ecologically similar" Colville River Delta, Northeast ACP and Kasegaluk Lagoon IBAs.

In addition, the site is used by Steller's and spectacled eiders which are categorized as vulnerable on the IUCN Red List and the NatureServe Explorer Global Status, which catalog species' risk of global extinction when evaluated by their published criteria (IUCN 2018, NatureServe 2018). Additionally, both eiders are listed on the North American Bird Conservation (NABCI)'s State of the Birds 2016 Watch List as a species of high conservation concern (NABCI 2016).

(iii) Preservation is determined by the district engineer to be appropriate and practicable;

On March 12, 2015 UMIAQ met with USACE to discuss and locate a suitable place for a wetland mitigation bank and settled on the proposed CEEMB site as meeting the preservation site criteria. This site was further discussed and solidified in a meeting of UMIAQ, The Conservation Fund (TCF) and USACE on November 19, 2015. A series of discussions between UMIAQ and USACE since that time have all focused on this site, including a site visit by USACE during the week of July 24, 2017, as well as subsequent discussions.

(iv) The resources are under threat of destruction or adverse modifications;

The CEEMB is under threat of destruction or adverse modification from scientific and commercial developments. Threats to the property include habitat destruction, fragmentation, and water quality degradation. Sources of the threat include scientific research and associated installations, oil and gas development, port development, and encroachment from the nearby community of Utqiaġvik (Figure 5).

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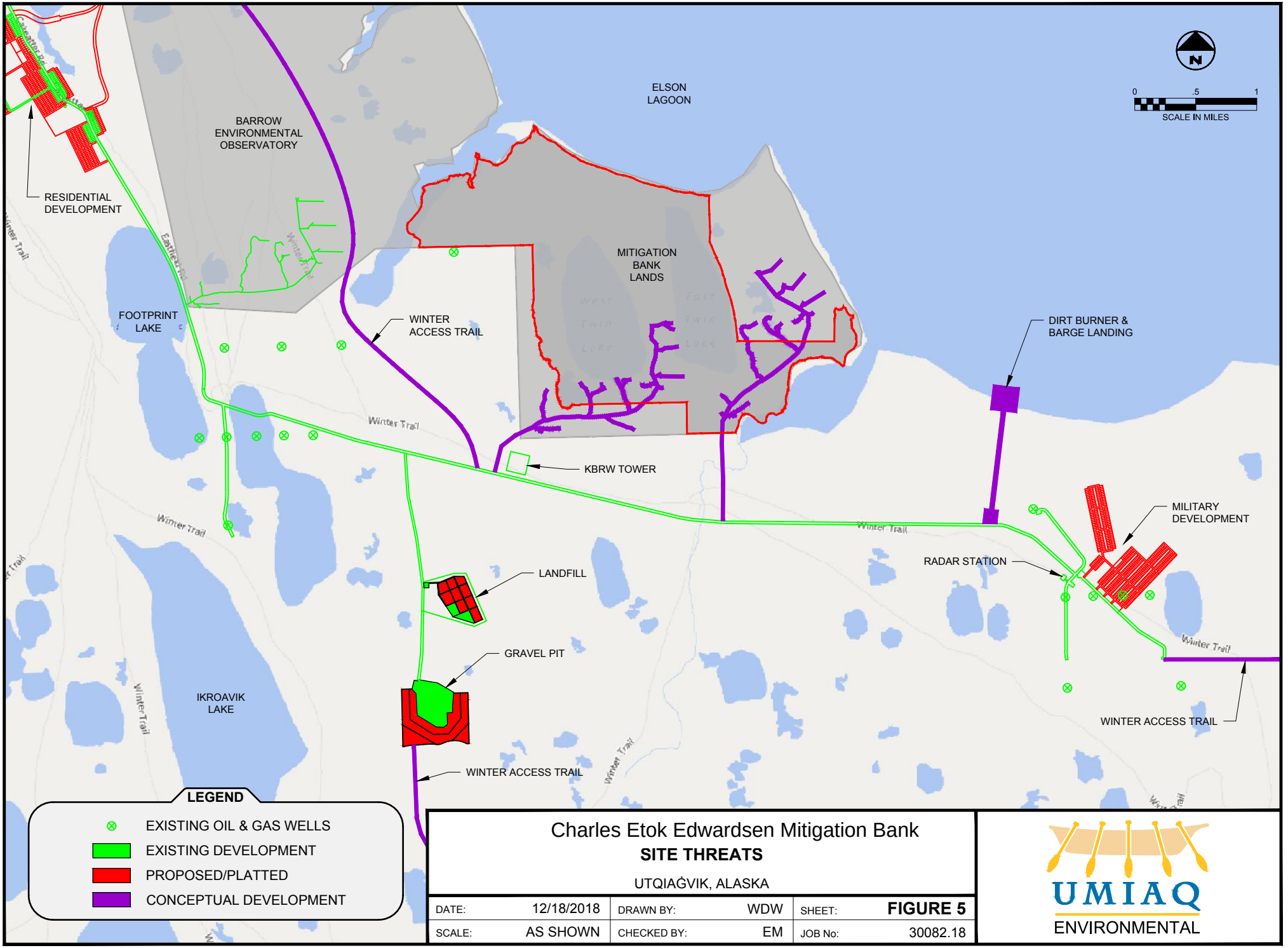

Charles Etok Edwardsen Mitigation Bank

SITE THREATS

UTQIAĠVIK, ALASKA

DATE:	12/18/2018	DRAWN BY:	WDW	SHEET:	FIGURE 5
SCALE:	AS SHOWN	CHECKED BY:	EM	JOB No:	30082.18

UMIAQ ENVIRONMENTAL

Scientific Research Installations

Figure 5: National Environmental Observation Network equipment within the BEO

The Utqiaġvik region is the heart of scientific research and development endeavors on the North Slope of Alaska. For centuries, Utqiaġvik has been a frontier field establishment for basic scientific investigations of the Arctic environment (Shelesnyak 1948). More recently, Utqiaġvik has been called "ground zero" for climate change, as scientists flock from around the globe to study sea ice, erosion, permafrost, and other Arctic phenomena (Reiss 2010). Scientific research is increasing due to climate change and commercial development on Alaska's North Slope. The CEEMB is within the Barrow Environmental Observatory (BEO), which has supported marine and terrestrial scientific research since 1947. The BEO is managed by UIC Science, who provides technical and logistical management and support services to scientific research teams. UIC Science reports an all-time high in interest in the Arctic, especially among U.S. government agencies (UIC 2016). In previous decades, research consisted mostly of manual recording of measurements and real-time observations. However as technological capabilities increase and the ability to use technical instrumentation in Arctic environments improves, how research occurs is changing. In recent years many teams have proposed and are installing monitoring devices for several years or an indefinite timeline. Interest in installing long-term monitoring equipment by the Federal government and universities is increasing.

Figure 6: Powered Atmospheric Radiation Monitoring station in the BEO

Monitoring stations have been installed for Atmospheric Radiation Monitoring, (Figure 6) the National Environmental Observation Network (Figure 7) and proposed for vessel traffic counts, mammal and avian observation, and many other projects (UIC 2016). These installations require large tracts of land, power, road and trail access, and emergency accommodations. As governments and engineering experts attempt to provide creative solutions to solve climate change's most pressing issues, teams are looking for test plots to experiment with tundra response to warming, drought, fires, seeding/ revegetation, and other erosion and warming concerns (Tsuyuzaki 2017).

Already on BEO lands, lakes have been dammed to measure evaporation, organic mats have been removed to measure permafrost melt, areas have been enclosed to monitor vegetation growth without

wildlife presence, animals have been captured and killed, and hydrology has been modified (Mitchell 2016).

Figure 7: Barrow Area Research Sites (BAID 2018)

Abandonment of research projects within the BEO has been an issue for many years. Accumulation of thousands (9,600 as of January 2013) of research sites complicates management, and there has been no comprehensive effort to determine which projects have long-term value or may warrant removal when completed (Figure 8). The ability to locate new sites on the BEO without impeding or impairing other research projects is becoming increasingly difficult (UMIAQ 2013). Installations must be removed because they have left behind damage to tundra and debris. This has become such an issue that UIC has proposed implementing a performance bond requirement for removal of research projects.

An additional concern in continuing to develop the BEO and the CEEMB is the potential to impact archaeological and cultural resources. Local UIC Science archaeologist Dr. Anne Jensen has noted that the area has not been cleared for archaeological significance, and the existing research sites/ installations themselves may qualify as historic sites.

The BEO does have protection in its zoning as a Scientific Research District by the NSB. Due to this zoning some land uses are restricted, however, use of heavy equipment for research installations, environmental manipulation, and subsistence use is allowed (NSB Municipal Code § 19.40.075). Further, this zoning protection was requested by UIC as the landowner, and can be undone. UIC leadership and position on land preservation can and likely will change over time.

The NSB Planning Commission approved the current BEO Master Plan in 2013. The approved Master Plan is intended to show all projects and uses of land to occur on the parcel for at least 10 years (2013-2123). Two new access roads into the BEO are proposed in the Master Plan, one of which extends from Gas Well Road near the KBRW Tower in the direction of West Twin Lake and the CEEMB. The northern half of the BEO is occupied by many installations, and the new access road, when constructed, will be the most economical and logical place to begin installing monitoring equipment and performing environmental manipulations. Proposed developments show the trend is to move scientific research into the CEEMB.

Oil, Gas, and Mineral Development

Natural gas and oil development exists just inland from the CEEMB along Gas Well Road (also known as Gas Field Road and Oil Field Road). Gas Well Road extends south of Utqiaġvik through historical oil and natural gas wells which are a mix of active and plugged/ abandoned installations. Legacy oil wells and

natural gas wells are prominent in this region in part due to the location of the Avak Crater south of Utqiaġvik along the southeastern border of the BEO. The Avak Crater is an impact crater which was formed between 95 million and 3 million years ago and trapped gas in the [Utqiaġvik] fields (Kirschner and Grantz 1990).

Lands surrounding Utqiaġvik are primarily held by UIC with subsurface rights, including mineral rights, being held by the BLM. At the CEEMB, BLM holds subsurface rights and can open oil and gas leasing as well as mining within the site if requested and deemed in the public interest (Kendor 2013).

Oil and gas development within Alaska's North Slope has primarily been within the Prudhoe Bay Region approximately 200 miles from Utqiaġvik, although there are large developments active and planned in Kuparuk, and exploration has occurred in the Chukchi Sea, along the Beaufort Sea coast at Cape Simpson/ Smith Bay, and location across the North Slope. Utqiaġvik is a community with potential for rapid expansion due to oil and gas development. The 2015-2035 Barrow (Utqiaġvik) Comprehensive Plan emphasizes this potential for change by including separate forecasts for population, public facilities, and services both with and without oil and gas development. Interest in Chukchi Sea lease exploration has waned since 2015 (ADN 2016), but potential for development onshore and additional exploration is still very real. As oil and gas development continues to creep closer to the community, construction of projects such as the deep water port and year-round road to Prudhoe Bay will continue to fragment area wetlands.

The CEEMB is adjacent to the National Petroleum Reserve – Alaska (NPR-A). The NPR-A is owned by the U.S. government and managed by BLM. BLM holds annual oil and gas lease sales within the NPR-A. According to the NPR-A Record of Decision (ROD), exploratory drill pads, production well drill pads, or a central processing facility for oil or gas are not allowed within a one-mile buffer from the coastline. However, "other facilities necessary for oil and gas production within NPRA that necessarily must be within this area (e.g., barge landing, seawater treatment plant, or spill response staging and storage areas) would not be precluded. Nor would this stipulation preclude infrastructure associated with offshore oil and gas exploration and production or construction, renovation, or replacement of facilities on existing gravel sites" (BLM 2013).

In addition to managing NPR-A lands, BLM also holds subsurface rights at the CEEMB. As subsurface rights holder, BLM could utilize this site for any number of activities it deems to be in the public interest, including oil and gas development and mining (43 CFR § 3602.31).

Port Development

Development of Elson Lagoon including construction of a deep water port for barge access and shipping operations has been proposed for many years. The landowner, UIC, contracted a feasibility study in 2015 to evaluate the economic viability and has explored funding partnerships. Currently the port access is conceptualized north of the CEEMB, but there is potential for the port to move south in order to avoid a National Oceanic and Atmospheric Administration (NOAA) Clean Air Sector (Figure 9). NOAA measures air quality from a location along the northern boundary of the BEO, and in order to get accurate results requires extremely minimal (preferably zero) emissions within the Clean Air Sector, which extends across Elson Lagoon just south of the proposed port location (UMIAQ 2013). Port development within the CEEMB could feasibly occur depending on future access points and coastal bathymetry.

Utqiaġvik Community Buildout

Utqiaġvik is a coastal community which may only grow inland towards the CEEMB. Extreme erosion at some locations along the Chukchi Sea coast is accelerating the move inland. Gas Well Road is the only year-round access to lands south and east of Utqiaġvik. The NSB maintains Gas Well Road and has been making improvements over the last several years. Road improvements increase the potential for development within the CEEMB by allowing ease of access, especially into areas adjacent to Elson Lagoon.

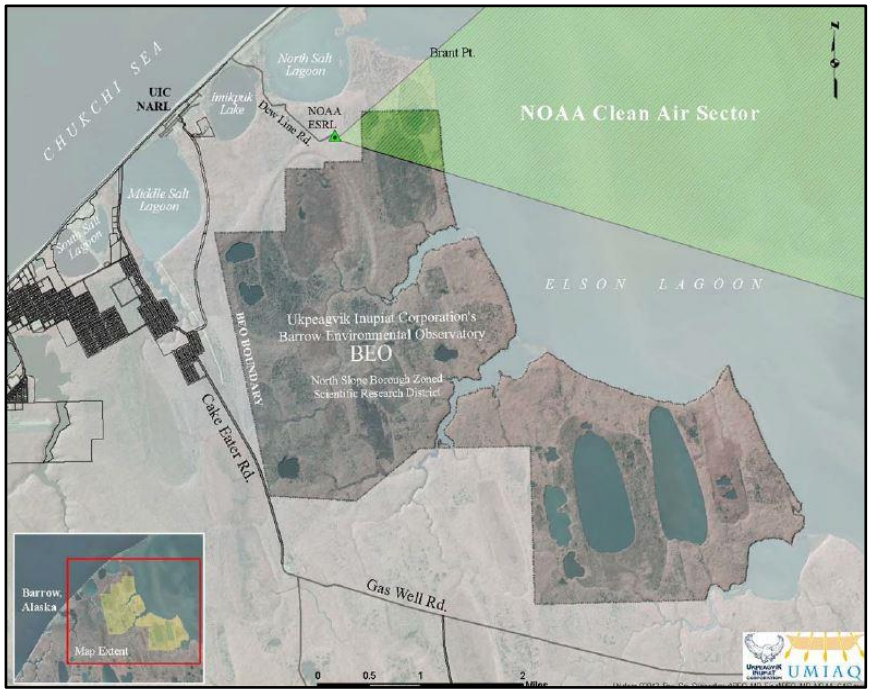

Figure 8: NOAA Clean Air Sector in Elson Lagoon

Platted subdivisions and radio towers already exist on the northern and southern ends of Gas Well Road. The platted subdivision on the southern end of Gas Well Road is intended to be used in the event that full-time military presence is required in Utqiaġvik. Community infrastructure sited along the road, such as the community landfill and the UIC-owned gravel pit, have been permitted to increase in size over the next several years. UIC has expressed interested in purchasing a dirt burner to assist with area soil remediation, which will require barge access from Elson Lagoon and land infrastructure off of Gas Well Road.

A winter access trail currently extends from the southern end of Gas Well Road when required by industry. A NSB maintained and permitted community winter access trail extends from Utqiaġvik to Atqasuk and Prudhoe Bay. There have been discussions to construct this winter trail from the end of Gas Well Road or from the UIC gravel pit to utilize existing infrastructure when possible. Should this occur, it is likely that a seasonal trail further north through the BEO would be established to move equipment to the barge landing in Utqiaġvik. The long-term vision for access to Prudhoe Bay from Utqiaġvik is a permanent gravel roadway (ADN 2018).

(v) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust). §332.3(h)]

The landowner, UIC, will record a Declaration of Restrictive Covenant in the Barrow Recording District, Third Judicial District, and submit to USACE. UIC recognizes the rights of USACE to enforce the terms of the Restrictive Covenant.

ADDITIONAL PROPOSED TERMS

10. Determination of Credits [33 CFR § 332.3(f)]

Significant work has been completed on this site, as evidenced by the ABR report (ABR 2015) (Appendix A), a July 2017 agency field assessment, and the ongoing series of meetings and calls with the USACE regarding the property. The ABR report performed a wetland functional assessment of the study area based on the widely utilized AKWAM methodology; that assessment has been formalized in this prospectus according to the AKWAM scoring methodology. As described below, the ABR functional assessment was used as the basis for this credit determination. EIP proposes that this method be used for the CEEMB. The adjacent AR-9 in-lieu-fee mitigation project by The Conservation Fund was also assessed by ABR (ABR 2015) using AKWAM, thus the assessment here would be comparable.

10.1. Baseline Information

As discussed in Section 7, ABR performed baseline assessment, as reported in the Wetland Mapping and Aquatic Site Assessment for a Proposed Wetland Mitigation Bank, Barrow, Alaska (ABR 2015) (Baseline Assessment). The wetlands assessed in this field survey included the CEEMB and surrounding lands within the BEO. Wetlands were determined, boundaries were interpreted, and wetlands and waters were classified by dominant vegetation and water regime. In addition to the wetland delineation, an aquatic site assessment (functional assessment) was performed to define environmental conditions, characteristics, and develop wetland functional classes. Per the AKWAM methodology, wetlands in the CEEMB rated highest in providing the following functions: sediment/ nutrient/ toxicant removal, educational/ scientific/ recreational/ subsistence use, fish habitat suitability, and threatened and endangered species support.

According to the Baseline Assessment, much of the CEEMB is considered wetlands which (1) provide documented habitat for threatened and endangered species; (2) represent a high quality example of a rare wetland type; (3) are rare within a given region; (4) provide habitat for very sensitive or important wildlife or plants; and/or (5) are undisturbed and contain ecological attributed that are impossible or difficult to replace within a human lifetime, if at all (ABR 2015).

As a supplement to the Baseline Assessment, three areas identified as palustrine wetlands in the Baseline Assessment were redelineated in this prospectus as riverine wetlands based on aerial imagery and site photos (Figure 3).

10.2. Credit Methodology

Each credit is assigned to wetlands based on the wetland functional classes identified in the Baseline Assessment, grouped by hydrogeomorphic (HGM) class into Assessment Areas (AA)s. The wetland functional classes from the Baseline Assessment were based on Cowardin classification, HGM class, physiography, vegetation, and microtopography (Cowardin 1979). The Baseline Assessment included an aquatic site assessment of wetland functions, but it did not determine wetland assessment scores. In order to translate the aquatic site assessment into a form that can be used for credit considerations, the 2010 Alaska Department of Transportation and Public Facilities (ADOT&PF) Alaska Wetland Assessment Method (AKWAM) was used to assess wetland functions and assign scores for credit production (Baseline Assessment). The Alaska District Credit Debit Methodology (CDM) V 1.0 was used for determination of credits for this preservation project (USACE 2016).

10.2.1. Determination of Assessment Areas

AKWAM Functional Capacity Index (FCI) scores were assigned to wetlands based on the wetland functional classes identified in the Baseline Assessment, grouped by HGM class into AAs. The AAs were grouped by HGM class rather than separated geographically by hydrologic divisions because the wetland system on the CEEMB is an almost contiguous mosaic of multiple wetland types, with very few defined breaks in hydrologic flow. AKWAM states that AAs can consist of multiple Cowardin classes, but each AA must be of a single HGM class. The existing wetlands and waterbodies on the CEEMB, as defined by the wetland functional types, were grouped into seven AAs (Table 2). Three wetland types were grouped in AA1 – Palustrine Flats, and two wetland types were grouped into AA2 – Palustrine Depressional. The small areas of riverine wetlands adjacent to an estuary or serving as outlets to the large lakes were placed in their own group, AA3; these areas were designated as palustrine flats or depressional wetlands in the Baseline Assessment, but they were revaluated based on best professional judgement for the CEEMB. AA4 represents the small palustrine ponds scattered throughout the property as a distinct aquatic resource. The small estuaries (one adjacent to AA3 in the northwest and one on the Elson Lagoon in the east) were evaluated as an aquatic resource separately (AA5). Several small areas of lacustrine fringe adjacent to small palustrine pond or lakes were evaluated as AA6. The large lakes (class L1UBH) are adjacent to some of the other AAs; the lakes were not scored using AKWAM, but they are considered AA7 for waterbody evaluation.

The extent of each AA, as defined by AKWAM guidance, may extend beyond the boundaries of the site, in order to evaluate wetland functions in larger wetland complexes and in relation to adjacent waterbodies. The extent of AAs is defined as the area within the project boundary, plus the contiguous up/downstream wetland area to the point of significant hydrologic change or 1000 feet, whichever is closer. For the AAs in the CEEMB, AA3, AA4, AA5, AA6, and AA7 are clearly defined hydrologically. AA1 and AA2 extend beyond the boundary of the project site (off-site area not depicted in Figure 3); large waterbodies define the boundaries on the north and east (Elson Lagoon), the southeast (Mayoeak River), and the northwest (Ikpik Slough). To the southwest of the project boundary, there are no significant hydrologic changes within 1000 feet of the project area, so AA1 and AA2 include all wetlands of the same type within a 1000-foot buffer around the project area. In addition to the wetland areas that extend outside the project boundary, wetlands AAs may include contiguous waterbodies. For the AAs on the CEEMB, AA-3 and AA-6 incorporate open water in their wetland assessments (but not in acreage calculations used for credit production); the waterbody portions are also scored separately as AA4, AA5, and AA7.

Table 2: Assessment Areas by Wetland Functional Type and Cowardin Class

Baseline Assessment Wetland Functional Type	Cowardin Class	Acres on the CEEMB	Assessment Area	AA Acres On-Site (On-Site + Off-Site or Waterbody)
Seasonally Flooded-Saturated Graminoid Meadow	PEM1E	583.90	AA1 – Palustrine Flats	1192.87 (1400)
Saturated Salt-killed Meadow	PEM1S	3.70		
Saturated Graminoid Meadow	PEM1B	605.28		

Semipermanently Flooded Wet Graminoid Meadow	PEM1F	231.21	AA2 – Palustrine Depressional	302.79 (307.26)
Wet Graminoid Meadow and Shallow Open Water Complex	PEM1F	97.42		
Riverine Intermittent Vegetated Streambed	R4SB7	13.87	AA3 – Riverine	13.87 (650)
Palustrine Ponds	PUBH	28.19	AA4 – Palustrine Ponds	28.19 (28.19)
Estuarine Waters	E2USP	3.90	AA5 - Estuarine	3.90 (3.90)
Lacustrine Fringe Graminoid Marsh	PEM1H	3.37	AA6 – Lacustrine Fringe	3.37 (37.35)
Open Water Lakes	L1UBH	723.35	AA7- Lakes	723.35 (723.35)

10.2.2. Wetland Functional Assessment

This evaluation used the Baseline Assessment, best professional judgment, and input from the USACE to perform a functional assessment of aquatic resources within the CEEMB. The Baseline Assessment assessed similar functions to those evaluated in AKWAM, so that method was used to translate the findings of the Baseline Assessment into a defined scoring system by wetland functional class. AKWAM assesses up to ten wetland functions for each AA. Within each of the ten functions, AKWAM calculates a 'Functional Capacity Index' used to determine the 'Actual Functional' scores, which range from 0.0 to 1.0. After all ten wetland functions are scored (or omitted as not applicable), the final result is the 'Percentage of Possible Scores,' which is the sum of the 'Actual Functional Points' divided by the sum of the 'Possible Functional Points'; the final percentage is expressed as a value ranging between 0.0 and 1.0. The 'Percentage of Possible Scores' (PPS) is comparable to similar indices used in other Alaska-specific functional assessment methodologies.

The supporting AKWAM wetland and waterbody evaluation forms are included as Appendix B. Table 3 presents a summary of the AKWAM function and service summary and overall rating for each AA. AA7, which consists of open water lakes, has a waterbody assessment form completed, but it does not have any AKWAM scores.

Table 3: AKWAM Function and Service Summary for the CEEMB Assessment Areas

Assessment Area	**Actual Functional Points**						
Functions and Services	**AA1 Palustrine Flats**	**AA2 Palustrine Depressional**	**AA3 Riverine**	**AA4 Palustrine Ponds**	**AA5 Estuarine Waters**	**AA6 Lacustrine Fringe**	**AA7 Lakes**
A. Habitat for Federally Listed/Candidate T&E Species or Other Species of Concern	1	1	1	1	0.7	0.9	Not Assessed for Credits. No wetland component.
B. General Wildlife Support	0.9	0.9	1	0.9	0.9	1	

C. General Fish Support	N/A	0.7	0.6	0.6	0.6	0.6
D. Water Storage	0.6	0.9	0.8	N/A	N/A	0.7
E. Sediment/ Nutrient/Toxicant Removal	1	1	0.6	0.5	0.5	0.7
F. Sediment/ Shoreline Stabilization	N/A	N/A	0.3	N/A	N/A	0.7
G. Production Export/ Food Chain Support	0.7	0.7	1	0.9	0.6	0.7
H. Groundwater Discharge Recharge	N/A	N/A	N/A	N/A	N/A	N/A
I. Uniqueness	0.4	0.4	0.7	0.4	0.7	0.7
J. Recreation/ Education Potential (bonus points)	0.15	0.15	0.15	0.15	0.15	0.15
Total Actual Functional Points	4.75	5.75	6.15	4.45	4.15	6.15
Total Possible Functional Points	6	7	8	6	6	8
Percent of Possible (PPS)	0.79	0.82	0.69	0.74	0.69	0.69

10.2.3. Credit Calculation

The first step in calculating credits is determining the difference between wetland functions in a "With Preservation" or "Without Preservation" site condition.

$$\Delta = \text{With Preservation} - \text{Without Preservation}$$

Credits would be produced from the preservation and maintenance of the CEEMB. In a "With Preservation" condition, undisturbed wetlands and waterbodies and their current functions would be preserved if the property is preserved in perpetuity, subject to an approved mitigation plan. The wetland functions are maintained; Tables 4 and 5 list the current functional capacity assigned to the wetland AAs.

In a "Without Preservation" condition, wetlands and waterbodies would be unprotected, resulting in likely loss of function resulting from threats to the property should this mitigation bank not be established, and the property is not preserved. Should unchecked scientific research be allowed to continue, there would be a permanent change of the existing wetland and waterbody system as a result of constructing long-term data collection installations, including constructing power sources for those installations, creation of miles of boardwalk or hardened trails, construction of additional access roads, manipulation of aquatic resources including potential thawing and draining of permafrost and/or waterbodies, and manipulation of wildlife habitat including potential addition of hazardous or harmful substances as well as habitat exclosures. Historical research projects provide a list of potential impacts, but there is no way to tell how damaging projects may be in the future. Large-scale tools for tundra-cutting, weather manipulation, and other purposes may produce impacts which are impossible to foresee. Construction of additional

roadways or seasonal trails may bring additional development to the CEEMB, potentially including oil and gas development and associated infrastructure, barge landing, and/or military installations. Due to the potential for large scale thaw, drainage, or addition of hazardous substances to the landscape, it is reasonable to assume all aquatic resource functions within the site would be lost and aquatic resources outside of the site boundaries would be impacted if the CEEMB site is not protected.

If the CEEMB site is not protected, then it is assumed that there will be a total loss of function provided by 1570.83 acres of wetlands contained on site. The establishment of a protected mitigation bank will effectively eliminate these threats to the site. Therefore, a reasonable wetland functional assessment would conclude that the difference between "with preservation" and "without preservation" equals the current functional values of aquatic resources on the CEEMB.

Functional values were assigned to resource types using the AKWAM PPS, described above. The AAs (Appendix B) used in the assessment were based on grouping the wetland functional classes from the Baseline Assessment by HGM class, with the addition of riverine wetland types (Table 2).

The second step in credit calculation is the following equation:

Preservation Adjustment Factor (PAF) = Threat (T) + Ecological Significance (ES)

The PAF incorporates a Threat component and an Ecological Significance component. For the Threat component, the CEEMB has a demonstrated land use trend that threatens the site, as discussed in Section 9 of the prospectus document. The site has a Master Plan approved by the NSB Planning Commission which includes a new access point, as well as the ongoing pressure of annual research. A Threat component of 0.3 was assigned because the site contains demonstrated land use trend within UIC corporate boundaries, and it is zoned as a scientific research district within the NSB.

The CEEMB contains the following attributes relevant to Ecological Significance:

- (0.1) Aquatic resources that are adjacent to or connect regionally important publicly held lands, such as: National Marine Sanctuaries, National Seashores, National and State Parks, Forests, Refuges and Wildlife Management Areas. √

The community of Utqiaġvik is located adjacent to the NPR-A, approximately 250 miles west of the Arctic National Wildlife Refuge (Arctic Refuge), and approximately 205 miles north of the Gates of the Arctic National Park and the Noatak National Preserve. Across Elson Lagoon from the CEEMB lies the Birnirk National Historic Landmark, also known as Pigniq. The landmark is composed of 19 mounds on beach ridges made up of ancient sod houses, meat caches, and cultural debris (UAF 2016). Technology developed at this site, and other similar sites, supported rapid population expansion across the arctic regions of North America and Greenland (NPS 2018). No comprehensive archaeological study has been completed for the CEEMB, however lands around Elson Lagoon including the CEEMB may contain archaeological resources based on nearby findings. A review of the North Slope Borough's Traditional Land Use Inventory has been requested to discover any known sites.

- (0.3) Site contains aquatic resources that have been identified as significant or productive within a specified Ecoregion. Such as: Alaska's Wildlife Action Plan or Anadromous Waters Catalog, Alaska Department of Fish and Game; Aquatic Resource of National Importance. √

As detailed in Section 3.1, 69% of birds and 56% of mammals which are regularly occurring within the CEEMB have been identified in Alaska's Wildlife Action Plan as Species of Greatest Conservation Need (ADF&G 2015). These birds and mammals are reliant on the aquatic resources provided in the CEEMB for their habitat.

The adjacent Avak Creek is an anadromous waterbody listed in the Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes (Anadromous Waters Catalog) (ADF&G 2018). In Avak Creek, broad whitefish, least cisco, and sockeye salmon are known to be present, all of which are categorized by ADF&G as Species of Greatest Conservation Need.

- (0.2) Aquatic resources that provide habitat important to species that have some special (Federal, State, or local) designation or importance. √

As detailed in Section 3.1, three of species regularly occurring within the site are listed as threatened under the ESA, including the polar bear, Steller's eider, and spectacled eider. Polar bear barrier island critical habitat exists opposite of Elson Lagoon along the Plover Islands, and within Elson Lagoon at locations south of the CEEMB.

The site is between two Important Bird Areas (IBA) as designated by Audubon Alaska, the Chukchi Sea Nearshore IBA and the Barrow Canyon and Smith Bay IBA (Audubon 2014). Steller's and spectacled eiders are also categorized as vulnerable on the International Union for the Conservation of Nature (IUCN) Red List and the NatureServe Explorer Global Status, which catalog species' risk of global extinction when evaluated by their published criteria (IUCN 2018, NatureServe 2018). Additionally, both eiders are listed on the North American Bird Conservation (NABCI)'s State of the Birds 2016 Watch List as a species of high conservation concern (NABCI 2016).

- (0.1) Scarcity of Aquatic Resource Type. Such as: Specific preservation to maintain diversity of habitat type within islands systems removing the threat of habitat fragmentation for fish and wildlife species (Alexander Archipelago Islands (Southeast Alaska) Kodiak and the Aleutian Chain). X

By adding together, the assigned attribute scores for Ecological Significance (0.6) and Threat (0.3), the Preservation Adjustment Factor (PAF) is 0.9.

The third step is the following equation:

$$\text{Preservation Adjusted } \Delta = (\Delta)(\text{PAF})$$

Since the PAF is 0.9, then the Preservation Adjusted Δ is 0.9 times Δ.

The fourth step is the following equation:

$$\text{Adjusted } \Delta = \text{Preservation Adjusted } \Delta \,/\, (\text{Time Lag})\ (\text{Risk})$$

Time Lag: The CEEMB is a preservation project and there is no Time Lag between credit releases and when the assessment has achieved a "With Preservation" functional outcome, as it is equal to the current condition. A Time Lag value of 1.0 was assigned.

Risk: A Risk score of 1.00 (*de minimis*) was assigned after considering the following factors:

a) Plant Communities: The plant communities in the CEEMB are established, largely undisturbed, and are unlikely to change after the site is preserved.

b) Invasive Exotic/Noxious Species: The likelihood of colonization by invasive exotic or noxious species is low because there are few recruitment sources nearby, the site has low suitability for establishment, and the functions of the plant community are not threatened, given current information.

c) Water Quality: Degradation of site water quality is unlikely because the CEEMB is undisturbed and the surrounding land uses are largely undisturbed.

d) Water Quantity: Changes in hydrological conditions is unlikely because the Beaufort Sea coast and local hydrology are unlikely to change because of preserving the site.

e) Indirect Impacts: The vulnerability of the mitigation to indirect impacts is low because the aquatic resources are fairly difficult to access by the public.

f) Direct Impacts: The vulnerability of the mitigation to direct impacts is low because aquatic resources are difficult to access by the public and the protections to be implemented on the CEEMB (i.e., management by Long-Term Steward and restrictive covenant) will effectively reduce the potential for indirect impacts.

Time Lag (1.0) multiplied by Risk (1.0) equals 1.0, resulting in an Adjusted Δ that is equal to Preservation Adjustment Δ, as displayed in Table 4. Table 5 shows the breakdown by credits by type.

Table 4: Determination of Credits with AKWAM

Baseline Assessment Wetland Functional Type	Cowardin Class	Assessment Area	With Pres. PPS	Without Pres. PPS	Δ	PAF	Adj. Δ	Acres	Credits
Seasonally Flooded-Saturated Graminoid Meadow	PEM1E	AA1 – Palustrine Flats	0.79	0	0.79	0.9	0.71	1192.87	846.94
Saturated Salt-killed Meadow	PEM1S								
Saturated Graminoid Meadow	PEM1B								
Semipermanently Flooded Wet Graminoid Meadow	PEM1F	AA2 – Palustrine Depressional	0.82	0	0.82	0.9	0.74	328.63	243.19
Wet Graminoid Meadow and Shallow Open Water Complex	PEM1F PEM1H								
Riverine Intermittent Vegetated Streambed	R4SB7	AA3 – Riverine	0.77	0	0.77	0.9	0.69	13.87	9.57
Palustrine Ponds	PUBH	AA4 – Palustrine Ponds	0.74	0	0.74	0.9	0.62	28.19	18.89
Estuarine Waters	E2USP	AA5 – Estuarine Waters	0.69	0	0.69	0.9	0.67	3.9	2.42
Lacustrine Fringe Graminoid Marsh	PEM1H	AA6- Lacustrine Fringe	0.77	0	0.77	0.9	0.69	3.37	2.33
		Total Aquatic Resources						**1570.83**	**1123.34**

Table 5: Credit Production Summary

Resource Type	Aquatic Resource Credits
Estuarine (E) Waters	2.42
Lacustrine (L)	2.33
Palustrine (P) Wetland	1521.50
Palustrine (P) Waters	18.89
Riverine (R)	9.57
Total by Resource Type	**1123.34**

The final step is the following equation:

$$\text{Credits} = (\text{Adjusted } \Delta)(\text{Acres})$$

Credits are determined for each resource type. The CEEMB will produce a total of 1123.34 credits (Table 5).

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Appendix A: Wetland Mapping and Aquatic Site Assessment for a Proposed Wetland Mitigation Bank in Barrow, Alaska (Baseline Assessment

WETLAND MAPPING AND AQUATIC SITE ASSESSMENT FOR A PROPOSED WETLAND MITIGATION BANK, BARROW, ALASKA

DRAFT REPORT

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November 2015

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INTRODUCTION

A wetlands mitigation bank is proposed for Ukpeagvik Inupiat Corporation (UIC) lands near Barrow, Alaska (Figure 1). The proposed mitigation bank lands are managed by Umiaq and occur within the boundaries of the Barrow Environmental Observatory (BEO). Comprising approximately 3,000 acres, the proposed mitigation bank lands extend along the Elson Lagoon Shoreline from Ikpik Slough to Takegakrok Point and inland south and west of Twin Lakes.

According to the U. S. Army Corps of Engineers (USACE) and Environmental Protection Agency (EPA) Compensatory Mitigation Final Rule (April 10, 2008), unavoidable impacts to wetlands (debits) may be compensated for through the purchase of wetland credits from an established wetland mitigation bank. To calculate debits and credits for compensatory mitigation using a wetland mitigation bank, an aquatic site assessment (ASA) for both the impact area(s) and mitigation bank lands is recommended to compare the ecological services provided by the individual wetland and waters types in question. UIC contracted with ABR, Inc.—Environmental Research & Services (ABR) to perform an ASA for wetlands and waters within the proposed mitigation bank lands using an ASA methodology specific to the Arctic Coastal Plain (ACP) of Alaska, evaluating a range of ecological services typically provided by northern permafrost wetlands. Debits for proposed development impacts may be calculated using a similar ASA technique to the one used in this report. The UIC mitigation bank at Barrow would be eligible for mitigation on projects within the ACP.

The mitigation bank study area includes all of the proposed mitigation bank lands under consideration and is located within the Arctic Coastal Plain (ACP) ecoregion (Gallant et al. 1995) (Figure 1). The ACP is characterized by an arctic climate and is underlain by continuous permafrost. The landscape is typified by low elevations and limited topographic relief and dominated by thaw lakes and drained thaw basins oriented along the prevailing summer wind direction. Plant communities are dominated by herbaceous plants (typically grasses and sedges) and prostrate shrubs. Lakes and drained lake basins account for over 60% of the Barrow Peninsula area (Frohn et al. 2005). The centroid of the study area is 71.276308°N, 156.481041°W and the legal description is Umiat meridian, Township 22, Range 18, Section 1

and Township 22, Range 17, Sections 4, 5, 6, 7, 8, 9, 10, 16, 17 and 18. The study area is located within the Northwest Coast Watershed (HUC 19060202).

METHODS

FIELD SURVEY

A wetlands field survey of the study area was performed from 28–31 July 2015 by Susan Ives and Erin Johnson of ABR and a bear guard from UIC. Routine wetland determinations were performed following the USACE three-parameter approach (Environmental Laboratory 1987, USACE 2007), and standard wetland determination forms (USACE 2007) were completed to confirm the wetland status at each wetland determination plot. Following the USACE methods, to be classified as a wetland, a site must be dominated by hydrophytic plants, have hydric soils, and show evidence of a wetland hydrologic regime. A mobile *Trimble® Nomad™* series GPS unit was used to record determination plot locations and the wetland data (using the *WetForm* database). *WetForm* is a commercially available relational database developed by Ecotone Corporation, which is used to enter wetland site data in the field and facilitate the preparation of electronic copies of the USACE regional supplement data form (USACE 2007) for each wetland determination plot. Each data form used the wetland plant indicator status per the *2014 National Wetland Plant List: Alaska* (Lichvar et al. 2014). Photos of soils and vegetation were taken at each wetland determination plot. Physiographic type, surface form type, Viereck et al. (1992) Level IV vegetation class, and observations of wildlife use (e.g., dens, browse, scat) or human activity (e.g., mining, ATV trails) were also recorded at each plot. Complete data sheets are provided in Appendix A

Rapid map-verification plots also were sampled to provide ground-reference data for the mapping of wetlands. At map-verification plots, the dominant plant species, Cowardin et al. (1979) water regime, and Viereck et al. (1992) Level IV vegetation class were recorded along with site photographs and GPS locations. The data from map-verification plots were used to improve map accuracy by increasing the number of documented wetland types tagged to particular image-signatures. Verification plot summaries and photographs are provided in Appendix B.

MAPPING AND CLASSIFICATION

Wetland boundaries were visually interpreted from image signatures and were digitized on-screen using ArcGIS software, the approach typically used by the U.S. Fish and Wildlife Service's National Wetlands Inventory (NWI) program (Dahl et al. 2015). Digital, high-resolution imagery (color enhanced aerial imagery at a resolution of 1.64 ft acquired in 2014) was provided by UIC and used as the base image for digitizing wetlands and waters boundaries. Wetlands and waters were mapped at a scale of 1:2,000, with a minimum map unit size of 0.1 acre.

Wetlands and waters were classified following the wetlands classification of Cowardin et al. (1979), which involves classifying wetlands by dominant vegetation type and water regime. The map polygons were attributed using NWI annotation (Dahl et al. 2015). In addition to assigning Cowardin classes, each wetland polygon was assigned a physiography class, hydrogeomorphic (HGM) class, Level IV Viereck et al. (1992) vegetation class, and a microtopography class. Physiographic types represent generalized geomorphic features used to describe landscape position and function (e.g. upland, lowland, lacustrine, and riverine). HGM classes were assigned following Smith et al. (1995), and are based on geomorphic setting, water source and transport, and hydrodynamics. Level IV vegetation classes follow the Alaska Vegetation Classification System (Viereck et al. 1992), and include dominant plant species and vegetation structure. The microtopographic classes used follow the periglacial classification system developed by Washburn (1973). The five mapped variables (Cowardin wetland class, physiography class, HGM class, Level IV vegetation class, and microtopographic class) were combined to produce a set of unique land-cover types, which were then aggregated into broader ecologically related categories. For this study, we aggregated the land-cover types into wetland functional classes for descriptive and functional assessment purposes (as described in the Aquatic Site Assessment section below), and wildlife habitat classes to assess potential habitat use by birds and mammals within the study.

AQUATIC SITE ASSESSMENT

The ASA was prepared using a rapid assessment of wetland function based on HGM principles, developed in consultation with the USACE specifically for wetlands on the ACP of Alaska. The ASA method includes ACP-specific wetland function criteria and proposed

thresholds to define categorical wetland function rankings. The criteria may be evaluated using available data in the literature or site-specific field data, depending on the resources available for the project. The method is applied to Wetland Functional Classes (groups of wetland and water types that share similar ecological functions). To develop Wetland Functional Classes, we integrated information from Cowardin et al. (1979) wetland types, Viereck et al. (1992) Level IV vegetation classes, broad-scale landscape characteristics (physiography), HGM classes, and microtopographic classes. Wetland functional classes within the BEO study area were derived using data from the field observations made during the ABR wetland surveys in July 2015 (Appendix A and B).

WETLAND FUNCTIONS

Satellite imagery interpretation, local topography, and review of existing wetland maps and data for the Barrow airport were used to define the environmental conditions and characteristics for each wetland functional class and to determine indicators specific to each function. Functional classes were rated as low, moderate, or high for each wetland function, depending on the indicators present. Eight functions were evaluated as described below; the results of the analysis are presented in Appendix C.

Flood flow regulation (storage) is the capacity of a wetland to control surface-water flow and subsequently moderate downstream flooding. Snowmelt-generated floods are the dominant, maximum annual flood events in arctic watersheds (Woo 2012, McNamara et al. 1998), particularly in the low-gradient rivers and streams found on the ACP. ACP wetlands and waters are near an annual maximum for surface wetness just after snowmelt, and gradually lose water over the summer as evapotranspiration greatly exceeds precipitation (Mendez et al. 1998). Thus, flood flow regulation was assessed from the standpoint of snowmelt-generated floods, which (1) affect most communities on the ACP as sheet flow, (2) were assumed to fill any storage available in spring, and (3) occur outside (before) the growing season. Since the largest seasonal floods occur at snowmelt and wetland vegetation is largely dormant at that time, geomorphic and structural landscape characteristics are primarily responsible for floodwater retention and storage. For wetlands outside of active riverine channels, the role of polygonal features, specifically the difference between low-center polygons with ice-rich raised polygonal rims and

high- and low-center polygons with smaller steep-sided depressions (Liljedahl et al. 2012), were considered in assessing flood water storage. Surface roughness provided by live vegetation was considered if seasonal flooding from rainfall events was likely to contribute to flooding the wetland (i.e., in riverine systems).

Sediment, nutrient, and toxicant removal is the capacity of a wetland to retain suspended sediment and nutrients and/or toxicants adsorbed to inorganic sediments. The cold temperatures and shallow active (thawed) layer on the ACP limit denitrification, thus this function is assessed from the standpoint of retaining inorganic sediments and adsorption of nutrients and toxicants through settlement. Indicators of floodwater storage as described above are important indicators of this function.

Erosion control and shoreline stabilization is the degree to which a wetland reduces erosion at the edges of relatively permanent flowing waters. Dense vegetation, soil texture, and historical stability of shorelines are important indicators of this function.

Maintenance of Soil Thermal Regime can refer to a broad range of wetland soil conditions that may provide high function for a particular ecosystem. For the purposes of this ACP-specific ASA method, it refers to the degree to which a given wetland type maintains a shallow active layer and underlying permafrost throughout the growing season. Stable permafrost profiles allow for a number of valuable functions, including carbon sequestration and stability of important habitat characteristics (Putkonen 1998). This ASA gives a shallow maximum active layer a high function rating, based on indicators of function that were measured during the wetland field survey or that can be interpreted on aerial photography. It is only applicable in regions of continuous or discontinuous permafrost. Reliable indicators of a shallow active layer include: vegetation biomass or density, depth of organic matt, landform, waterbody type, soil moisture and aspect (Kelley et al. 2004,).

Organic matter production and export is the capacity of a wetland to make organic matter contributions to the ecosystem through primary production. Herbaceous or deciduous woody vegetation occurrence and observed depth of organic layer were principle indicators of productivity. Aerial imagery was used to assess potential export of organic matter contributions through surface-water connections and potential for flooding.

Threatened and Endangered Species (TES) Support is the capacity of a wetland or water to support threatened or endangered species. There are no threatened or endangered terrestrial mammals in the study area, and with the exception of polar bears (*Ursus maritimus),* no marine mammals occur in the study area. Polar bear habitat preferences were not assessed, however, because the primary use of terrestrial areas by polar bears in the Barrow area (with the exception of attraction to whale carcasses and possibly putrescible waste) is for maternal dens during the winter; dens are located in areas of appropriate topographic relief (e.g., bluff faces which promote deep snowdrifts) and those physical features are not associated with wetlands and waters.

Two threatened sea duck species, Steller's Eiders (*Polysticta stelleri*) and Spectacled Eiders (*Somateria fischeri*), are present in the Barrow area during the breeding season. To assess wetland support of these species, observations made in the study area and the documented use of wetland habitats (derived from other studies on the ACP) were used to develop a comprehensive understanding of the likely use of the mapped wetlands by these species. First, individual observations in the study area, as compiled by the U.S. Fish and Wildlife Service's Arctic Landscape Conservation Cooperative (ALCC 2012), were overlaid on the wetlands mapping prepared in this report to determine the occurrence of these species in individual wetland types. For this analysis, only observations of birds on the ground indicating actual use of mapped wetlands were used (i.e., flyover observations were disregarded).

Second, because many observations of threatened eiders in the study area were made in aquatic habitats with standing water and there were no records of nests, it was necessary also to assess the use of non-aquatic tundra wetlands for nesting. For this analysis, we relied first on the habitat preference information for Spectacled Eiders developed by ABR from multi-year data sets and rigorous use-versus-availability analyses in the Colville River Delta (CRD) area (Johnson et. al. 2014). While the mapped wetland habitats in the CRD studies are similar to those found on the Barrow peninsula, there are some important differences that prevent the use of the habitat-preference information for CRD wetlands directly in this study. For these reasons, we prepared a habitat-use table developed specifically for the study area to infer habitat use for the wetland types in a given Wetland Functional Class based on the documented use of those wetlands by threatened eiders in the scientific literature; this analysis was conducted using

information from the CRD work and from studies conducted in the Barrow area. The methodology for preparing the literature-based habitat-use table is described in the General avian/mammal habitat suitability section below.

General avian/mammal habitat suitability is the capacity of a wetland to support a diversity of wildlife species. This function was assessed from both a local and a regional perspective, relying on regional-scale wetlands mapping and a local-scale assessment of wildlife habitat use. The local-scale assessment of wildlife habitat use was prepared using 3 sources of information: (1) observations of wildlife species in the study area made by the ABR field crew for this study in July 2015; (2) the scientific literature, emphasizing studies in the CRD and Barrow areas, that documents the use of particular wetland habitats; and (3) communication with U.S. Fish and Wildlife Service staff who conduct bird surveys in the Barrow area. The goal was to develop a list of the bird and mammal species, including TES species, that are likely to regularly occur in the study area and to identify which wetland habitats and Wetland Functional Classes they will regularly use during some portion of their life cycle. For this assessment, Wetland Functional Classes were first crosswalked to recognizable wildlife habitat types described in the literature sources used (see below). The data sources above then were used to designate the habitats mapped in this study as important (regularly used at some point in the life cycle, e.g., for breeding, denning, migration) or not important (infrequently used or avoided completely). The literature used included the habitat-preference information for the CRD from Johnson et al. (2014), and observations made in the Barrow area during systematic wildlife surveys conducted between 2004 and 2008 (Parrett and Johnson 2004; Cyr and Johnson 2005: Attanas and Johnson 2006, 2007, and 2008). Other studies specific to the Barrow peninsula also were evaluated including work by Pitelka (1974), Johnson and Herter (1989); Larned et. al. (2006, 2012); Quakenbush et. al. (2004), and Safine (2013). For mammal species, when Barrow-specific wildlife habitat-use data were not available, we used the habitat-use information in MacDonald and Cook (2009). Based on this assessment, the list of regularly occurring wildlife species in the study area includes 35 birds and 9 mammals (Appendix D). A Wetland Functional Class was considered to have high diversity if at least half of the assessed species are expected to use the class regularly (i.e., >5 mammal species and >18 bird species).

When assessing habitat suitability at a regional scale, disproportionately high habitat use in relation to habitat availability was taken into account, as this generally reflects habitat preference. Because regional habitat mapping is not available for the Barrow area, digital NWI mapping (USFWS 2014) for palustrine, lacustrine, and riverine systems in the Northwest Coast watershed (HUC 19060202) on the ACP was used to assess the regional rarity of wetlands and waters occurring within the BEO study area. A threshold of 1% occurrence in areal coverage in the Northwest Coast watershed NWI mapping was used to define rarity of wetlands and waters and to augment the assessment of habitat suitability for birds and mammals in the study area.

Fish habitat suitability was evaluated by assessing the degree to which a wetland or water directly supports fish. Only those wetlands and waters with at least a seasonal, intermittent connection to known or likely fish-bearing waters have the potential to perform this function. Aerial imagery was used to assess the size and depth of surface waters, presence and type of vegetation, likely presence of spawning or resting areas, and connections to other waters.

Educational, scientific, recreational, or subsistence use reflects the degree to which a wetland provides direct support of hunting and gathering activities, local travel, and/or education. The study area is located entirely within the Barrow Environmental Observatory (BEO), a nearly 7,500 acre area zoned as a Scientific Research District to facilitate field research activities in a natural tundra ecosystem. The criteria used to determine if the study area is important for educational or scientific use included whether long term research sites or permanent sample plots were directly impacted. Established trails visible in aerial imagery were indicative of local travel. Opportunistic subsistence may occur as resources are available, due to the proximity of the study area to Barrow.

PROPOSED MITIGATION RANKING CATEGORIES

As part of the Section 404 permitting and wetland mitigation process, wetlands are typically categorized according to their overall functional capacity. While the final mitigation ranking categories will be determined by USACE, each wetland functional class mapped in the study area was placed into 1 of the following 3 proposed mitigation ranking categories, following the guidelines in the USACE *Ratios for Compensatory Mitigation* (USACE 2014) and the U.S. Fish

and Wildlife Service (USFWS) Part 501 FW 2 Mitigation Policy and Appendix 2 (USFWS 1993a, b).

Category I — Wetlands that: (1) provide documented habitat for threatened or endangered species; (2) represent a high quality example of a rare wetland type; (3) are rare within a given region; (4) provide habitat for very sensitive or important wildlife or plants; and/or (5) are undisturbed and contain ecological attributes that are impossible or difficult to replace within a human lifetime, if at all (USACE 2014).

For this study, a wetland functional class was given Category I status if the following ASA criteria were met: (1) contained TES preferred habitat as documented by long-term studies applicable to the study area, (2) was within an established critical habitat boundary for TES, or (3) was rated high for all evaluated functions. Long-term habitat preference studies rely on a large pool of observations, during appropriate seasons, and typically use statistical analyses to identify preferred habitats thus are considered more appropriate than single observations to determine TES use.

Category II — Wetlands that can be important for a variety of wildlife species and can be critical for the watershed depending on where they are located. In contrast to Category I wetlands, Category II wetlands do not provide critical habitat for threatened or endangered species or species of concern. Generally these wetlands are pristine, not fragmented, are common but more productive and sustain higher biodiversity compared to Category III wetlands (USACE 2014).

For this study, a wetland functional class was given Category II status if the class was rated high for 2 or more, but not all, evaluated functions.

Category III — Wetlands that are usually plentiful in the watershed, and often supporting low biodiversity. Category III wetlands are not rare or unique, and overall productivity and species diversity are relatively low. These wetlands are affected by human activities, or by fire or other natural events, and are not considered to be pristine. As a result, in some cases these wetlands require less than 1:1 mitigation ratios (USACE 2014).

For this study, a wetland functional class was given Category III status if the following ASA criteria were met: (1) rated high for 1 or fewer functions, or (2) if disturbed, the wetlands in the

functional class were degraded to the point of substantially altering original functions without providing new functions.

RESULTS AND DISCUSSION

WETLANDS AND WATERS TYPES

Three small Estuarine Intertidal Irregularly Flooded Unconsolidated Shore (E2USP) features were mapped immediately adjacent to the nearshore marine waters of Elson Lagoon, Ikpik Slough, and the mouth of the Mayoeak River. This wetland type is represented by plot BEO-30. At the time of the field survey, none of the E2USP waters had a direct surface water connection to the nearshore marine waters, but EC values were out of range of the meter used (> 20,000 µS/cm), indicating the salt concentration of the water exceeds that of freshwater (Riverine and Palustrine) systems. Waters are saline with an irregularly flooded regime receiving salt water input during storm surges. Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom lakes (L1UBH), documented at plot BEO-33, occur throughout the study area and include East Twin Lake, West Twin Lake and 2 smaller unnamed lakes. Fresh open water accounts for approximately 25% of the BEO study area (Table 1). The study area contains one recently tapped and drained lake and coastal erosion is being monitored at the north end of East Twin Lake where the lake may be breached. Palustrine Permanently Flooded Unconsolidated Bottom Ponds (PUBH, <20acres in area) occur throughout the BEO study area and are represented at plot BEO-02. PUBH is largely a shallow open water type without islands but may have polygonised margins. Well-developed lacustrine fringes are relatively rare in open water types within this study area.

Palustrine Permanently Flooded Persistent Emergent marshes (PEM1H) account for only 0.1% of the study area (Table 1). The permanently flooded wetland code was reserved for mapping the limited number of lacustrine fringe wetlands within the study area. Represented at plot BEO-15, the plant community is dominated by Artic pendant grass (*Arctophila fulva*) and Palla's buttercup (*Ranunculus Pallasii*), with a thick floating mat of obligate wetland mosses. Soils are histosols or histic epipedons with permanent surface water.

Palustrine Semipermanently Flooded Persistent Emergent (PEM1F) wetlands account for 22.2% of the BEO study area and are a component of lowland areas surrounding lakes or within

the drained lake basin. This wetland type is most commonly a patterned feature with wetter areas occupying micro-lows. Field data collected within this type was documented via paired plots (BEO-11 and 12, BEO-06 and 07 and BEO-04 and 05) describing the moist high zones and the wet depressions separately (Appendix A). Microtopographic depressions are typically dominated by wetland obligate sedges including water sedge (*Carex aquatilis*), tall cottongrass (*Eriophorum angustifolium*), and red cottongrass (*E. russeolum*). Areas with surface water support stands of *Arctophila fulva*. The moist wetland types also support a variety of sedges and limited dwarf shrub cover including tealeaf willow (*Salix pulchra*), oval-leaf willow (*S. ovalifolia*) and least willow (*S. rotundifolia*). Soils are typically histic epipedons with a high water table and saturation to the surface. Palustrine Seasonally Flooded/Saturated Persistent Emergent meadow (PEM1E) accounts for 22.5% of the BEO study area and has a plant community composition very similar to that of PEM1F, with wet micro-low and more mesic micro-high zones. PEM1E was differentiated from PEM1F through aerial photo interpretation; it has less surface water visible in the imagery.

Palustrine Semipermanently Flooded Tidal Persistent Emergent (PEM1T) and Palustrine Temporary-Tidal Persistent Emergent (PEM1S) wetlands included 2 tidally influenced freshwater types identified during the field survey; together they account for less than 2% of the study area (Table 1). PEM1T wetlands occurred within narrow drainage features directly connecting to E2USP tidal guts. Described in plot BEO-31, these drainage features support a variety of typical salt tolerate emergent vegetation, including Fisher's tundragrass *(Dupontia fisheri*), creeping alkaligrass (*Puccinellia phryganodes*), and saltmarsh starwort (*Stellaria humifusa*). These communities have brackish EC levels (1,800 µS/cm). Soils are gleyed silty clay loams meeting the Alaska Gleyed without Hue 5Y or redder underlying indicator. Saturation is at the surface and the water table is near surface. PEM1S was described at plot BEO-23 and occurs on the raised coastline of the study area. Raised polygon centers within the PEM1S type have damage due to saltwater inputs during storm surge events. Nevertheless, low lying areas within this community type still support a healthy emergent vegetation mat that includes scurvygrass (*Cochlearia officinalis*), *Eriophorum angustifolium*, northern woodrush (*Luzula confusa*), *Dupontia fisheri*, and *Arctophila fulva*. PEM1S usually occurs on raised convex banks that support moist wetland communities. Histic epipedons are a common hydric soil type.

Primary hydrologic indicators (e.g., saturation) were absent at the time of sampling but the secondary hydrology indicators shallow active layer (shallow aquitard) and FAC neutral test were present.

Palustrine Saturated Persistent Emergent meadow (PEM1B) was the most dominant (26.9%) wetland type mapped in the BEO study area (Table 1). This wetland was typically associated with raised convex slope features occurring on banks along the coast or along the margins of lake basins. The plant communities are dominated by a variety of emergent species including Arctic sweet coltsfoot (*Petasites frigidus*), Arctic woodrush (*Luzula nivalis*), *Carex aquatilis*, *Eriophorum angustifolium*, and *L. confusa*. The dwarf shrub *Salix rotundifolia* is occasionally codominant. The hydric soil indicators Alaska Redox and positive reaction to alpha, alpha-dipyridol were present and saturation was observed within the top 12 inches of the soil profile.

AQUATIC SITE ASSESSMENT

WETLAND FUNCTIONS

The 9 mapped NWI wetland and waters types were aggregated into 9 ecologically similar Wetland Functional Classes according to the scheme outlined in Table 2. Individual NWI wetland types mostly corresponded to individual Wetland Functional Classes but in some cases, NWI types were combined within similar HGM types to better represent the range of functions. Wetland Functional Class descriptions including plot specific data obtained during the field survey and indicators visible in aerial photography are included in Table 2.

Lakes and Ponds, Wet Graminoid Meadow and Open Water Complex, Semipermanently Flooded Tidal Wet Graminoid Meadow and Seasonally Flooded-Saturated Graminoid Meadow all rated high for flood flow regulation, primarily due to the floodwater storage capacity provided by available depressional features and in some cases, the presence of thick emergent vegetation. Saturated Salt-killed Meadow and Saturated Graminoid Meadow occupy raised convex topographic features, with relatively few microtopographic lows that provide water storage. Thus, this Wetland Functional Class rated low for flood flow regulation (Table 3).

A majority of the Wetland Functional Classes rated high value for sediment nutrient and toxicant removal, with the exception of Saturated Salt-killed Meadow and Saturated Graminoid Meadow (Table 3). Waters classes (Estuarine Waters and Lakes and Ponds) (Table 2) rate high

because of the presence of still or slow moving water and observed evidence of sedimentation. The Wetland Functional Classes that have significant water/vegetation interspersion, the presence of slow moving or standing water, and relatively thick surface organic horizons rated high because these features contribute to sediment nutrient and toxicant removal.

Erosion control and shoreline stabilization was only assessed for Lacustrine Graminoid Marsh and Semipermanently Flooded Tidal Wet Graminoid Meadow because due to landscape position, they are the only wetland types directly affected by lacustrine or seasonal tidal processes. Both wetland classes were rated high for this function (Table 3), based on the presence of dense energy absorbing vegetation and predominantly organic substrates (Appendix C). Erosion control and shoreline stabilization was only assessed at the local scale, is based on local-scale functions for wetlands routinely subject to and formed by flooding from adjacent waterbodies. Even though the BEO study area has extensive wetlands bordering nearshore marine waters, it is beyond the scope of this evaluation to address erosional forces that are largely driven by global or regional indicators, such as the thawing of permafrost, sea level rise, or global climatic changes.

Maintenance of soil thermal regime was added as a function for this assessment to identify wetlands in the study area that are important for maintaining permafrost. As expected, waters and lacustrine fringe wetlands (Estuarine Waters, Lakes and Ponds and Lacustrine Fringe Graminoid Marsh) rated as low value (Table 3) as substantial thaw bulbs tend to develop beneath these features (Brosten 2006, Jorgenson and Shur 2007). Saturated Salt-killed Meadow also rated as low value for this function because as a result of storm surges, the insulating vegetation mat and underlying organic soil of this type have been disturbed and are no longer as effective in protecting the underlying permafrost as similarly undisturbed habitats. Saturated Graminoid Meadow was the only wetland class rated as high because it supports dense vegetation, a relatively thick organic mat, and a saturated hydrology, which slows the rate at which heat can penetrate the soil. The remaining wetland types rated as moderate due to varying degrees of flooding; water is an affective conductor of heat.

Organic matter production and export rated low to moderate across all wetland types (Table 3), due to the absence of riverine corridors or drainages (none were identified on the aerial photography or during the field survey) (Figure 2, Appendix A and B). Riverine wetlands

typically rate high for this function due to the presence of a productive broadleaved deciduous plant canopy. Wetlands with the combination of seasonal flooding and vegetation/water interspersion were rated as moderate; the remaining wetlands received a low rating for this function (Table 3, Appendix C).

TES support was evaluated based on direct observations, presence of formally established critical habitat, and presence of preferred habitat as inferred from the habitat use table developed for this study. Wetland Functional Classes considered to be preferred habitat for the purposes of this study include Estuarine Waters, Lakes and Ponds, Lacustrine Fringe Graminoid Marsh, Wet Graminoid Meadow and Open Water Complex, Semipermanently Flooded Wet Graminoid Meadow, Seasonally Flooded-Saturated Graminoid Meadow and Saturated Graminoid Meadow (Table 3, Appendix C). No critical habitat is present within the BEO study area.

The highest ranking Wetland Functional Classes for general avian and mammal habitat suitability were Wet Graminoid Meadow and Open Water Complex, Semipermanently Flooded Wet Graminoid Meadow and Seasonally Flooded/Saturated Graminoid Meadow. The habitats have a high diversity of both mammals and birds as well as relatively high water and vegetation interspersion (Appendix C). None of the Wetland Functional Classes were considered regionally rare.

General Fish Habitat Suitability for Semipermanently Flooded Wet Graminoid Meadow, Seasonally Flooded/Saturated Graminoid Meadow, Saturated Salt-killed Meadow and Saturated Graminoid Meadow was not applicable because these wetlands were not adjacent to any fish bearing waterbodies or streams. The remaining Wetland Functional Classes ranked high on the basis of providing spawning and rearing habitat with the assumption that all wetland classes with a surface water component have the potential to support at least seasonal populations of fish.

Education/Science/Recreation and Subsistence Use was rated high value for all evaluated Wetland Functional Classes (Table 3) on the basis that the entire study area is located within an established research area (BEO), is in public ownership close to Barrow, and easily accessible by road and boat.

PROPOSED MITIGATION RANKING CATEGORIES

Using the criteria described in the Methods section of this report, 7 Wetland Functional Classes ranked as Category I, 1 ranked as Category II and 1 as Category III. Estuarine Waters, Lakes and Ponds, Lacustrine Fringe Graminoid Marsh, and Wet Graminoid Meadow and Open Water Complex, Semipermanently Flooded Wet Graminoid Meadow, Seasonally Flooded-Saturated Graminoid Meadow and Saturated Graminoid Meadow fell into Category I because they are documented as preferred habitat for either Spectacled or Steller's Eider; otherwise they would have been considered Category II wetlands due to their combination of moderate to high ratings. Semipermanently Flooded Tidal Wet Graminoid Meadow is not preferred habitat for any TES but rated high value for 3 functions and thus was ranked as Category II. Saturated Salt-killed Meadow also was given Category III status based on its low to moderate ratings across most functions.

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Table 1. Waters and wetlands within the BEO study area, Barrow, Alaska, 2015.

NWI Code[a]	NWI Name	Area (acres)	Percent of Study Area
Waters			
E2USP	Estuarine Intertidal Irregularly Flooded Unconsolidated Shore	4.59	0.2
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom	723.36	25.1
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom	48.46	1.7
	Waters Subtotal	**776.42**	**27.0**
Wetlands			
PEM1H	Palustrine Permanently Flooded Persistent Emergent	2.77	0.1
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent	641.55	22.2
PEM1T	Palustrine Semipermanently Flooded-Tidal Persistent Emergent	3.12	0.1
PEM1E	Palustrine Seasonally Flooded/Saturated Persistent Emergent	648.62	22.5
PEM1S	Palustrine Temporary-Tidal Persistent Emergent	36.40	1.3
PEM1B	Palustrine Saturated Persistent Emergent	776.85	26.9
	Wetlands Subtotal	**2109.31**	**73.0**
	Grand Total	**2885.72**	**100.0**

[a] NWI = National Wetland Inventory annotation based on Cowardin et al. (1979) classification system.

Table 2. Wetland Functional Class descriptions and crosswalk table to mapped NWI types in the BEO study area, Barrow, Alaska, 2015.

Wetland Functional Class	HGM type	NWI* type	Class Description
Estuarine Waters	Depressional	E2USP	Occurs within 3 small inlets where tidal influence was considered to be at least seasonal. Direct surface water connections to marine waters were not observed during the field survey, but based on the prevalence of salt tolerant plant species on the edges of the waterbody and an EC measurement of 20 mS/cm, these waters were classified as estuarine.
Lakes and Ponds	Depressional	L1UBH, PUBH	Lakes (>20 acres in size) and ponds occur throughout the BEO study area. Depth is unknown but overall assumed to be shallow <3m in depth.
Lacustrine Fringe Graminoid Marsh	Lacustrine Fringe	PEM1H, PEM1F	Occurs along the fringes of 2 small ponds. Vegetation types are aquatic sedge marsh or floating mats with significant moss cover. Typical graminoid species include *Arctophila fulva*, *Carex aquatilis* and *Eriophorum angustifolium*.
Wet Graminoid Meadow and Shallow Open Water Complex	Depressional	PEM1H, PEM1F	A subset of the mapped PEM1F wetland type with mixed high- and low-center polygon patterned ground features. Occurs in low-lying areas at the edges of lakes or within the drained lake basin where microtopographic low features are permanently inundated, forming small ponds too small to map individually. Plant community dominated by obligate wetland sedge species including *Carex aquatilis* and *Eriophorum angustifolium*. Surface water is present throughout the growing season and soils are histic epipedons.
Semipermanently Flooded Tidal WetGraminoid Meadow	Depressional	PEM1T	Mapped within 2 drainage features connected to the Estuarine Waters type described above. Dominated by salt tolerant emergent vegetation such as *Dupontia fisheri*, *Puccinellia phryganodes* and *Stellaria humifusa*. Measured EC levels indicate this wetland class is brackish. Soils are gleyed silty clay loams with a near surface water table.

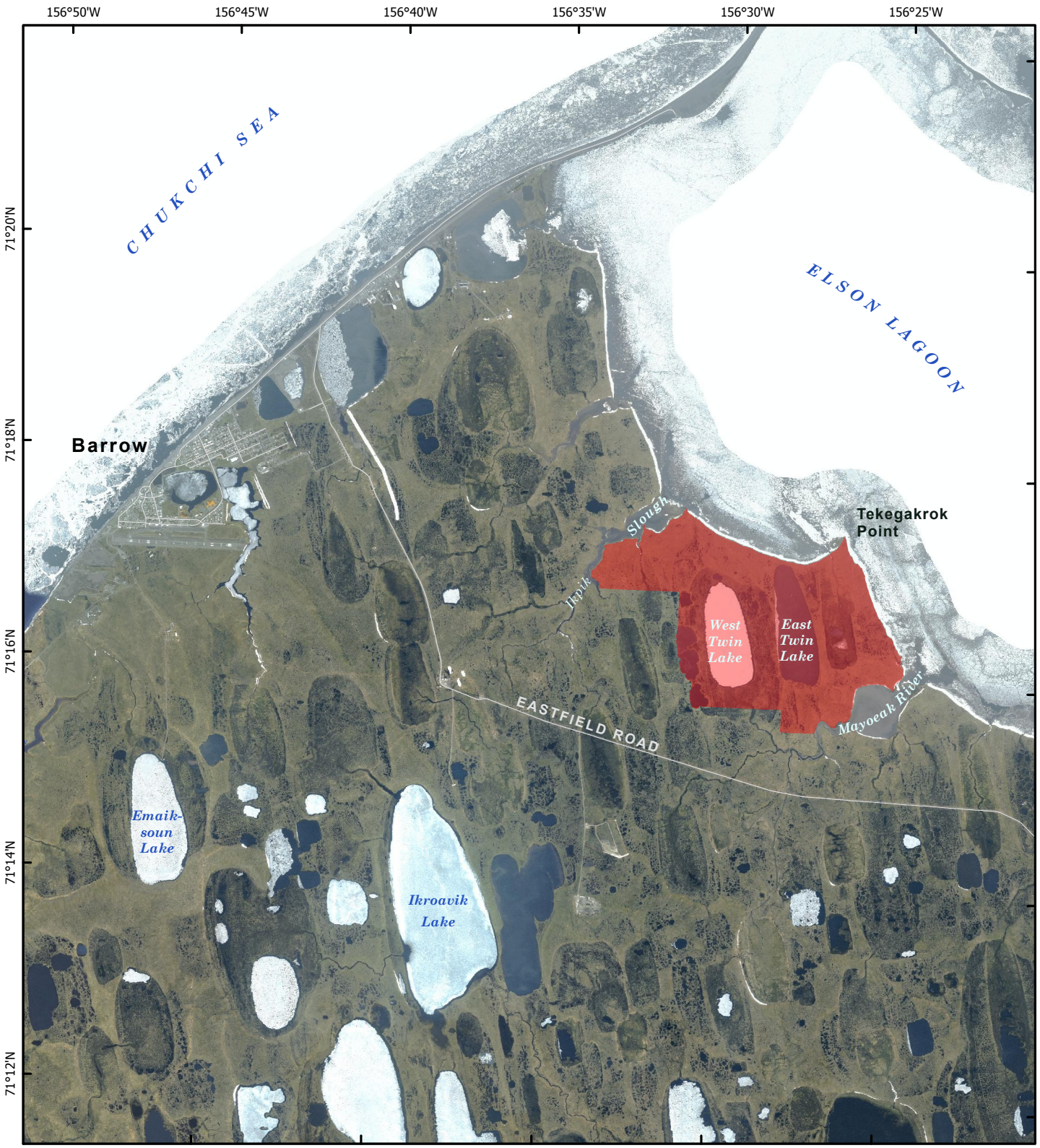
Table 2. Continued.

Wetland Functional Class	HGM type	NWI* type	Class Description
Semipermanently Flooded Wet Graminoid Meadow	Depressional	PEM1F	Typically found in lowland areas at the edges of lakes and in drained lake basins. The most common pattern ground feature are low center polygons which support obligate wet sedge plant communities. Development of small open waterbodies within degrading polygon features is not as pronounced as the Wet Sedge Meadow and Shallow Open Water Complex.
Seasonally Flooded-Saturated Graminoid Meadow	Flats	PEM1E	Mapped on Flats HGM landforms with similar plant community composition to Semipermanently Flooded Wet Graminoid Meadow with fewer open water patches throughout the class. Patterned ground feature is mixed high and low center polygons with high features supporting moist tundra types and depressions supporting wetter obligate sedge communities.
Saturated Salt-killed Meadow	Flats	PEM1S	Occurs in discrete patches on banks of marine waters where storm surge events have caused salt kill to palustrine tundra communities. High center polygon centers receive the most damage with intact moist emergent plant communities occupying the low microtopography. Soils are histic epipedons with secondary hydrology indicators present.
Saturated Graminoid Meadow	Flats	PEM1B	Occurs on raised convex topography on banks along the coast and at the edges of lake basins. Pattern ground features are high center polygons with very little standing surface water with low-lying troughs. Dominated by an emergent plant community composed of *Petasites frigidus*, *Luzula nivalis*, *Carex aquatilis*, and *Eriophorum angustifolium*. Dwarf shrubs including *Salix rotundifolia* may be present on raised microtopography. Soils meet Alaska Redox hydric soil indicator and saturation is within the top 12 inches of the soil profile.

* NWI = National Wetland Inventory annotation based on Cowardin et al. (1979) classification system.

Table 3. Wetland Functional Class relative ratings and proposed mitigation ranking categories for the BEO study area, Barrow, Alaska, 2015.

Wetland Functional Class	Category	Flood Flow Regulation	Sediment/ Nutrient/ Toxicant Removal	Erosion Control & Shoreline Stabil.	Maintenance of Soil Thermal Regime	Organic Matter Production and Export	TES Support	General Avian and Mammal Habitat Suitability	General Fish Habitat Suitability	Education/ Science/ Rec/ Subsist Use
Estuarine Waters	I	Moderate	High	N/A	Low	Low	Moderate	Low	High	High
Lakes and Ponds	I	High	High	N/A	Low	Low	High	Moderate	High	High
Lacustrine Fringe Graminoid Marsh	I	Moderate	High	High	Low	Moderate	Moderate	Moderate	High	High
Wet Graminoid Meadow and Open Water Complex	I	High	High	N/A	Moderate	Moderate	Moderate	High	High	High
Semipermanently Flooded Tidal Wet Graminoid Meadow	II	Moderate	High	Moderate	Low	Low	Low	Moderate	High	High
Semipermanently Flooded Wet Graminoid Meadow	I	High	High	N/A	Moderate	Moderate	High	High	N/A	High
Seasonally Flooded-Saturated Graminoid Meadow	I	High	High	N/A	Moderate	Moderate	High	High	N/A	High
Saturated Salt-killed Meadow	III	Low	Low	N/A	Moderate	Low	Low	Low	N/A	High
Saturated Graminoid Meadow	I	Low	Low	N/A	High	Low	High	Moderate	N/A	High



Study Area

Background imagery from SPOT5 pseudo-natural color, spatial resolution of 2.5m. Data obtained via the Alaska Mapped and the Statewide Digital Mapping Initiative from the UAF Geographic Information Network of Alaska (GINA) on http://www.alaskamapped.org/

0 1 2 3 km

0 0.5 1 1.5 2 mi

Figure 1.
Study Area Location

map prepared by:
ABR inc. environmental research & services

13 October 2015

Barrow_Mitigation_Bank_SA_15-176.mxd

NWI Code[1]	Description
Waters	
E2USP	Estuarine Intertidal Irregularly Flooded Unconsolidated Shore
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom
Wetlands	
PEM1H	Palustrine Permanently Flooded Persistent Emergent
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent
PEM1T	Palustrine Semipermanently Flooded-Tidal Persistent Emergent
PEM1E	Palustrine Seasonally Flooded/Saturated Persistent Emergent
PEM1S	Palustrine Temporary-Tidal Persistent Emergent
PEM1B	Palustrine Saturated Persistent Emergent

[1] Follows National Wetlands Inventory (NWI) map conventions and Cowardin et al. (1979) classification system.

Wetland

Wetland Determination Plot

Verification Plot

Approximate Scale = 1:15,500

0 500 1,000 1,500 2,000 Feet

0 200 400 600 Meters

Mapping by ABR, Inc. Ortho-rectified, color-balanced imagery acquired by Umiaq in 2014 at a resolution of 1.64ft. Background imagery available via Alaska Mapped and the Statewide Digital Mapping Initiative from the UAF Geographic Information Network of Alaska (GINA) on http://www.alaskamapped.org/

Map projection: Alaska State Plane Zone 6, NAD 1983, U.S. feet. Map scale when printed at 11"x17" is 1:15,500 or 1"=1,292'.

Figure 2.
Barrow Mitigation Bank Wetlands and Waters

Map prepared by:
ABR Inc.—Environmental Research & Services

2 November 2015 | Barrow_Mitigation_Bank_Wetlands_15-176.mxd

156°34'0"W 156°33'0"W 156°32'0"W 156°31'0"W 156°30'0"W 156°29'0"W 156°28'0"W 156°27'0"W 156°26'0"W 156°25'0"W 156°24'0"W

71°17'30"N

71°17'0"N

71°16'30"N

71°16'0"N

Ikpik Slough

Tekegakrok Point

West Twin Lake

East Twin Lake

Mayoeak River

Wetland Functional Class

- Estuarine Waters
- Lakes and Ponds
- Lacustrine Fringe Graminoid Marsh
- Wet Graminoid Meadow & Shallow Open Water Complex
- Semipermanently Flooded Tidal Graminoid Meadow
- Semipermanently Flooded Wet Graminoid Meadow
- Seasonally Flooded-Saturated Graminoid Meadow
- Saturated Salt-killed Meadow
- Saturated Graminoid Meadow

Approximate Scale = 1:16,646

0 500 1,000 1,500 2,000 Feet

0 200 400 600 Meters

N W E S

Mapping by ABR, Inc. Background imagery available via Alaska Mapped and the Statewide Digital Mapping Initiative from the UAF Geographic Information Network of Alaska (GINA) on http://www.alaskamapped.org/
Map projection: Alaska State Plane Zone 6, NAD 1983, U.S. feet. Map scale when printed at 11"x17" is 1:15,500 or 1"=1,292'.

Figure 3.
Barrow Mitigation Bank
Wetland Functional Class

Map prepared by:
ABR Inc.—Environmental Research & Services

2 November 2015 | Barrow_Mitigation_Bank_WetFunClass_15-176.mxd

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 28-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-01**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Lakeshore

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 10

Subregion : Northern Alaska | Lat.: 71.26624 | Long.: -156.512023333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1F**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: lacustrine fringe of smaller lake. water levels low, areas of fringe with arcful and mud. abundant goose scat, feathers, tracks, and heavily grazed arcful. fox scat.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Sapling/Shrub Stratum			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Herb Stratum			
1. Arctophila fulva	35	☑	OBL
2. Eriophorum scheuchzeri	0.1	☐	OBL
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	35.1		

50% of Total Cover: 17.55 | 20% of Total Cover: 7.02

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	35.1	x 1 =	35.1
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	35.1 (A)		35.1 (B)

Prevalence Index = B/A = 1.000

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 40

Total Cover of Bryophytes 55

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: bare ground is mud or water

SOIL

Sampling Point: **BEO-01**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1		100					Peat	fibric organics
1-6		100					Mucky Peat	hemic organics
6-13		100					Muck	sapric organics

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☑ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: frost
Depth (inches): 13

Hydric Soil Present? Yes ◉ No ○

Remarks:
H2S odor when walking through wetter areas. Seasonal frost at 13in, unsure if histel or histic epipedon.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☑ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	0
Water Table Present?	Yes ◉	No ○	Depth (inches):	3
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
H2S odor when walking through wetter areas. EC is 690. Temp is 38.5F.

BEO-01

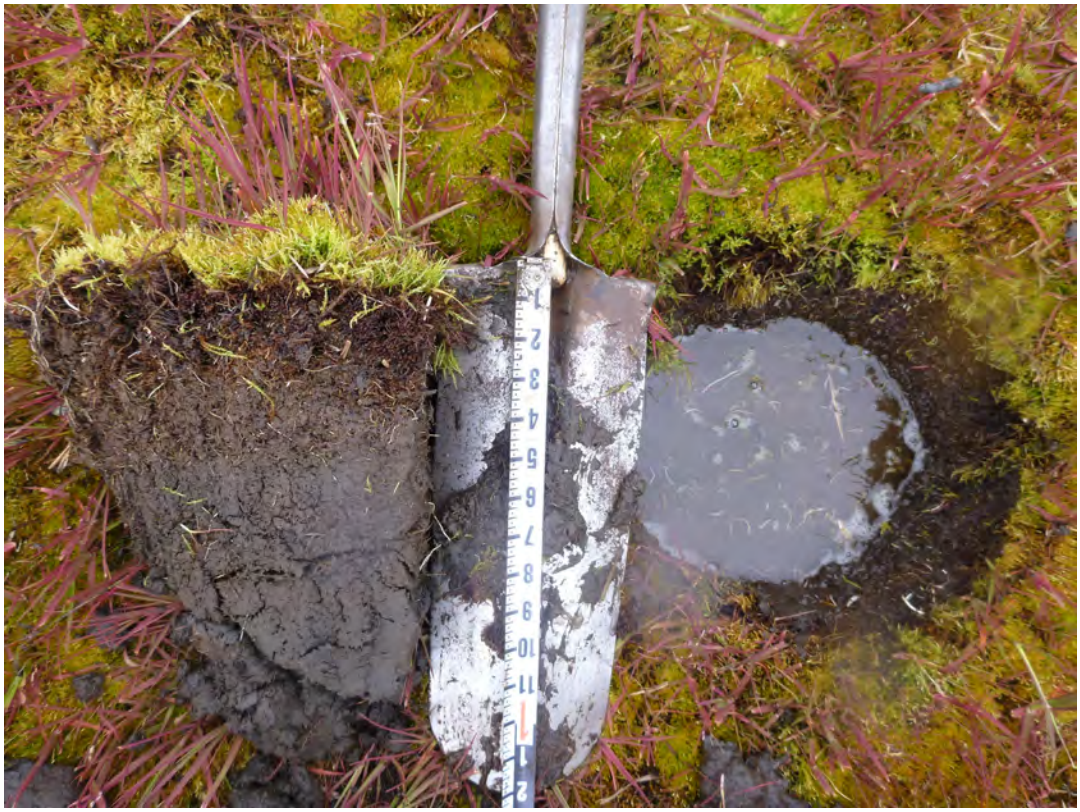
PEM1F

Wetland Functional Class: Lacustrine Fringe Graminoid Marsh

Wildlife Habitat: Aquatic Graminoid Marsh

Hydric Soil Indicators: Histic Epipedon (A2), Hydrogen Sulfide (A4).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Hydrogen Sulfide Odor (C1).



WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 28-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-02**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Pond

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 10

Subregion : Northern Alaska | Lat.: 71.2661633333333 | Long.: -156.512006666667 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PUBH**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☑ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: Lacustrine pond at edge of study area. no islands. narrow band of arcful likely mapped as part of pond, obvious emergent fringe characterized by BEO-01. No obvious inlets/outlets. several dunlin observed on pond.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
Herb Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	0		
	50% of Total Cover: 0	20% of Total Cover: 0	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	0	x 1 =	0
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0.000

Hydrophytic Vegetation Indicators:

☐ Dominance Test is > 50%

☐ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☑ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width)

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 100

Total Cover of Bryophytes

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: unvegetated pond

SOIL

Sampling Point: **BEO-02**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:
unvegetated pond, assume hydric soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	12
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
water temp 44
ec 700
uncertain of pond depth. rooted veg all within 20ft of shore

BEO-02

PUBH

Wetland Functional Class: Lakes and Ponds

Wildlife Habitat: Deep Open Water without Islands

Hydric Soil Indicators: Other: inundated, assume hydric soil.

Wetland Hydrology Indicators: Surface Water (A1).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 28-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-03**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): none | Slope: 0.0 % / 0.0 ° | Elevation: 10

Subregion : Northern Alaska | Lat.: 71.2642233333333 | Long.: -156.506766666667 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: level terrain, bright photosignature. few small cracks, but overall non-patterned. scattered goose and caribou scat. vole tunnels.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Sapling/Shrub Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix rotundifolia	7	☑	FAC
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	7		

50% of Total Cover: 3.5 | 20% of Total Cover: 1.4

Herb Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Carex aquatilis	30	☑	OBL
2. Saxifraga nelsoniana	5	☐	FAC
3. Eriophorum russeolum	3	☐	FACW
4. Poa arctica	3	☐	FAC
5. Petasites frigidus	3	☐	FACW
6. Saxifraga cernua	0.1	☐	FACW
7. Saxifraga foliolosa	0.1	☐	FACW
8. Stellaria longipes	0.1	☐	FAC
9. Luzula confusa	0.1	☐	FAC
10. Luzula nivalis	0.1	☐	FAC
Total Cover:	44.5		

50% of Total Cover: 22.25 | 20% of Total Cover: 8.9

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	30	x 1 =	30
FACW Species	6.2	x 2 =	12.4
FAC Species	15.3	x 3 =	45.90
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	51.5 (A)		88.30 (B)

Prevalence Index = B/A = 1.715

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width): r=15m

% Cover of Wetland Bryophytes (Where applicable):

% Bare Ground: 9

Total Cover of Bryophytes: 90

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: 1% unid poa, trace unid grass (calamagrostis lapponica?). Low confidence in Saxnel ID--saxifrage, leaves and distribution match Hulten. abundant lichens (dactylina, leopard spot)

SOIL

Sampling Point: **BEO-03**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1		100					Fibric Organics	
1-6		100					Hemic Organics	
6-7		100					Sapric Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: frost
Depth (inches): 7

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:
assume organics extend to 8in (frozen).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	6

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:

BEO-03

PEM1B

Wetland Functional Class: Saturated Graminoid Meadow

Wildlife Habitat: Moist Sedge-Shrub Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: Saturation (A3), Shallow Aquitard (D3), FAC-neutral Test (D5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 28-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-04**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 20

Subregion : Northern Alaska | Lat.: 71.263845 | Long.: -156.50173 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1E**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: low center, low relief polygonal tundra. scattered light ATV tracks, very similar to those at BRW-V01. characterizing large, shallow poly centers. overall community best mapped as pem1e or pem1/ss1e.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Carex aquatilis	30	☑	OBL
2. Eriophorum angustifolium	7	☐	OBL
3. Eriophorum russeolum	3	☐	FACW
4. Arctophila fulva	0.1	☐	OBL
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	40.1		
50% of Total Cover: 20.05		20% of Total Cover: 8.02	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	37.1	x 1 =	37.1
FACW Species	3	x 2 =	6
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	40.1 (A)		43.1 (B)

Prevalence Index = B/A = 1.075

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=10m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 45

Total Cover of Bryophytes 50

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: trace ranunculus pallasii (spoon like, fleshy leaves). Trace unidentified grass.

SOIL

Sampling Point: **BEO-04**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1							Fibric Organics	
1-7		100					Hemic Organics	
7-8	10YR 3/3	100					Silt Loam	
8-13		100					Hemic Organics	with mineral inclusions

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: frost
Depth (inches): 13

Hydric Soil Present? Yes ◉ No ○

Remarks:
Seasonal frost at 13in, uncertain if histel or histic epipedon.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	1
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

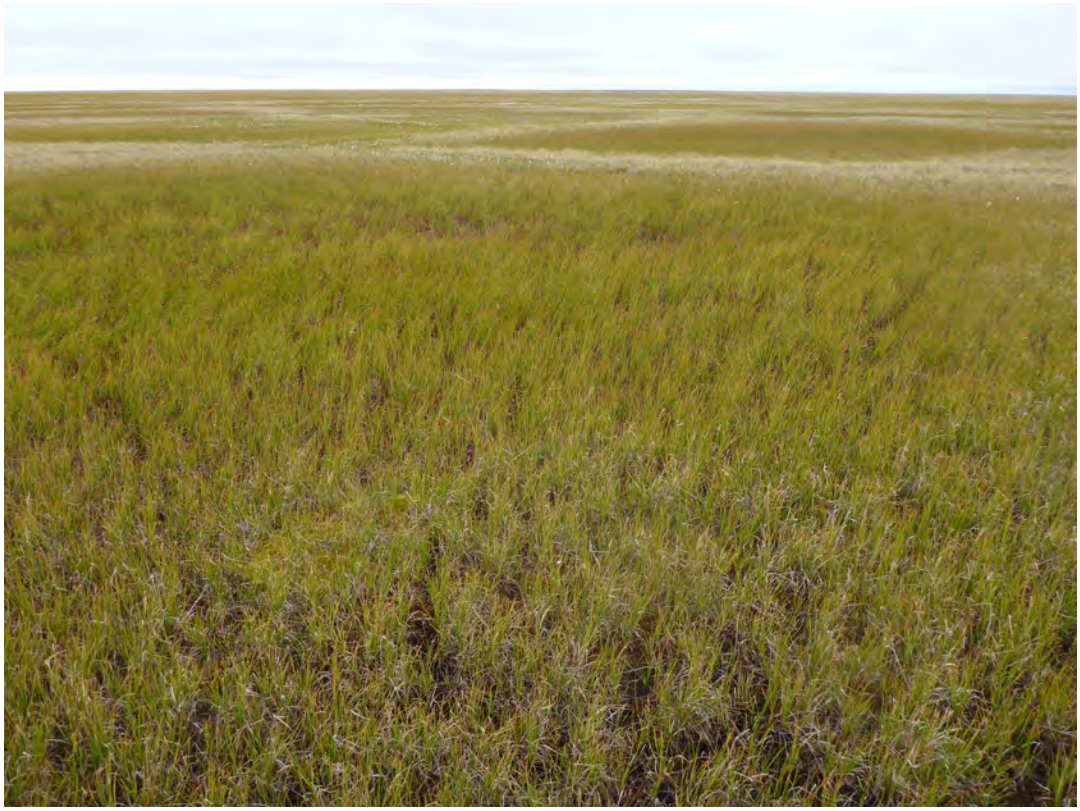
Remarks:
D3--seasonal frost
water in pit, temp 39.5, ec 370

BEO-04

PEM1E

Wetland Functional Class: Semipermanently Flooded Wet Graminoid Meadow

Wildlife Habitat: Patterned Wet Meadow



Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Iron Deposits (B5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 28-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-05**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): convex | Slope: 0.0 % / 0.0 ° | Elevation: 25

Subregion : Northern Alaska | Lat.: 71.2638583333333 | Long.: -156.501761666667 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: characterizing rims of low center, low relief polygonal tundra. while the rims are saturated, the community as a whole is best characterized as pem1e. abundant goose scat, vole tunnels.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1. Salix pulchra	5	☑	FACW
2. Salix rotundifolia	1	☐	FAC
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	6		
50% of Total Cover: 3		20% of Total Cover: 1.2	
Herb Stratum			
1. Carex aquatilis	25	☑	OBL
2. Eriophorum russeolum	7	☐	FACW
3. Juncus arcticus	3	☐	OBL
4. Festuca rubra	3	☐	FAC
5. Poa arctica	1	☐	FAC
6. Saxifraga cernua	0.1	☐	FACW
7. Saxifraga tricuspidata	0.1	☐	FACU
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	39.2		
50% of Total Cover: 19.6		20% of Total Cover: 7.84	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	28	x 1 =	28
FACW Species	12.1	x 2 =	24.20
FAC Species	5	x 3 =	15
FACU Species	0.1	x 4 =	0.400
UPL Species	0	x 5 =	0
Column Totals:	45.2 (A)		67.60 (B)

Prevalence Index = B/A = 1.496

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) 1m x 5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground

Total Cover of Bryophytes

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: **BEO-05**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-3		100					Hemic Organics	
3-7		100%					Hemic Organics	with 10YR3/3 silt loam inclusions

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 7

Hydric Soil Present? Yes ◉ No ○

Remarks:
histic epipedon, similar to adjacent BEO-04 but with silt loam inclusions

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 2

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
D3--frozen at 7in

BEO-05

PEM1B

Wetland Functional Class: Semipermanently Flooded Wet Graminoid Meadow

Wildlife Habitat: Patterned Wet Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: Saturation (A3), Shallow Aquitard (D3), FAC-neutral Test (D5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 28-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-06**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Swale

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 10

Subregion : Northern Alaska | Lat.: 71.265085 | Long.: -156.494473333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1H**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: swale at southern end of West Twin Lake. likely shallow surface water flow from lake in a more typical year. numerous dunlin in community, abundant goose scat and feathers on scattered high points.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Carex aquatilis	30	☑	OBL
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	30		
50% of Total Cover: 15		20% of Total Cover: 6	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	30	x 1 =	30
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	30 (A)		30 (B)

Prevalence Index = B/A = 1.000

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 100

Total Cover of Bryophytes 0

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: sedges heavily grazed, assume all caraqu. trace ranunculus pallasii as at beo-04.

SOIL

Sampling Point: **BEO-06**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-3							Peat	
3-16							Mucky Peat	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- [x] Histosol or Histel (A1)
- [ ] Histic Epipedon (A2)
- [ ] Hydrogen Sulfide (A4)
- [ ] Thick Dark Surface (A12)
- [ ] Alaska Gleyed (A13)
- [ ] Alaska Redox (A14)
- [ ] Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- [ ] Alaska Color Change (TA4)[4]
- [ ] Alaska Alpine swales (TA5)
- [ ] Alaska Redox With 2.5Y Hue
- [ ] Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- [ ] Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 16

Hydric Soil Present? Yes (•) No ( )

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [x] Iron Deposits (B5)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Marl Deposits (B15)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Dry-Season Water Table (C2)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Stained Leaves (B9)
- [ ] Drainage Patterns (B10)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [x] Presence of Reduced Iron (C4)
- [ ] Salt Deposits (C5)
- [ ] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [x] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes (•)	No ( )	Depth (inches):	4
Water Table Present?	Yes (•)	No ( )	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes (•)	No ( )	Depth (inches):	0

Wetland Hydrology Present? Yes (•) No ( )

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
D3--seasonal frost at 16in
C4--biogenic sheen on surface water

BEO-06

PEM1H

Wetland Functional Class: Semipermanently Flooded Wet Graminoid Meadow

Wildlife Habitat: Nonpatterned Wet Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: Surface Water (A1), High Water Table (A2), Saturation (A3), Iron Deposits (B5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 28-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-07**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Lake

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 10

Subregion : Northern Alaska | Lat.: 71.2658016666667 | Long.: -156.494528333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: L1UBH**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☑ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: West Twin Lake. small waves, wave formed shoreline. numerous dunlin in surf and lac fringe wetland (see BEO-06). no aquatic fringe besides sampled wetland (BEO-06). review imagery for presence of islands.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Herb Stratum			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	0	x 1 =	0
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0.000

Hydrophytic Vegetation Indicators:

☐ Dominance Test is > 50%

☐ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☑ Problematic Hydrophytic Vegetation [1](Explain)

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

Plot size (radius, or length x width)

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground

Total Cover of Bryophytes

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: unvegetated lake

SOIL

Sampling Point: **BEO-07**

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:
inundated--assume hydric soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☑ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	36
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
water temp 44
ec 250
unknown water depth, estimate over 36in

BEO-07

L1UBH

Wetland Functional Class: Lakes and Ponds

Wildlife Habitat: Deep Open Water without Islands

Hydric Soil Indicators: Other: inundated, assume hydric soil.

Wetland Hydrology Indicators: Surface water (A1), Inundation Visible on Aerial Imagery (B7).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-08**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): none | Slope: 0.0 % / 0.0 ° | Elevation: 10

Subregion : Northern Alaska | Lat.: 71.27658 | Long.: -156.512863333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1E**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: Wet sedge tundra west of West Twin Lake. light atv damage, similar to other atv tracks in BEO. ATV tracks appear dispersed throughout area, no defined/heavily rutted trails observed.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1. Salix pulchra	0.1	☑	FACW
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	0.1		
50% of Total Cover: 0.05		20% of Total Cover: 0.02	
Herb Stratum			
1. Carex aquatilis	25	☑	OBL
2. Eriophorum russeolum	10	☑	FACW
3. Eriophorum angustifolium	10	☑	OBL
4. Eriophorum scheuchzeri	5	☐	OBL
5. Arctophila fulva	2	☐	OBL
6. Ranunculus pallasii	2	☐	OBL
7. Saxifraga foliolosa	0.1	☐	FACW
8. Juncus arcticus	0.1	☐	OBL
9. Petasites frigidus	0.1	☐	FACW
10. Juncus biglumis	0.1	☐	OBL
Total Cover:	54.4		
50% of Total Cover: 27.2		20% of Total Cover: 10.88	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	44.2	x 1 =	44.2
FACW Species	10.3	x 2 =	20.60
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	54.5 (A)		64.80 (B)

Prevalence Index = B/A = 1.189

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 10

Total Cover of Bryophytes 85

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: 1% unidentified grass, trace saxcer

SOIL

Sampling Point: **BEO-08**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-7		100					Mucky Peat	hemic organics
7-11		100					Mucky Peat	hemic organics w mineral inclusions
11-12		100					Silt Loam	w organic inclusions

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: frost
Depth (inches): 12

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	2
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
Ec = 490. Temp = 36.5F.

BEO-08

PEM1E

Wetland Functional Class: Semipermanently Flooded Wet Graminoid Meadow

Wildlife Habitat: Patterned Wet Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-09**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): none | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.27663 | Long.: -156.51462 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1F**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: wet sedge tundra intermixed with small tundra ponds. small ponds characterized by BEO-10, but the area may be best described as a complex. extensive mud/bare ground suggests that the unusually dry season is the only reason there isn't standing water at time of site visit. one agitated dowitcher, unid shorebirds, and swan nest. few goose scat. note--2 loons (silver heads) on adjacent pond that is turquoise in imagery.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Carex aquatilis	25	☑	OBL
2. Eriophorum russeolum	5	☐	FACW
3. Arctophila fulva	1	☐	OBL
4. Saxifraga cernua	0.1	☐	FACW
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	31.1		
50% of Total Cover: 15.55		20% of Total Cover: 6.22	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	26	x 1 =	26
FACW Species	5.1	x 2 =	10.2
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	31.1 (A)		36.2 (B)

Prevalence Index = B/A = 1.164

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 65

Total Cover of Bryophytes 30

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: 2% ranunculus pallasii (fleshy spoon leaves), trace pedicularis. bryophytes include scosco.

SOIL

Sampling Point: **BEO-09**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-7		100					Fibric Organics	
7-10		100					Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 10

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

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

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

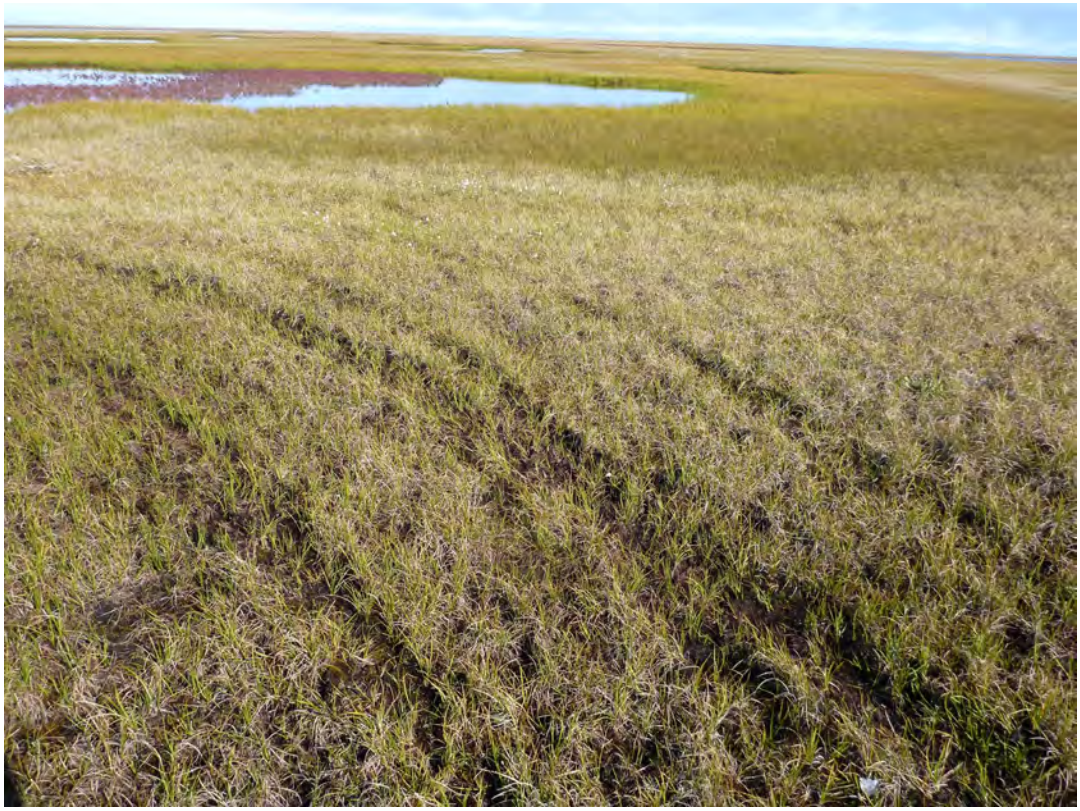
Remarks:
D3--seasonal frost
B5--iron floc on sediments
temp 38
ec 520

BEO-09

PEM1F

Wetland Functional Class: Wet Graminoid Meadow and Shallow Open Water Complex

Wildlife Habitat: Deep Polygon Complex



Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Iron Deposits (B5). Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-10**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Pond

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.2767266666667 | Long.: -156.514816666667 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PUBH**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** **Yes ◉ No ○**
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks: small shallow tundra pond in complex with PEM1F (see BEO-09). jaegers flying over. arcful is heavily grazed.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
Herb Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1. Arctophila fulva	20	☑	OBL
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	20		
	50% of Total Cover: 10	20% of Total Cover: 4	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	20	x 1 =	20
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	20 (A)		20 (B)

Prevalence Index = B/A = 1.000

Hydrophytic Vegetation Indicators:

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

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 100

Total Cover of Bryophytes 0

Hydrophytic Vegetation Present? **Yes ◉ No ○**

Remarks: arcful cover not high enough for pem2h

SOIL

Sampling Point: **BEO-10**

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:
inundated--assume hydric soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	6
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
bottom visible, estimate water depth <12in.
ec 350
temp 46

BEO-10

PUBH

Wetland Functional Class: Wet Graminoid Meadow and Shallow Open Water Complex

Wildlife Habitat: Deep Polygon Complex

Hydric Soil Indicators: Other: inundated, assume hydric soil.

Wetland Hydrology Indicators: Surface Water (A1), FAC-neutral Test (D5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-11**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): none | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.2824033333333 | Long.: -156.508826666667 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1F**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: wet sedge tundra very similar to BEO-09. shallow tundra ponds here are larger, may be mapped separately (not as part of complex). wet sedge tundra a mix of E and F water regimes, believe that the unusually dry season is the reason there isn't standing water at time of site visit. abundant goose scat, feathers.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1. Salix pulchra	0.1	☑	FACW
2. Salix ovalifolia	0.1	☑	FAC
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	0.2		
Herb Stratum	50% of Total Cover: 0.1	20% of Total Cover: 0.04	
1. Carex aquatilis	30	☑	OBL
2. Eriophorum scheuchzeri	15	☑	OBL
3. Arctophila fulva	5	☐	OBL
4. Saxifraga cernua	0.1	☐	FACW
5. Saxifraga foliolosa	0.1	☐	FACW
6. Saxifraga hirculus	0.1	☐	OBL
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	50.3		
	50% of Total Cover: 25.15	20% of Total Cover: 10.06	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	50.1	x 1 =	50.1
FACW Species	0.3	x 2 =	0.600
FAC Species	0.1	x 3 =	0.300
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	50.5 (A)		51 (B)

Prevalence Index = B/A = 1.010

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 60

Total Cover of Bryophytes 35

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: trace pedicularis, dupfis. eriophorum likely a mix of erirus andd erisch.

SOIL

Sampling Point: **BEO-11**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4		100					Fibric Organics	
4-13		100					Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 13

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	1
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

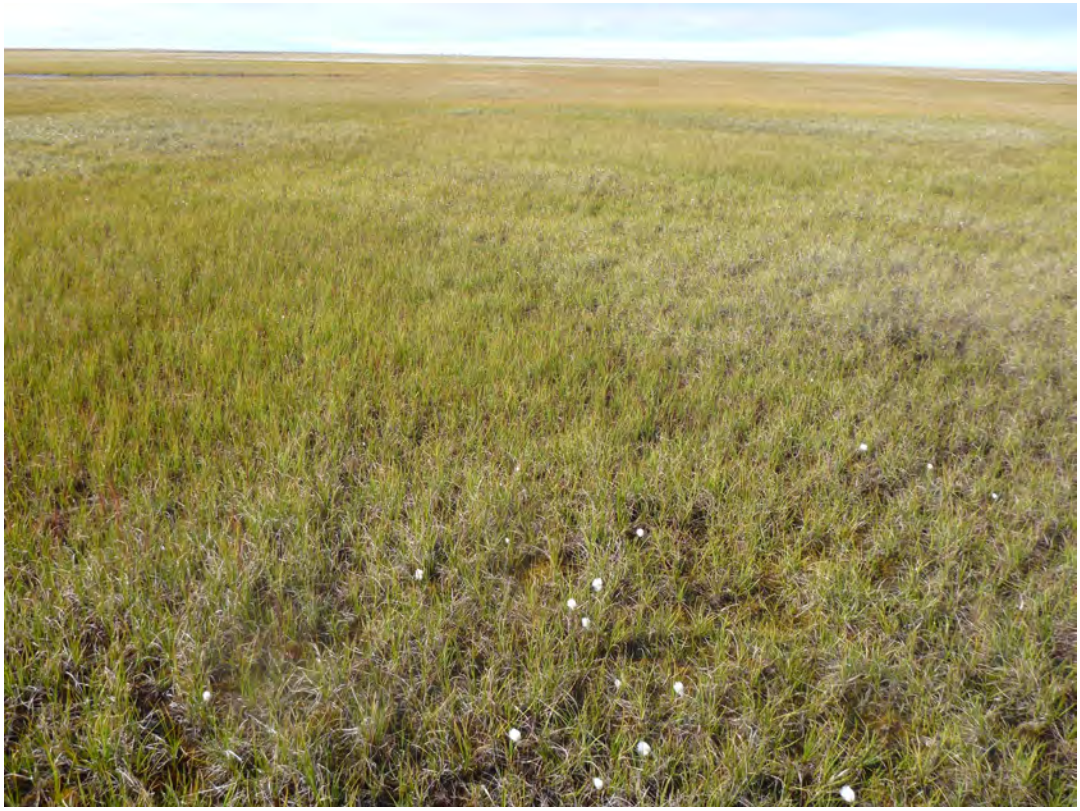
Remarks:
temp 38
ec 860

BEO-11

PEM1F

Wetland Functional Class: Semipermanently Flooded Wet Graminoid Meadow

Wildlife Habitat: Nonpatterned Wet Meadow



Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-12**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Pond

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.2824033333333 | Long.: -156.508183333333 | Datum: 0

Soil Map Unit Name: | **NWI classification: PEM2H**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: shallow tundra pond with sufficient aquatic grass cover for PEM2H code. arcful is heavily grazed.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Herb Stratum			
1. Arctophila fulva	25	☑	OBL
2. Carex aquatilis	7	☑	OBL
3. Hippuris vulgaris	0.1	☐	OBL
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	32.1		

50% of Total Cover: 16.05 | 20% of Total Cover: 6.42

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	32.1	x 1 =	32.1
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	32.1 (A)		32.1 (B)

Prevalence Index = B/A = 1.000

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1](Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 100

Total Cover of Bryophytes

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: **BEO-12**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:
inundated--assume hydric soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	12
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
shallow tundra pond, estimate 12 in deep.
ec 490
temp 49

BEO-12

PEM2H

Wetland Functional Class: Semipermanently Flooded Wet Graminoid Meadow

Wildlife Habitat: Nonpatterned Wet Meadow

Hydric Soil Indicators: Other: inundated, assume hydric soil.

Wetland Hydrology Indicators: Surface Water (A1), FAC-neutral Test (D5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-13**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Shoreline

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 20

Subregion : Northern Alaska | Lat.: 71.2847016666667 | Long.: -156.505863333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PSS1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: appears to be relic shoreline. high reflectance photosig. higher in elevation than adjacent wet sedge tundra, landform almost a shoulder. consider upland physio. longspur in community, numerous microtine burrows, scattered goose scat

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1. Salix rotundifolia	60	☑	FAC
2. Salix pulchra	1	☐	FACW
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	61		
Herb Stratum	50% of Total Cover: 30.5	20% of Total Cover: 12.2	
1. Petasites frigidus	20	☑	FACW
2. Alopecurus magellanicus	5	☐	FACW
3. Eriophorum angustifolium	5	☐	OBL
4. Saxifraga nelsoniana	3	☐	FAC
5. Luzula confusa	2	☐	FAC
6. Saxifraga hieraciifolia	1	☐	FAC
7. Pedicularis lanata	1	☐	FAC
8. Poa arctica	0.1	☐	FAC
9.	0	☐	
10.	0	☐	
Total Cover:	37.1		
50% of Total Cover: 18.55	20% of Total Cover: 7.42		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	5	x 1 =	5
FACW Species	26	x 2 =	52
FAC Species	67.1	x 3 =	201.3
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	98.1 (A)		258.3 (B)

Prevalence Index = B/A = 2.633

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 15

Total Cover of Bryophytes 15

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: trace draba sp, 10% lichen cover. Low confidence in Saxnel ID--saxifrage, leaves and distribution match Hulten.

SOIL

Sampling Point: **BEO-13**

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-1			100						Hemic Organics	
1-5	10YR	3/3	80	10YR	4/1	20	C	PL	Silty Clay Loam	
5-13	2.5Y	4/3	85	2.5Y	4/4	15	C	PL	Silty Clay Loam	distinct redox concentrations
13-17	10YR	2/1	100						Silt Loam	high organic content

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☑ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: silty clay loam, seasonal frost
Depth (inches): 1, 13

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 13

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

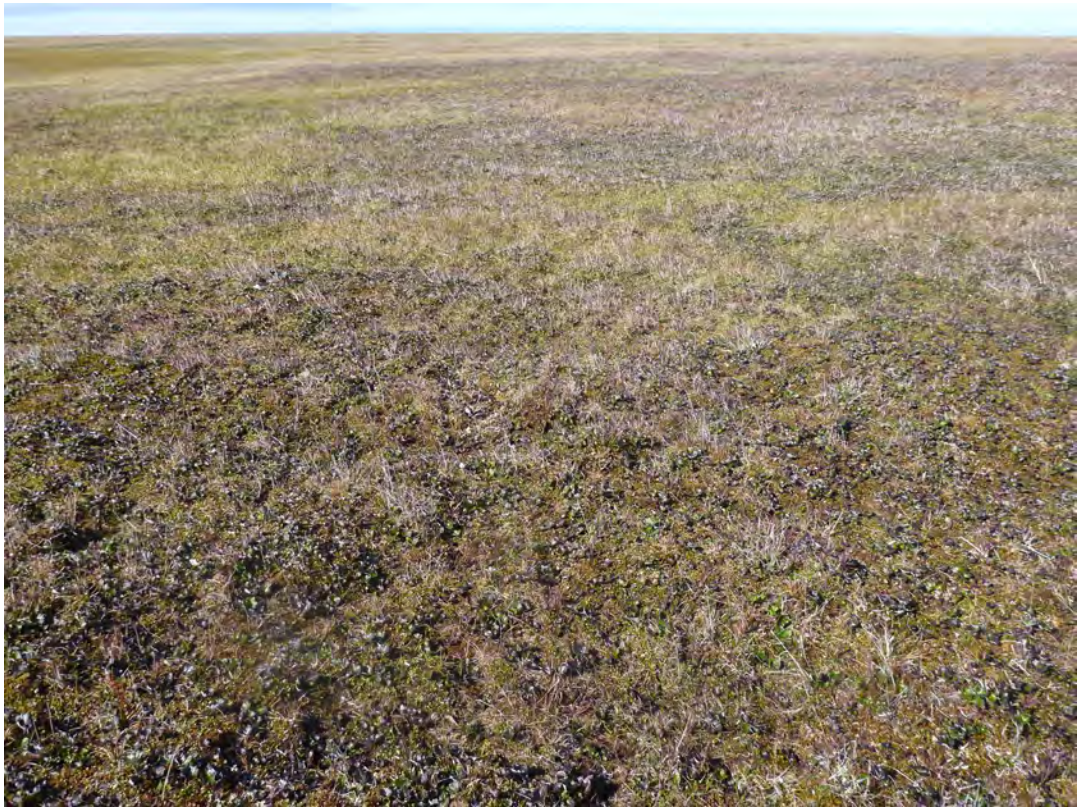
Remarks:
D3--silty clay loam, seasonal frost

BEO-13

PSS1B

Wetland Functional Class: Saturated Graminoid Meadow

Wildlife Habitat: Moist Sedge-Shrub Meadow



Hydric Soil Indicators: No hydric soil indicators.

Wetland Hydrology Indicators: Shallow Aquitard (D3), FAC-neutral Test (D5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-14**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): none | Slope: 0.0 % / 0.0 ° | Elevation: 40

Subregion : Northern Alaska | Lat.: 71.2824966666667 | Long.: -156.521195 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: mixed high and low center polygonal tundra. plot characterizing high center polygon. troughs and low center polys as at previously sampled wet sedge tundra. common goose and caribou scat.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1. Salix pulchra	5	☑	FACW
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	5		
Herb Stratum	50% of Total Cover: 2.5	20% of Total Cover: 1	
1. Carex aquatilis	20	☑	OBL
2. Luzula nivalis	15	☑	FAC
3. Luzula confusa	5	☐	FAC
4. Eriophorum russeolum	3	☐	FACW
5. Eriophorum angustifolium	1	☐	OBL
6. Saxifraga foliolosa	0.1	☐	FACW
7. Saxifraga cernua	0.1	☐	FACW
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	44.2		
	50% of Total Cover: 22.1	20% of Total Cover: 8.84	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	21	x 1 =	21
FACW Species	#######	x 2 =	16.40
FAC Species	20	x 3 =	60
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	49.2 (A)		97.40 (B)

Prevalence Index = B/A = 1.980

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 45

Total Cover of Bryophytes 50

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: salix at shoulder of high center poly

SOIL

Sampling Point: **BEO-14**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4		100					Hemic Organics	
4-7	10YR 2/2	100					Silty Clay Loam	
7-12		100					Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: silty clay loam, seasonal frost
Depth (inches): 4, 12

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	4

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
D3--silty clay loam, seasonal frost

BEO-14

PEM1B

Wetland Functional Class: Seasonally Flooded-Saturated Graminoid Meadow

Wildlife Habitat: Patterned Wet Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: Saturation (A3), Shallow Aquitard (D3), FAC-neutral Test (D5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-15**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): none | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.2805533333333 | Long.: -156.520485 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM2F**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: 2 loons on adjacent pond. portions of arcful lacustrine fringe wetland with nearly continuous moss cover, otherwise standing water with algae. common goose and possibly swan scat. heavily grazed arcful.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Arctophila fulva	30	☑	OBL
2. Ranunculus pallasii	10	☑	OBL
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	40		
50% of Total Cover: 20		20% of Total Cover: 8	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	40	x 1 =	40
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	40 (A)		40 (B)

Prevalence Index = B/A = 1.000

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 5

Total Cover of Bryophytes 90

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: bare ground includes standing water with algae.

SOIL

Sampling Point: **BEO-15**

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

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5			100						Fibric Organics	
5-6			100						Hemic Organics	
6-8			100						Sapric Organics	
8-9			100						Sapric Organics	with mineral inclusions
9-14	10Y	4/1	100						Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☑ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☑ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: silty clay loam, seasonal frost
Depth (inches): 9, 14

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☑ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	3
Water Table Present?	Yes ◉	No ○	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

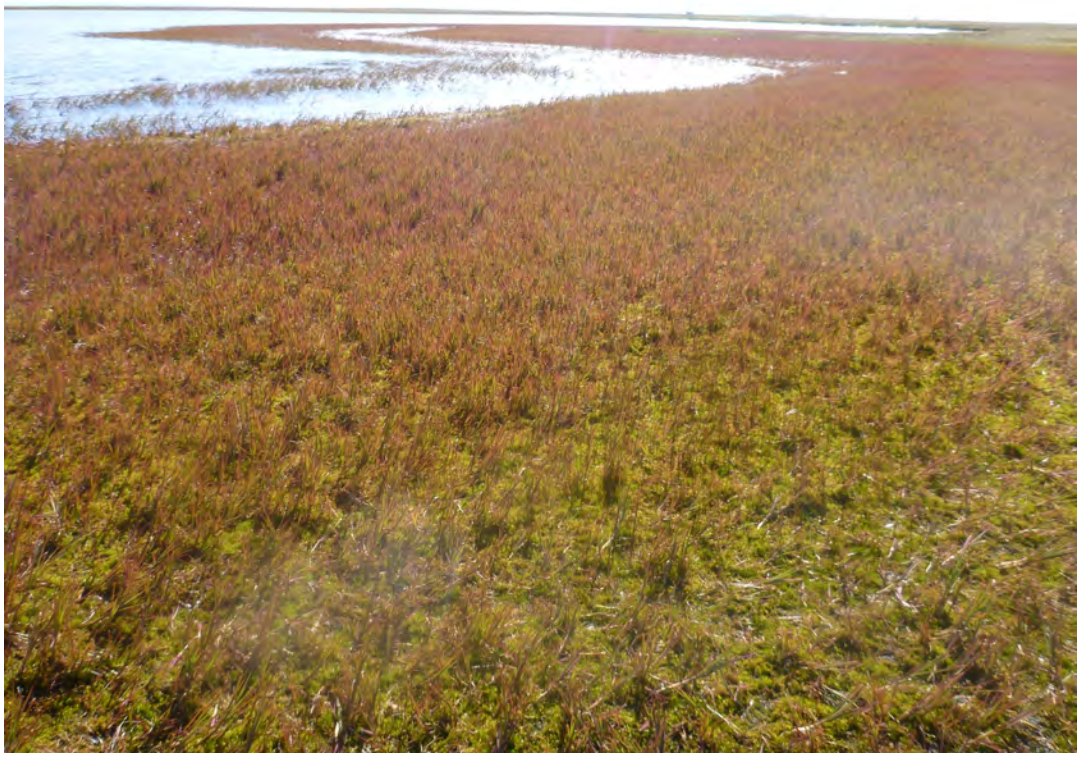
Remarks:
areas of shallow standing water, otherwise water is at or just below the surface.
D2--lacustrine fringe
C1--H2S in upper 12 inches
temp 42
ec 610

BEO-15

PEM2F

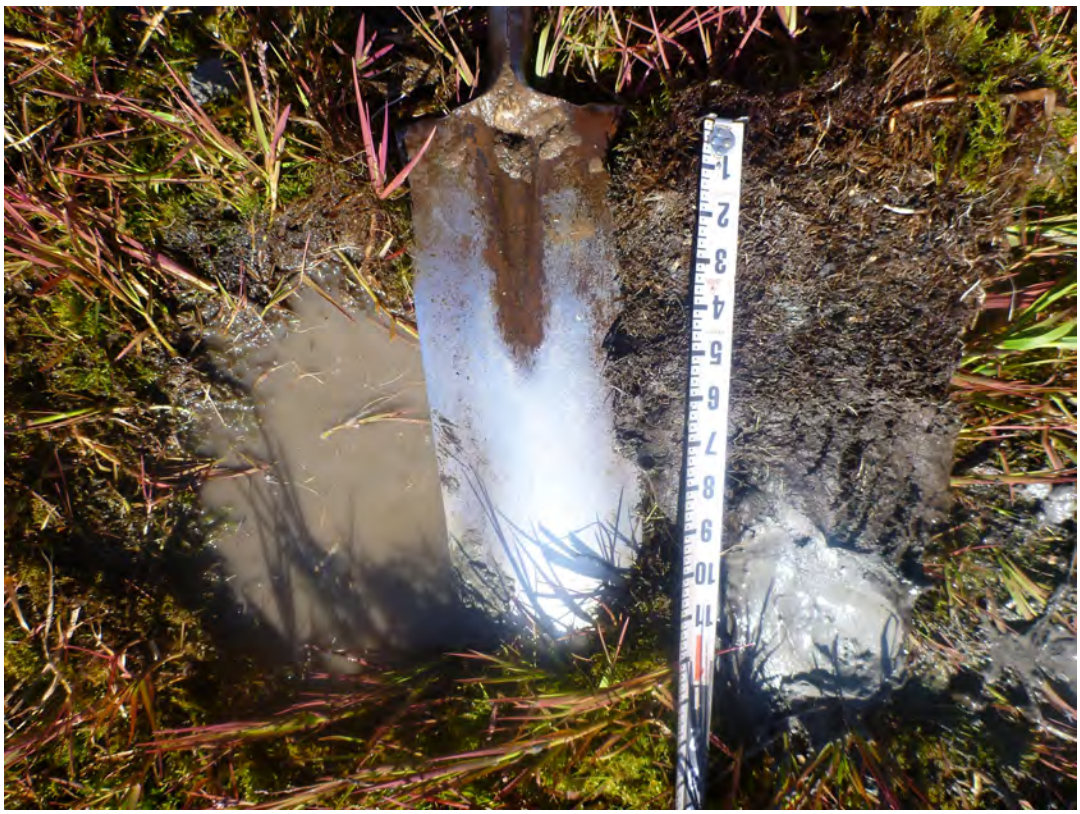
Wetland Functional Class: Lacustrine Fringe Graminoid Marsh

Wildlife Habitat: Aquatic Graminoid Marsh



Hydric Soil Indicators: Histic Epipedon (A2), Hydrogen Sulfide (A4).

Wetland Hydrology Indicators: Surface water (A1), High Water Table (A2), Saturation (A3).



WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-16**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Swale

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.28261 | Long.: -156.53846 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1F**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes (●) No ( )

Hydric Soil Present? Yes (●) No ( )

Wetland Hydrology Present? Yes (●) No ( )

Is the Sampled Area within a Wetland? Yes (●) No ( )

Remarks: swale connecting drained lake basin to Ikpik Slough. few goose scat.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Carex aquatilis	20	☑	OBL
2. Eriophorum angustifolium	10	☑	OBL
3. Eriophorum russeolum	10	☑	FACW
4. Dupontia fischeri	0.1	☐	FACW
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	40.1		
50% of Total Cover: 20.05		20% of Total Cover: 8.02	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	30	x 1 =	30
FACW Species	10.1	x 2 =	20.20
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	40.1 (A)		50.20 (B)

Prevalence Index = B/A = 1.252

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 0

Total Cover of Bryophytes 98

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks:

SOIL

Sampling Point: **BEO-16**

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

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-2			100						Fibric Organics	
2-6			100						Hemic Organics	
6-7	2.5Y	3/3	100						Silty Clay Loam	
7-13			100						Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 13

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	1
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
waffling between E and F hydro codes. very dry year, water at surface, hence F.
temp 42
ec 380
D2--swale
D3--silty clay loam, seasonal frost

BEO-16

PEM1F

Wetland Functional Class: Semipermanently Flooded Wet Graminoid Meadow

Wildlife Habitat: Nonpatterned Wet Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Geomorphic Position (D2).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-17**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Swale

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.2826666666667 | Long.: -156.53932 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PUBH**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: open water in swale connecting drained lake basin to Ikpik Slough. see BEO-16 for adjacent wet sedge tundra.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Arctophila fulva	5	☑	OBL
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	5		
50% of Total Cover: 2.5		20% of Total Cover: 1	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	5	x 1 =	5
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	5 (A)		5 (B)

Prevalence Index = B/A = 1.000

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) 1m x 5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 99

Total Cover of Bryophytes

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: **BEO-17**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:
inundated--assume hydric soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	16
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
bottom visible in places
D2--swale
temp 53
ec 330

BEO-17

PUBH

Wetland Functional Class: Lakes and Ponds

Wildlife Habitat: Shallow Open Water without Islands

Hydric Soil Indicators: Other: inundated, assume hydric soil.

Wetland Hydrology Indicators: Surface Water (A1), Geomorphic Position (D2), FAC-neutral Test (D5).

No Photo

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-18**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): none | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.284275 | Long.: -156.536633333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: hiking through this community, it is a mix of pem1b (as at this plot) and pem1e wet sedge tundra, with a few pss1b areas as at BEO-13. many microtine burrows.

VEGETATION - Use scientific names of plants. List all species in the plot.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
Herb Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1. Petasites frigidus	15	☑	FACW
2. Eriophorum angustifolium	10	☑	OBL
3. Poa arctica	10	☑	FAC
4. Carex aquatilis	10	☑	OBL
5. Alopecurus magellanicus	2	☐	FACW
6. Luzula confusa	1	☐	FAC
7. Stellaria longipes	0.1	☐	FAC
8. Saxifraga hieraciifolia	0.1	☐	FAC
9. Saxifraga foliolosa	0.1	☐	FACW
10. Saxifraga cernua	0.1	☐	FACW
Total Cover:	48.4		
50% of Total Cover: 24.2	20% of Total Cover: 9.68		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	20	x 1 =	20
FACW Species	17.2	x 2 =	34.40
FAC Species	11.2	x 3 =	33.60
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	48.4 (A)		88.00 (B)

Prevalence Index = B/A = 1.818

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 0

Total Cover of Bryophytes 95

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: surprisingly high poaarc cover. may be underestimate. 1% dupfis, trace small unidentified grass (callap?)

SOIL

Sampling Point: **BEO-18**

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

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-3			100						Hemic Organics	
3-7	2.5Y	3/2	90	7.5YR	3/3	10	C	PL	Silty Clay	C includes oxidized rhizospheres at living ro
7-11			100						Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: silty clay, seasonal frost
Depth (inches): 3, 11

Hydric Soil Present? Yes ◉ No ○

Remarks:
frozen at 11, assume an additional inch of frozen organics

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	7
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	2

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
D3--clay, seasonal frost

BEO-18

PEM1B

Wetland Functional Class: Seasonally Flooded-Saturated Graminoid Meadow

Wildlife Habitat: Patterned Wet Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-19**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 20

Subregion : Northern Alaska | Lat.: 71.2887966666667 | Long.: -156.526328333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: high center polygon community with frost boils. polygonal troughs as at BEO-20. few goose scat.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Eriophorum scheuchzeri	20	☑	OBL
2. Carex aquatilis	15	☑	OBL
3. Petasites frigidus	2	☐	FACW
4. Luzula confusa	1	☐	FAC
5. Saxifraga hieraciifolia	0.1	☐	FAC
6. Cochlearia officinalis	0.1	☐	FAC
7. Saxifraga cernua	0.1	☐	FACW
8. Luzula nivalis	0.1	☐	FAC
9. Saxifraga foliolosa	0.1	☐	FACW
10.	0	☐	
Total Cover:	38.5		
50% of Total Cover: 19.25		20% of Total Cover: 7.7	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	35	x 1 =	35
FACW Species	2.2	x 2 =	4.4
FAC Species	1.3	x 3 =	3.900
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	38.5 (A)		43.3 (B)

Prevalence Index = B/A = 1.125

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 15

Total Cover of Bryophytes 60

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: 20% lichen cover

SOIL

Sampling Point: **BEO-19**

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

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4			100						Hemic Organics	
4-7	10YR	3/3	100						Silt Loam	wavy boundary with 7-8 layer
7-8	10YR	2/2	100						Silt Loam	
8-14			100						Hemic Organics	with mineral inclusions

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 14

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	10
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	2

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
D3--seasonal frost
temp 33
ec 550

BEO-19

PEM1B

Wetland Functional Class: Saturated Graminoid Meadow

Wildlife Habitat: Moist Sedge-Shrub Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-20**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 20

Subregion : Northern Alaska | Lat.: 71.28879 | Long.: -156.526413333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1H**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: troughs of high center polygonal tundra.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Eriophorum angustifolium	20	☑	OBL
2. Carex aquatilis	10	☑	OBL
3. Eriophorum russeolum	0.1	☐	FACW
4. Arctophila fulva	0.1	☐	OBL
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	30.2		
50% of Total Cover: 15.1		20% of Total Cover: 6.04	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	30.1	x 1 =	30.1
FACW Species	0.1	x 2 =	0.200
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	30.2 (A)		30.30 (B)

Prevalence Index = B/A = 1.003

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1](Explain)

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

Plot size (radius, or length x width)

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 99

Total Cover of Bryophytes 0

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: **BEO-20**

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

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-2			100						Fibric Organics	
2-6			100						Hemic Organics	
6-8	10YR	3/3	100						Silty Clay Loam	
8-12			100						Hemic Organics	
12-16	5Y	3/2	90	10Y	3/1	10	RM	M	Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 16

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	4
Water Table Present?	Yes ◉	No ○	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
C4--biogenic sheen
D3--seasonal frost
temp 55
ec 780

BEO-20

PEM1H

Wetland Functional Class: Saturated Graminoid Meadow

Wildlife Habitat: Moist Sedge-Shrub Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: Surface Water (A1), High Water Table (A2), Saturation (A3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-21**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 20

Subregion : Northern Alaska | Lat.: 71.2897983333333 | Long.: -156.51523 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1E**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: mosaic of ponds and wet sedge tundra.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1. Salix ovalifolia	5	☑	FAC
2. Salix rotundifolia	1	☐	FAC
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	6		
50% of Total Cover: 3		20% of Total Cover: 1.2	
Herb Stratum			
1. Eriophorum angustifolium	15	☑	OBL
2. Carex aquatilis	10	☑	OBL
3. Eriophorum russeolum	5	☐	FACW
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	30		
50% of Total Cover: 15		20% of Total Cover: 6	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	25	x 1 =	25
FACW Species	5	x 2 =	10
FAC Species	6	x 3 =	18
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	36 (A)		53 (B)

Prevalence Index = B/A = 1.472

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1](Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 50

Total Cover of Bryophytes 45

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: salix on micro-high

SOIL

Sampling Point: **BEO-21**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12		100					Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 12

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	1
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
B5--iron floc
D3--seasonal frost
ec 440
temp 38

BEO-21

PEM1E

Wetland Functional Class: Seasonally Flooded-Saturated Graminoid Meadow

Wildlife Habitat: Patterned Wet Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Iron Deposits (B5), Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 29-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-22**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): none | Slope: 0.0 % / 0.0 ° | Elevation: 20

Subregion : Northern Alaska | Lat.: 71.2922466666667 | Long.: -156.519038333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: nonpatterned tundra near coast. few goose scat.

VEGETATION - Use scientific names of plants. List all species in the plot.

	Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.			☐	
2.			☐	
3.			☐	
4.			☐	
5.			☐	
	Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

	Sapling/Shrub Stratum			
1.			☐	
2.			☐	
3.			☐	
4.			☐	
5.			☐	
6.			☐	
7.			☐	
8.			☐	
9.			☐	
10.			☐	
	Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

	Herb Stratum			
1.	Carex aquatilis	25	☑	OBL
2.	Eriophorum angustifolium	15	☑	OBL
3.	Petasites frigidus	10	☐	FACW
4.	Dupontia fischeri	5	☐	FACW
5.	Saxifraga nelsoniana	3	☐	FAC
6.	Poa arctica	2	☐	FAC
7.	Saxifraga cernua	2	☐	FACW
8.	Alopecurus magellanicus	2	☐	FACW
9.	Cochlearia officinalis	0.1	☐	FAC
10.	Rumex arcticus	0.1	☐	FAC
	Total Cover:	64.2		

50% of Total Cover: 32.1 | 20% of Total Cover: 12.84

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	40	x 1 =	40
FACW Species	19	x 2 =	38
FAC Species	5.2	x 3 =	15.6
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	64.2 (A)		93.6 (B)

Prevalence Index = B/A = 1.458

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 5

Total Cover of Bryophytes 90

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: trace stelaria longipes, saxifraga hieraciifolia. Low confidence in Saxnel ID--saxifrage, leaves and distribution match Hulten.

SOIL

Sampling Point: **BEO-22**

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-4			100						Hemic Organics	
4-8	10YR	3/3	100						Silty Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 8

Hydric Soil Present? Yes ◉ No ○

Remarks:
positive reaction to alpha, alpha-dipyridol

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	3
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	1

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
C4--positive reaction to alpha, alpha-dipyridol.
D3--seasonal frost
temp 33
ec 720

BEO-22

PEM1B

Wetland Functional Class: Saturated Graminoid Meadow

Wildlife Habitat: Moist Sedge-Shrub Meadow

Hydric Soil Indicators: Other: positive reaction to alpha, alpha-dipyridol.

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Presence of Reduced Iron (C4).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-23**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 25

Subregion : Northern Alaska | Lat.: 71.2834066666667 | Long.: -156.43366 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1S**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: salt-affected high center polygons near coast. common goose scat. male common eider loafing in community. dunlin foraging. Salt killed tundra.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1. Salix rotundifolia	3	☑	FAC
2. Salix pulchra	2	☑	FACW
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	5		
Herb Stratum	50% of Total Cover: 2.5	20% of Total Cover: 1	
1. Cochlearia officinalis	15	☑	FAC
2. Potentilla nana	15	☑	FAC
3. Eriophorum angustifolium	10	☑	OBL
4. Luzula confusa	10	☑	FAC
5. Festuca brachyphylla	10	☑	UPL
6. Luzula nivalis	7	☐	FAC
7. Poa arctica	5	☐	FAC
8. Petasites frigidus	2	☐	FACW
9. Stellaria humifusa	0.1	☐	OBL
10. Juncus biglumis	0.1	☐	OBL
Total Cover:	74.2		
	50% of Total Cover: 37.1	20% of Total Cover: 14.84	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 85.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	10.2	x 1 =	10.2
FACW Species	4	x 2 =	8
FAC Species	55	x 3 =	165
FACU Species	0	x 4 =	0
UPL Species	10	x 5 =	50
Column Totals:	79.2 (A)		233.2 (B)

Prevalence Index = B/A = 2.944

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 80

Total Cover of Bryophytes 5

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: trace unid grass, saxfol, stelon. polygonal troughs with eriang, dupfis, arcful.

SOIL

Sampling Point: **BEO-23**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-10		100					Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 10

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
D3--seasonal frost

BEO-23

PEM1S

Wetland Functional Class: Saturated Salt-killed Meadow

Wildlife Habitat: Salt-killed Tundra

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: Shallow Aquitard (D3), FAC-neutral Test (D5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-24**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 10

Subregion : Northern Alaska | Lat.: 71.27661 | Long.: -156.43133 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: low center polygonal tundra rim. common goose and caribou scat.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1. Salix rotundifolia	3	☑	FAC
2. Salix ovalifolia	2	☑	FAC
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	5		
Herb Stratum	50% of Total Cover: 2.5	20% of Total Cover: 1	
1. Carex aquatilis	20	☑	OBL
2. Eriophorum russeolum	15	☑	FACW
3. Eriophorum angustifolium	5	☐	OBL
4. Poa arctica	5	☐	FAC
5. Luzula nivalis	5	☐	FAC
6. Stellaria longipes	0.1	☐	FAC
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	50.1		
	50% of Total Cover: 25.05	20% of Total Cover: 10.02	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	25	x 1 =	25
FACW Species	15	x 2 =	30
FAC Species	15.1	x 3 =	45.30
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	55.1 (A)		100.3 (B)

Prevalence Index = B/A = 1.820

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 30

Total Cover of Bryophytes 65

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: trace poa sp

SOIL

Sampling Point: **BEO-24**

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-4			100						Hemic Organics	
4-6	10YR	4/2	50	10YR	3/3	50		M	Silt Loam	
6-8			100						Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 8

Hydric Soil Present? Yes ◉ No ○

Remarks:
frozen at 8in, assume organics continue to meet A2 requirements

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	7
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	1

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:

BEO-24

PEM1B

Wetland Functional Class: Wet Graminoid Meadow and Shallow Open Water Complex

Wildlife Habitat: Deep Polygon Complex

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-25**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 25

Subregion : Northern Alaska | Lat.: 71.2766333333333 | Long.: -156.431433333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1F**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: low center polygonal tundra. polygon center. most polys in this community are fairly wet, given the dry season F seems the most appropriate hydro code.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Carex aquatilis	30	☑	OBL
2. Ranunculus pallasii	7	☐	OBL
3. Arctophila fulva	5	☐	OBL
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	42		
50% of Total Cover: 21		20% of Total Cover: 8.4	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	42	x 1 =	42
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	42 (A)		42 (B)

Prevalence Index = B/A = 1.000

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1](Explain)

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

Plot size (radius, or length x width) r=10m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 95

Total Cover of Bryophytes 3

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: bryophytes include scosco

SOIL

Sampling Point: **BEO-25**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-3		100					Fibric Organics	
3-9		100					Hemic Organics	
9-13		100					Hemic Organics	with mineral inclusions

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 13

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	4
Water Table Present?	Yes ◉	No ○	Depth (inches):	1
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
surface water 4-6in deep. temp 43, ec 950
C4--biogenic sheen
B5--iron floc
D3--seasonal frost

BEO-25

PEM1F

Wetland Functional Class: Wet Graminoid Meadow and Shallow Open Water Complex

Wildlife Habitat: Deep Polygon Complex

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: Surface Water (A1), High Water Table (A2), Saturation (A3), Iron Deposits (B5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-26**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Drained Lake Basin

Local relief (concave, convex, none): none | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.2770366666667 | Long.: -156.44063 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1F**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: large drained lake basin. patchy community changes undetectable in imagery--erirus, caraqu, arcful dominants with varying moss cover. map as wet sedge tundra.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Dupontia fischeri	25	☑	FACW
2. Eriophorum russeolum	10	☑	FACW
3. Eriophorum scheuchzeri	5	☐	OBL
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	40		
50% of Total Cover: 20		20% of Total Cover: 8	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	5	x 1 =	5
FACW Species	35	x 2 =	70
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	40 (A)		75 (B)

Prevalence Index = B/A = 1.875

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 0

Total Cover of Bryophytes 99

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: **BEO-26**

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

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4			100						Fibric Organics	
4-6			100						Hemic Organics	
6-8	10YR	3/2	100						Silt Loam	
8-12			100						Hemic Organics	
12-14	10YR	3/2	100						Silt Loam	with organic inclusions

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 14

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	1
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

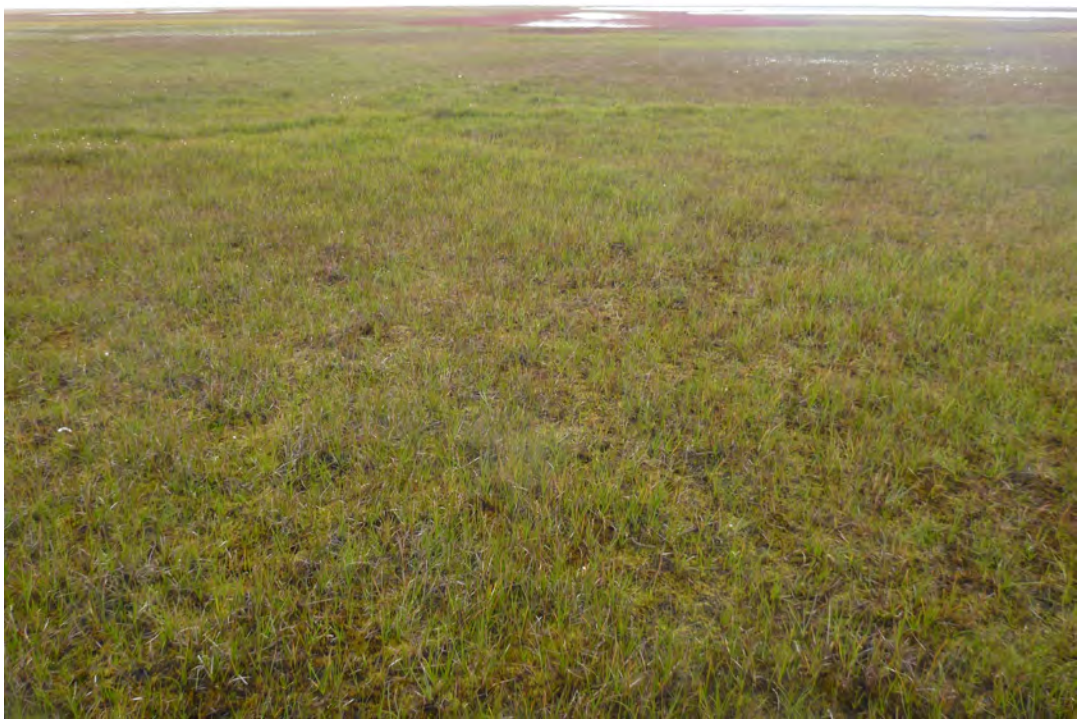
Remarks:
D3--seasonal frost
ec 2600uS
temp 42

BEO-26

PEM1F

Wetland Functional Class: Semipermanently Flooded Wet Graminoid Meadow

Wildlife Habitat: Nonpatterned Wet Meadow



Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-27**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 25

Subregion : Northern Alaska | Lat.: 71.2765233333333 | Long.: -156.440778333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM2H**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: small arcful pond in drained lake basin.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Arctophila fulva	30	☑	OBL
2. Ranunculus pallasii	5	☐	OBL
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	35		
50% of Total Cover: 17.5		20% of Total Cover: 7	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	35	x 1 =	35
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	35 (A)		35 (B)

Prevalence Index = B/A = 1.000

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1](Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 0

Total Cover of Bryophytes 95

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: substrate appears to be sphagnum

SOIL

Sampling Point: **BEO-27**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:
inundated--assume hydric soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	24
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
shallow pond in drained lake basin, arcful throughout. estimate water depth at 24in.
temp 50
ec 3700

BEO-27

PEM2H

Wetland Functional Class: Semipermanently Flooded Wet Graminoid Meadow

Wildlife Habitat: Nonpatterned Wet Meadow

Hydric Soil Indicators: Other: inundated, assume hydric soil.

Wetland Hydrology Indicators: Surface Water (A1), FAC-neutral Test (D5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-28**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Shoreline

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 25

Subregion : Northern Alaska | Lat.: 71.2766283333333 | Long.: -156.453245 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: raised shoreline between East Twin Lake and drained lake basin. numerous sparrows in community. common goose and caribou scat. polygonal troughs are pem1e and pem1f wet sedge tundra.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1. Salix rotundifolia	10	☑	FAC
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	10		
Herb Stratum	50% of Total Cover: 5	20% of Total Cover: 2	
1. Eriophorum russeolum	15	☑	FACW
2. Carex aquatilis	10	☑	OBL
3. Petasites frigidus	7	☑	FACW
4. Luzula nivalis	5	☐	FAC
5. Poa arctica	5	☐	FAC
6. Luzula confusa	5	☐	FAC
7. Eriophorum angustifolium	5	☐	OBL
8. Saxifraga nelsoniana	2	☐	FAC
9. Saxifraga cernua	0.1	☐	FACW
10. Saxifraga foliolosa	0.1	☐	FACW
Total Cover:	54.2		
	50% of Total Cover: 27.1	20% of Total Cover: 10.84	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	15	x 1 =	15
FACW Species	22.2	x 2 =	44.40
FAC Species	27	x 3 =	81
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	64.2 (A)		140.4 (B)

Prevalence Index = B/A = 2.187

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 20

Total Cover of Bryophytes 60

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: 1% potentilla sp, 10% lichen cover. Low confidence in Saxnel ID--saxifrage, leaves and distribution match Hulten.

SOIL

Sampling Point: **BEO-28**

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

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-2			100						Hemic Organics	with thin mineral band at 1in
2-7	7.5YR	3/2	98	5YR	2.5/2	2	C	PL	Silty Clay Loam	
7-10			100						Hemic Organics	with mineral inclusions

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 10

Hydric Soil Present? Yes ◉ No ○

Remarks:
positive reaction to alpha, alpha-dipyridol

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 9

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
C4--positive reaction to alpha, alpha-dipyridol
D3--seasonal frost

BEO-28

PEM1B

Wetland Functional Class: Saturated Graminoid Meadow

Wildlife Habitat: Moist Sedge-Shrub Meadow

Hydric Soil Indicators: Other: positive reaction to alpha, alpha-dipyridol

Wetland Hydrology Indicators: Saturation (A3), Presence of Reduced Iron (C4), Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-29**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Drained Lake Basin

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.2824216666667 | Long.: -156.458096666667 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1F**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: mosaic of small ponds, partially vegetated areas with iron floc, and wet sedge tundra with moss. overall map as pem1f wet sedge tundra. 2 loons in adjacent pond, agitated gull overhead, several dunlins in community. many goose scat, feathers, tracks. heavily grazed sedges and grasses.

VEGETATION - Use scientific names of plants. List all species in the plot.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum (50% of Total Cover: 0 / 20% of Total Cover: 0)			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
Herb Stratum (50% of Total Cover: 0 / 20% of Total Cover: 0)			
1. Eriophorum angustifolium	25	☑	OBL
2. Arctophila fulva	5	☐	OBL
3. Eriophorum russeolum	5	☐	FACW
4. Dupontia fischeri	5	☐	FACW
5. Ranunculus pallasii	3	☐	OBL
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	43		
50% of Total Cover: 21.5 / 20% of Total Cover: 8.6			

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	33	x 1 =	33
FACW Species	10	x 2 =	20
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	43 (A)		53 (B)

Prevalence Index = B/A = 1.233

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1](Explain)

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

Plot size (radius, or length x width): r=15m

% Cover of Wetland Bryophytes (Where applicable):

% Bare Ground: 60

Total Cover of Bryophytes: 35

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: bryophytes include scosco

SOIL

Sampling Point: **BEO-29**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5		100					Fibric Organics	
5-12		100					Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 12

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	1
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

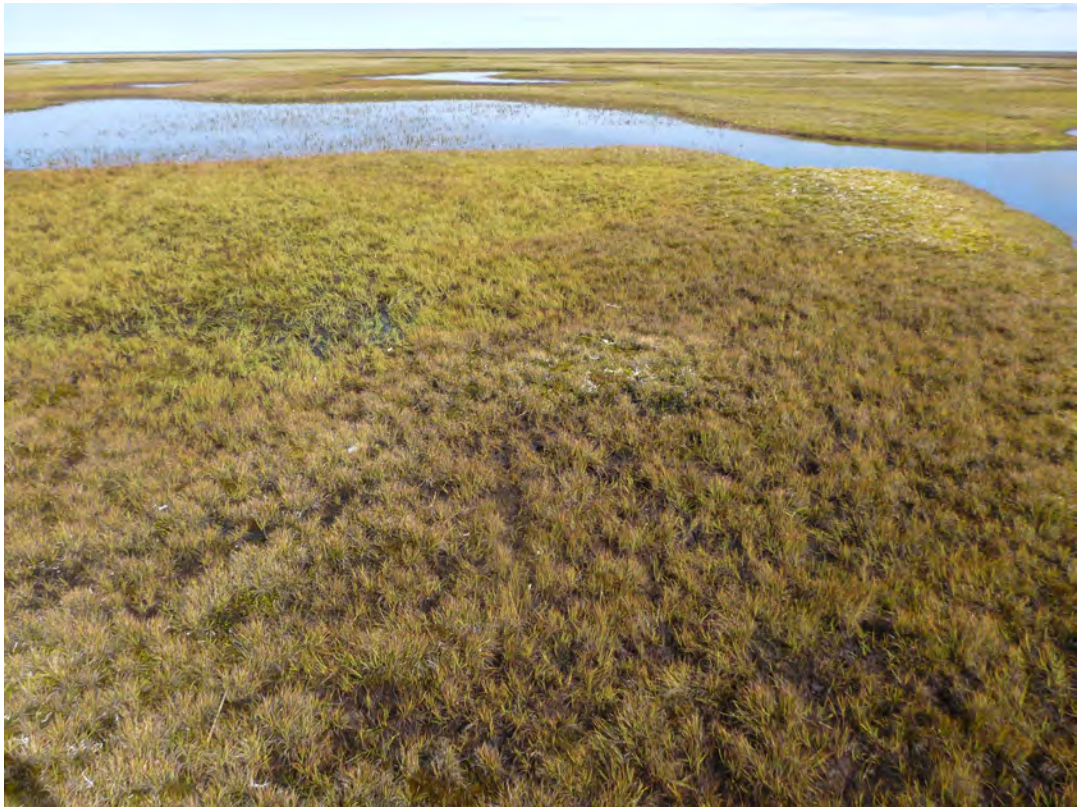
Remarks:
B5--iron floc
D3--seasonal frost
temp 45
ec 550

BEO-29

PEM1F

Wetland Functional Class: Semipermanently Flooded Wet Graminoid Meadow

Wildlife Habitat: Patterned Wet Meadow



Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Iron Deposits (B5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-30**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Slough

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 20

Subregion : Northern Alaska | Lat.: 71.2866933333333 | Long.: -156.44724 | Datum: WGS84

Soil Map Unit Name: | **NWI classification:** E2USP

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☑ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? **Yes** ◉ **No** ○

Remarks: unvegetated substrates at mouth, no open water connection to Beaufort Sea at time of site visit, current water level about 12in below OHW. common goose scat, tracks, feathers.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Herb Stratum			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	0	x 1 =	0
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0.000

Hydrophytic Vegetation Indicators:

☐ Dominance Test is > 50%

☐ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☑ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width)

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground

Total Cover of Bryophytes

Hydrophytic Vegetation Present? **Yes** ◉ **No** ○

Remarks: unvegetated water

SOIL

Sampling Point: **BEO-30**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:
inundated--assume hydric soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	36
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
relatively deep open water. B5--iron floc, C4--biogenic sheen
temp 53
ec > 20mS/cm.

BEO-30

E2USP

Wetland Functional Class: Estuarine Waters

Wildlife Habitat: Brackish Water

Hydric Soil Indicators: Other: inundated, assume hydric soil.

Wetland Hydrology Indicators: Surface Water (A1), Iron Deposits (B5), Geomorphic Position (D2).

No Photo

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-31**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Swale

Local relief (concave, convex, none): concave | Slope: 3.0 % / 1.7 ° | Elevation: 5

Subregion : Northern Alaska | Lat.: 71.28645 | Long.: -156.447146666667 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1T**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: swale connecting to water characterized by BEO-30, no channel morphology in swale. many goose tracks, grazed vegetation. This is a narrow, sparsely vegetated feature. Plot centered in low point of swale, overall vegetation cover in mappable unit likely high enough for PEM1 code.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Dupontia fischeri	5	☑	FACW
2. Eriophorum angustifolium	0.1	☐	OBL
3. Arctophila fulva	0.1	☐	OBL
4. Ranunculus pallasii	0.1	☐	OBL
5. Stellaria humifusa	0.1	☐	OBL
6. Caltha palustris	0.1	☐	OBL
7. Puccinellia phryganodes	0.1	☐	OBL
8. Poa pratensis	0.1	☐	FACU
9.	0	☐	
10.	0	☐	
Total Cover:	5.7		
50% of Total Cover: 2.85		20% of Total Cover: 1.14	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	0.6	x 1 =	0.6
FACW Species	5	x 2 =	10
FAC Species	0	x 3 =	0
FACU Species	0.1	x 4 =	0.400
UPL Species	0	x 5 =	0
Column Totals:	5.7 (A)		11.00 (B)

Prevalence Index = B/A = 1.930

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1](Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 99

Total Cover of Bryophytes 0

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: trace viviparous poa (Poa pratensis ssp colpodea [Skinner et al. 2012]), this is likely the small poa observed at previous plots. No separate indicator status for subspecies, entered as Poa pratensis (FACU).

SOIL

Sampling Point: **BEO-31**

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-7			100						Hemic Organics	
7-8	2.5Y	3/2	100						Silty Clay Loam	
8-19	N	3/1	70	N	2.5/1	30		M	Silty Clay Loam	dark colors at organic inclusions

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☑ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 19

Hydric Soil Present? Yes ◉ No ○

Remarks:
Soil pit located near edge of swale, in area with higher vegetation cover.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	1
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
B5--iron floc
D3--seasonal frost
temp 41
ec 1900

BEO-31

PEM1T

Wetland Functional Class: Semipermanently Flooded Tidal Graminoid Meadow

Wildlife Habitat: Halophytic Sedge Wet Meadow

Hydric Soil Indicators: Alaska Gleyed w/o Hue 5Y or Redder Underlying Layer.

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Iron Deposits (B5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-32**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): none | Slope: 0.0 % / 0.0 ° | Elevation: 10

Subregion : Northern Alaska | Lat.: 71.2866433333333 | Long.: -156.449036666667 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○	**Is the Sampled Area within a Wetland? Yes ◉ No ○**
Hydric Soil Present? Yes ◉ No ○	
Wetland Hydrology Present? Yes ◉ No ○	

Remarks: nonpatterned mesic grass tundra.

VEGETATION - Use scientific names of plants. List all species in the plot.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum (50% of Total Cover: 0 / 20% of Total Cover: 0)			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
Herb Stratum (50% of Total Cover: 0 / 20% of Total Cover: 0)			
1. Petasites frigidus	10	☑	FACW
2. Alopecurus magellanicus	10	☑	FACW
3. Poa pratensis	10	☑	FACU
4. Poa arctica	10	☑	FAC
5. Eriophorum angustifolium	5	☐	OBL
6. Eriophorum scheuchzeri	5	☐	OBL
7. Saxifraga nelsoniana	5	☐	FAC
8. Luzula confusa	3	☐	FAC
9. Saxifraga cernua	0.1	☐	FACW
10. Stellaria longipes	0.1	☐	FAC
Total Cover:	58.2		
50% of Total Cover: 29.1 / 20% of Total Cover: 11.64			

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 75.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	10	x 1 =	10
FACW Species	20.1	x 2 =	40.20
FAC Species	18.1	x 3 =	54.30
FACU Species	10	x 4 =	40
UPL Species	0	x 5 =	0
Column Totals:	58.2 (A)		144.5 (B)

Prevalence Index = B/A = 2.483

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1](Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground

Total Cover of Bryophytes

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: trace saxhir, saxhie. Viviparous Poa pratensis ssp colpodea [Skinner et al. 2012]), no separate indicator status for subspecies, entered as Poa pratensis (FACU). Low confidence in Saxnel ID--saxifrage, leaves and distribution match Hulten.

SOIL

Sampling Point: **BEO-32**

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-1			100						Hemic Organics	
1-9	10YR	3/2	85	5YR	3/2	15	C	PL	Silt Loam	positive reaction to alpha alpha dipyridol

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 9

Hydric Soil Present? Yes ◉ No ○

Remarks:
positive reaction to alpha, alpha-dipyridol

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 9

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
C4--positive reaction to alpha, alpha-dipyridol

BEO-32

PEM1B

Wetland Functional Class: Saturated Graminoid Meadow

Wildlife Habitat: Moist Sedge-Shrub Meadow

Hydric Soil Indicators: Other: positive reaction to alpha, alpha-dipyridol.

Wetland Hydrology Indicators: Saturation (A3), Presence of Reduced Iron (C4), Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-33**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Lake

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.2853716666667 | Long.: -156.46852 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: L1UBH**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☑ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: East Twin Lake. no islands, bottom not visible. abundant goose scat, feathers, tracks on shore. no lacustrine fringe wetlands in vicinity of plot. camera trap 7ft from coast, bank not undercut. Lake approx 250ft from coast at time of site visit.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Herb Stratum			
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	0	x 1 =	0
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0.000

Hydrophytic Vegetation Indicators:

☐ Dominance Test is > 50%

☐ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☑ Problematic Hydrophytic Vegetation [1](Explain)

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

Plot size (radius, or length x width)

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground

Total Cover of Bryophytes

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: unvegetated water

SOIL

Sampling Point: **BEO-33**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:
inundated--assume hydric soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	72
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
ec 48
temp 890
no rooted vegetation in lake, assume depth is 2m.

BEO-33

L1UBH

Wetland Functional Class: Lakes and Ponds

Wildlife Habitat: Deep Open Water without Islands

Hydric Soil Indicators: Other: inundated, assume hydric soil.

Wetland Hydrology Indicators: Surface Water (A1).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-34**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Relic Lake Basin

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.2799466666667 | Long.: -156.479955 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1F**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: abundant goose scat, tracks, heavily grazed sedges. numerous dunlin in community, agitated gull overhead, several jaegers overhead. old rusted drum on northwest bank of small pond immediately to the north.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Eriophorum angustifolium	20	☑	OBL
2. Eriophorum russeolum	20	☑	FACW
3. Ranunculus pallasii	11	☑	OBL
4. Carex aquatilis	10	☐	OBL
5. Arctophila fulva	2	☐	OBL
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	63		
50% of Total Cover: 31.5		20% of Total Cover: 12.6	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	43	x 1 =	43
FACW Species	20	x 2 =	40
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	63 (A)		83 (B)

Prevalence Index = B/A = 1.317

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 80

Total Cover of Bryophytes 15

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: few seed heads, sedges grazed. reasonably confident of species list, lower confidence on individual species cover.

SOIL

Sampling Point: **BEO-34**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-13		100					Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 13

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	3
Water Table Present?	Yes ◉	No ○	Depth (inches):	1
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
scattered ponds visible in imagery not included in this plot, surface water described here comprising small, shallow pools throughout wetland. B5--iron floc. C4--biogenic sheen. D3--seasonal frost ec 70 temp 43

BEO-34

PEM1F

Wetland Functional Class: Wet Graminoid Meadow and Shallow Open Water Complex

Wildlife Habitat: Deep Polygon Complex

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: Surface Water (A1), High Water Table (A2), Saturation (A3), Iron Deposits (B5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-35**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 25

Subregion : Northern Alaska | Lat.: 71.2823316666667 | Long.: -156.478945 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1F**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: characterizing basins of low center polygonal tundra. few goose scat and feathers, trails through sedges to small ponds in basins. two large flocks of king eiders overhead. numerous dunlin in community.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Carex aquatilis	30	☑	OBL
2. Eriophorum angustifolium	30	☑	OBL
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	60		
50% of Total Cover: 30		20% of Total Cover: 12	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	60	x 1 =	60
FACW Species	0	x 2 =	0
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	60 (A)		60 (B)

Prevalence Index = B/A = 1.000

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 99

Total Cover of Bryophytes 0

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: **BEO-35**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-2		100					Fibric Organics	
2-8		100					Hemic Organics	
8-13	10YR 2/2	100					Silt Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 13

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	4
Water Table Present?	Yes ◉	No ○	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
surface water 4in deep in sedges, deeper in small ponds. D3--seasonal frost
temp 55
ec 410

BEO-35

PEM1F

Wetland Functional Class: Wet Graminoid Meadow and Shallow Open Water Complex

Wildlife Habitat: Deep Polygon Complex

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: Surface Water (A1), High Water Table (A2), Saturation (A3)

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 30-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-36**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.2846483333333 | Long.: -156.480498333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: high center polygon top. troughs are pem1e wet sedge tundra.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		

50% of Total Cover: 0 | 20% of Total Cover: 0

Herb Stratum			
1. Luzula nivalis	25	☑	FAC
2. Luzula confusa	15	☑	FAC
3. Carex aquatilis	10	☐	OBL
4. Petasites frigidus	5	☐	FACW
5. Poa arctica	3	☐	FAC
6. Saxifraga cernua	0.1	☐	FACW
7. Saxifraga foliolosa	0.1	☐	FACW
8. Saxifraga nelsoniana	0.1	☐	FAC
9.	0	☐	
10.	0	☐	
Total Cover:	58.3		

50% of Total Cover: 29.15 | 20% of Total Cover: 11.66

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	10	x 1 =	10
FACW Species	5.2	x 2 =	10.4
FAC Species	43.1	x 3 =	129.3
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	58.3 (A)		149.7 (B)

Prevalence Index = B/A = 2.568

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=15

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 10

Total Cover of Bryophytes 20

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: 40% lichen cover. Low confidence in Saxnel ID--saxifrage, leaves and distribution match Hulten.

SOIL

Sampling Point: **BEO-36**

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

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-2			100						Hemic Organics	
2-3	7.5YR	2.5/3	100						Silt Loam	
3-8			100						Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 8

Hydric Soil Present? Yes ◉ No ○

Remarks:
assume organics continue for at least another inch

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	7
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
D3--seasonal frost

BEO-36

PEM1B

Wetland Functional Class: Saturated Graminoid Meadow

Wildlife Habitat: Moist Sedge-Shrub Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 31-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-37**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 25

Subregion : Northern Alaska | Lat.: 71.264505 | Long.: -156.465003333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1F**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: low center polygonal tundra, characterizing basin. PEM1F wet sedge basins with PEM1B mesic sedge rims.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Carex aquatilis	35	☑	OBL
2. Eriophorum russeolum	5	☐	FACW
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	40		
50% of Total Cover: 20		20% of Total Cover: 8	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	35	x 1 =	35
FACW Species	5	x 2 =	10
FAC Species	0	x 3 =	0
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	40 (A)		45 (B)

Prevalence Index = B/A = 1.125

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1](Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 90

Total Cover of Bryophytes 5

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: **BEO-37**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-3		100					Fibric Organics	
3-5		100					Hemic Organics	
5-6	10YR 3/3	100					Silt Loam	
6-16		100					Hemic Organics	with mineral inclusions

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 16

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	1
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
no standing water at time of site visit, but iron floc and bare ground suggest that basins are usually flooded.
temp 41 ec 600
B5--iron floc, D3--seasonal frost

BEO-37

PEM1F

Wetland Functional Class: Seasonally Flooded-Saturated Graminoid Meadow

Wildlife Habitat: Patterned Wet Meadow

Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Iron Deposits (B5).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 31-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-38**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 20

Subregion : Northern Alaska | Lat.: 71.2666816666667 | Long.: -156.460483333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: faint patterning, indistinct mixed high and low center polygonal tundra. a mix of PEM1E and PEM1B, suggest PEM1B for community as a whole based on field observations.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1. Salix pulchra	3	☑	FACW
2. Salix rotundifolia	2	☑	FAC
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	5		
Herb Stratum	50% of Total Cover: 2.5	20% of Total Cover: 1	
1. Carex aquatilis	20	☑	OBL
2. Eriophorum scheuchzeri	15	☑	OBL
3. Eriophorum angustifolium	10	☐	OBL
4. Eriophorum russeolum	5	☐	FACW
5. Poa alpina	3	☐	FACU
6. Dupontia fischeri	2	☐	FACW
7. Pedicularis lanata	1	☐	FAC
8. Petasites frigidus	0.1	☐	FACW
9. Saxifraga nelsoniana	0.1	☐	FAC
10. Saxifraga hieraciifolia	0.1	☐	FAC
Total Cover:	56.3		
	50% of Total Cover: 28.15	20% of Total Cover: 11.26	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	45	x 1 =	45
FACW Species	10.1	x 2 =	20.20
FAC Species	3.2	x 3 =	9.6
FACU Species	3	x 4 =	12
UPL Species	0	x 5 =	0
Column Totals:	61.3 (A)		86.80 (B)

Prevalence Index = B/A = 1.416

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 5

Total Cover of Bryophytes 90

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: trace stellaria longipes, saxfol, saxcer. Low confidence in Saxnel ID--saxifrage, leaves and distribution match Hulten.

SOIL

Sampling Point: **BEO-38**

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

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4			100						Hemic Organics	
4-7	2.5Y	3/2	100						Silt Loam	
7-9			100						Hemic Organics	with mineral inclusions
9-16	2.5Y	2.5/1	100						Silt Loam	positive reaction to alpha alpha dipyridol

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 16

Hydric Soil Present? Yes ◉ No ○

Remarks:
positive reaction to alpha, alpha-dipyridol

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	2
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
C4--positive reaction to alpha, alpha-dipyridol
D3--seasonal frost
temp 37 ec 750

BEO-38

PEM1B

Wetland Functional Class: Seasonally Flooded-Saturated Graminoid Meadow

Wildlife Habitat: Patterned Wet Meadow

Hydric Soil Indicators: Other: positive reaction to alpha, alpha-dipyridol.

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Presence of Reduced Iron (C4).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 31-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-39**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 25

Subregion : Northern Alaska | Lat.: 71.2662266666667 | Long.: -156.449675 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: high center polygonal tundra, characterizing polygon top. few frost boils on polygon tops. well developed troughs are PEM1F wet sedge tundra with caraqu and eriophorum spp. common goose and caribou scat.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1.	0	☐	
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	0		
Herb Stratum	50% of Total Cover: 0	20% of Total Cover: 0	
1. Luzula nivalis	30	☑	FAC
2. Carex aquatilis	7	☐	OBL
3. Luzula confusa	5	☐	FAC
4. Poa arctica	5	☐	FAC
5. Eriophorum russeolum	3	☐	FACW
6. Dupontia fischeri	1	☐	FACW
7. Petasites frigidus	0.1	☐	FACW
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	51.1		
	50% of Total Cover: 25.55	20% of Total Cover: 10.22	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

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

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	7	x 1 =	7
FACW Species	4.1	x 2 =	8.2
FAC Species	40	x 3 =	120
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	51.1 (A)		135.2 (B)

Prevalence Index = B/A = 2.646

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation [1] (Explain)

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

Plot size (radius, or length x width) r=5m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 3

Total Cover of Bryophytes 45

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: 50% lichen cover, including thamnolia, dactylina

SOIL

Sampling Point: **BEO-39**

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

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1			100						Fibric Organics	
1-3			100						Hemic Organics	
3-5	10YR	3/3	100						Silt Loam	
5-10			100						Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☑ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 10

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	7
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	3

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

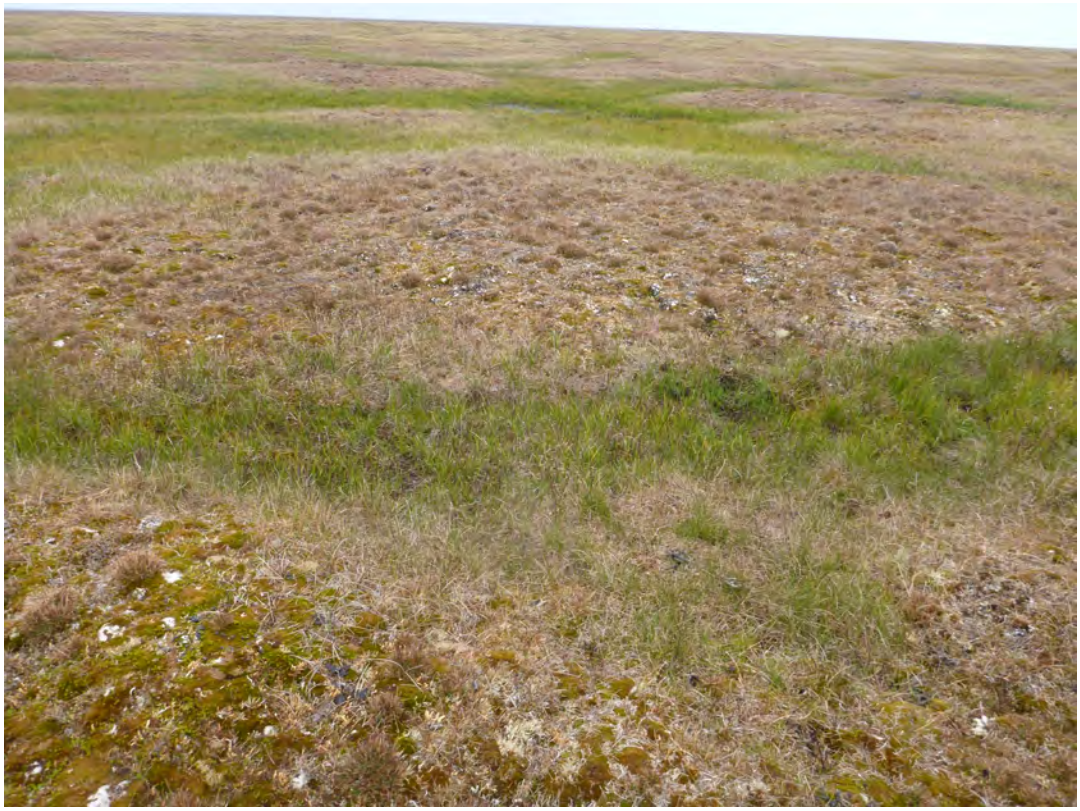
Remarks:
D3--seasonal frost

BEO-39

PEM1B

Wetland Functional Class: Saturated Graminoid Meadow

Wildlife Habitat: Moist Sedge-Shrub Meadow



Hydric Soil Indicators: Histic Epipedon (A2).

Wetland Hydrology Indicators: High Water Table (A2), Saturation (A3), Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 31-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-40**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Undulating

Local relief (concave, convex, none): concave | Slope: 0.0 % / 0.0 ° | Elevation: 25

Subregion : Northern Alaska | Lat.: 71.2646383333333 | Long.: -156.437638333333 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☑ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: high center, low relief polygonal tundra.

VEGETATION - Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Sapling/Shrub Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
6.		☐	
7.		☐	
8.		☐	
9.		☐	
10.		☐	
Total Cover:	0		
50% of Total Cover: 0		20% of Total Cover: 0	
Herb Stratum			
1. Carex aquatilis	10	☑	OBL
2. Luzula nivalis	10	☑	FAC
3. Eriophorum angustifolium	7	☐	OBL
4. Petasites frigidus	7	☐	FACW
5. Poa arctica	3	☐	FAC
6. Arctagrostis latifolia	1	☐	FACW
7. Luzula confusa	1	☐	FAC
8. Cochlearia officinalis	0.1	☐	FAC
9. Stellaria longipes	0.1	☐	FAC
10.	0	☐	
Total Cover:	39.2		
50% of Total Cover: 19.6		20% of Total Cover: 7.84	

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	17	x 1 =	17
FACW Species	8	x 2 =	16
FAC Species	14.2	x 3 =	42.60
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	39.2 (A)		75.60 (B)

Prevalence Index = B/A = 1.929

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

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

Plot size (radius, or length x width) r=15m

% Cover of Wetland Bryophytes (Where applicable)

% Bare Ground 5

Total Cover of Bryophytes 45

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: 2% potentilla sp, trace saxcer, 45% lichen cover

SOIL

Sampling Point: **BEO-40**

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR	4/3	80	5Y	4/2	20	D	PL	Silty Clay Loam	positive reaction to alpha alpha dipyridol at
16-18			100		5/1				Hemic Organics	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☐ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☑ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 18

Hydric Soil Present? Yes ◉ No ○

Remarks:
positive reaction to alpha, alpha-dipyridol

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	7

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
D3--seasonal frost

BEO-40

PEM1B

Wetland Functional Class: Saturated Graminoid Meadow

Wildlife Habitat: Moist Sedge-Shrub Meadow

Hydric Soil Indicators: Other: positive reaction to alpha, alpha-dipyridol.

Wetland Hydrology Indicators: Saturation (A3), Shallow Aquitard (D3).

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Barrow Environmental Obseratory | Borough/City: North Slope Borough | Sampling Date: 31-Jul-15

Applicant/Owner: UIC | Sampling Point: **BEO-41**

Investigator(s): SLI, EKJ | Landform (hillside, terrace, hummocks etc.): Flat

Local relief (concave, convex, none): none | Slope: 0.0 % / 0.0 ° | Elevation: 15

Subregion : Northern Alaska | Lat.: 71.2616783333334 | Long.: -156.448546666667 | Datum: WGS84

Soil Map Unit Name: | **NWI classification: PEM1B**

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

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks: nonpatterned tundra, common goose and caribou scat.

VEGETATION - Use scientific names of plants. List all species in the plot.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum			
1.		☐	
2.		☐	
3.		☐	
4.		☐	
5.		☐	
Total Cover:	0		
Sapling/Shrub Stratum (50% of Total Cover: 0 / 20% of Total Cover: 0)			
1. Salix rotundifolia	20	☑	FAC
2.	0	☐	
3.	0	☐	
4.	0	☐	
5.	0	☐	
6.	0	☐	
7.	0	☐	
8.	0	☐	
9.	0	☐	
10.	0	☐	
Total Cover:	20		
Herb Stratum (50% of Total Cover: 10 / 20% of Total Cover: 4)			
1. Petasites frigidus	25	☑	FACW
2. Luzula confusa	7	☑	FAC
3. Arctagrostis latifolia	5	☐	FACW
4. Saxifraga nelsoniana	5	☐	FAC
5. Poa arctica	5	☐	FAC
6. Alopecurus magellanicus	5	☐	FACW
7. Luzula nivalis	2	☐	FAC
8. Saxifraga cernua	0.1	☐	FACW
9. Cochlearia officinalis	0.1	☐	FAC
10.	0	☐	
Total Cover:	54.2		
50% of Total Cover: 27.1 / 20% of Total Cover: 10.84			

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL Species	0	x 1 =	0
FACW Species	35.1	x 2 =	70.2
FAC Species	39.1	x 3 =	117.3
FACU Species	0	x 4 =	0
UPL Species	0	x 5 =	0
Column Totals:	74.2 (A)		187.5 (B)

Prevalence Index = B/A = 2.527

Hydrophytic Vegetation Indicators:

☑ Dominance Test is > 50%

☑ Prevalence Index is ≤3.0

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

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

Plot size (radius, or length x width): r=15m

% Cover of Wetland Bryophytes (Where applicable):

% Bare Ground: 5

Total Cover of Bryophytes: 40

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: 1% Potentilla sp, trace stellaria longipes. 40% lichen cover.

SOIL

Sampling Point: **BEO-41**

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

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-1			100						Hemic Organics	
1-4	10YR	3/3	100						Silt Loam	with organic inclusions and wavy boundary
4-10	5Y	4/1	90	10YR	4/4	10	C	PL	Silty Clay Loam	
10-12	5YR	2.5/1	100						Silt Loam	with organic inclusions

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix [2] Location: PL=Pore Lining. RC=Root Channel. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol or Histel (A1)
- ☐ Histic Epipedon (A2)
- ☐ Hydrogen Sulfide (A4)
- ☐ Thick Dark Surface (A12)
- ☐ Alaska Gleyed (A13)
- ☑ Alaska Redox (A14)
- ☐ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3] :

- ☐ Alaska Color Change (TA4)[4]
- ☐ Alaska Alpine swales (TA5)
- ☐ Alaska Redox With 2.5Y Hue
- ☐ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ☐ Other (Explain in Remarks)

[3] One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

[4] Give details of color change in Remarks.

Restrictive Layer (if present):
Type: seasonal frost
Depth (inches): 12

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9)
- ☐ Drainage Patterns (B10)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Salt Deposits (C5)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☑ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ○	No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	10

Wetland Hydrology Present? Yes ◉ No ○

Recorded Data (stream gauge, monitor well, aerial photo, previous inspection), if available:

Remarks:
D3--seasonal frost

BEO-41

PEM1B

Wetland Functional Class: Saturated Graminoid Meadow

Wildlife Habitat: Moist Sedge-Shrub Meadow

Hydric Soil Indicators: Alaska Redox (A14).

Wetland Hydrology Indicators: Saturation (A3), Shallow Aquitard (D3), FAC-neutral (D5).

Appendix B. Verification Table and Site Photos.

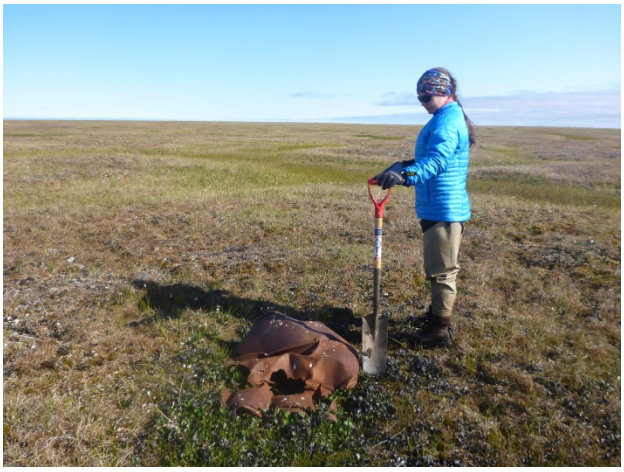
BEO-V01
Site: Barrow, AK
Date: 7/30/15
NWI: PEM1F
Field Notes: Documenting representative disturbance on BEO lands. Fairly light ATV trails. Per Oona Edwardson (UIC bear guard), residents access this area to collect goose eggs.

BEO-V02
Site: Barrow, AK
Date: 7/30/15
NWI: PEM1F
Field Notes: Light ATV damage to tundra. About 20ft long, tracks 4in deep.

BEO-V03
Site: Barrow, AK
Date: 7/30/15
NWI: PEM1B
Field Notes: Documenting light ATV damage to tundra. 5ft long, 2-4in deep.

BEO-V04
Site: Barrow, AK
Date: 7/30/15
NWI: PEM1E
Field Notes: Mixed high and low center polys. All low relief. HCPs and rims of LCPs are as at PEM1B and PSS1B plots, and troughs and LCP centers are as at PEM1E Hgwst plots. Overall, PEM1B seems the best call for this area.

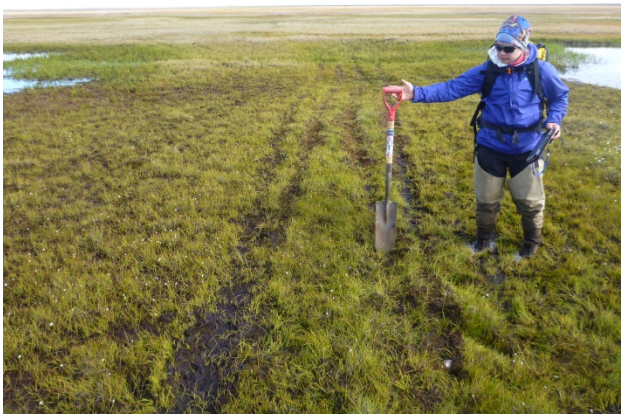
BEO-V05
Site: Barrow, AK
Date: 7/30/15
NWI: PEM1B
Field Notes: Marking location of old drum, potential restoration opportunity. Drum in PEM1B high center polygons.



BEO-V06
Site: Barrow, AK
Date: 7/30/15
NWI: PEM1B
Field Notes: Documenting potential archaeological resource; send to Anne Jensen. About 4ft high, 25ft long, the only raised feature in the area.

BEO-V07
Site: Barrow, AK
Date: 7/30/15
Dominant Species: *Carex aquatilis, Eriophorum angustifolium*
NWI: PEM1F
Field Notes: Low center polygonal tundra, Hgwst PEM1E centers and Hgmst PEM1B rims. Overall, PEM1E a good fit for community.

BEO-V08
Site: Barrow, AK
Date: 7/30/15
NWI: PEM1F
Field Notes: ATV tracks through wet sedge tundra.



BEO-V09
Site: Barrow, AK
Date: 7/30/15
Dominant Species: *Eriophorum scheuchzeri, Eriophorum angustifolium, Carex aquatilis aquatilis, Poa sp., Poa arctica*
NWI: PEM1F
Field Notes:

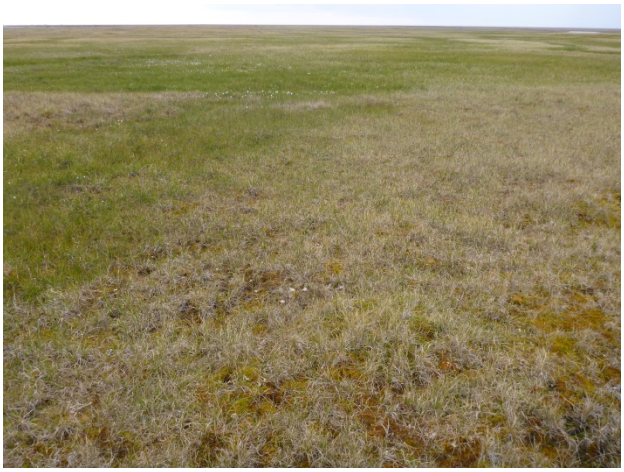
BEO-V10
Site: Barrow, AK
Date: 7/30/15
NWI: PEM1B
Field Notes: Mixed high and low center polygonal tundra. High center polygons PEM1B Hgmst, troughs and basins of low center polygons PEM1E Hgwst.

BEO-V11
Site: Barrow, AK
Date: 7/30/15
NWI: PEM1B
Field Notes: Potential restoration opportunity, appears to be old experiment. Small wooden structures in pieces. About 1.5ft x 1.5ft x 3ft each, 2 structures plus assorted wooden debris.

BEO-V12
Site: Barrow, AK
Date: 7/31/15
Dominant Species: *Arctophila fulva, Hippuris vulgaris*
NWI: PUBH
Field Notes: Series of small tundra ponds, likely too small to map. May provide surface water connection to slough at high water. Narrow vegetated fringe, grazed arcful. Ec 370, temp 48F.

BEO-V13
Site: Barrow, AK
Date: 7/31/15
NWI: PEM1E
Field Notes: Low center polygonal tundra, PEM1F basins.

BEO-V14
Site: Barrow, AK
Date: 7/31/15
Dominant Species: *Carex aquatilis, Eriophorum angustifolium*
NWI: PEM1E
Field Notes: Indistinct mixed high and low center polygonal tundra. Likely best mapped as PEM1E.



BEO-V15
Site: Barrow, AK
Date: 7/31/15
Dominant Species: *Luzula arctica, Luzula confusa, Carex aquatilis*
NWI: PEM1E
Field Notes: Mixed high and low center polygonal tundra.

Appendix C. Aquatic Site Assessment Forms.

Functional Class: Estuarine Waters
NWI Code(s): E2USP
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
A. Flood Flow Regulation (Storage)			Function focuses on assessing the degree to which ACP wetlands store runoff or delay downslope movement of surface water. Riverine and estuarine waters below the OHWM do not perform this function (N/A). Wetlands that do not seasonally flood (e.g., pingos, tussock tundra) do not perform this function (N/A). Surface water storage by wetlands in permafrost regions can be significant, while the conventional view that subsurface storage is an effective modulator of stormflow is a misconception in permafrost regions (Woo 2012).
1. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	1. N/A		Tussocks, low to tall (>20cm height) woody stems, and polygonal features provide surface roughness, which delays downslope movement of floodwaters by slowing velocity. These are persistent features, present during spring snowmelt-generated flooding.
2. Wetland or water is a depressional HGM class or has depressional features capable of storage.	2. Y		HGM depressions occur in topographic depressions with closed contours, and flow vectors are from surrounding areas toward the center of the depression, allowing the accumulation of surface water. Ice-rich, raised polygonal rims act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012, Woo 2012).
3. Wetland or water shows signs of storage (i.e. fluctuating water levels, algal mats, and/or lodged debris).	3. Y		Visible signs of storage indicate that a wetland is capable of, and has in the past, retained additional water.
4. Floodwaters enter and flow through wetland predominantly as sheet flow rather than channel flow.	4 N	These small estuarine features are not directly connected to perennial channelized flow but they are connected to narrow semi-permanently flooded drainage features and floodwaters are likely to enter as channelized flow rather than sheet flow	Floodwater entering as sheet flow, rather than channelized flow, is more likely to interact with surface roughness features.
5. Waterbody is lake (>20 acres) (N/A if assessing wetlands).	5. N		Lakes (>20 acres) have substantial storage capacities, and modulate snowmelt-dominated streamflow regimes (Arp et al. 2012, Woo 2012).
Rating Criteria: 4 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**2 (Y): Moderate**		
B. Sediment, Nutrient (N and P), Toxicant Removal			ACP soils have a relatively shallow active layer of unfrozen soil during the growing season. Cold temperatures and shallow active layer limit the ability of ACP wetlands to perform denitrification, thus this function focuses on the removal of inorganic sediments and adsorbed toxicants and nutrients through settlement. Sediment retention is used as a proxy for toxicant removal as many toxicants adsorb to sediments, and sediment retention is relatively easy to assess.
1. Slow-moving or still water is present.	1. Y		Slow or still-moving water allows sediments and adsorbed toxicants to settle out of the water column, as opposed to swift-moving water that suspends sediments/toxicants.
2. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	2. N/A		Tussocks and low to tall (>20cm height) woody stems provide surface roughness, which slows water velocity and allows sediments and adsorbed nutrients and toxicants to settle out of the water column. Raised polygonal rims provide surface roughness, which delays downslope movement of floodwaters by slowing velocity, and also act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012). These are persistent features, present during spring snowmelt-generated flooding.
3. At least moderate interspersion of vegetation and water is present. Surface water patches should account for >10% areal coverage (N/A if assessing waters).	3. N/A		Rooted vegetation takes up nutrients directly from the soil, which may encourage nutrients to move from water to soil to maintain equilibrium.
4. Sediment deposits are present, providing evidence of deposition during natural flood events.	4 Y		Visible signs of sedimentation indicate that a wetland is capable of, and has in the past, allowed sediments and presumably adsorbed nutrients and toxicants to settle out of the water column.
5. Thick surface organic horizon and/or abundant fine organic litter is present (N/A if assessing waters).	5. N/A		Organic soils are effective at retaining heavy metals, some of which can be bound into long-term complexes with peat, particularly in cool climates.
Wetlands Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 1–2 (Y) = High, 0 (Y) = Low	**2 (Y): High**		

Functional Class: Estuarine Waters
NWI Code(s): E2USP
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
C. Erosion Control and Shoreline Stabilization		Waterbodies do not perform erosion control functions.	Function reflects the ability of a wetland to stabilize banks through anchoring soils and dissipating erosive forces. This function is typically only performed by wetlands directly abutting a relatively permanent channelized water. Neither waters nor wetlands that do not abut relatively permanent channelized waters perform this function (N/A). Depending on the mapping and classification, however, some individual wetlands that do not actually directly abut a relatively permanent water (rivers and streams) may be included in this assessment.
1. Wetland has dense, energy absorbing vegetation bordering the watercourse and no evidence of erosion.	1. N/A		Plants bind soils with their root systems, and slow incoming waves or currents through increased surface roughness.
2. Soils are not predominantly sandy or silty, and are not ice rich.	2. N/A		Sandy and silty soils and ice rich permafrost are more susceptible to erosion.
3. Historical aerial photography (if available) indicates stable shoreline features.	3. N/A		Visible evidence of stable shorelines indicates a lack of historical erosion, which may be due any one or a combination of factors including bank erodability, erosive force, or protection afforded by adjacent wetlands.
Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**0 (Y): N/A**		
D. Maintenance of Soil Thermal Regime			Added as a function due to the presence of continuous permafrost in study area.
1. Vegetation cover is continuous	1. N		Biomass or vegetation height are good indicators of areas with stable shallow active layers. Thick vegetation provides shading and insulation from heat escaping during the summer and cold air temperatures in winter. Thick vegetation also tends to trap more snow (resulting in a deeper snowpack) in winter.
2. Wetland type does not have a permanently flooded hydrologic regime	2. N		Water bodies typically have a thaw bulb or no permafrost (Brosten et. al. 2006)
3. Wetland type is not within the riverine, lacustrine fringe or estuarine fringe HGM classes	3. Y		Vegetation types that get seasonal flooding from lake and river surface water fluctuations typically are lacking permafrost or active layer is very deep (Brosten et. al 2006)
4. Wetland soil profile is a histosol or histic epipedon	4. N		Deep organic surface mats provide insulation and are a good predictor of stable shallow growing season active layers
5. Wetland is located in the discontinuous permafrost zone on a north facing aspect	5. N		North facing slopes in the discontinuous permafrost zone are areas where permafrost may persist (Yi et. al. 2009)
6. Wetland occupies a raised on convex landform that does not receive and store significant floodwaters during snowmelt	6. N		Infiltration of floodwaters to the active layer adds significant energy, in areas receiving relatively larger amounts of snowmelt floodwaters the active layer may be greater (Putkonen 1998)
Wetlands Rating Criteria: 5 + (Y) = High, 3 -4 (Y) = Moderate, 0–2 (Y) = Low	**1 (Y): Low**		
E. Organic Matter Production and Export			Organic matter production and export assesses primary production and subsequent flushing of organic material to downstream waters. Wetlands that are not flooded at least every 10 years do not perform this function as flooding is the transport mechanism for moving organics to downstream waters. If no flooding occurs, production may be high but no carbon is exported.
1. Wetland has at least 30%, or water has at least 10%, cover herbaceous vegetation. Woody plants are predominantly deciduous.	1. N	Unvegetated water (see BEO-30, Appendix A).	Herbaceous vegetation is generally more productive than aquatic bed, scrub-shrub, or forested wetland vegetation Adamus et al. (1991). Higher productivity generates more carbon available for export. Deciduous woody species produce higher quality litter than evergreen woody species, which have recalcitrant litter with high concentrations of lignin and phenolic compounds (Wardle 2002).
2. At least 10% of wetland is seasonally flooded (N/A for waters).	2. N/A		Surface water controls many differences between wetland types, including decomposition (Bayley and Mewhort 2004). Increased surface water promotes increased decomposition, which may facilitate carbon export (Adamus 2013).
3. Surface water outflow occurs outside of spring flooding.	3. Y		A longer duration of surface water outflow provides more opportunity for organic matter export. While the vast majority of ACP wetlands flood during spring breakup, fewer have surface water outflow later in the growing season, when small beaded streams can stop flowing and waterbodies become disconnected.
Wetlands Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 2 (Y) = High, 0–1 (Y) = Low	**1 (Y): Low**		

Functional Class: Estuarine Waters
NWI Code(s): E2USP
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
F. TES Support			Assesses the ability of a wetland or water to support Threatened or Endangered Species (TES) per the Endangered Species Act (ESA) and species or subspecies of fish or wildlife in Alaska per the Alaska Department of Fish and Game (ADF&G) as defined by Alaska Statute 16.20.190.
1. Wetland or water contains documented occurrence of a state or federally listed threatened or endangered species.	1. N	Neither Steller's nor Spectacled Eiders have been documented in this functional class within the study area (ALCC 2012).	A documented occurrence confirms use by TES for at least some aspect of life history, even if the community isn't a preferred or designated critical habitat.
2. Wetland or water contains documented critical habitat, designated by the U.S. Fish and Wildlife Service (USFWS) and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries).	2. N		NOAA Fisheries and USFWS, the two federal agencies responsible for administering the ESA, are required to designate critical habitat for listed species. Critical habitat is specific geographic areas containing features essential to the conservation of an endangered or threatened species, including areas not currently occupied but necessary for recovery.
3. Wetland or water is a known preferred habitat for state or federally listed threatened or endangered species.	3. Y	Steller's Eiders and Spectacled Eiders are expected to use Estuarine Waters at some point during their life cycle (Appendix D)	If specific work on habitat preference in the study area (e.g. Johnson et al. 2014) is not available, habitat preferences were inferred using the literature based habitat use tables provided in Appendix D of this report.
Rating Criteria: 2–3 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**1 (Y): Moderate**		
G. General Avian and Mammal Habitat Suitability			Assesses whether the wetland or water supports a high diversity of birds and mammals. Characteristics of the wetland or water, landscape setting, and documented species diversity are considered.
1. Wetland or water is undisturbed by human habitation or development.	1. Y		Anthropogenic disturbance tends to reduce the diversity of birds and mammals using an area.
2. Wetland or water is used by a high diversity of mammal species.	2. N	Fewer than half of assessed mammal species regularly occurring in the study area are commonly found in the Brackish Water wildlife habitat type (Appendix C).	If no systematic wildlife surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
3. Wetland or water is used by a high diversity of avian species.	3. N	Fewer than half of assessed avian species regularly occurring in the study area are commonly found in the Brackish Water wildlife habitat type (Appendix C).	If no systematic avian surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
4. Interspersion of vegetation and water is at least moderate (surface water patches accounting for 5–10% areal cover, or continuous cover of surface water with a well-developed emergent component).	4. N		A greater variety of vegetation and cover types is present in communities with high vegetation-water interspersion. Communities with high vegetation water interspersion may support species adapted to open water, edge environments, and well-vegetated components of the community.
5. Wetland or water is considered rare at a regional scale.	5. N	E2USP polygons represent less than 1% of the NWI mapping (USFWS 2014) in the Northwest Coast watershed (HUC 19060202). However, the habitat associated with this functional class is not used by a high diversity of bird or mammal species.	Disproportionately high habitat use, in relation to habitat availability, may indicate habitat preference. Habitat availability must be assessed at a larger, regional scale rather than the project mapping which is limited to construction boundaries
Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**1 (Y): Low**		

Functional Class: Estuarine Waters
NWI Code(s): E2USP
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
H. General Fish Habitat Suitability			Applicable to all waters, and wetlands with perennial or intermittent surface water connection to a fish bearing water. Sheet flow during spring snowmelt is not considered a sufficiently reliable connection to fish-bearing waters for this function to be applicable.
1. Water has sufficient size and depth of open water so as not to freeze completely during winter (N/A for wetlands).	1. N		Assessing whether the wetland or water provides overwintering habitat, which is limited on the ACP.
2. Fish are present.	2. Y	No fish were observed during the time of the field survey but a resident seasonal population is assumed based on proximity to nearshore marine waters.	A documented occurrence confirms use by fish for at least some aspect of life history.
3. Herbaceous and/or woody vegetation is present in wetland and/or buffer to provide cover, shade, and/or detrital matter.	3. Y		Overhanging vegetation provides refuge from predators, shade to maintain water temperatures, and detrital matter contributions to the food web.
4. Suitable spawning areas are present.	4. Y		Suitable spawning habitat may include aquatic vegetation, deep lakes, and mixed gravel substrate in streambed.
5. Juvenile rest areas present.	5. Y		Juvenile rest areas include flooded wetlands, pools with organic debris, and/or overhanging vegetation.
Wetlands Rating Criteria: 2–4 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low Waters Rating Criteria: 2–5 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**4 (Y): High**		
I. Educational, Scientific, Recreational, or Subsistence Use			Consumptive (e.g. hunting, fishing, food gathering) and non-consumptive uses, as well as educational and scientific use are assessed.
1. Site has documented scientific or educational use.	1. Y	BEO lands	Scientific use function assesses whether the wetland has been used in scientific studies (peer-reviewed or grey literature), excluding studies necessitated by NEPA or project-permitting. Educational assesses the educational value of the wetland to the community (e.g. contains interpretive signs, is historically used for ecology or species identification classes, is a known long term research site with established permanent sample plots, etc.).
2. Wetland or water is in public ownership.	2. Y		Wetlands or waters in public ownership are more accessible to a variety of people.
3. Accessible trails are available.	3. Y		Visible or established trails demonstrate that the wetland or water is accessible, and may be used for recreational or subsistence purposes.
4. Wetland or water supports subsistence activities (e.g., hunting, fishing, berry picking).	4. Y		Observed or documented consumptive use confirms that a community is used for subsistence purposes.
Rating Criteria: 3–4 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Functional Class: Lakes and Ponds
NWI Code(s): L1UBH, PUBH
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
A. Flood Flow Regulation (Storage)			Function focuses on assessing the degree to which ACP wetlands store runoff or delay downslope movement of surface water. Riverine and estuarine waters below the OHWM do not perform this function (N/A). Wetlands that do not seasonally flood (e.g., pingos, tussock tundra) do not perform this function (N/A). Surface water storage by wetlands in permafrost regions can be significant, while the conventional view that subsurface storage is an effective modulator of stormflow is a misconception in permafrost regions (Woo 2012).
1. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	1. N/A		Tussocks, low to tall (>20cm height) woody stems, and polygonal features provide surface roughness, which delays downslope movement of floodwaters by slowing velocity. These are persistent features, present during spring snowmelt-generated flooding.
2. Wetland or water is a depressional HGM class or has depressional features capable of storage.	2. Y		HGM depressions occur in topographic depressions with closed contours, and flow vectors are from surrounding areas toward the center of the depression, allowing the accumulation of surface water. Ice-rich, raised polygonal rims act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012, Woo 2012).
3. Wetland or water shows signs of storage (i.e. fluctuating water levels, algal mats, and/or lodged debris).	3. Y	The presence of permanently flooded waterbody indicates surface water storage.	Visible signs of storage indicate that a wetland is capable of, and has in the past, retained additional water.
4. Floodwaters enter and flow through wetland predominantly as sheet flow rather than channel flow.	4 Y	Waters enter as sheet flow during spring break-up, no perennial channelized inputs were observed during the field survey or visible on aerial imagery.	Floodwater entering as sheet flow, rather than channelized flow, is more likely to interact with surface roughness features.
5. Waterbody is lake (>20 acres) (N/A if assessing wetlands).	5. Y	Over half of the mapped waterbodies are over 20 acres.	Lakes (>20 acres) have substantial storage capacities, and modulate snowmelt-dominated streamflow regimes (Arp et al. 2012, Woo 2012).
Rating Criteria: 4 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		
B. Sediment, Nutrient (N and P), Toxicant Removal			ACP soils have a relatively shallow active layer of unfrozen soil during the growing season. Cold temperatures and shallow active layer limit the ability of ACP wetlands to perform denitrification, thus this function focuses on the removal of inorganic sediments and adsorbed toxicants and nutrients through settlement. Sediment retention is used as a proxy for toxicant removal as many toxicants adsorb to sediments, and sediment retention is relatively easy to assess.
1. Slow-moving or still water is present.	1. Y		Slow or still-moving water allows sediments and adsorbed toxicants to settle out of the water column, as opposed to swift-moving water that suspends sediments/toxicants.
2. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	2. N/A		Tussocks and low to tall (>20cm height) woody stems provide surface roughness, which slows water velocity and allows sediments and adsorbed nutrients and toxicants to settle out of the water column. Raised polygonal rims provide surface roughness, which delays downslope movement of floodwaters by slowing velocity, and also act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012). These are persistent features, present during spring snowmelt-generated flooding.
3. At least moderate interspersion of vegetation and water is present. Surface water patches should account for >10% areal coverage (N/A if assessing waters).	3. N/A		Rooted vegetation takes up nutrients directly from the soil, which may encourage nutrients to move from water to soil to maintain equilibrium.
4. Sediment deposits are present, providing evidence of deposition during natural flood events.	4 Y		Visible signs of sedimentation indicate that a wetland is capable of, and has in the past, allowed sediments and presumably adsorbed nutrients and toxicants to settle out of the water column.
5. Thick surface organic horizon and/or abundant fine organic litter is present (N/A if assessing waters).	5. N/A		Organic soils are effective at retaining heavy metals, some of which can be bound into long-term complexes with peat, particularly in cool climates.
Wetlands Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 1–2 (Y) = High, 0 (Y) = Low	**2 (Y): High**		

Functional Class: Lakes and Ponds
NWI Code(s): L1UBH, PUBH
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
C. Erosion Control and Shoreline Stabilization		Waterbodies do not perform erosion control functions.	Function reflects the ability of a wetland to stabilize banks through anchoring soils and dissipating erosive forces. This function is typically only performed by wetlands directly abutting a relatively permanent channelized water. Neither waters nor wetlands that do not abut relatively permanent channelized waters perform this function (N/A). Depending on the mapping and classification, however, some individual wetlands that do not actually directly abut a relatively permanent water (rivers and streams) may be included in this assessment.
1. Wetland has dense, energy absorbing vegetation bordering the watercourse and no evidence of erosion.	1. N/A		Plants bind soils with their root systems, and slow incoming waves or currents through increased surface roughness.
2. Soils are not predominantly sandy or silty, and are not ice rich.	2. N/A		Sandy and silty soils and ice rich permafrost are more susceptible to erosion.
3. Historical aerial photography (if available) indicates stable shoreline features.	3. N/A		Visible evidence of stable shorelines indicates a lack of historical erosion, which may be due any one or a combination of factors including bank erodability, erosive force, or protection afforded by adjacent wetlands.
Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**0 (Y): N/A**		
D. Maintenance of Soil Thermal Regime			Added as a function due to the presence of continuous permafrost in study area.
1. Vegetation cover is continuous	1. N		Biomass or vegetation height are good indicators of areas with stable shallow active layers. Thick vegetation provides shading and insulation both to heat escaping during the summer and cold air temperatures in winter. Thick vegetation also tends to have deeper snowpacks in winter.
2. Wetland type does not have a permanently flooded hydrologic regime	2. N		Water bodies typically have a thaw bulb or no permafrost (Brosten et. al. 2006)
3. Wetland type is not within the riverine, lacustrine fringe or estuarine fringe HGM classes	3. N		Vegetation types that get seasonal flooding from lake and river surface water fluctuations typically are lacking permafrost or active layer is very deep (Brosten et. al 2006)
4. Wetland soil profile is a histosol or histic epipedon	4. N		Deep organic surface mats provide insulation and are a good predictor of stable shallow growing season active layers
5. Wetland is located in the discontinuous permafrost zone on a north facing aspect	5. N		North facing slopes in the discontinuous permafrost zone are areas where permafrost may persist (Yi et. al. 2009)
6. Wetland occupies a raised on convex landform that does not receive and store significant floodwaters during snowmelt	6. N		Infiltration of floodwaters to the active layer adds significant energy, in areas receiving relatively larger amounts of snowmelt floodwaters the active layer may be greater (Putkonen 1998)
Wetlands Rating Criteria: 5 + (Y) = High, 3 -4 (Y) = Moderate, 0–2 (Y) = Low	**0 (Y): Low**		
E. Organic Matter Production and Export			Organic matter production and export assesses primary production and subsequent flushing of organic material to downstream waters. Wetlands that are not flooded at least every 10 years do not perform this function as flooding is the transport mechanism for moving organics to downstream waters. If no flooding occurs, production may be high but no carbon is exported.
1. Wetland has at least 30%, or water has at least 10%, cover herbaceous vegetation. Woody plants are predominantly deciduous.	1. N	See BEO-02, BEO-07, BEO-17, and BEO-33 (Appendix A).	Herbaceous vegetation is generally more productive than aquatic bed, scrub-shrub, or forested wetland vegetation Adamus et al. (1991). Higher productivity generates more carbon available for export. Deciduous woody species produce higher quality litter than evergreen woody species, which have recalcitrant litter with high concentrations of lignin and phenolic compounds (Wardle 2002).
2. At least 10% of wetland is seasonally flooded (N/A for waters).	2. N/A		Surface water controls many differences between wetland types, including decomposition (Bayley and Mewhort 2004). Increased surface water promotes increased decomposition, which may facilitate carbon export (Adamus 2013).
3. Surface water outflow occurs outside of spring flooding.	3. N	Perennial channelized outputs were not observed during the field survey nor were they visible in aerial photography.	A longer duration of surface water outflow provides more opportunity for organic matter export. While the vast majority of ACP wetlands flood during spring breakup, fewer have surface water outflow later in the growing season, when small beaded streams can stop flowing and waterbodies become disconnected.
Wetlands Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 2 (Y) = High, 0–1 (Y) = Low	**0 (Y): Low**		

Functional Class: Lakes and Ponds
NWI Code(s): L1UBH, PUBH
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
F. TES Support			Assesses the ability of a wetland or water to support Threatened or Endangered Species (TES) per the Endangered Species Act (ESA) and species or subspecies of fish or wildlife in Alaska per the Alaska Department of Fish and Game (ADF&G) as defined by Alaska Statute 16.20.190.
1. Wetland or water contains documented occurrence of a state or federally listed threatened or endangered species.	1. Y	One Steller's Eider was documented in West Twin Lake (ALCC 2012).	A documented occurrence confirms use by TES for at least some aspect of life history, even if the community isn't a preferred or designated critical habitat.
2. Wetland or water contains documented critical habitat, designated by the U.S. Fish and Wildlife Service (USFWS) and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries).	2. N		NOAA Fisheries and USFWS, the two federal agencies responsible for administering the ESA, are required to designate critical habitat for listed species. Critical habitat is specific geographic areas containing features essential to the conservation of an endangered or threatened species, including areas not currently occupied but necessary for recovery.
3. Wetland or water is a known preferred habitat for state or federally listed threatened or endangered species.	3. Y	Steller's Eiders and Spectacled Eiders are expected to use Lakes and Ponds at some point during their life cycle (Appendix D)	If specific work on habitat preference in the study area (e.g. Johnson et al. 2014) is not available, habitat preferences were inferred using the literature based habitat use tables provided in Appendix D of this report.
Rating Criteria: 2–3 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**2 (Y): High**		
G. General Avian and Mammal Habitat Suitability			Assesses whether the wetland or water supports a high diversity of birds and mammals. Characteristics of the wetland or water, landscape setting, and documented species diversity are considered.
1. Wetland or water is undisturbed by human habitation or development.	1. Y		Anthropogenic disturbance tends to reduce the diversity of birds and mammals using an area.
2. Wetland or water is used by a high diversity of mammal species.	2. N	No assessed mammal species regularly occurring in the study area are commonly found in the Deep Open Water without Islands and Shallow Open Water without islands habitats, combined (Appendix C).	If no systematic wildlife surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
3. Wetland or water is used by a high diversity of avian species.	3. Y	Over half (20 out of 35) assessed bird species regularly occurring in the study area are commonly found in the Deep Open Water without Islands and Shallow Open Water without islands habitats, combined (Appendix C).	If no systematic avian surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
4. Interspersion of vegetation and water is at least moderate (surface water patches accounting for 5–10% areal cover, or continuous cover of surface water with a well-developed emergent component).	4. N		A greater variety of vegetation and cover types is present in communities with high vegetation-water interspersion. Communities with high vegetation water interspersion may support species adapted to open water, edge environments, and well-vegetated components of the community.
5. Wetland or water is considered rare at a regional scale.	5. N	A recent remote sensing study indicated that thaw lakes accounted for 21.5% of the land area on the Barrow Peninsula (Frohn et al. 2005). Excluding marine and estuarine waters, L1UBH polygons account for over 10% and PUBH polygons over 1% of NWI mapping (USFWS 2014) in the Northwest Coast watershed (HUC 19060202).	Disproportionately high habitat use, in relation to habitat availability, may indicate habitat preference. Habitat availability must be assessed at a larger, regional scale rather than the project mapping which is limited to construction boundaries
Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**2 (Y): Moderate**		

Functional Class: Lakes and Ponds
NWI Code(s): L1UBH, PUBH
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
H. General Fish Habitat Suitability			Applicable to all waters, and wetlands with perennial or intermittent surface water connection to a fish bearing water. Sheet flow during spring snowmelt is not considered a sufficiently reliable connection to fish-bearing waters for this function to be applicable.
1. Water has sufficient size and depth of open water so as not to freeze completely during winter (N/A for wetlands).	1. Y	Lake depths are unknown but at least 4 of the mapped waterbodies have the potential to provide overwintering habitat.	Assessing whether the wetland or water provides overwintering habitat, which is limited on the ACP.
2. Fish are present.	2. Y	No fish were observed during the time of the field survey but a resident seasonal population is assumed.	A documented occurrence confirms use by fish for at least some aspect of life history.
3. Herbaceous and/or woody vegetation is present in wetland and/or buffer to provide cover, shade, and/or detrital matter.	3. Y		Overhanging vegetation provides refuge from predators, shade to maintain water temperatures, and detrital matter contributions to the food web.
4. Suitable spawning areas are present.	4. Y		Suitable spawning habitat may include aquatic vegetation, deep lakes, and mixed gravel substrate in streambed.
5. Juvenile rest areas present.	5. Y		Juvenile rest areas include flooded wetlands, pools with organic debris, and/or overhanging vegetation.
Wetlands Rating Criteria: 2–4 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low Waters Rating Criteria: 2–5 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**5 (Y): High**		
I. Educational, Scientific, Recreational, or Subsistence Use			Consumptive (e.g. hunting, fishing, food gathering) and non-consumptive uses, as well as educational and scientific use are assessed.
1. Site has documented scientific or educational use.	1. Y	BEO lands	Scientific use function assesses whether the wetland has been used in scientific studies (peer-reviewed or grey literature), excluding studies necessitated by NEPA or project-permitting. Educational assesses the educational value of the wetland to the community (e.g. contains interpretive signs, is historically used for ecology or species identification classes, is a known long term research site with established permanent sample plots, etc.).
2. Wetland or water is in public ownership.	2. Y		Wetlands or waters in public ownership are more accessible to a variety of people.
3. Accessible trails are available.	3. Y		Visible or established trails demonstrate that the wetland or water is accessible, and may be used for recreational or subsistence purposes.
4. Wetland or water supports subsistence activities (e.g., hunting, fishing, berry picking).	4. Y		Observed or documented consumptive use confirms that a community is used for subsistence purposes.
Rating Criteria: 3–4 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Functional Class: Lacustrine Fringe Graminoid Marsh
NWI Code(s): PEM1H, PEM1F
HGM: Lacustrine Fringe

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
A. Flood Flow Regulation (Storage)			Function focuses on assessing the degree to which ACP wetlands store runoff or delay downslope movement of surface water. Riverine and estuarine waters below the OHWM do not perform this function (N/A). Wetlands that do not seasonally flood (e.g., pingos, tussock tundra) do not perform this function (N/A). Surface water storage by wetlands in permafrost regions can be significant, while the conventional view that subsurface storage is an effective modulator of stormflow is a misconception in permafrost regions (Woo 2012).
1. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	1. N	See BEO-01 and BEO-15 (Appendix A).	Tussocks, low to tall (>20cm height) woody stems, and polygonal features provide surface roughness, which delays downslope movement of floodwaters by slowing velocity. These are persistent features, present during spring snowmelt-generated flooding.
2. Wetland or water is a depressional HGM class or has depressional features capable of storage.	2. Y	Wetland is a lacustrine fringe HGM class but within an overall depressional feature and provides storage capacity similar to the immediately adjacent waterbody.	HGM depressions occur in topographic depressions with closed contours, and flow vectors are from surrounding areas toward the center of the depression, allowing the accumulation of surface water. Ice-rich, raised polygonal rims act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012, Woo 2012).
3. Wetland or water shows signs of storage (i.e. fluctuating water levels, algal mats, and/or lodged debris).	3. Y	Most of the lacustrine fringe marshes in the BEO area are permanently flooded indicating storage capacity.	Visible signs of storage indicate that a wetland is capable of, and has in the past, retained additional water.
4. Floodwaters enter and flow through wetland predominantly as sheet flow rather than channel flow.	4 Y		Floodwater entering as sheet flow, rather than channelized flow, is more likely to interact with surface roughness features.
5. Waterbody is lake (>20 acres) (N/A if assessing wetlands).	5. N/A		Lakes (>20 acres) have substantial storage capacities, and modulate snowmelt-dominated streamflow regimes (Arp et al. 2012, Woo 2012).
Rating Criteria: 4 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**3 (Y): Moderate**		
B. Sediment, Nutrient (N and P), Toxicant Removal			ACP soils have a relatively shallow active layer of unfrozen soil during the growing season. Cold temperatures and shallow active layer limit the ability of ACP wetlands to perform denitrification, thus this function focuses on the removal of inorganic sediments and adsorbed toxicants and nutrients through settlement. Sediment retention is used as a proxy for toxicant removal as many toxicants adsorb to sediments, and sediment retention is relatively easy to assess.
1. Slow-moving or still water is present.	1. Y		Slow or still-moving water allows sediments and adsorbed toxicants to settle out of the water column, as opposed to swift-moving water that suspends sediments/toxicants.
2. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	2. N	Wetland is a lacustrine fringe HGM class but within an overall depressional feature and provides storage capacity similar to the immediately adjacent waterbody.	Tussocks and low to tall (>20cm height) woody stems provide surface roughness, which slows water velocity and allows sediments and adsorbed nutrients and toxicants to settle out of the water column. Raised polygonal rims provide surface roughness, which delays downslope movement of floodwaters by slowing velocity, and also act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012). These are persistent features, present during spring snowmelt-generated flooding.
3. At least moderate interspersion of vegetation and water is present. Surface water patches should account for >10% areal coverage (N/A if assessing waters).	3. Y	See BEO-01 and BEO-15 (Appendix A).	Rooted vegetation takes up nutrients directly from the soil, which may encourage nutrients to move from water to soil to maintain equilibrium.
4. Sediment deposits are present, providing evidence of deposition during natural flood events.	4 Y		Visible signs of sedimentation indicate that a wetland is capable of, and has in the past, allowed sediments and presumably adsorbed nutrients and toxicants to settle out of the water column.
5. Thick surface organic horizon and/or abundant fine organic litter is present (N/A if assessing waters).	5. Y	See BEO-01 and BEO-15 (Appendix A).	Organic soils are effective at retaining heavy metals, some of which can be bound into long-term complexes with peat, particularly in cool climates.
Wetlands Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 1–2 (Y) = High, 0 (Y) = Low	**4 (Y): High**		

Functional Class: Lacustrine Fringe Graminoid Marsh
NWI Code(s): PEM1H, PEM1F
HGM: Lacustrine Fringe

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
C. Erosion Control and Shoreline Stabilization			Function reflects the ability of a wetland to stabilize banks through anchoring soils and dissipating erosive forces. This function is typically only performed by wetlands directly abutting a relatively permanent channelized water. Neither waters nor wetlands that do not abut relatively permanent channelized waters perform this function (N/A). Depending on the mapping and classification, however, some individual wetlands that do not actually directly abut a relatively permanent water (rivers and streams) may be included in this assessment.
1. Wetland has dense, energy absorbing vegetation bordering the watercourse and no evidence of erosion.	1. Y	See BEO-01 and BEO-15 (Appendix A). No erosion noted in field or in aerial imagery.	Plants bind soils with their root systems, and slow incoming waves or currents through increased surface roughness.
2. Soils are not predominantly sandy or silty, and are not ice rich.	2. Y	Organic soils (see BEO-01 and BEO-15, Appendix A).	Sandy and silty soils and ice rich permafrost are more susceptible to erosion.
3. Historical aerial photography (if available) indicates stable shoreline features.	3. Y		Visible evidence of stable shorelines indicates a lack of historical erosion, which may be due any one or a combination of factors including bank erodability, erosive force, or protection afforded by adjacent wetlands.
Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**3 (Y): High**		
D. Maintenance of Soil Thermal Regime			Added as a function due to the presence of continuous permafrost in study area.
1. Vegetation cover is continuous	1. N		Biomass or vegetation height are good indicators of areas with stable shallow active layers. Thick vegetation provides shading and insulation both to heat escaping during the summer and cold air temperatures in winter. Thick vegetation also tends to have deeper snowpacks in winter.
2. Wetland type does not have a permanently flooded hydrologic regime	2. N		Water bodies typically have a thaw bulb or no permafrost (Brosten et. al. 2006)
3. Wetland type is not within the riverine, lacustrine fringe or estuarine fringe HGM classes	3. N	Lacustrine Fringe HGM class.	Vegetation types that get seasonal flooding from lake and river surface water fluctuations typically are lacking permafrost or active layer is very deep (Brosten et. al 2006)
4. Wetland soil profile is a histosol or histic epipedon	4. Y	Organic soils (see BEO-01 and BEO-15, Appendix A).	Deep organic surface mats provide insulation and are a good predictor of stable shallow growing season active layers
5. Wetland is located in the discontinuous permafrost zone on a north facing aspect	5. N		North facing slopes in the discontinuous permafrost zone are areas where permafrost may persist (Yi et. al. 2009)
6. Wetland occupies a raised on convex landform that does not receive and store significant floodwaters during snowmelt	6. N		Infiltration of floodwaters to the active layer adds significant energy, in areas receiving relatively larger amounts of snowmelt floodwaters the active layer may be greater (Putkonen 1998)
Wetlands Rating Criteria: 5+ (Y) = High, 3–4 (Y) = Moderate, 0–2 (Y) = Low Waters Rating Criteria: 2 (Y) = High, 0–1 (Y) = Low	**1 (Y): Low**		
E. Organic Matter Production and Export			Organic matter production and export assesses primary production and subsequent flushing of organic material to downstream waters. Wetlands that are not flooded at least every 10 years do not perform this function as flooding is the transport mechanism for moving organics to downstream waters. If no flooding occurs, production may be high but no carbon is exported.
1. Wetland has at least 30%, or water has at least 10%, cover herbaceous vegetation. Woody plants are predominantly deciduous.	1. Y	Field data indicate over 30% vegetation cover (see BEO-01 and BEO-15, Appendix A).	Herbaceous vegetation is generally more productive than aquatic bed, scrub-shrub, or forested wetland vegetation Adamus et al. (1991). Higher productivity generates more carbon available for export. Deciduous woody species produce higher quality litter than evergreen woody species, which have recalcitrant litter with high concentrations of lignin and phenolic compounds (Wardle 2002).
2. At least 10% of wetland is seasonally flooded (N/A for waters).	2. Y		Surface water controls many differences between wetland types, including decomposition (Bayley and Mewhort 2004). Increased surface water promotes increased decomposition, which may facilitate carbon export (Adamus 2013).
3. Surface water outflow occurs outside of spring flooding.	3. N	Perennial channelized outputs were not observed during the field survey nor were they visible in aerial photography	A longer duration of surface water outflow provides more opportunity for organic matter export. While the vast majority of ACP wetlands flood during spring breakup, fewer have surface water outflow later in the growing season, when small beaded streams can stop flowing and waterbodies become disconnected.
Wetlands Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 2 (Y) = High, 0–1 (Y) = Low	**2 (Y): Moderate**		

Functional Class: Lacustrine Fringe Graminoid Marsh
NWI Code(s): PEM1H, PEM1F
HGM: Lacustrine Fringe

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
F. TES Support			Assesses the ability of a wetland or water to support Threatened or Endangered Species (TES) per the Endangered Species Act (ESA) and species or subspecies of fish or wildlife in Alaska per the Alaska Department of Fish and Game (ADF&G) as defined by Alaska Statute 16.20.190.
1. Wetland or water contains documented occurrence of a state or federally listed threatened or endangered species.	1. N	Neither Steller's nor Spectacled Eiders have been documented in this functional class within the study area (ALCC 2012).	A documented occurrence confirms use by TES for at least some aspect of life history, even if the community isn't a preferred or designated critical habitat.
2. Wetland or water contains documented critical habitat, designated by the U.S. Fish and Wildlife Service (USFWS) and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries).	2. N		NOAA Fisheries and USFWS, the two federal agencies responsible for administering the ESA, are required to designate critical habitat for listed species. Critical habitat is specific geographic areas containing features essential to the conservation of an endangered or threatened species, including areas not currently occupied but necessary for recovery.
3. Wetland or water is a known preferred habitat for state or federally listed threatened or endangered species.	3. Y	Steller's Eiders and Spectacled Eiders are expected to use Lacustrine Fringe Graminoid Marsh at some point during their life cycle (Appendix D)	If specific work on habitat preference in the study area (e.g. Johnson et al. 2014) is not available, habitat preferences were inferred using the literature based habitat use tables provided in Appendix D of this report.
Rating Criteria: 2–3 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**1 (Y): Moderate**		
G. General Avian and Mammal Habitat Suitability			Assesses whether the wetland or water supports a high diversity of birds and mammals. Characteristics of the wetland or water, landscape setting, and documented species diversity are considered.
1. Wetland or water is undisturbed by human habitation or development.	1. Y		Anthropogenic disturbance tends to reduce the diversity of birds and mammals using an area.
2. Wetland or water is used by a high diversity of mammal species.	2. N	No assessed mammal species regularly occurring in the study area are commonly found in the Aquatic Graminoid Marsh wildlife habitat type (Appendix C).	If no systematic wildlife surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
3. Wetland or water is used by a high diversity of avian species.	3. N	Fewer than half of assessed avian species (16 out of 35) regularly occuring in the study area are commonly found in the Aquatic Graminoid Marsh wildlife habitat type (Appendix C).	If no systematic avian surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
4. Interspersion of vegetation and water is at least moderate (surface water patches accounting for 5–10% areal cover, or continuous cover of surface water with a well developed emergent component).	4. Y		A greater variety of vegetation and cover types is present in communities with high vegetation-water interspersion. Communities with high vegetation water interspersion may support species adapted to open water, edge environments, and well-vegetated components of the community.
5. Wetland or water is considered rare at a regional scale.	5. N	Excluding marine and estuarine waters, PEM1H and PEM1F polygons account for over 8% of NWI mapping (USFWS 2014) in the Northwest Coast watershed (HUC 19060202).	Disproportionately high habitat use, in relation to habitat availability, may indicate habitat preference. Habitat availability must be assessed at a larger, regional scale rather than the project mapping which is limited to construction boundaries
Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**2 (Y): Moderate**		

Functional Class: Lacustrine Fringe Graminoid Marsh
NWI Code(s): PEM1H, PEM1F
HGM: Lacustrine Fringe

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
H. General Fish Habitat Suitability			Applicable to all waters, and wetlands with perennial or intermittent surface water connection to a fish bearing water. Sheet flow during spring snowmelt is not considered a sufficiently reliable connection to fish-bearing waters for this function to be applicable.
1. Water has sufficient size and depth of open water so as not to freeze completely during winter (N/A for wetlands).	1. N		Assessing whether the wetland or water provides overwintering habitat, which is limited on the ACP.
2. Fish are present.	2. Y	No fish were observed during the time of the field survey but a resident seasonal population is assumed. This wetland type is located immediately adjacent to open waterbodies that are assumed to support resident fish populations.	A documented occurrence confirms use by fish for at least some aspect of life history.
3. Herbaceous and/or woody vegetation is present in wetland and/or buffer to provide cover, shade, and/or detrital matter.	3. Y		Overhanging vegetation provides refuge from predators, shade to maintain water temperatures, and detrital matter contributions to the food web.
4. Suitable spawning areas are present.	4. Y		Suitable spawning habitat may include aquatic vegetation, deep lakes, and mixed gravel substrate in streambed.
5. Juvenile rest areas present.	5. Y		Juvenile rest areas include flooded wetlands, pools with organic debris, and/or overhanging vegetation.
Wetlands Rating Criteria: 2–4 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low Waters Rating Criteria: 2–5 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**4 (Y): High**		
I. Educational, Scientific, Recreational, or Subsistence Use			Consumptive (e.g. hunting, fishing, food gathering) and non-consumptive uses, as well as educational and scientific use are assessed.
1. Site has documented scientific or educational use.	1. Y	BEO lands	Scientific use function assesses whether the wetland has been used in scientific studies (peer-reviewed or grey literature), excluding studies necessitated by NEPA or project-permitting. Educational assesses the educational value of the wetland to the community (e.g. contains interpretive signs, is historically used for ecology or species identification classes, is a known long term research site with established permanent sample plots, etc.).
2. Wetland or water is in public ownership.	2. Y		Wetlands or waters in public ownership are more accessible to a variety of people.
3. Accessible trails are available.	3. Y		Visible or established trails demonstrate that the wetland or water is accessible, and may be used for recreational or subsistence purposes.
4. Wetland or water supports subsistence activities (e.g., hunting, fishing, berry picking).	4. Y		Observed or documented consumptive use confirms that a community is used for subsistence purposes.
Rating Criteria: 3–4 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Functional Class: Wet Graminoid Meadow and Shallow Open Water Complex
NWI Code(s): PEM1H, PEM1F
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
A. Flood Flow Regulation (Storage)			Function focuses on assessing the degree to which ACP wetlands store runoff or delay downslope movement of surface water. Riverine and estuarine waters below the OHWM do not perform this function (N/A). Wetlands that do not seasonally flood (e.g., pingos, tusssock tundra) do not perform this function (N/A). Surface water storage by wetlands in permafrost regions can be significant, while the conventional view that subsurface storage is an effective modulator of stormflow is a misconception in permafrost regions (Woo 2012).
1. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	1. Y	Typically composed of low center polygons with raised rims interspersed with small shallow open waterbodies.	Tussocks, low to tall (>20cm height) woody stems, and polygonal features provide surface roughness, which delays downslope movement of floodwaters by slowing velocity. These are persistent features, present during spring snowmelt-generated flooding.
2. Wetland or water is a depressional HGM class or has depressional features capable of storage.	2. Y	This type was most often interpreted as a depressional type forming in low areas within drained lake basins.	HGM depressions occur in topographic depressions with closed contours, and flow vectors are from surrounding areas toward the center of the depression, allowing the accumulation of surface water. Ice-rich, raised polygonal rims act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012, Woo 2012).
3. Wetland or water shows signs of storage (i.e. fluctuating water levels, algal mats, and/or lodged debris).	3. Y	Small flooded shallow water ponds within this complex type indicate that storage is occurring.	Visible signs of storage indicate that a wetland is capable of, and has in the past, retained additional water.
4. Floodwaters enter and flow through wetland predominantly as sheet flow rather than channel flow.	4 Y	No perennial surface water outlets observed during field survey or visible in aerial imagery.	Floodwater entering as sheet flow, rather than channelized flow, is more likely to interact with surface roughness features.
5. Waterbody is lake (>20 acres) (N/A if assessing wetlands).	5. N/A		Lakes (>20 acres) have substantial storage capacities, and modulate snowmelt-dominated streamflow regimes (Arp et al. 2012, Woo 2012).
Rating Criteria: 4 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		
B. Sediment, Nutrient (N and P), Toxicant Removal			ACP soils have a relatively shallow active layer of unfrozen soil during the growing season. Cold temperatures and shallow active layer limit the ability of ACP wetlands to perform denitrification, thus this function focuses on the removal of inorganic sediments and adsorbed toxicants and nutrients through settlement. Sediment retention is used as a proxy for toxicant removal as many toxicants adsorb to sediments, and sediment retention is relatively easy to assess.
1. Slow-moving or still water is present.	1. Y		Slow or still-moving water allows sediments and adsorbed toxicants to settle out of the water column, as opposed to swift-moving water that suspends sediments/toxicants.
2. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	2. Y	This type was most often interpreted as a depressional type forming in low areas within drained lake basins.	Tussocks and low to tall (>20cm height) woody stems provide surface roughness, which slows water velocity and allows sediments and adsorbed nutrients and toxicants to settle out of the water column. Raised polygonal rims provide surface roughness, which delays downslope movement of floodwaters by slowing velocity, and also act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012). These are persistent features, present during spring snowmelt-generated flooding.
3. At least moderate interspersion of vegetation and water is present. Surface water patches should account for >10% areal coverage (N/A if assessing waters).	3. Y		Rooted vegetation takes up nutrients directly from the soil, which may encourage nutrients to move from water to soil to maintain equilibrium.
4. Sediment deposits are present, providing evidence of deposition during natural flood events.	4 Y		Visible signs of sedimentation indicate that a wetland is capable of, and has in the past, allowed sediments and presumably adsorbed nutrients and toxicants to settle out of the water column.
5. Thick surface organic horizon and/or abundant fine organic litter is present (N/A if assessing waters).	5. Y	Field data document organic soils (see BEO-09, BEO-24, BEO-25, BEO-34, and BEO-35, Appendix A).	Organic soils are effective at retaining heavy metals, some of which can be bound into long-term complexes with peat, particularly in cool climates.
Wetlands Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 1–2 (Y) = High, 0 (Y) = Low	**5 (Y): High**		

Functional Class: Wet Graminoid Meadow and Shallow Open Water Complex
NWI Code(s): PEM1H, PEM1F
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
C. Erosion Control and Shoreline Stabilization			Function reflects the ability of a wetland to stabilize banks through anchoring soils and dissipating erosive forces. This function is typically only performed by wetlands directly abutting a relatively permanent channelized water. Neither waters nor wetlands that do not abut relatively permanent channelized waters perform this function (N/A). Depending on the mapping and classification, however, some individual wetlands that do not actually directly abut a relatively permanent water (rivers and streams) may be included in this assessment.
1. Wetland has dense, energy absorbing vegetation bordering the watercourse and no evidence of erosion.	1. N/A		Plants bind soils with their root systems, and slow incoming waves or currents through increased surface roughness.
2. Soils are not predominantly sandy or silty, and are not ice rich.	2. N/A		Sandy and silty soils and ice rich permafrost are more susceptible to erosion.
3. Historical aerial photography (if available) indicates stable shoreline features.	3. N/A		Visible evidence of stable shorelines indicates a lack of historical erosion, which may be due any one or a combination of factors including bank erodability, erosive force, or protection afforded by adjacent wetlands.
Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**0 (Y): N/A**	This wetland type does not directly abut relatively permanent channelized waters, thus this function is not applicable	
D. Maintenance of Soil Thermal Regime			Added as a function due to the presence of continuous permafrost in study area.
1. Vegetation cover is continuous	1. N		Biomass or vegetation height are good indicators of areas with stable shallow active layers. Thick vegetation provides shading and insulation both to heat escaping during the summer and cold airtemperatures in winter. Thick vegetation also tends to have deeper snowpacks in winter.
2. Wetland type does not have a permanently flooded hydrologic regime	2. Y		Water bodies typically have a thaw bulb or no permafrost (Brosten et. al. 2006)
3. Wetland type is not within the riverine, lacustrine fringe or estuarine fringe HGM classes	3. Y	This type was most often interpreted as a depressional type forming in low areas within drained lake basins.	Vegetation types that get seasonal flooding from lake and river surface water fluctuations typically are lacking permafrost or active layer is very deep (Brosten et. al 2006)
4. Wetland soil profile is a histosol or histic epipedon	4. Y	Field data document organic soils (see BEO-09, BEO-24, BEO-25, BEO-34, and BEO-35, Appendix A).	Deep organic surface mats provide insulation and are a good predictor of stable shallow growing season active layers
5. Wetland is located in the discontinuous permafrost zone on a north facing aspect	5. N		North facing slopes in the discontinuous permafrost zone are areas where permafrost may persist (Yi et. al. 2009)
6. Wetland occupies a raised on convex landform that does not receive and store significant floodwaters during snowmelt	6. N		Infiltration of floodwaters to the active layer adds significant energy, in areas receiving relatively larger amounts of snowmelt floodwaters the active layer may be greater (Putkonen 1998)
Wetlands Rating Criteria: 5 + (Y) = High, 3 -4 (Y) = Moderate, 0–2 (Y) = Low	**3 (Y): Moderate**		
E. Organic Matter Production and Export			Organic matter production and export assesses primary production and subsequent flushing of organic material to downstream waters. Wetlands that are not flooded at least every 10 years do not perform this function as flooding is the transport mechanism for moving organics to downstream waters. If no flooding occurs, production may be high but no carbon is exported.
1. Wetland has at least 30%, or water has at least 10%, cover herbaceous vegetation. Woody plants are predominantly deciduous.	1. Y	Field data document over 30% cover herbaceous vegetation in wetland component, and over 10% cover herbaceous vegetation in water component of complex (see BEO-09, BEO-10, BEO-24, BEO-25, BEO-34, and BEO-35, Appendix A).	Herbaceous vegetation is generally more productive than aquatic bed, scrub-shrub, or forested wetland vegetation Adamus et al. (1991). Higher productivity generates more carbon available for export. Deciduous woody species produce higher quality litter than evergreen woody species, which have recalcitrant litter with high concentrations of lignin and phenolic compounds (Wardle 2002).
2. At least 10% of wetland is seasonally flooded (N/A for waters).	2. Y		Surface water controls many differences between wetland types, including decomposition (Bayley and Mewhort 2004). Increased surface water promotes increased decomposition, which may facilitate carbon export (Adamus 2013).
3. Surface water outflow occurs outside of spring flooding.	3. N	Perennial channelized outputs were not observed during the field survey nor were they visible in aerial photography	A longer duration of surface water outflow provides more opportunity for organic matter export. While the vast majority of ACP wetlands flood during spring breakup, fewer have surface water outflow later in the growing season, when small beaded streams can stop flowing and waterbodies become disconnected.
Wetlands Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 2 (Y) = High, 0–1 (Y) = Low	**2 (Y): Moderate**		

Functional Class: Wet Graminoid Meadow and Shallow Open Water Complex
NWI Code(s): PEM1H, PEM1F
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
F. TES Support			Assesses the ability of a wetland or water to support Threatened or Endangered Species (TES) per the Endangered Species Act (ESA) and species or subspecies of fish or wildlife in Alaska per the Alaska Department of Fish and Game (ADF&G) as defined by Alaska Statute 16.20.190.
1. Wetland or water contains documented occurrence of a state or federally listed threatened or endangered species.	1. N	Neither Steller's nor Spectacled Eiders have been documented in this functional class within the study area (ALCC 2012).	A documented occurrence confirms use by TES for at least some aspect of life history, even if the community isn't a preferred or designated critical habitat.
2. Wetland or water contains documented critical habitat, designated by the U.S. Fish and Wildlife Service (USFWS) and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries).	2. N		NOAA Fisheries and USFWS, the two federal agencies responsible for administering the ESA, are required to designate critical habitat for listed species. Critical habitat is specific geographic areas containing features essential to the conservation of an endangered or threatened species, including areas not currently occupied but necessary for recovery.
3. Wetland or water is a known preferred habitat for state or federally listed threatened or endangered species.	3. Y	Steller's Eiders and Spectacled Eiders are expected to use Wet Graminoid Meadow and Shallow Open Water Complex at some point during their life cycle (Appendix D)	If specific work on habitat preference in the study area (e.g. Johnson et al. 2014) is not available, habitat preferences were inferred using the literature based habitat use tables provided in Appendix D of this report.
Rating Criteria: 2–3 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**1 (Y): Moderate**		
G. General Avian and Mammal Habitat Suitability			Assesses whether the wetland or water supports a high diversity of birds and mammals. Characteristics of the wetland or water, landscape setting, and documented species diversity are considered.
1. Wetland or water is undisturbed by human habitation or development.	1. Y		Anthropogenic disturbance tends to reduce the diversity of birds and mammals using an area.
2. Wetland or water is used by a high diversity of mammal species.	2. Y	Over half (8 out of 9) assessed mammal species regularly occurring in the study area are commonly found in the Deep Polygon Complex habitat (Appendix C).	If no systematic wildlife surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
3. Wetland or water is used by a high diversity of avian species.	3. Y	Over half (26 out of 35) assessed bird species regularly occurring in the study area are commonly found in the Deep Polygon Complex habitat (Appendix C).	If no systematic avian surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
4. Interspersion of vegetation and water is at least moderate (surface water patches accounting for 5–10% areal cover, or continuous cover of surface water with a well developed emergent component).	4. Y		A greater variety of vegetation and cover types is present in communities with high vegetation-water interspersion. Communities with high vegetation water interspersion may support species adapted to open water, edge environments, and well-vegetated components of the community.
5. Wetland or water is considered rare at a regional scale.	5. N	Excluding marine and estuarine waters, PEM1H and PEM1F polygons account for over 8% of NWI mapping (USFWS 2014) in the Northwest Coast watershed (HUC 19060202).	Disproportionately high habitat use, in relation to habitat availability, may indicate habitat preference. Habitat availability must be assessed at a larger, regional scale rather than the project mapping which is limited to construction boundaries
Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Functional Class: Wet Graminoid Meadow and Shallow Open Water Complex
NWI Code(s): PEM1H, PEM1F
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
H. General Fish Habitat Suitability			Applicable to all waters, and wetlands with perennial or intermittent surface water connection to a fish bearing water. Sheet flow during spring snowmelt is not considered a sufficiently reliable connection to fish-bearing waters for this function to be applicable.
1. Water has sufficient size and depth of open water so as not to freeze completely during winter (N/A for wetlands).	1. N	Ponds within this complex are shallow, and would freeze fast during winter.	Assessing whether the wetland or water provides overwintering habitat, which is limited on the ACP.
2. Fish are present.	2. Y	Because this wetland type is characterized by intermittent small shallow waterbodies fish are assumed present even though the likelihood is poor.	A documented occurrence confirms use by fish for at least some aspect of life history.
3. Herbaceous and/or woody vegetation is present in wetland and/or buffer to provide cover, shade, and/or detrital matter.	3. Y		Overhanging vegetation provides refuge from predators, shade to maintain water temperatures, and detrital matter contributions to the food web.
4. Suitable spawning areas are present.	4. Y		Suitable spawning habitat may include aquatic vegetation, deep lakes, and mixed gravel substrate in streambed.
5. Juvenile rest areas present.	5. Y		Juvenile rest areas include flooded wetlands, pools with organic debris, and/or overhanging vegetation.
Wetlands Rating Criteria: 2–4 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low Waters Rating Criteria: 2–5 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**4 (Y): High**		
I. Educational, Scientific, Recreational, or Subsistence Use			Consumptive (e.g. hunting, fishing, food gathering) and non-consumptive uses, as well as educational and scientific use are assessed.
1. Site has documented scientific or educational use.	1. Y	BEO lands	Scientific use function assesses whether the wetland has been used in scientific studies (peer-reviewed or grey literature), excluding studies necessitated by NEPA or project-permitting. Educational assesses the educational value of the wetland to the community (e.g. contains interpretive signs, is historically used for ecology or species identification classes, is a known long term research site with established permanent sample plots, etc.).
2. Wetland or water is in public ownership.	2. Y		Wetlands or waters in public ownership are more accessible to a variety of people.
3. Accessible trails are available.	3. Y		Visible or established trails demonstrate that the wetland or water is accessible, and may be used for recreational or subsistence purposes.
4. Wetland or water supports subsistence activities (e.g., hunting, fishing, berry picking).	4. Y		Observed or documented consumptive use confirms that a community is used for subsistence purposes.
Rating Criteria: 3–4 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Functional Class: Semipermanently Flooded Tidal Graminoid Meadow
NWI Code(s): PEM1T
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
A. Flood Flow Regulation (Storage)			Function focuses on assessing the degree to which ACP wetlands store runoff or delay downslope movement of surface water. Riverine and estuarine waters below the OHWM do not perform this function (N/A). Wetlands that do not seasonally flood (e.g., pingos, tussock tundra) do not perform this function (N/A). Surface water storage by wetlands in permafrost regions can be significant, while the conventional view that subsurface storage is an effective modulator of stormflow is a misconception in permafrost regions (Woo 2012).
1. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	1. N	Forms within drainage features in BEO study area with non-patterned surface forms. No raised rims, tussock forming sedges or woody species present.	Tussocks, low to tall (>20cm height) woody stems, and polygonal features provide surface roughness, which delays downslope movement of floodwaters by slowing velocity. These are persistent features, present during spring snowmelt-generated flooding.
2. Wetland or water is a depressional HGM class or has depressional features capable of storage.	2. Y		HGM depressions occur in topographic depressions with closed contours, and flow vectors are from surrounding areas toward the center of the depression, allowing the accumulation of surface water. Ice-rich, raised polygonal rims act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012, Woo 2012).
3. Wetland or water shows signs of storage (i.e. fluctuating water levels, algal mats, and/or lodged debris).	3. Y	Surface water is present for most of the growing season indicating that storage is occurring	Visible signs of storage indicate that a wetland is capable of, and has in the past, retained additional water.
4. Floodwaters enter and flow through wetland predominantly as sheet flow rather than channel flow.	4 Y	No perennial surface water outlets observed during field survey or visible in aerial imagery	Floodwater entering as sheet flow, rather than channelized flow, is more likely to interact with surface roughness features.
5. Waterbody is lake (>20 acres) (N/A if assessing wetlands).	5. N/A		Lakes (>20 acres) have substantial storage capacities, and modulate snowmelt-dominated streamflow regimes (Arp et al. 2012, Woo 2012).
Rating Criteria: 4 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**3 (Y): Moderate**		
B. Sediment, Nutrient (N and P), Toxicant Removal			ACP soils have a relatively shallow active layer of unfrozen soil during the growing season. Cold temperatures and shallow active layer limit the ability of ACP wetlands to perform denitrification, thus this function focuses on the removal of inorganic sediments and adsorbed toxicants and nutrients through settlement. Sediment retention is used as a proxy for toxicant removal as many toxicants adsorb to sediments, and sediment retention is relatively easy to assess.
1. Slow-moving or still water is present.	1. Y		Slow or still-moving water allows sediments and adsorbed toxicants to settle out of the water column, as opposed to swift-moving water that suspends sediments/toxicants.
2. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	2. N	Forms within drainage features in BEO study area with non-patterned surface forms. No raised rims, tussock forming sedges or woody species present.	Tussocks and low to tall (>20cm height) woody stems provide surface roughness, which slows water velocity and allows sediments and adsorbed nutrients and toxicants to settle out of the water column. Raised polygonal rims provide surface roughness, which delays downslope movement of floodwaters by slowing velocity, and also act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012). These are persistent features, present during spring snowmelt-generated flooding.
3. At least moderate interspersion of vegetation and water is present. Surface water patches should account for >10% areal coverage (N/A if assessing waters).	3. Y		Rooted vegetation takes up nutrients directly from the soil, which may encourage nutrients to move from water to soil to maintain equilibrium.
4. Sediment deposits are present, providing evidence of deposition during natural flood events.	4 Y		Visible signs of sedimentation indicate that a wetland is capable of, and has in the past, allowed sediments and presumably adsorbed nutrients and toxicants to settle out of the water column.
5. Thick surface organic horizon and/or abundant fine organic litter is present (N/A if assessing waters).	5. Y	Field data document 7 inches of organics over mineral soil (see BEO-31, Appendix A).	Organic soils are effective at retaining heavy metals, some of which can be bound into long-term complexes with peat, particularly in cool climates.
Wetlands Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 1–2 (Y) = High, 0 (Y) = Low	**4 (Y): High**		

Functional Class: Semipermanently Flooded Tidal Graminoid Meadow
NWI Code(s): PEM1T
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
C. Erosion Control and Shoreline Stabilization			Function reflects the ability of a wetland to stabilize banks through anchoring soils and dissipating erosive forces. This function is typically only performed by wetlands directly abutting a relatively permanent channelized water. Neither waters nor wetlands that do not abut relatively permanent channelized waters perform this function (N/A). Depending on the mapping and classification, however, some individual wetlands that do not actually directly abut a relatively permanent water (rivers and streams) may be included in this assessment.
1. Wetland has dense, energy absorbing vegetation bordering the watercourse and no evidence of erosion.	1. N		Plants bind soils with their root systems, and slow incoming waves or currents through increased surface roughness.
2. Soils are not predominantly sandy or silty, and are not ice rich.	2. Y	Field data document 7 inches of organics over silty clay loam (see BEO-31, Appendix A).	Sandy and silty soils and ice rich permafrost are more susceptible to erosion.
3. Historical aerial photography (if available) indicates stable shoreline features.	3. Y		Visible evidence of stable shorelines indicates a lack of historical erosion, which may be due any one or a combination of factors including bank erodability, erosive force, or protection afforded by adjacent wetlands.
Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**2 (Y): Moderate**		
D. Maintenance of Soil Thermal Regime			Added as a function due to the presence of continuous permafrost in study area.
1. Vegetation cover is continuous	1. N	Vegetation is present, but not continuous (see BEO-31, Appendix A).	Biomass or vegetation height are good indicators of areas with stable shallow active layers. Thick vegetation provides shading and insulation both to heat escaping during the summer and cold air temperatures in winter. Thick vegetation also tends to have deeper snowpacks in winter.
2. Wetland type does not have a permanently flooded hydrologic regime	2. Y		Water bodies typically have a thaw bulb or no permafrost (Brosten et. al. 2006)
3. Wetland type is not within the riverine, lacustrine fringe or estuarine fringe HGM classes	3. Y		Vegetation types that get seasonal flooding from lake and river surface water fluctuations typically are lacking permafrost or active layer is very deep (Brosten et. al 2006)
4. Wetland soil profile is a histosol or histic epipedon	4. N	Field data document 7 inches of organics over silty clay loam (see BEO-31, Appendix A), which is not sufficiently thick to qualify as a histosol or histic epipedon.	Deep organic surface mats provide insulation and are a good predictor of stable shallow growing season active layers
5. Wetland is located in the discontinuous permafrost zone on a north facing aspect	5. N		North facing slopes in the discontinuous permafrost zone are areas where permafrost may persist (Yi et. al. 2009)
6. Wetland occupies a raised on convex landform that does not receive and store significant floodwaters during snowmelt	6. N		Infiltration of floodwaters to the active layer adds significant energy, in areas receiving relatively larger amounts of snowmelt floodwaters the active layer may be greater (Putkonen 1998)
Wetlands Rating Criteria: 5 + (Y) = High, 3 -4 (Y) = Moderate, 0–2 (Y) = Low Waters Rating Criteria: 2 (Y) = High, 0–1 (Y) = Low	**2 (Y): Low**		
E. Organic Matter Production and Export			Organic matter production and export assesses primary production and subsequent flushing of organic material to downstream waters. Wetlands that are not flooded at least every 10 years do not perform this function as flooding is the transport mechanism for moving organics to downstream waters. If no flooding occurs, production may be high but no carbon is exported.
1. Wetland has at least 30%, or water has at least 10%, cover herbaceous vegetation. Woody plants are predominantly deciduous.	1. N	Less than 30% herbaceous vegetation and no woody vegetation documented by field data (see BEO-31, Appendix A).	Herbaceous vegetation is generally more productive than aquatic bed, scrub-shrub, or forested wetland vegetation Adamus et al. (1991). Higher productivity generates more carbon available for export. Deciduous woody species produce higher quality litter than evergreen woody species, which have recalcitrant litter with high concentrations of lignin and phenolic compounds (Wardle 2002).
2. At least 10% of wetland is seasonally flooded (N/A for waters).	2. Y		Surface water controls many differences between wetland types, including decomposition (Bayley and Mewhort 2004). Increased surface water promotes increased decomposition, which may facilitate carbon export (Adamus 2013).
3. Surface water outflow occurs outside of spring flooding.	3. N	Perennial channelized outputs were not observed during the field survey nor were they visible in aerial photography	A longer duration of surface water outflow provides more opportunity for organic matter export. While the vast majority of ACP wetlands flood during spring breakup, fewer have surface water outflow later in the growing season, when small beaded streams can stop flowing and waterbodies become disconnected.
Wetlands Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 2 (Y) = High, 0–1 (Y) = Low	**1 (Y): Low**		

Functional Class: Semipermanently Flooded Tidal Graminoid Meadow
NWI Code(s): PEM1T
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
F. TES Support			Assesses the ability of a wetland or water to support Threatened or Endangered Species (TES) per the Endangered Species Act (ESA) and species or subspecies of fish or wildlife in Alaska per the Alaska Department of Fish and Game (ADF&G) as defined by Alaska Statute 16.20.190.
1. Wetland or water contains documented occurrence of a state or federally listed threatened or endangered species.	1. N	Neither Steller's nor Spectacled Eiders have been documented in this functional class within the study area (ALCC 2012).	A documented occurrence confirms use by TES for at least some aspect of life history, even if the community isn't a preferred or designated critical habitat.
2. Wetland or water contains documented critical habitat, designated by the U.S. Fish and Wildlife Service (USFWS) and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries).	2. N		NOAA Fisheries and USFWS, the two federal agencies responsible for administering the ESA, are required to designate critical habitat for listed species. Critical habitat is specific geographic areas containing features essential to the conservation of an endangered or threatened species, including areas not currently occupied but necessary for recovery.
3. Wetland or water is a known preferred habitat for state or federally listed threatened or endangered species.	3. N		If specific work on habitat preference in the study area (e.g. Johnson et al. 2014) is not available, habitat preferences were inferred using the literature based habitat use tables provided in Appendix D of this report.
Rating Criteria: 2–3 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**0 (Y): Low**		
G. General Avian and Mammal Habitat Suitability			Assesses whether the wetland or water supports a high diversity of birds and mammals. Characteristics of the wetland or water, landscape setting, and documented species diversity are considered.
1. Wetland or water is undisturbed by human habitation or development.	1. Y		Anthropogenic disturbance tends to reduce the diversity of birds and mammals using an area.
2. Wetland or water is used by a high diversity of mammal species.	2. N	Fewer than half (2 out of 10) assessed mammal species regularly occurring in the study area are commonly found in the Halophytic Sedge Wet Meadow habitat (Appendix C).	If no systematic wildlife surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
3. Wetland or water is used by a high diversity of avian species.	3. N	Fewer than half (6 out of 35) assessed bird species regularly occurring in the study area are commonly found in the Halophytic Sedge Wet Meadow wildlife habitat (Appendix C).	If no systematic avian surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
4. Interspersion of vegetation and water is at least moderate (surface water patches accounting for 5–10% areal cover, or continuous cover of surface water with a well developed emergent component).	4. Y		A greater variety of vegetation and cover types is present in communities with high vegetation-water interspersion. Communities with high vegetation water interspersion may support species adapted to open water, edge environments, and well-vegetated components of the community.
5. Wetland or water is considered rare at a regional scale.	5. N	No PEM1T polygons are present in the NWI mapping (USFWS 2014) in the Northwest Coast watershed (HUC 19060202). However, the habitat associated with this functional class is not used by a high diversity of bird or mammal species.	Disproportionately high habitat use, in relation to habitat availability, may indicate habitat preference. Habitat availability must be assessed at a larger, regional scale rather than the project mapping which is limited to construction boundaries
Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**2 (Y): Moderate**		

Functional Class: Semipermanently Flooded Tidal Graminoid Meadow
NWI Code(s): PEM1T
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
H. General Fish Habitat Suitability		This wetland type was evaluated for fish habitat suitability because it directly abuts a permanently flooded estuarine type connected to nearshore marine waters	Applicable to all waters, and wetlands with perennial or intermittent surface water connection to a fish bearing water. Sheet flow during spring snowmelt is not considered a sufficiently reliable connection to fish-bearing waters for this function to be applicable.
1. Water has sufficient size and depth of open water so as not to freeze completely during winter (N/A for wetlands).	1. N		Assessing whether the wetland or water provides overwintering habitat, which is limited on the ACP.
2. Fish are present.	2. Y		A documented occurrence confirms use by fish for at least some aspect of life history.
3. Herbaceous and/or woody vegetation is present in wetland and/or buffer to provide cover, shade, and/or detrital matter.	3. Y		Overhanging vegetation provides refuge from predators, shade to maintain water temperatures, and detrital matter contributions to the food web.
4. Suitable spawning areas are present.	4. Y		Suitable spawning habitat may include aquatic vegetation, deep lakes, and mixed gravel substrate in streambed.
5. Juvenile rest areas present.	5. Y		Juvenile rest areas include flooded wetlands, pools with organic debris, and/or overhanging vegetation.
Wetlands Rating Criteria: 2–4 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low Waters Rating Criteria: 2–5 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**4 (Y): High**		
I. Educational, Scientific, Recreational, or Subsistence Use			Consumptive (e.g. hunting, fishing, food gathering) and non-consumptive uses, as well as educational and scientific use are assessed.
1. Site has documented scientific or educational use.	1. Y	BEO lands	Scientific use function assesses whether the wetland has been used in scientific studies (peer-reviewed or grey literature), excluding studies necessitated by NEPA or project-permitting. Educational assesses the educational value of the wetland to the community (e.g. contains interpretive signs, is historically used for ecology or species identification classes, is a known long term research site with established permanent sample plots, etc.).
2. Wetland or water is in public ownership.	2. Y		Wetlands or waters in public ownership are more accessible to a variety of people.
3. Accessible trails are available.	3. Y		Visible or established trails demonstrate that the wetland or water is accessible, and may be used for recreational or subsistence purposes.
4. Wetland or water supports subsistence activities (e.g., hunting, fishing, berry picking).	4. Y		Observed or documented consumptive use confirms that a community is used for subsistence purposes.
Rating Criteria: 3–4 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Functional Class: Semipermanently Flooded Wet Graminoid Meadow
NWI Code(s): PEM1F
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
A. Flood Flow Regulation (Storage)			Function focuses on assessing the degree to which ACP wetlands store runoff or delay downslope movement of surface water. Riverine and estuarine waters below the OHWM do not perform this function (N/A). Wetlands that do not seasonally flood (e.g., pingos, tussock tundra) do not perform this function (N/A). Surface water storage by wetlands in permafrost regions can be significant, while the conventional view that subsurface storage is an effective modulator of stormflow is a misconception in permafrost regions (Woo 2012).
1. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	1. Y	Typically composed of low center polygons with raised rims, tussocks are generally absent and woody stem shrubs occur in low density.	Tussocks, low to tall (>20cm height) woody stems, and polygonal features provide surface roughness, which delays downslope movement of floodwaters by slowing velocity. These are persistent features, present during spring snowmelt-generated flooding.
2. Wetland or water is a depressional HGM class or has depressional features capable of storage.	2. Y		HGM depressions occur in topographic depressions with closed contours, and flow vectors are from surrounding areas toward the center of the depression, allowing the accumulation of surface water. Ice-rich, raised polygonal rims act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012, Woo 2012).
3. Wetland or water shows signs of storage (i.e. fluctuating water levels, algal mats, and/or lodged debris).	3. Y	Surface water is present for most of the growing season indicating that storage is occurring.	Visible signs of storage indicate that a wetland is capable of, and has in the past, retained additional water.
4. Floodwaters enter and flow through wetland predominantly as sheet flow rather than channel flow.	4 Y	No perennial surface water outlets observed during field survey or visible in aerial imagery.	Floodwater entering as sheet flow, rather than channelized flow, is more likely to interact with surface roughness features.
5. Waterbody is lake (>20 acres) (N/A if assessing wetlands).	5. N/A		Lakes (>20 acres) have substantial storage capacities, and modulate snowmelt-dominated streamflow regimes (Arp et al. 2012, Woo 2012).
Rating Criteria: 4 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		
B. Sediment, Nutrient (N and P), Toxicant Removal			ACP soils have a relatively shallow active layer of unfrozen soil during the growing season. Cold temperatures and shallow active layer limit the ability of ACP wetlands to perform denitrification, thus this function focuses on the removal of inorganic sediments and adsorbed toxicants and nutrients through settlement. Sediment retention is used as a proxy for toxicant removal as many toxicants adsorb to sediments, and sediment retention is relatively easy to assess.
1. Slow-moving or still water is present.	1. Y		Slow or still-moving water allows sediments and adsorbed toxicants to settle out of the water column, as opposed to swift-moving water that suspends sediments/toxicants.
2. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	2. Y	Typically composed of low center polygons with raised rims, tussocks are generally absent and woody stem shrubs occur in low density.	Tussocks and low to tall (>20cm height) woody stems provide surface roughness, which slows water velocity and allows sediments and adsorbed nutrients and toxicants to settle out of the water column. Raised polygonal rims provide surface roughness, which delays downslope movement of floodwaters by slowing velocity, and also act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012). These are persistent features, present during spring snowmelt-generated flooding.
3. At least moderate interspersion of vegetation and water is present. Surface water patches should account for >10% areal coverage (N/A if assessing waters).	3. Y		Rooted vegetation takes up nutrients directly from the soil, which may encourage nutrients to move from water to soil to maintain equilibrium.
4. Sediment deposits are present, providing evidence of deposition during natural flood events.	4 Y		Visible signs of sedimentation indicate that a wetland is capable of, and has in the past, allowed sediments and presumably adsorbed nutrients and toxicants to settle out of the water column.
5. Thick surface organic horizon and/or abundant fine organic litter is present (N/A if assessing waters).	5. Y	Field data document histic epipedons or histosols in this functional class (see BEO-04, BEO-05, BEP-06, BEO-08, BEO-11, BEO-12, BEO-26, BEO-27, and BEO-29, Appendix A).	Organic soils are effective at retaining heavy metals, some of which can be bound into long-term complexes with peat, particularly in cool climates.
Wetlands Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 1–2 (Y) = High, 0 (Y) = Low	**5 (Y): High**		

Functional Class: Semipermanently Flooded Wet Graminoid Meadow
NWI Code(s): PEM1F
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
C. Erosion Control and Shoreline Stabilization		This wetland type does not directly abut relatively permanent channelized waters, thus this function is not applicable	Function reflects the ability of a wetland to stabilize banks through anchoring soils and dissipating erosive forces. This function is typically only performed by wetlands directly abutting a relatively permanent channelized water. Neither waters nor wetlands that do not abut relatively permanent channelized waters perform this function (N/A). Depending on the mapping and classification, however, some individual wetlands that do not actually directly abut a relatively permanent water (rivers and streams) may be included in this assessment.
1. Wetland has dense, energy absorbing vegetation bordering the watercourse and no evidence of erosion.	1. N/A		Plants bind soils with their root systems, and slow incoming waves or currents through increased surface roughness.
2. Soils are not predominantly sandy or silty, and are not ice rich.	2. N/A		Sandy and silty soils and ice rich permafrost are more susceptible to erosion.
3. Historical aerial photography (if available) indicates stable shoreline features.	3. N/A		Visible evidence of stable shorelines indicates a lack of historical erosion, which may be due any one or a combination of factors including bank erodability, erosive force, or protection afforded by adjacent wetlands.
Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**0 (Y): N/A**		
D. Maintenance of Soil Thermal Regime			Added as a function due to the presence of continuous permafrost in study area.
1. Vegetation cover is continuous	1. Y		Biomass or vegetation height are good indicators of areas with stable shallow active layers. Thick vegetation provides shading and insulation both to heat escaping during the summer and cold air temperatures in winter. Thick vegetation also tends to have deeper snowpacks in winter.
2. Wetland type does not have a permanently flooded hydrologic regime	2. Y		Water bodies typically have a thaw bulb or no permafrost (Brosten et. al. 2006)
3. Wetland type is not within the riverine, lacustrine fringe or estuarine fringe HGM classes	3. Y		Vegetation types that get seasonal flooding from lake and river surface water fluctuations typically are lacking permafrost or active layer is very deep (Brosten et. al 2006)
4. Wetland soil profile is a histosol or histic epipedon	4. Y	Field data document histic epipedons or histosols in this functional class (see BEO-04, BEO-05, BEP-06, BEO-08, BEO-11, BEO-12, BEO-26, BEO-27, and BEO-29, Appendix A).	Deep organic surface mats provide insulation and are a good predictor of stable shallow growing season active layers
5. Wetland is located in the discontinuous permafrost zone on a north facing aspect	5. N		North facing slopes in the discontinuous permafrost zone are areas where permafrost may persist (Yi et. al. 2009)
6. Wetland occupies a raised on convex landform that does not receive and store significant floodwaters during snowmelt	6. N		Infiltration of floodwaters to the active layer adds significant energy, in areas receiving relatively larger amounts of snowmelt floodwaters the active layer may be greater (Putkonen 1998)
Wetlands Rating Criteria: 5 + (Y) = High, 3 -4 (Y) = Moderate, 0–2 (Y) = Low	**4 (Y): Moderate**		
E. Organic Matter Production and Export			Organic matter production and export assesses primary production and subsequent flushing of organic material to downstream waters. Wetlands that are not flooded at least every 10 years do not perform this function as flooding is the transport mechanism for moving organics to downstream waters. If no flooding occurs, production may be high but no carbon is exported.
1. Wetland has at least 30%, or water has at least 10%, cover herbaceous vegetation. Woody plants are predominantly deciduous.	1. Y	Field data document over 30% herbaceous vegetation in this functional class (see BEO-04, BEO-05, BEP-06, BEO-08, BEO-11, BEO-12, BEO-26, BEO-27, and BEO-29, Appendix A).	Herbaceous vegetation is generally more productive than aquatic bed, scrub-shrub, or forested wetland vegetation Adamus et al. (1991). Higher productivity generates more carbon available for export. Deciduous woody species produce higher quality litter than evergreen woody species, which have recalcitrant litter with high concentrations of lignin and phenolic compounds (Wardle 2002).
2. At least 10% of wetland is seasonally flooded (N/A for waters).	2. Y		Surface water controls many differences between wetland types, including decomposition (Bayley and Mewhort 2004). Increased surface water promotes increased decomposition, which may facilitate carbon export (Adamus 2013).
3. Surface water outflow occurs outside of spring flooding.	3. N	Perennial channelized outputs were not observed during the field survey nor were they visible in aerial photography	A longer duration of surface water outflow provides more opportunity for organic matter export. While the vast majority of ACP wetlands flood during spring breakup, fewer have surface water outflow later in the growing season, when small beaded streams can stop flowing and waterbodies become disconnected.
Wetlands Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 2 (Y) = High, 0–1 (Y) = Low	**2 (Y): Moderate**		

Functional Class: Semipermanently Flooded Wet Graminoid Meadow
NWI Code(s): PEM1F
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
F. TES Support			Assesses the ability of a wetland or water to support Threatened or Endangered Species (TES) per the Endangered Species Act (ESA) and species or subspecies of fish or wildlife in Alaska per the Alaska Department of Fish and Game (ADF&G) as defined by Alaska Statute 16.20.190.
1. Wetland or water contains documented occurrence of a state or federally listed threatened or endangered species.	1. Y	Three Spectacled Eiders documented in this functional class within the study area (ALCC 2012).	A documented occurrence confirms use by TES for at least some aspect of life history, even if the community isn't a preferred or designated critical habitat.
2. Wetland or water contains documented critical habitat, designated by the U.S. Fish and Wildlife Service (USFWS) and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries).	2. N		NOAA Fisheries and USFWS, the two federal agencies responsible for administering the ESA, are required to designate critical habitat for listed species. Critical habitat is specific geographic areas containing features essential to the conservation of an endangered or threatened species, including areas not currently occupied but necessary for recovery.
3. Wetland or water is a known preferred habitat for state or federally listed threatened or endangered species.	3. Y	Steller's Eiders and Spectacled Eiders are expected to use Semipermanently Flooded Wet Graminoid Meadow at some point during their life cycle (Appendix D)	If specific work on habitat preference in the study area (e.g. Johnson et al. 2014) is not available, habitat preferences were inferred using the literature based habitat use tables provided in Appendix D of this report.
Rating Criteria: 2–3 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**2 (Y): High**		
G. General Avian and Mammal Habitat Suitability			Assesses whether the wetland or water supports a high diversity of birds and mammals. Characteristics of the wetland or water, landscape setting, and documented species diversity are considered.
1. Wetland or water is undisturbed by human habitation or development.	1. Y		Anthropogenic disturbance tends to reduce the diversity of birds and mammals using an area.
2. Wetland or water is used by a high diversity of mammal species.	2. Y	Over half of assessed mammals (8 out of 9) regularly occurring in the study area are commonly found in the combination of Patterned Wet Meadow and Nonpatterned Wet Meadow habitats (Appendix C).	If no systematic wildlife surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
3. Wetland or water is used by a high diversity of avian species.	3. Y	Over half of assessed birds (29 out of 35) regularly occurring in the study area are commonly found in the combination of Patterned Wet Meadow and Nonpatterned Wet Meadow habitats (Appendix C).	If no systematic avian surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
4. Interspersion of vegetation and water is at least moderate (surface water patches accounting for 5–10% areal cover, or continuous cover of surface water with a well developed emergent component).	4. Y		A greater variety of vegetation and cover types is present in communities with high vegetation-water interspersion. Communities with high vegetation water interspersion may support species adapted to open water, edge environments, and well-vegetated components of the community.
5. Wetland or water is considered rare at a regional scale.	5. N	Excluding marine and estuarine waters, PEM1F polygons account for over 8% of NWI mapping (USFWS 2014) in the Northwest Coast watershed (HUC 19060202).	Disproportionately high habitat use, in relation to habitat availability, may indicate habitat preference. Habitat availability must be assessed at a larger, regional scale rather than the project mapping which is limited to construction boundaries
Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Functional Class: Semipermanently Flooded Wet Graminoid Meadow
NWI Code(s): PEM1F
HGM: Depressional

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
H. General Fish Habitat Suitability		While fish may be imported to this wetland type through spring flood events it is still essentially a terrestrial community that is unsuitable as permanent fish habitat and thus is not considered for the fish habitat function	Applicable to all waters, and wetlands with perennial or intermittent surface water connection to a fish bearing water. Sheet flow during spring snowmelt is not considered a sufficiently reliable connection to fish-bearing waters for this function to be applicable.
1. Water has sufficient size and depth of open water so as not to freeze completely during winter (N/A for wetlands).	1. N/A		Assessing whether the wetland or water provides overwintering habitat, which is limited on the ACP.
2. Fish are present.	2. N/A		A documented occurrence confirms use by fish for at least some aspect of life history.
3. Herbaceous and/or woody vegetation is present in wetland and/or buffer to provide cover, shade, and/or detrital matter.	3. N/A		Overhanging vegetation provides refuge from predators, shade to maintain water temperatures, and detrital matter contributions to the food web.
4. Suitable spawning areas are present.	4. N/A		Suitable spawning habitat may include aquatic vegetation, deep lakes, and mixed gravel substrate in streambed.
5. Juvenile rest areas present.	5. N/A		Juvenile rest areas include flooded wetlands, pools with organic debris, and/or overhanging vegetation.
Wetlands Rating Criteria: 2–4 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low Waters Rating Criteria: 2–5 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**0 (Y): N/A**		
I. Educational, Scientific, Recreational, or Subsistence Use			Consumptive (e.g. hunting, fishing, food gathering) and non-consumptive uses, as well as educational and scientific use are assessed.
1. Site has documented scientific or educational use.	1. Y	BEO lands	Scientific use function assesses whether the wetland has been used in scientific studies (peer-reviewed or grey literature), excluding studies necessitated by NEPA or project-permitting. Educational assesses the educational value of the wetland to the community (e.g. contains interpretive signs, is historically used for ecology or species identification classes, is a known long term research site with established permanent sample plots, etc.).
2. Wetland or water is in public ownership.	2. Y		Wetlands or waters in public ownership are more accessible to a variety of people.
3. Accessible trails are available.	3. Y		Visible or established trails demonstrate that the wetland or water is accessible, and may be used for recreational or subsistence purposes.
4. Wetland or water supports subsistence activities (e.g., hunting, fishing, berry picking).	4. Y		Observed or documented consumptive use confirms that a community is used for subsistence purposes.
Rating Criteria: 3–4 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Functional Class: Seasonally Flooded-Saturated Graminoid Meadow
NWI Code(s): PEM1E
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
A. Flood Flow Regulation (Storage)			Function focuses on assessing the degree to which ACP wetlands store runoff or delay downslope movement of surface water. Riverine and estuarine waters below the OHWM do not perform this function (N/A). Wetlands that do not seasonally flood (e.g., pingos, tussock tundra) do not perform this function (N/A). Surface water storage by wetlands in permafrost regions can be significant, while the conventional view that subsurface storage is an effective modulator of stormflow is a misconception in permafrost regions (Woo 2012).
1. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	1. Y	The surface form for this wetland consists of mixed low and high center polygons, raised ridges are present which support minimal woody shrub vegetation. Tussocks are not present.	Tussocks, low to tall (>20cm height) woody stems, and polygonal features provide surface roughness, which delays downslope movement of floodwaters by slowing velocity. These are persistent features, present during spring snowmelt-generated flooding.
2. Wetland or water is a depressional HGM class or has depressional features capable of storage.	2. Y	This wetland type was typically interpreted as Flats HGM type, occurring within drained lake basin margins, however, the type is characterized by numerous micro-depressions formed along troughs or in degrading polygon centers that act as depressions and provide important storage capacity.	HGM depressions occur in topographic depressions with closed contours, and flow vectors are from surrounding areas toward the center of the depression, allowing the accumulation of surface water. Ice-rich, raised polygonal rims act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012, Woo 2012).
3. Wetland or water shows signs of storage (i.e. fluctuating water levels, algal mats, and/or lodged debris).	3. Y	Low center polygons and troughs between high center polygons have semi permanent surface water indicating that storage is occurring in this wetland type	Visible signs of storage indicate that a wetland is capable of, and has in the past, retained additional water.
4. Floodwaters enter and flow through wetland predominantly as sheet flow rather than channel flow.	4 Y	Floodwaters are assumed to impact all wetland types typically occurring on the coastal plain during snow melt	Floodwater entering as sheet flow, rather than channelized flow, is more likely to interact with surface roughness features.
5. Waterbody is lake (>20 acres) (N/A if assessing wetlands).	5. N/A		Lakes (>20 acres) have substantial storage capacities, and modulate snowmelt-dominated streamflow regimes (Arp et al. 2012, Woo 2012).
Rating Criteria: 4 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		
B. Sediment, Nutrient (N and P), Toxicant Removal			ACP soils have a relatively shallow active layer of unfrozen soil during the growing season. Cold temperatures and shallow active layer limit the ability of ACP wetlands to perform denitrification, thus this function focuses on the removal of inorganic sediments and adsorbed toxicants and nutrients through settlement. Sediment retention is used as a proxy for toxicant removal as many toxicants adsorb to sediments, and sediment retention is relatively easy to assess.
1. Slow-moving or still water is present.	1. Y		Slow or still-moving water allows sediments and adsorbed toxicants to settle out of the water column, as opposed to swift-moving water that suspends sediments/toxicants.
2. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	2. Y	The surface form for this wetland consists of mixed low and high center polygons, raised ridges are present which support minimal woody shrub vegetation. Tussocks are not present.	Tussocks and low to tall (>20cm height) woody stems provide surface roughness, which slows water velocity and allows sediments and adsorbed nutrients and toxicants to settle out of the water column. Raised polygonal rims provide surface roughness, which delays downslope movement of floodwaters by slowing velocity, and also act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012). These are persistent features, present during spring snowmelt-generated flooding.
3. At least moderate interspersion of vegetation and water is present. Surface water patches should account for >10% areal coverage (N/A if assessing waters).	3. Y		Rooted vegetation takes up nutrients directly from the soil, which may encourage nutrients to move from water to soil to maintain equilibrium.
4. Sediment deposits are present, providing evidence of deposition during natural flood events.	4 N		Visible signs of sedimentation indicate that a wetland is capable of, and has in the past, allowed sediments and presumably adsorbed nutrients and toxicants to settle out of the water column.
5. Thick surface organic horizon and/or abundant fine organic litter is present (N/A if assessing waters).	5. Y	Field data document histosols or histic epipedons in this wetland functional class (see BEO-14, BEO-18, BEO-21, BEO-37 and BEO-38, Appendix A).	Organic soils are effective at retaining heavy metals, some of which can be bound into long-term complexes with peat, particularly in cool climates.
Wetlands Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 1–2 (Y) = High, 0 (Y) = Low	**4 (Y): High**		

Functional Class: Seasonally Flooded-Saturated Graminoid Meadow
NWI Code(s): PEM1E
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
C. Erosion Control and Shoreline Stabilization		This wetland type does not directly abut relatively permanent channelized waters, thus this function is not applicable	Function reflects the ability of a wetland to stabilize banks through anchoring soils and dissipating erosive forces. This function is typically only performed by wetlands directly abutting a relatively permanent channelized water. Neither waters nor wetlands that do not abut relatively permanent channelized waters perform this function (N/A). Depending on the mapping and classification, however, some individual wetlands that do not actually directly abut a relatively permanent water (rivers and streams) may be included in this assessment.
1. Wetland has dense, energy absorbing vegetation bordering the watercourse and no evidence of erosion.	1. N/A		Plants bind soils with their root systems, and slow incoming waves or currents through increased surface roughness.
2. Soils are not predominantly sandy or silty, and are not ice rich.	2. N/A		Sandy and silty soils and ice rich permafrost are more susceptible to erosion.
3. Historical aerial photography (if available) indicates stable shoreline features.	3. N/A		Visible evidence of stable shorelines indicates a lack of historical erosion, which may be due any one or a combination of factors including bank erodability, erosive force, or protection afforded by adjacent wetlands.
Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**0 (Y): N/A**		
D. Maintenance of Soil Thermal Regime			Added as a function due to the presence of continuous permafrost in study area.
1. Vegetation cover is continuous	1. Y		Biomass or vegetation height are good indicators of areas with stable shallow active layers. Thick vegetation provides shading and insulation both to heat escaping during the summer and cold air temperatures in winter. Thick vegetation also tends to have deeper snowpacks in winter.
2. Wetland type does not have a permanently flooded hydrologic regime	2. Y		Water bodies typically have a thaw bulb or no permafrost (Brosten et. al. 2006)
3. Wetland type is not within the riverine, lacustrine fringe or estuarine fringe HGM classes	3. Y		Vegetation types that get seasonal flooding from lake and river surface water fluctuations typically are lacking permafrost or active layer is very deep (Brosten et. al 2006)
4. Wetland soil profile is a histosol or histic epipedon	4. Y	Field data document histosols or histic epipedons in this wetland functional class (see BEO-14, BEO-18, BEO-21, BEO-37 and BEO-38, Appendix A).	Deep organic surface mats provide insulation and are a good predictor of stable shallow growing season active layers
5. Wetland is located in the discontinuous permafrost zone on a north facing aspect	5. N		North facing slopes in the discontinuous permafrost zone are areas where permafrost may persist (Yi et. al. 2009)
6. Wetland occupies a raised on convex landform that does not receive and store significant floodwaters during snowmelt	6. N		Infiltration of floodwaters to the active layer adds significant energy, in areas receiving relatively larger amounts of snowmelt floodwaters the active layer may be greater (Putkonen 1998)
Wetlands Rating Criteria: 5 + (Y) = High, 3 -4 (Y) = Moderate, 0–2 (Y) = Low	**4 (Y): Moderate**		
E. Organic Matter Production and Export			Organic matter production and export assesses primary production and subsequent flushing of organic material to downstream waters. Wetlands that are not flooded at least every 10 years do not perform this function as flooding is the transport mechanism for moving organics to downstream waters. If no flooding occurs, production may be high but no carbon is exported.
1. Wetland has at least 30%, or water has at least 10%, cover herbaceous vegetation. Woody plants are predominantly deciduous.	1. Y	Field data document over 30% herbaceous vegetation in this wetland functional class (see BEO-14, BEO-18, BEO-21, BEO-37 and BEO-38, Appendix A).	Herbaceous vegetation is generally more productive than aquatic bed, scrub-shrub, or forested wetland vegetation Adamus et al. (1991). Higher productivity generates more carbon available for export. Deciduous woody species produce higher quality litter than evergreen woody species, which have recalcitrant litter with high concentrations of lignin and phenolic compounds (Wardle 2002).
2. At least 10% of wetland is seasonally flooded (N/A for waters).	2. Y		Surface water controls many differences between wetland types, including decomposition (Bayley and Mewhort 2004). Increased surface water promotes increased decomposition, which may facilitate carbon export (Adamus 2013).
3. Surface water outflow occurs outside of spring flooding.	3. N	No channelized surface water outflow observed in field or in aerial imagery.	A longer duration of surface water outflow provides more opportunity for organic matter export. While the vast majority of ACP wetlands flood during spring breakup, fewer have surface water outflow later in the growing season, when small beaded streams can stop flowing and waterbodies become disconnected.
Wetlands Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 2 (Y) = High, 0–1 (Y) = Low	**2 (Y): Moderate**		

Functional Class: Seasonally Flooded-Saturated Graminoid Meadow
NWI Code(s): PEM1E
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
F. TES Support			Assesses the ability of a wetland or water to support Threatened or Endangered Species (TES) per the Endangered Species Act (ESA) and species or subspecies of fish or wildlife in Alaska per the Alaska Department of Fish and Game (ADF&G) as defined by Alaska Statute 16.20.190.
1. Wetland or water contains documented occurrence of a state or federally listed threatened or endangered species.	1. Y	One Spectacled Eider was documented in this functional class within the study area (ALCC 2012).	A documented occurrence confirms use by TES for at least some aspect of life history, even if the community isn't a preferred or designated critical habitat.
2. Wetland or water contains documented critical habitat, designated by the U.S. Fish and Wildlife Service (USFWS) and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries).	2. N		NOAA Fisheries and USFWS, the two federal agencies responsible for administering the ESA, are required to designate critical habitat for listed species. Critical habitat is specific geographic areas containing features essential to the conservation of an endangered or threatened species, including areas not currently occupied but necessary for recovery.
3. Wetland or water is a known preferred habitat for state or federally listed threatened or endangered species.	3. Y	Steller's Eiders are expected to use Seasonally Flooded-Saturated Graminoid Meadow at some point during their life cycle (Appendix D)	If specific work on habitat preference in the study area (e.g. Johnson et al. 2014) is not available, habitat preferences were inferred using the literature based habitat use tables provided in Appendix D of this report.
Rating Criteria: 2–3 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**2 (Y): High**		
G. General Avian and Mammal Habitat Suitability			Assesses whether the wetland or water supports a high diversity of birds and mammals. Characteristics of the wetland or water, landscape setting, and documented species diversity are considered.
1. Wetland or water is undisturbed by human habitation or development.	1. Y		Anthropogenic disturbance tends to reduce the diversity of birds and mammals using an area.
2. Wetland or water is used by a high diversity of mammal species.	2. Y	Over half of assessed mammals (8 out of 9) regularly occurring in the study area are commonly found in the Moist Sedge-Shrub Meadow habitat (Appendix C).	If no systematic wildlife surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
3. Wetland or water is used by a high diversity of avian species.	3. Y	Over half of assessed birds (20 out of 35) regularly occurring in the study area are commonly found in the Moist Sedge-Shrub Meadow habitat (Appendix C).	If no systematic avian surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
4. Interspersion of vegetation and water is at least moderate (surface water patches accounting for 5–10% areal cover, or continuous cover of surface water with a well-developed emergent component).	4. Y		A greater variety of vegetation and cover types is present in communities with high vegetation-water interspersion. Communities with high vegetation water interspersion may support species adapted to open water, edge environments, and well-vegetated components of the community.
5. Wetland or water is considered rare at a regional scale.	5. N	Excluding marine and estuarine waters, PEM1E polygons account for over 12% of NWI mapping (USFWS 2014) in the Northwest Coast watershed (HUC 19060202).	Disproportionately high habitat use, in relation to habitat availability, may indicate habitat preference. Habitat availability must be assessed at a larger, regional scale rather than the project mapping which is limited to construction boundaries
Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Functional Class: Seasonally Flooded-Saturated Graminoid Meadow
NWI Code(s): PEM1E
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
H. General Fish Habitat Suitability			Applicable to all waters, and wetlands with perennial or intermittent surface water connection to a fish bearing water. Sheet flow during spring snowmelt is not considered a sufficiently reliable connection to fish-bearing waters for this function to be applicable.
1. Water has sufficient size and depth of open water so as not to freeze completely during winter (N/A for wetlands).	1. N/A	This wetland type does not have at least an intermittent surface water connection to a fish bearing waterbody, thus this function is not applicable	Assessing whether the wetland or water provides overwintering habitat, which is limited on the ACP.
2. Fish are present.	2. N/A		A documented occurrence confirms use by fish for at least some aspect of life history.
3. Herbaceous and/or woody vegetation is present in wetland and/or buffer to provide cover, shade, and/or detrital matter.	3. N/A		Overhanging vegetation provides refuge from predators, shade to maintain water temperatures, and detrital matter contributions to the food web.
4. Suitable spawning areas are present.	4. N/A		Suitable spawning habitat may include aquatic vegetation, deep lakes, and mixed gravel substrate in streambed.
5. Juvenile rest areas present.	5. N/A		Juvenile rest areas include flooded wetlands, pools with organic debris, and/or overhanging vegetation.
Wetlands Rating Criteria: 2–4 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low Waters Rating Criteria: 2–5 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**0 (Y): N/A**		
I. Educational, Scientific, Recreational, or Subsistence Use			Consumptive (e.g. hunting, fishing, food gathering) and non-consumptive uses, as well as educational and scientific use are assessed.
1. Site has documented scientific or educational use.	1. Y	BEO lands	Scientific use function assesses whether the wetland has been used in scientific studies (peer-reviewed or grey literature), excluding studies necessitated by NEPA or project-permitting. Educational assesses the educational value of the wetland to the community (e.g. contains interpretive signs, is historically used for ecology or species identification classes, is a known long term research site with established permanent sample plots, etc.).
2. Wetland or water is in public ownership.	2. Y		Wetlands or waters in public ownership are more accessible to a variety of people.
3. Accessible trails are available.	3. Y		Visible or established trails demonstrate that the wetland or water is accessible, and may be used for recreational or subsistence purposes.
4. Wetland or water supports subsistence activities (e.g., hunting, fishing, berry picking).	4. Y		Observed or documented consumptive use confirms that a community is used for subsistence purposes.
Rating Criteria: 3–4 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Functional Class: Saturated Salt-killed Meadow
NWI Code(s): PEM1S
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
A. Flood Flow Regulation (Storage)			Function focuses on assessing the degree to which ACP wetlands store runoff or delay downslope movement of surface water. Riverine and estuarine waters below the OHWM do not perform this function (N/A). Wetlands that do not seasonally flood (e.g., pingos, tussock tundra) do not perform this function (N/A). Surface water storage by wetlands in permafrost regions can be significant, while the conventional view that subsurface storage is an effective modulator of stormflow is a misconception in permafrost regions (Woo 2012).
1. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	1. N	Salt killed tundra is a typical palustrine plant community type that has been disturbed by seasonal salt water input. The surface form is typically high center polygons where the vegetation on the high centers is dead. Raised polygon rims are absent as are extensive patches of woody shrubs.	Tussocks, low to tall (>20cm height) woody stems, and polygonal features provide surface roughness, which delays downslope movement of floodwaters by slowing velocity. These are persistent features, present during spring snowmelt-generated flooding.
2. Wetland or water is a depressional HGM class or has depressional features capable of storage.	2. N	Salt killed tundra occurs on raised banks immediately adjacent to nearshore marine water and are interpreted in this study area as Flat HGM.	HGM depressions occur in topographic depressions with closed contours, and flow vectors are from surrounding areas toward the center of the depression, allowing the accumulation of surface water. Ice-rich, raised polygonal rims act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012, Woo 2012).
3. Wetland or water shows signs of storage (i.e. fluctuating water levels, algal mats, and/or lodged debris).	3. N		Visible signs of storage indicate that a wetland is capable of, and has in the past, retained additional water.
4. Floodwaters enter and flow through wetland predominantly as sheet flow rather than channel flow.	4 Y	Floodwaters are assumed to impact all wetland types typically occurring on the coastal plain during snow melt	Floodwater entering as sheet flow, rather than channelized flow, is more likely to interact with surface roughness features.
5. Waterbody is lake (>20 acres) (N/A if assessing wetlands).	5. N/A		Lakes (>20 acres) have substantial storage capacities, and modulate snowmelt-dominated streamflow regimes (Arp et al. 2012, Woo 2012).
Rating Criteria: 4 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**1 (Y): Low**		
B. Sediment, Nutrient (N and P), Toxicant Removal			ACP soils have a relatively shallow active layer of unfrozen soil during the growing season. Cold temperatures and shallow active layer limit the ability of ACP wetlands to perform denitrification, thus this function focuses on the removal of inorganic sediments and adsorbed toxicants and nutrients through settlement. Sediment retention is used as a proxy for toxicant removal as many toxicants adsorb to sediments, and sediment retention is relatively easy to assess.
1. Slow-moving or still water is present.	1. N		Slow or still-moving water allows sediments and adsorbed toxicants to settle out of the water column, as opposed to swift-moving water that suspends sediments/toxicants.
2. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	2. N	Salt killed tundra is a typical palustrine plant community type that has been disturbed by seasonal salt water input. The surface form is typically high center polygons where the vegetation on the high centers is dead. Raised polygon rims are absent as are extensive patches of woody shrubs.	Tussocks and low to tall (>20cm height) woody stems provide surface roughness, which slows water velocity and allows sediments and adsorbed nutrients and toxicants to settle out of the water column. Raised polygonal rims provide surface roughness, which delays downslope movement of floodwaters by slowing velocity, and also act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012). These are persistent features, present during spring snowmelt-generated flooding.
3. At least moderate interspersion of vegetation and water is present. Surface water patches should account for >10% areal coverage (N/A if assessing waters).	3. N		Rooted vegetation takes up nutrients directly from the soil, which may encourage nutrients to move from water to soil to maintain equilibrium.
4. Sediment deposits are present, providing evidence of deposition during natural flood events.	4 N		Visible signs of sedimentation indicate that a wetland is capable of, and has in the past, allowed sediments and presumably adsorbed nutrients and toxicants to settle out of the water column.
5. Thick surface organic horizon and/or abundant fine organic litter is present (N/A if assessing waters).	5. Y	Field data document histic epipedons in this functional class (see BEO 23, Appendix A).	Organic soils are effective at retaining heavy metals, some of which can be bound into long-term complexes with peat, particularly in cool climates.
Wetlands Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 1–2 (Y) = High, 0 (Y) = Low	**1 (Y): Low**		

Functional Class: Saturated Salt-killed Meadow
NWI Code(s): PEM1S
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
C. Erosion Control and Shoreline Stabilization		This wetland type does not directly abut relatively permanent channelized waters, thus this function is not applicable	Function reflects the ability of a wetland to stabilize banks through anchoring soils and dissipating erosive forces. This function is typically only performed by wetlands directly abutting a relatively permanent channelized water. Neither waters nor wetlands that do not abut relatively permanent channelized waters perform this function (N/A). Depending on the mapping and classification, however, some individual wetlands that do not actually directly abut a relatively permanent water (rivers and streams) may be included in this assessment.
1. Wetland has dense, energy absorbing vegetation bordering the watercourse and no evidence of erosion.	1. N/A		Plants bind soils with their root systems, and slow incoming waves or currents through increased surface roughness.
2. Soils are not predominantly sandy or silty, and are not ice rich.	2. N/A		Sandy and silty soils and ice rich permafrost are more susceptible to erosion.
3. Historical aerial photography (if available) indicates stable shoreline features.	3. N/A		Visible evidence of stable shorelines indicates a lack of historical erosion, which may be due any one or a combination of factors including bank erodability, erosive force, or protection afforded by adjacent wetlands.
Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**0 (Y): N/A**		
D. Maintenance of Soil Thermal Regime			Added as a function due to the presence of continuous permafrost in study area.
1. Vegetation cover is continuous	1. N		Biomass or vegetation height are good indicators of areas with stable shallow active layers. Thick vegetation provides shading and insulation both to heat escaping during the summer and cold airtemperatures in winter. Thick vegetation also tends to have deeper snowpacks in winter.
2. Wetland type does not have a permanently flooded hydrologic regime	2. Y		Water bodies typically have a thaw bulb or no permafrost (Brosten et. al. 2006)
3. Wetland type is not within the riverine, lacustrine fringe or estuarine fringe HGM classes	3. Y		Vegetation types that get seasonal flooding from lake and river surface water fluctuations typically are lacking permafrost or active layer is very deep (Brosten et. al 2006)
4. Wetland soil profile is a histosol or histic epipedon	4. Y	Field data document histic epipedons in this functional class (see BEO 23, Appendix A).	Deep organic surface mats provide insulation and are a good predictor of stable shallow growing season active layers
5. Wetland is located in the discontinuous permafrost zone on a north facing aspect	5. N		North facing slopes in the discontinuous permafrost zone are areas where permafrost may persist (Yi et. al. 2009)
6. Wetland occupies a raised on convex landform that does not receive and store significant floodwaters during snowmelt	6. N		Infiltration of floodwaters to the active layer adds significant energy, in areas receiving relatively larger amounts of snowmelt floodwaters the active layer may be greater (Putkonen 1998)
Wetlands Rating Criteria: 5 + (Y) = High, 3 -4 (Y) = Moderate, 0–2 (Y) = Low	**3 (Y): Moderate**		
E. Organic Matter Production and Export			Organic matter production and export assesses primary production and subsequent flushing of organic material to downstream waters. Wetlands that are not flooded at least every 10 years do not perform this function as flooding is the transport mechanism for moving organics to downstream waters. If no flooding occurs, production may be high but no carbon is exported.
1. Wetland has at least 30%, or water has at least 10%, cover herbaceous vegetation. Woody plants are predominantly deciduous.	1. Y	Field data document >30% herbaceous vegetation, and 5% deciduous woody vegetation, in this functional class (see BEO-23, Appendix A).	Herbaceous vegetation is generally more productive than aquatic bed, scrub-shrub, or forested wetland vegetation Adamus et al. (1991). Higher productivity generates more carbon available for export. Deciduous woody species produce higher quality litter than evergreen woody species, which have recalcitrant litter with high concentrations of lignin and phenolic compounds (Wardle 2002).
2. At least 10% of wetland is seasonally flooded (N/A for waters).	2. N		Surface water controls many differences between wetland types, including decomposition (Bayley and Mewhort 2004). Increased surface water promotes increased decomposition, which may facilitate carbon export (Adamus 2013).
3. Surface water outflow occurs outside of spring flooding.	3. N		A longer duration of surface water outflow provides more opportunity for organic matter export. While the vast majority of ACP wetlands flood during spring breakup, fewer have surface water outflow later in the growing season, when small beaded streams can stop flowing and waterbodies become disconnected.
Wetlands Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 2 (Y) = High, 0–1 (Y) = Low	**1 (Y): Low**		

Functional Class: Saturated Salt-killed Meadow
NWI Code(s): PEM1S
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
F. TES Support			Assesses the ability of a wetland or water to support Threatened or Endangered Species (TES) per the Endangered Species Act (ESA) and species or subspecies of fish or wildlife in Alaska per the Alaska Department of Fish and Game (ADF&G) as defined by Alaska Statute 16.20.190.
1. Wetland or water contains documented occurrence of a state or federally listed threatened or endangered species.	1. N	Neither Steller's nor Spectacled Eiders have been documented in this functional class within the study area (ALCC 2012).	A documented occurrence confirms use by TES for at least some aspect of life history, even if the community isn't a preferred or designated critical habitat.
2. Wetland or water contains documented critical habitat, designated by the U.S. Fish and Wildlife Service (USFWS) and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries).	2. N		NOAA Fisheries and USFWS, the two federal agencies responsible for administering the ESA, are required to designate critical habitat for listed species. Critical habitat is specific geographic areas containing features essential to the conservation of an endangered or threatened species, including areas not currently occupied but necessary for recovery.
3. Wetland or water is a known preferred habitat for state or federally listed threatened or endangered species.	3. N		If specific work on habitat preference in the study area (e.g. Johnson et al. 2014) is not available, habitat preferences were inferred using the literature based habitat use tables provided in Appendix D of this report.
Rating Criteria: 2–3 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**0 (Y): Low**		
G. General Avian and Mammal Habitat Suitability			Assesses whether the wetland or water supports a high diversity of birds and mammals. Characteristics of the wetland or water, landscape setting, and documented species diversity are considered.
1. Wetland or water is undisturbed by human habitation or development.	1. Y		Anthropogenic disturbance tends to reduce the diversity of birds and mammals using an area.
2. Wetland or water is used by a high diversity of mammal species.	2. N	No assessed mammals regularly occurring in the study area are commonly found in the Salt-killed Tundra habitat (Appendix C).	If no systematic wildlife surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
3. Wetland or water is used by a high diversity of avian species.	3. N	Fewer than half of assessed birds (7 out of 35) regularly occurring in the study area are commonly found in the Salt-killed Tundra habitat (Appendix C).	If no systematic avian surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
4. Interspersion of vegetation and water is at least moderate (surface water patches accounting for 5–10% areal cover, or continuous cover of surface water with a well developed emergent component).	4. N		A greater variety of vegetation and cover types is present in communities with high vegetation-water interspersion. Communities with high vegetation water interspersion may support species adapted to open water, edge environments, and well-vegetated components of the community.
5. Wetland or water is considered rare at a regional scale.	5. N	No PEM1S polygons are present in the NWI mapping (USFWS 2014) in the Northwest Coast watershed (HUC 19060202). However, the habitat associated with this functional class is not used by a high diversity of bird or mammal species.	Disproportionately high habitat use, in relation to habitat availability, may indicate habitat preference. Habitat availability must be assessed at a larger, regional scale rather than the project mapping which is limited to construction boundaries
Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**1 (Y): Low**		

Functional Class: Saturated Salt-killed Meadow
NWI Code(s): PEM1S
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
H. General Fish Habitat Suitability			Applicable to all waters, and wetlands with perennial or intermittent surface water connection to a fish bearing water. Sheet flow during spring snowmelt is not considered a sufficiently reliable connection to fish-bearing waters for this function to be applicable.
1. Water has sufficient size and depth of open water so as not to freeze completely during winter (N/A for wetlands).	1. N/A		Assessing whether the wetland or water provides overwintering habitat, which is limited on the ACP.
2. Fish are present.	2. N/A		A documented occurrence confirms use by fish for at least some aspect of life history.
3. Herbaceous and/or woody vegetation is present in wetland and/or buffer to provide cover, shade, and/or detrital matter.	3. N/A		Overhanging vegetation provides refuge from predators, shade to maintain water temperatures, and detrital matter contributions to the food web.
4. Suitable spawning areas are present.	4. N/A		Suitable spawning habitat may include aquatic vegetation, deep lakes, and mixed gravel substrate in streambed.
5. Juvenile rest areas present.	5. N/A		Juvenile rest areas include flooded wetlands, pools with organic debris, and/or overhanging vegetation.
Wetlands Rating Criteria: 2–4 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low Waters Rating Criteria: 2–5 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**0 (Y): N/A**		
I. Educational, Scientific, Recreational, or Subsistence Use			Consumptive (e.g. hunting, fishing, food gathering) and non-consumptive uses, as well as educational and scientific use are assessed.
1. Site has documented scientific or educational use.	1. Y	BEO lands	Scientific use function assesses whether the wetland has been used in scientific studies (peer-reviewed or grey literature), excluding studies necessitated by NEPA or project-permitting. Educational assesses the educational value of the wetland to the community (e.g. contains interpretive signs, is historically used for ecology or species identification classes, is a known long term research site with established permanent sample plots, etc.).
2. Wetland or water is in public ownership.	2. Y		Wetlands or waters in public ownership are more accessible to a variety of people.
3. Accessible trails are available.	3. Y		Visible or established trails demonstrate that the wetland or water is accessible, and may be used for recreational or subsistence purposes.
4. Wetland or water supports subsistence activities (e.g., hunting, fishing, berry picking).	4. Y		Observed or documented consumptive use confirms that a community is used for subsistence purposes.
Rating Criteria: 3–4 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Functional Class: Saturated Graminoid Meadow
NWI Code(s): PEM1B
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
A. Flood Flow Regulation (Storage)			Function focuses on assessing the degree to which ACP wetlands store runoff or delay downslope movement of surface water. Riverine and estuarine waters below the OHWM do not perform this function (N/A). Wetlands that do not seasonally flood (e.g., pingos, tussock tundra) do not perform this function (N/A). Surface water storage by wetlands in permafrost regions can be significant, while the conventional view that subsurface storage is an effective modulator of stormflow is a misconception in permafrost regions (Woo 2012).
1. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	1. N	Within the BEO study area Saturated Graminoid Tundra occurred primarily in nonpatterned sloping bank features that border basins, drainage features or coastal banks.	Tussocks, low to tall (>20cm height) woody stems, and polygonal features provide surface roughness, which delays downslope movement of floodwaters by slowing velocity. These are persistent features, present during spring snowmelt-generated flooding.
2. Wetland or water is a depressional HGM class or has depressional features capable of storage.	2. N		HGM depressions occur in topographic depressions with closed contours, and flow vectors are from surrounding areas toward the center of the depression, allowing the accumulation of surface water. Ice-rich, raised polygonal rims act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012, Woo 2012).
3. Wetland or water shows signs of storage (i.e. fluctuating water levels, algal mats, and/or lodged debris).	3. N		Visible signs of storage indicate that a wetland is capable of, and has in the past, retained additional water.
4. Floodwaters enter and flow through wetland predominantly as sheet flow rather than channel flow.	4 Y	Floodwaters are assumed to impact all wetland types typically occurring on the coastal plain during snowmelt.	Floodwater entering as sheet flow, rather than channelized flow, is more likely to interact with surface roughness features.
5. Waterbody is lake (>20 acres) (N/A if assessing wetlands).	5. N/A		Lakes (>20 acres) have substantial storage capacities, and modulate snowmelt-dominated streamflow regimes (Arp et al. 2012, Woo 2012).
Rating Criteria: 4 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**1 (Y): Low**		
B. Sediment, Nutrient (N and P), Toxicant Removal			ACP soils have a relatively shallow active layer of unfrozen soil during the growing season. Cold temperatures and shallow active layer limit the ability of ACP wetlands to perform denitrification, thus this function focuses on the removal of inorganic sediments and adsorbed toxicants and nutrients through settlement. Sediment retention is used as a proxy for toxicant removal as many toxicants adsorb to sediments, and sediment retention is relatively easy to assess.
1. Slow-moving or still water is present.	1. N		Slow or still-moving water allows sediments and adsorbed toxicants to settle out of the water column, as opposed to swift-moving water that suspends sediments/toxicants.
2. Dense tussocks, low to tall woody vegetation present, or raised polygonal rims are present (N/A if assessing waters).	2. N	Within the BEO study area Saturated Graminoid Tundra occurred primarily in nonpatterned sloping bank features that border basins, drainage features or coastal banks.	Tussocks and low to tall (>20cm height) woody stems provide surface roughness, which slows water velocity and allows sediments and adsorbed nutrients and toxicants to settle out of the water column. Raised polygonal rims provide surface roughness, which delays downslope movement of floodwaters by slowing velocity, and also act as micro-depressions for long-term storage over the growing season (Liljedahl et al. 2012). These are persistent features, present during spring snowmelt-generated flooding.
3. At least moderate interspersion of vegetation and water is present. Surface water patches should account for >10% areal coverage (N/A if assessing waters).	3. N		Rooted vegetation takes up nutrients directly from the soil, which may encourage nutrients to move from water to soil to maintain equilibrium.
4. Sediment deposits are present, providing evidence of deposition during natural flood events.	4 N		Visible signs of sedimentation indicate that a wetland is capable of, and has in the past, allowed sediments and presumably adsorbed nutrients and toxicants to settle out of the water column.
5. Thick surface organic horizon and/or abundant fine organic litter is present (N/A if assessing waters).	5. Y	Field data document histosols or histic epipedons for nearly half (5 out of 11) of plots sampled in this functional class (see BEO-03, BEO-13, BEO-19, BEO-20, BEO-22, BEO-28, BEO-32, BEO-36, BEO-39, BEO-40, and BEO-41, Appendix A).	Organic soils are effective at retaining heavy metals, some of which can be bound into long-term complexes with peat, particularly in cool climates.
Wetlands Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 1–2 (Y) = High, 0 (Y) = Low	**1 (Y): Low**		

Functional Class: Saturated Graminoid Meadow
NWI Code(s): PEM1B
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
C. Erosion Control and Shoreline Stabilization		This wetland type does not directly abut relatively permanent channelized waters, thus this function is not applicable	Function reflects the ability of a wetland to stabilize banks through anchoring soils and dissipating erosive forces. This function is typically only performed by wetlands directly abutting a relatively permanent channelized water. Neither waters nor wetlands that do not abut relatively permanent channelized waters perform this function (N/A). Depending on the mapping and classification, however, some individual wetlands that do not actually directly abut a relatively permanent water (rivers and streams) may be included in this assessment.
1. Wetland has dense, energy absorbing vegetation bordering the watercourse and no evidence of erosion.	1. N/A		Plants bind soils with their root systems, and slow incoming waves or currents through increased surface roughness.
2. Soils are not predominantly sandy or silty, and are not ice rich.	2. N/A		Sandy and silty soils and ice rich permafrost are more susceptible to erosion.
3. Historical aerial photography (if available) indicates stable shoreline features.	3. N/A		Visible evidence of stable shorelines indicates a lack of historical erosion, which may be due any one or a combination of factors including bank erodability, erosive force, or protection afforded by adjacent wetlands.
Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**0 (Y): N/A**		
D. Maintenance of Soil Thermal Regime			Added as a function due to the presence of continuous permafrost in study area.
1. Vegetation cover is continuous	1. Y		Biomass or vegetation height are good indicators of areas with stable shallow active layers. Thick vegetation provides shading and insulation both to heat escaping during the summer and cold airtemperatures in winter. Thick vegetation also tends to have deeper snowpacks in winter.
2. Wetland type does not have a permanently flooded hydrologic regime	2. Y		Water bodies typically have a thaw bulb or no permafrost (Brosten et. al. 2006)
3. Wetland type is not within the riverine, lacustrine fringe or estuarine fringe HGM classes	3. Y		Vegetation types that get seasonal flooding from lake and river surface water fluctuations typically are lacking permafrost or active layer is very deep (Brosten et. al 2006)
4. Wetland soil profile is a histosol or histic epipedon	4. Y	Field data document histosols or histic epipedons for nearly half (5 out of 11) of plots sampled in this functional class (see BEO-03, BEO-13, BEO-19, BEO-20, BEO-22, BEO-28, BEO-32, BEO-36, BEO-39, BEO-40, and BEO-41, Appendix A).	Deep organic surface mats provide insulation and are a good predictor of stable shallow growing season active layers
5. Wetland is located in the discontinuous permafrost zone on a north facing aspect	5. N		North facing slopes in the discontinuous permafrost zone are areas where permafrost may persist (Yi et. al. 2009)
6. Wetland occupies a raised on convex landform that does not receive and store significant floodwaters during snowmelt	6. Y		Infiltration of floodwaters to the active layer adds significant energy, in areas receiving relatively larger amounts of snowmelt floodwaters the active layer may be greater (Putkonen 1998)
Wetlands Rating Criteria: 5 + (Y) = High, 3 -4 (Y) = Moderate, 0–2 (Y) = Low	**5 (Y): High**		
E. Organic Matter Production and Export			Organic matter production and export assesses primary production and subsequent flushing of organic material to downstream waters. Wetlands that are not flooded at least every 10 years do not perform this function as flooding is the transport mechanism for moving organics to downstream waters. If no flooding occurs, production may be high but no carbon is exported.
1. Wetland has at least 30%, or water has at least 10%, cover herbaceous vegetation. Woody plants are predominantly deciduous.	1. Y	Field data document over 30% herbaceous cover in this functional class (see BEO-03, BEO-13, BEO-19, BEO-20, BEO-22, BEO-28, BEO-32, BEO-36, BEO-39, BEO-40, and BEO-41, Appendix A).	Herbaceous vegetation is generally more productive than aquatic bed, scrub-shrub, or forested wetland vegetation Adamus et al. (1991). Higher productivity generates more carbon available for export. Deciduous woody species produce higher quality litter than evergreen woody species, which have recalcitrant litter with high concentrations of lignin and phenolic compounds (Wardle 2002).
2. At least 10% of wetland is seasonally flooded (N/A for waters).	2. N		Surface water controls many differences between wetland types, including decomposition (Bayley and Mewhort 2004). Increased surface water promotes increased decomposition, which may facilitate carbon export (Adamus 2013).
3. Surface water outflow occurs outside of spring flooding.	3. N		A longer duration of surface water outflow provides more opportunity for organic matter export. While the vast majority of ACP wetlands flood during spring breakup, fewer have surface water outflow later in the growing season, when small beaded streams can stop flowing and waterbodies become disconnected.
Wetlands Rating Criteria: 3 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low Waters Rating Criteria: 2 (Y) = High, 0–1 (Y) = Low	**1 (Y): Low**		

Functional Class: Saturated Graminoid Meadow
NWI Code(s): PEM1B
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
F. TES Support			Assesses the ability of a wetland or water to support Threatened or Endangered Species (TES) per the Endangered Species Act (ESA) and species or subspecies of fish or wildlife in Alaska per the Alaska Department of Fish and Game (ADF&G) as defined by Alaska Statute 16.20.190.
1. Wetland or water contains documented occurrence of a state or federally listed threatened or endangered species.	1. Y	Steller's Eiders documented in this functional class within the study area (ALCC 2012).	A documented occurrence confirms use by TES for at least some aspect of life history, even if the community isn't a preferred or designated critical habitat.
2. Wetland or water contains documented critical habitat, designated by the U.S. Fish and Wildlife Service (USFWS) and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries).	2. N		NOAA Fisheries and USFWS, the two federal agencies responsible for administering the ESA, are required to designate critical habitat for listed species. Critical habitat is specific geographic areas containing features essential to the conservation of an endangered or threatened species, including areas not currently occupied but necessary for recovery.
3. Wetland or water is a known preferred habitat for state or federally listed threatened or endangered species.	3. Y	Steller's Eiders are expected to use Saturated Graminoid Meadow at some point during their life cycle (Appendix D)	If specific work on habitat preference in the study area (e.g. Johnson et al. 2014) is not available, habitat preferences were inferred using the literature based habitat use tables provided in Appendix D of this report.
Rating Criteria: 2–3 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**2 (Y): High**		
G. General Avian and Mammal Habitat Suitability			Assesses whether the wetland or water supports a high diversity of birds and mammals. Characteristics of the wetland or water, landscape setting, and documented species diversity are considered.
1. Wetland or water is undisturbed by human habitation or development.	1. Y		Anthropogenic disturbance tends to reduce the diversity of birds and mammals using an area.
2. Wetland or water is used by a high diversity of mammal species.	2. Y	Over half of assessed mammals (8 out of 9) regularly occurring in the study area are commonly found in the Moist Sedge-Shrub Meadow habitat (Appendix C).	If no systematic wildlife surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
3. Wetland or water is used by a high diversity of avian species.	3. Y	Over half of assessed birds (20 out of 35) regularly occurring in the study area are commonly found in the Moist Sedge-Shrub Meadow habitat (Appendix C).	If no systematic avian surveys were conducted in the project area or near vicinity, a review of previous wildlife studies will identify which species are likely to regularly occur and what habitats they occupy (see Habitat Evaluation in accompanying report).
4. Interspersion of vegetation and water is at least moderate (surface water patches accounting for 5–10% areal cover, or continuous cover of surface water with a well-developed emergent component).	4. N		A greater variety of vegetation and cover types is present in communities with high vegetation-water interspersion. Communities with high vegetation water interspersion may support species adapted to open water, edge environments, and well-vegetated components of the community.
5. Wetland or water is considered rare at a regional scale.	5. N	Excluding marine and estuarine waters, PEM1B polygons account for less than 1% of NWI mapping (USFWS 2014) in the Northwest Coast watershed (HUC 19060202). Review of NWI mapping, however, indicates that polygonal tundra in this watershed was routinely attributed as a mixed class code: PEM1/SS1B or PEM1/SS1E. PEM1/SS1B, the saturated polygonal tundra analogous to the PEM1B mapped within the study area, comprised over 30% of the NWI mapping.	Disproportionately high habitat use, in relation to habitat availability, may indicate habitat preference. Habitat availability must be assessed at a larger, regional scale rather than the project mapping which is limited to construction boundaries
Rating Criteria: 4–5 (Y) = High, 2–3 (Y) = Moderate, 0–1 (Y) = Low	**3 (Y): Moderate**		

Functional Class: Saturated Graminoid Meadow
NWI Code(s): PEM1B
HGM: Flats

Function and Indicators	Rating	Project Rationale	Arctic Coastal Plain (ACP) Rationale
H. General Fish Habitat Suitability			Applicable to all waters, and wetlands with perennial or intermittent surface water connection to a fish bearing water. Sheet flow during spring snowmelt is not considered a sufficiently reliable connection to fish-bearing waters for this function to be applicable.
1. Water has sufficient size and depth of open water so as not to freeze completely during winter (N/A for wetlands).	1. N/A		Assessing whether the wetland or water provides overwintering habitat, which is limited on the ACP.
2. Fish are present.	2. N/A		A documented occurrence confirms use by fish for at least some aspect of life history.
3. Herbaceous and/or woody vegetation is present in wetland and/or buffer to provide cover, shade, and/or detrital matter.	3. N/A		Overhanging vegetation provides refuge from predators, shade to maintain water temperatures, and detrital matter contributions to the food web.
4. Suitable spawning areas are present.	4. N/A		Suitable spawning habitat may include aquatic vegetation, deep lakes, and mixed gravel substrate in streambed.
5. Juvenile rest areas present.	5. N/A		Juvenile rest areas include flooded wetlands, pools with organic debris, and/or overhanging vegetation.
Wetlands Rating Criteria: 2–4 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low Waters Rating Criteria: 2–5 (Y) = High, 1 (Y) = Moderate, 0 (Y) = Low	**0 (Y): N/A**		
I. Educational, Scientific, Recreational, or Subsistence Use			Consumptive (e.g. hunting, fishing, food gathering) and non-consumptive uses, as well as educational and scientific use are assessed.
1. Site has documented scientific or educational use.	1. Y	BEO lands	Scientific use function assesses whether the wetland has been used in scientific studies (peer-reviewed or grey literature), excluding studies necessitated by NEPA or project-permitting. Educational assesses the educational value of the wetland to the community (e.g. contains interpretive signs, is historically used for ecology or species identification classes, is a known long term research site with established permanent sample plots, etc.).
2. Wetland or water is in public ownership.	2. Y		Wetlands or waters in public ownership are more accessible to a variety of people.
3. Accessible trails are available.	3. Y		Visible or established trails demonstrate that the wetland or water is accessible, and may be used for recreational or subsistence purposes.
4. Wetland or water supports subsistence activities (e.g., hunting, fishing, berry picking).	4. Y		Observed or documented consumptive use confirms that a community is used for subsistence purposes.
Rating Criteria: 3–4 (Y) = High, 2 (Y) = Moderate, 0–1 (Y) = Low	**4 (Y): High**		

Appendix D. Habitat evaluation for birds and mammals likely to occur regularly in BEO study area, Alaska, 2015 (x indicates a wildlife habitat considered important for a species).

		Wildlife Habitat and associated *Wetland Functional Class									
		Brackish Water *Estuarine Waters	Deep Open Water without Islands *Lakes and Ponds	Shallow Open Water without Islands *Lakes and Ponds	Aquatic Graminoid Marsh *Lacustrine Fringe Graminoid Marsh	Deep Polygon Complex *Wet Graminoid Meadow and Shallow Open Water Complex	Halophytic Sedge Wet Meadow *Semipermanently Flooded Tidal Wet Meadow	Nonpatterned Wet Meadow *Semipermanently Flooded Wet Graminoid Meadow	Patterned Wet Meadow *Semipermanently Flooded Wet Graminoid Meadow	Moist Sedge-Shrub Meadow *Saturated Graminoid Meadow and *Seasonally Flooded-Saturated Graminoid Meadow	Salt-killed Tundra *Satureated Salt-killed Meadow
BIRDS											
Greater White-fronted Goose	*Anser albifrons*	x	x	x	x	x	x	x	x	x	x
Brant	*Branta bernicla*	x	x	x					x		
Tundra Swan	*Cygnus columbianus*	x	x	x	x	x			x	x	
Northern Shoveler	*Anas clypeata*		x	x	x	x			x		
Northern Pintail	*Anas acuta*		x	x	x	x			x		
Green-winged Teal	*Anas crecca*		x	x	x	x			x		
Steller's Eider	*Polysticta stelleri*	x	x	x	x	x			x	x	
Spectacled Eider	*Somateria fischeri*	x	x	x	x	x		x	x		
King Eider	*Somateria spectabilis*	x	x	x	x	x			x	x	
Long-tailed Duck	*Clangula hyemalis*	x	x	x	x	x		x	x	x	
Red-throated Loon	*Gavia stellata*	x	x	x	x	x		x	x		

Appendix D. Continued.

		Wildlife Habitat and associated *Wetland Functional Class									
		Brackish Water *Estuarine Waters	Deep Open Water without Islands *Lakes and Ponds	Shallow Open Water without Islands *Lakes and Ponds	Aquatic Graminoid Marsh *Lacustrine Fringe Graminoid Marsh	Deep Polygon Complex *Wet Graminoid Meadow and Shallow Open Water Complex	Halophytic Sedge Wet Meadow *Semipermanently Flooded Tidal Wet Meadow	Nonpatterned Wet Meadow *Semipermanently Flooded Wet Graminoid Meadow	Patterned Wet Meadow *Semipermanently Flooded Wet Graminoid Meadow	Moist Sedge-Shrub Meadow *Saturated Graminoid Meadow and *Seasonally Flooded-Saturated Graminoid Meadow	Salt-killed Tundra *Satureated Salt-killed Meadow
Pacific Loon	*Gavia pacifica*		x	x	x	x					
American Golden-Plover	*Pluvialis dominica*					x	x	x	x	x	x
Semipalmated Plover	*Charadrius semipalmatus*										x
Ruddy Turnstone	*Arenaria interpres*										x
Dunlin	*Calidris alpina*	x		x	x	x	x	x	x	x	x
Baird's Sandpiper	*Calidris bairdii*										x
Pectoral Sandpiper	*Calidris melanotos*				x	x		x	x	x	
Semipalmated Sandpiper	*Calidris pusilla*	x		x		x	x		x	x	
Western Sandpiper	*Calidris mauri*	x		x		x	x		x	x	
Long-billed Dowitcher	*Limnodromus scolopaceus*	x		x	x	x	x	x	x	x	
Wilson's Snipe	*Gallinago delicata*					x		x	x		
Red-necked Phalarope	*Phalaropus lobatus*			x	x	x			x		
Red Phalarope	*Phalaropus fulicarius*			x	x	x			x		

Appendix D. Continued.

		Wildlife Habitat and associated *Wetland Functional Class										
		Brackish Water *Estuarine Waters	Deep Open Water without Islands *Lakes and Ponds	Shallow Open Water without Islands *Lakes and Ponds	Aquatic Graminoid Marsh *Lacustrine Fringe Graminoid Marsh	Deep Polygon Complex *Wet Graminoid Meadow and Shallow Open Water Complex	Halophytic Sedge Wet Meadow *Semipermanently Flooded Tidal Wet Meadow	Nonpatterned Wet Meadow *Semipermanently Flooded Wet Graminoid Meadow	Patterned Wet Meadow *Semipermanently Flooded Wet Graminoid Meadow	Moist Sedge-Shrub Meadow *Saturated Graminoid Meadow and *Seasonally Flooded-Saturated Graminoid Meadow	Salt-killed Tundra *Satureated Salt-killed Meadow
Pomarine Jaeger	*Stercorarius pomarinus*					x		x	x	x	
Parasitic Jaeger	*Stercorarius parasiticus*					x		x	x	x	
Long-tailed Jaeger	*Stercorarius longicaudus*					x				x	
Glaucous Gull	*Larus hyperboreus*	x	x	x		x		x	x	x	
Arctic Tern	*Sterna paradisaea*			x					x		
Snowy Owl	*Bubo scandiacus*							x	x	x	
Short-eared Owl	*Asio flammeus*							x	x	x	
Common Raven	*Corvus corax*					x		x	x	x	
Lapland Longspur	*Calcarius lapponicus*					x		x	x	x	
Snow Bunting	*Plectrophenax nivalis*										x
Savannah Sparrow	*Passerculus sandwichensis*							x	x	x	
MAMMALS											
Collared lemming	*Dicrostonyx groenlandicus*					x					
Brown lemming	*Lemmus trimucronatus*					x		x	x	x	

Appendix D. Continued.

		Wildlife Habitat and associated *Wetland Functional Class									
		Brackish Water *Estuarine Waters	Deep Open Water without Islands *Lakes and Ponds	Shallow Open Water without Islands *Lakes and Ponds	Aquatic Graminoid Marsh *Lacustrine Fringe Graminoid Marsh	Deep Polygon Complex *Wet Graminoid Meadow and Shallow Open Water Complex	Halophytic Sedge Wet Meadow *Semipermanently Flooded Tidal Wet Meadow	Nonpatterned Wet Meadow *Semipermanently Flooded Wet Graminoid Meadow	Patterned Wet Meadow *Semipermanently Flooded Wet Graminoid Meadow	Moist Sedge-Shrub Meadow *Saturated Graminoid Meadow and *Seasonally Flooded-Saturated Graminoid Meadow	Salt-killed Tundra *Satureated Salt-killed Meadow
Root vole (tundra vole)	*Microtus rutilus*					x		x	x	x	
Tundra shrew	*Sorex tundrensis*					x		x	x	x	
Barren ground shrew	*Sorex ugyunak*					x	x		x	x	
Arctic fox	*Vulpes lagopus*					x			x	x	
Brown bear	*Ursus arctos*					x		x	x	x	
Ermine (short-tailed weasel)	*Mustela erminea*					x		x	x	x	
Least weasel	*Mustela nivalis*					x	x	x	x	x	
Caribou	*Rangifer tarandus*					x				x	

[a] Species listed are likely to occur regularly in the study area during some portion of their life history (e.g., breeding/mating, staging, migration, denning/wintering). Numbers present could be high or low depending on natural fluctuations in abundance. Species that could occur sporadically or for which suitable habitat is not present in the study area are not listed. Habitat use for birds and mammals was determined from available literature (Johnson and Herter 1989, MacDonald and Cook 2009, Norton et al. 1993, Pitelka 1974, and Safine 2011, 2012, 2013) and from field observations in the study area during late July 2015.

Appendix B: AKWAM Assessment Forms

Appendix A
Wetland Assessment Data Form

Digital Form – Use only if completing on a computer. Otherwise, use form in AKWAM manual.
Use this form to assess areas that are primarily wetlands (versus waterbodies). For waterbodies, use the Waterbody Categorization Form.

1. Project name: Charles Etok Edwardsen Mitigation Bank

2. Assessment Area #(s): AA1 - Palustrine Flats

3. Evaluation date: Mo. 07 Day 30-31 Yr. 2015

4. Evaluator(s) and affiliation: **SLI, EKJ: ABR**

5. Purpose of evaluation:

☐ Wetland/waterbody potentially affected by a proposed project

☐ Mitigation wetlands; post-construction

☐ Mitigation wetlands; pre-construction

☒ Other Mitigation wetlands; preservation; Current/with project condition

6. Wetland location(s):

Legal: T. 22N R. 17W; S. 4-10,16-18; T. 22N R. 18W; S. 1; Umiat Meridian

Lat. (dec.deg.)**:** 71.2823 **Long.:** -156.5088 **Datum:** NAD83

Nearest community: Utqiaġvik, AK

Watershed: *Elson Lagoon - Frontal Beaufort Sea (12th level HUC 190602020105)*

Ecoregion (from USCOE 2007): _____

7. Identifying numbers ofrelated data: wetland determination forms **BEO-36, BEO-21, BEO -19, BEO-14, BEO-18** photos s**ee ABR Baseline Assessment Appendices A and C** GPS waypoint # _____ other

Map (#) showing AA: Figure 6 (closely follow the User's Manual instructions for identifying the AA)

Briefly describe the features that define the limits of the AA (e.g., tributary, wetland/upland boundary, extreme low tide elevation)**:**

AA1 consists of NWI class palustrine flats (PEM1E, PEM1B, PEM1S), as part of a larger wetland complex. For the purposes of AKWAM, the boundaries of the AA do not end with the edges of the project boundary. It is bordered on the N and E by the Beaufort Sea and a large slough, on the S by the Mayoek River, and on the W by ponds/lakes and depressional wetlands. Where there was no hydrologic barrier, the AA extended up to 1000 ft from the AR-9 boundary.

8. Wetland size (total acres, not just AA): 1000+acres (visually estimated) or ____ acres (measured,e.g., in GIS)

9. Assessment area (AA) size: acres (visually estimated) **approximately 1400** acres (measured)

Note: ***Waterbodies were not considered in this AA even when adjacent to wetlands because there was not direct connection. 1192.87 acres of the AA are within the project site.***

Acreage of the AA MINUS the part that is waterbody that will be separately assessed using the waterbody form: **1400** acres of wetland in AA

10. Classification of Wetland and Waterbody in the Wetlland AA:

Class (Cowardin)	Water Regime (Cowardin)	Modifier (if anv: Cowardin)	% of AA
EM - PEM1E	S/I		49%
EM - PEM1B, PEM1S	T/E		51%

HGM Class (Brinson)	% of AA
F	100%
	%
	%
	%

HGM Classes: Riverine (**R**), Depressional (**D**), Slope (**S**), Flat (**F**), Lacustrine Fringe (**LF)**

Abbreviations: Cowardin Classes: Forested Wetland (**FO**), Scrub-Shrub Wetland (**SS**), Emergent Wetland (**EM**), Moss-lichen Wetland (**ML**), Aquatic Bed (**AB**), Unvegetated (**UN**)

Water (Inundation) Regimes: Permanent/Perennial (**P/P**), Seasonal/Intermittent (**S/I**), Temporary/Ephemeral/Saturated (**T/E**)

Modifiers: Excavated (**X**), Impounded (**I**), Diked (**D**), Partly Drained (**PD**), Farmed (**F**), Artificial (**A**), Beaver-modified (**B**)

11. Estimated relative abundance of similar wetlands within the same 6th level hydrologic unit subregion (see definitions in user's manual)**:**

(check one) ☐Unknown ☐Rare ☒Common ☐Abundant

What information sources did you use for this estimate?

Estimate based on visual observation of palustrine flat wetlands within HUC.

12. **General condition of AA:**

i. Disturbance (see user's manual for descriptions of disturbance levels; check appropriate box):

Conditions adjacent to AA / ***Conditions within AA***	***Predominant conditions adjacent to (within 500 feet of) the AA, plus any area that drains into the AA***		
	Adjacent land is in a natural state	***Adjacent land has experienced minimal or minor disturbance***	***Adjacent land is substantially disturbed***
AA is in a natural state	☒ low disturbance	☐ low disturbance	☐ moderate disturbance
AA has experienced minimal or minor disturbance	☐ moderate disturbance	☐ moderate disturbance	☐ high disturbance
AA is substantially disturbed	☐ high disturbance	☐ high disturbance	☐ high disturbance

Describe the disturbance within the AA (type, age, intensity, source of disturbance, location)**:** ***Very isolated instances of minimal disturbance found, like small equipment or a few ATV tracks, mostly outside of this AA. Considered to be essentially natural***

ii. Consider the 6th level HU containing the AA again. If you estimate that **more than 10% of the land in the 6th level HU is disturbed**, check here ☐, and choose (below) the disturbance level that is one level higher:

☐ low disturbance ☐ moderate disturbance ☐ high disturbance

iii. List any noxious or invasive plant or animal species in the AA or surrounding lands (specify which are in the AA): ***None.***

iv. Briefly describe the AA and surrounding land use and habitat types (dominant species, water source, topography, approximate slope, inlets and outlets, land use, relationship to other AAs, adjacent vegetation types and land uses)**:**

AA1 consists of NWI class palustrine (PEM1E, PEM1B, PEM1S), flats (HGM) graminoid (sedge) meadow tundra, part of a larger wetland complex with depressional wetlands and open water ponds and lakes. PEM1B (Saturated Graminoid Meadow) is the most common functional class, which has high centered polygons with dwarf shrubs and low-lying troughs with standing water. The second most common functional class is PEM1E (Seasonally Flooded-Saturated Graminoid Meadow), which has patterned ground features supporting moist tundra types (high) and wetter obligate sedge communities (depression). Typical graminoid species include Petasites frigidus, Luzula nivalis, Carex aquatilis, and Eriophorum angustifolium. The smallest class (9%) is PEM1S (Saturated Salt-killed Meadow), which occurs in discrete areas on banks of marine waters where storm surge have allowed salt kill of palustrine vegetation on high center polygons. Depressions have intact moist emergent plant communities.

13. **Structural Diversity of AA** (based on number of simplified Cowardin **vegetated** classes present, listed in #10 above):

Existing # of Cowardin vegetated classes in AA	***Rating***
≥3 classes; or 2 classes if 1 is forested	☐ H
2 classes; or 1 class if forested	☒ M
1 class, and humans do not prevent establishment of additional classes	☐ M
1 class, and humans limit establishment of additional classes	☐ L

14A. Habitat for Federally Listed or Candidate Threatened or Endangered Plants or Animals or Other Species of Concern:

i. AA is Documented (D) or Suspected (S) to contain (check one based on definitions contained in instructions):

Primary or critical habitat (**list species**) ☒ D ☐S species: Steller's eider (T),

Secondary habitat (**list species**) ☐ D ☒S species: Polar Bear (T), Spectacled Eider

Incidental habitat (**list species**) ☐ D ☐(T) _____

None or unknown ☐ S species:

ii. Rating (use the conclusions from 14A.i. above and the matrix below to arrive at [check] the functional points and rating):

Highest Habitat Level	*doc/ primary*	*sus/ primary*	*doc/ secondary*	*sus/ secondary*	*doc/ incidental*	*sus/ incidental*	*None*
One or more of the species listed in 14A.i. is a federally Listed or Candidate Threatened or Endangered Species	☒ 1H	☐ .9H	☐ .8M	☐ .7M	☐ .3L	☐ .1L	☐ 0L
Species listed 14A.i. are all "Other Species of Concern" (i.e., not listed under the Endangered Species Act)	☐ .8M	☐ .7M	☐ .6M	☐ .5M	☐ .2L	☐ .1L	☒ 0L

Sources for documented or suspected use (e.g., observations, records, etc):
Two threatened sea duck species, Steller's Eider (Polysticta stelleri) and Spectacled Eider (Somateria fischeri), are present in the area during the breeding season (ABR Report, BEO Master Plan 2013, Barrow Comprehensive Plan 2014). A Stellar's Eider was documented in palustrine flats within the AA (ALCC 2012 from ABR Baseline Assessment, Appendix C). Based on expected habitat use (see ABR report), both eider species are expected to use palustrine flats at some point in their life cycle. The AA is within the 2010 Polar Bear critical habitat zone (although it is under review).

iii. Final Score and Rating: **1.0H** Enter on the summary page on the Habitat for Federally Listed Species row.

14B. General Wildlife Support Rating:

i. Evidence of overall wildlife use in the AA (check substantial, moderate, or low based on supporting evidence):

Substantial (based on any of the following [check]):

- ☐ observations of abundant wildlife #s or high species diversity (during any period) during peak use periods
- ☒ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ presence of extremely limiting habitat features not available in the surrounding area sources
- ☒ interviews with local biologists with knowledge of the AA or its habitat type

Minimal (based on any of the following [check]):

- ☐ few or no wildlife observations
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food
- ☐ interviews with local biologists with knowledge of the AA

Moderate (based on any of the following [check]):

- ☐ observations of scattered wildlife groups or individuals or relatively few species during peak periods
- ☐ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ upland food sources exist in moderate quantity
- ☐ interviews with local biologists with knowledge of the AA or its habitat type

ii. Wildlife habitat features Working from top to bottom, check appropriate AA attributes in the matrix to arrive at the rating.
Structural diversity is from question #13.
For class cover to be considered evenly distributed, the most and least prevalent **vegetated** classes must be within 20% of each other in terms of their percent age of the AA (see #10).
Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent. See instructions for further definitions of these terms.

Structural diversity (from #13)	***High***								***Moderate***								***Low***			
Class cover distribution (all vegetated classes)	***Even***				***Uneven***				***Even***				***Uneven***				***Even***			
Longest duration of surface water in ≥ 10% of AA, or immediately abutting the AA	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***
***Low** disturbance at AA (see #12i & 12ii)*	☐ E	☐ E	☐ E	☐ H	☐ E	☐ E	☐ H	☐ H	☐ E	☒ H	☐ H	☐ M	☐ E	☐H	☐ M	☐ M	☐ E	☐ H	☐ M	☐ M
***Moderate** disturbance at AA (see #12i & 12ii)*	☐ H	☐ H	☐ H	☐ H	☐ H	☐ H	☐ H	☐ M	☐ H	☐ H	☐ M	☐ M	☐ H	☐ M	☐ M	☐ L	☐ H	☐ M	☐ L	☐ L
***High** disturbance at AA (see #12i & 12ii)*	☐ M	☐ M	☐ M	☐ L	☐ M	☐ M	☐ L	☐ L	☐ M	☐ M	☐ L	☐ L	☐ M	☐ L	☐ L	☐ L	☐ L	☐ L	☐ L	☐ L

iii. Rating (use the conclusions from i. and ii. above and the matrix below to arrive at [check] the functional points and rating)

	Wildlife habitat features rating (ii)			
Evidence of wildlife use (i)	***Exceptional***	***High***	***Moderate***	***Low***
Substantial	☐ 1E	☒ .9H	☐ .8H	☐ .7M
Moderate	☐ .9H	☐ .7M	☐ .5M	☐ .3L
Minimal	☐ .6M	☐ .4M	☐ .2L	☐ .1L

iv. Final Score and Rating: **0.9H** Enter on the summary page on the General Wildlife Support row.
Comments:

The AA evaluation included evidence of use by loons, goose, swan, grazers, fox, and other species. In addition, the ABR Baseline Assessment included a review of wildlife use by wetland functional class for the region including the AA.

14C. **General Fish Support Rating:** (Assess this function if any part of the AA (including the waterbody part of a wetland AA) is used by fish or the existing situation is "correctable" such that the AA could be used by fish. If the AA is not used by fish, fish use is not restorable, or is not desired from a management perspective, then check ☒ **NA** here and proceed to 14D.)

i. Habitat Quality and Known / Suspected Fish Species in AA (use matrix to arrive at [check] the functional points and rating)

Duration of surface water in AA	***Permanent / Perennial***			***Seasonal / Intermittent***			***Temporary / Ephemeral***		
Aquatic hiding / resting / escape cover in waterbody (Table 3 in manual)	*Optimal*	*Adequate*	*Poor*	*Optimal*	*Adequate*	*Poor*	*Optimal*	*Adequate*	*Poor*
Anadromous salmon species	☐ 1E	☐.8H	☐.6M	☐.9H	☐.7M	☐.5M	☐.7M	☐.5M	☐.3L
Resident and non-salmon sport and subsistence species	☐.9H	☐.7M	☐.5M	☐.8H	☐.6M	☐.4M	☐.6M	☐.4M	☐.2L
Other resident species	☐.8H	☐.6M	☐.4M	☐.7M	☐.5M	☐.3L	☐.5M	☐.3L	☐.1L

ii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1)

*a) Is fish use of the AA precluded or substantially reduced by a culvert, dike, or other man-made structure or activity **or** is the waterbody included on the current Alaska Department of Environmental Conservation list of Category 5 / Section 303(d) Impaired Waterbodies (unless its impaired uses are named and aquatic life is not listed as impaired)?*

☐**Y** ☐**N** *If yes, reduce the score in 14C.i. by 0.1:* _____ *(If no, do not change the score.)*

b) Do noxious or invasive plant species or invasive fish species (see Appendices F and G) occur in the AA?

☐**Y** ☐**N** *If yes, reduce the score in 14C.i. by 0.1:* _____ *(If no, do not change the score.)*

iii. Final Score and Rating: **N/A** Enter on the summary page on the General Fish Support row.

Comments:

14D. **Water Storage:** (Applies to wetlands that flood or pond from overbank flooding, precipitation, or overland flow from uplands. If no wetlands in the AA are subject to inundation or ponding, check ☐ **NA** here and proceed to 14E.)

i. Rating

Estimate the variation in the water volume stored in the **wetland** portion of the AA **that experiences surface ponding or flooding** during the typical year, between break-up and freeze-up. First, identify the part of the AA that is both wetland and has surface water sometime between breakup and freezeup (the "flooded wetland"). Estimate its area in acres: ***1192.87*** acres = A.
Second, estimate the range in that flooded wetland's water surface elevation between its lowest and highest elevation during the unfrozen period, in feet. Call this D for depth: **0.5 feet** = D. For example, if the water table is typically one foot below the ground surface during the driest part of summer, and is typically 6 inches above the surface following breakup, the range is 18 inches, or 1.5 feet. Consider evidence such as water marks, staining on vegetation or rocks, drift lines, and the depth to the water table in your soil pit. Consider also the elevation of the wetland surface relative to the elevation of the water surface in an adjacent stream (i.e., does the channel overflow its banks into the wetland?). During a flood, the depth of water over a stream channel is likely to be double its depth when the stream is full to its banks. Consider the area the stream would flood when the water is that deep. Multiply the range in the flooded wetland's water surface elevation (D) times the area (A) to estimate the maximum storage volume

in acre-feet. D **0.5** feet X A **1400** acres = **700** acre-feet. Use this storage volume estimate in the matrix below.

Next, determine the portion of the flooded wetland that is forested, shrub-dominated, or is neither of those but is dominated by hummocks or tussocks at least one foot in height:

% of AA that experiences water surface fluctuation that is forested or scrub/shrub **5** %
plus the additional % of the flooded wetland that is hummocky **15** %
= **20** % of flooded wetland with water-slowing roughness. Use this percentage in the second row of the matrix below.

Working from top to bottom, use the matrix below to arrive at [check] the functional points and rating.

Estimated maximum acre-feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding	***>5 acre-feet***			***1 to 5 acre-feet***			***<1 acre-foot***		
% of flooded wetland classified as forested or scrub/shrub or dominated by hummocks > 1 foot tall	*>75%*	*25-75%*	*<25%*	*>75%*	*25-75%*	*<25%*	*>75%*	*25-75%*	*<25%*
AA contains ***no outlet or restricted outlet***	☐ 1H	☐ .9H	☒ .6M	☐ .8H	☐ .7M	☐ .5M	☐ .4M	☐ .3L	☐ .2L
AA contains ***unrestricted outlet***	☐ .9H	☐ .8H	☐ .5M	☐ .7M	☐ .6M	☐ .4M	☐ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: **0.6M** Enter on the summary page on the Water Storage row.

Comments:

Wetlands within AA are subject to seasonal or irregular inundation and likely store water during those periods. There were no channelized outlets observed, but sheet flow to and from surrounding wetlands is likely.

iii. Potential Property Protection

Are ≥10 acres of wetland in the AA subject to flooding AND are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA (check)? ☐Y☒ N (This information will be used later.)

Comments:

14E. **Sediment/Nutrient/Toxicant Retention and Removal:** (Applies to wetlands with potential to receive sediments, nutrients, or toxicants through influx of surface or ground water or direct input. If no wetlands in the AA are, or with the planned project will be, subject to such input, check ☐ **NA** here and proceed to 14F.)

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating [H = high, M = moderate, or L = low])

Sediment, nutrient, and toxicant input levels within AA	*AA receives or surrounding land use (including proposed future land use) has potential to deliver levels of sediments, nutrients, or toxicants at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication are present, or sources are suspected.*				*Waterbody is on Alaska's Section 303(d) List of Impaired Waterbodies or AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or toxicants such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, unnatural turbidity, or signs of eutrophication are present.*			
% cover of vegetation in AA	≥ 70%		< 70%		≥ 70%		< 70%	
Evidence of flooding / ponding in AA	Yes	No	Yes	No	Yes	No	Yes	No
AA contains ***no or restricted outlet***	☒ 1H	☐ .8H	☐ .7M	☐ .5M	☐ .5M	☐ .4M	☐ .3L	☐ .2L
AA contains ***unrestricted outlet***	☐ .9H	☐ .7M	☐ .6M	☐ .4M	☐ .4M	☐ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: **1.0H** Enter on the summary page on the Sediment/Nutrient/Toxicant Retention row.

Comments:

AA likely receives sediments, nutrients, and/or toxicants from adjacent areas. ABR Baseline Report contains details on vegetation and ponding observed. Vegetation percentage includes bryophytes.

14F. Sediment/Shoreline Stabilization: (Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action. If 14F does not apply, check ☒ **NA** here and proceed to 14G.)

For the <u>wetland</u> area subjected to erosive forces, % cover of species with deep, soil-binding root masses	***Duration of surface water adjacent to rooted vegetation in the AA***		
	Permanent / Perennial	***Seasonal / Intermittent***	***Temporary / Ephemeral***
≥ 65%	☐ 1H	☐ .9H	☐ .7M
35-64%	☐ .7M	☐ .6M	☐ .5M
< 35%	☐ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: **N/A** Enter on the summary page on the Sediment/Shoreline Stabilization row.

Comments:

14G. Production Export/Terrestrial and Aquatic Food Chain Support:

i. Level of Biological Activity (synthesis of wildlife and fish habitat ratings from 14B and 14C [check appropriate box in matrix])

General Fish Habitat Rating (14C.iii.)	*General Wildlife Habitat Rating (14B.iii.)*		
	E/H	***M***	***L***
E/H	☒ H	☐ H	☐ M
M	☐ H	☐ M	☐ M
L	☐ M	☐ M	☐ L
NA	☐ M	☐ M	☐ L

ii. Rating Working from top to bottom, use the matrix below to arrive at the functional points and rating.
Factor A = acreage of vegetated wetland component in the AA; Factor B = level of biological activity rating from above (14G.i.); Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to duration of surface water in the AA, where P/P, S/I, and T/E are as defined under #10 above, and A = "absent")

A	***Vegetated component >5 acres***						***Vegetated component 1-5 acres***						***Vegetated component <1 acre***					
B	***High***		***Moderate***		***Low***		***High***		***Moderate***		***Low***		***High***		***Moderate***		***Low***	
C	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***
P/P	☐ 1H	☐ .7M	☐ .8H	☐ .5M	☐ .6M	☐ .4M	☐ .9H	☐ .6M	☐ .7M	☐ .4M	☐ .5M	☐ .3L	☐ .8H	☐ .6M	☐ .6M	☐ .4M	☐ .3L	☐ .2L
S/I	☐ .9H	☒ .6M	☐ .7M	☐ .4M	☐ .5M	☐ .3L	☐ .8H	☐ .5M	☐ .6M	☐ .3L	☐ .4M	☐ .2L	☐ .7M	☐ .5M	☐ .5M	☐ .3L	☐ .3L	☐ .2L
T/E or A	☐ .8H	☐ .5M	☐ .6M	☐ .3L	☐ .4M	☐ .2L	☐ .7M	☐ .4M	☐ .5M	☐ .2L	☐ .3L	☐ .1L	☐ .6M	☐ .4M	☐ .4M	☐ .2L	☐ .2L	☐ .1L

iii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1.)

A **Vegetated Upland Buffer** is an area with ≥ 30% plant cover, ≤ 2% noxious or invasive plant cover, and that is not subjected to periodic mowing or clearing (unless for weed control).

a) Is there an average ≥50-foot-wide vegetated upland buffer around ≥75% of the AA circumference?

☒**Y** ☐**N** *If yes, add 0.1 to the score in **14G.ii.** above and adjust the rating accordingly:*

iv. Final Score and Rating: **0.7M** Enter on the summary page on the Production Export row.

Comments: ***Fish rating was N/A, assumed 14Gi was H based on 14Biii. There are no uplands present around the AA, so 14Giii was answered based on the vegetated wetland buffer of depressional wetlands around the majority of the AA.***

14H. **Groundwater Discharge/Recharge:** (Check the appropriate indicators in i. and ii. below.)

i. Discharge Indicators

- ☐ The AA is a slope wetland (HGM type)
- ☐ Springs or seeps are known or observed
- ☐ Vegetation growing during dormant season
- ☐ Wetland occurs at the toe of a natural slope
- ☐ AA permanently flooded during dry periods
- ☐ Wetland contains an outlet, but no inlet
- ☐ Other: _____

ii. Recharge Indicators ☐ **(NA for fringe wetlands)**

- ☐ Permeable substrate present without underlying impeding layer
- ☐ Wetland contains inlet but no outlet
- ☐ Stream is a known 'losing' stream; discharge decreases downstream
- ☐ Other: _____

iii. Rating (use the information from i. and ii. above and the table below to arrive at [check] the functional points and rating)

Criteria	***Duration of saturation at AA wetlands FROM GROUNDWATER DISCHARGE OR WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM***			
	P/P	***S/I***	***T/E***	***None***
Groundwater discharge or recharge indicators exist	☐ 1H	☐ .7M	☐ .4M	☐ .1L
Permafrost underlies the wetland or insufficient information exists	☒ NA			

iv. Final Score and Rating: **N/A** Enter on the summary page on the Groundwater Discharge/Recharge row.

Comments:

There is permafrost present.

14l. Uniqueness:

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating)

Replacement potential	*AA contains irreplaceable wetland types [fens, bogs, springs, seeps, or mature forested wetland type] OR a plant association listed as S1, S2, G1, or G2 by the AKNHP (Appendix J)*			*AA does not contain irreplaceable wetland types and structural diversity (#13) is high OR contains plant association listed as S3, G3, S?, or G? by the AKNHP (Appendix J)*			*AA does not contain irreplaceable wetland types and structural diversity (#13) is low to moderate (Appendix J)*		
Estimated relative abundance of wetland types (from 11)	***rare***	***common***	***abundant***	***rare***	***common***	***abundant***	***rare***	***common***	***abundant***
Low disturbance at AA (from 12i and ii)	☐ 1H	☐ .6M	☐ .5M	☐ .8H	☐ .5M	☐ .4M	☐ .7M	☒ .4M	☐ .3L
Moderate disturbance at AA (from 12i and ii)	☐.9H	☐ .5M	☐ .4M	☐ .7M	☐ .4M	☐ .3L	☐ .6M	☐ .3L	☐ .2L
High disturbance at AA (from12i and ii)	☐ .7M	☐ .3L	☐ .2L	☐ .5M	☐ .2L	☐ .1L	☐ .4M	☐ .1L	☐ .1L

ii. Final Score and Rating: **0.4M** Enter on the summary page on the Uniqueness row.

Comments:

14J. Recreation/Education Potential: (affords "bonus" points if AA provides recreation or education opportunity)
i. Is the AA a known or potential recreation or education site: (check) ☒**Y** ☐ **N** (if 'Yes' continue with the evaluation; if 'No' then check ☐ **NA** here and proceed to the overall summary and rating page)

ii. Check categories that apply to the AA:

☒Educational/scientific study ☐ Consumptive recreation ☐ Non-consumptive recreation ☒Other Subsistence Use

iii. Rating (use the matrix below to arrive at [check] the functional points and rating)

Known or Potential Recreation or Education Area	*Known*	*Potential*
Public ownership or public easement with general public access (no permission required)	☐ .2H	☐ .15H
Private ownership with general public access (no permission required)	☒ .15H	☐ .1M
Private or public ownership without general public access, or requiring permission for public access	☐ .1M	☐ .05L

iv. Final Score and Rating: **0.15H** Enter on the summary page on the Recreation/Education Potential row.
Comments:

Property is currently under private ownership but does not appear to prohibit subsistence use by the public. ATV trails occur occasionally near the AA. Scientific use requires a permit.

General Site Notes:

FUNCTION AND SERVICE SUMMARY AND OVERALL RATING FOR WETLAND AA #(s):

AA1 - Estuarine Wetlands

Functions and Services	Rating (E, H, M, L)	Actual Functional Points (0 to 1.0)	Possible Functional Points	Optional: Functional Units Affected (Actual Points x AA Acreage Affected)	Indicate the four most prominent functions with a check
A. Habitat for Federally Listed/Candidate T&E Species or Other Species of Concern	H	1.0	1.0		☒
B. General Wildlife Support	H	0.9	1.0		☒
C. General Fish Support	N/A	N/A	1.0		☐
D. Water Storage	M	0.6	1.0		☐
E. Sediment/Nutrient/Toxicant Removal	H	1.0	1.0		☒
F. Sediment/Shoreline Stabilization	N/A	N/A	1.0		☐
G. Production Export/Food Chain Support	M	0.7	1.0		☒
H. Groundwater Discharge/Recharge	N/A	N/A	N/A		☐
I. Uniqueness	M	0.4	1.0		☐
J. Recreation/Education Potential (bonus points)	H	0.15			☐
Totals:		4.75	6.0		
Percent of Possible Score (actual points divided by possible points)		79%			

Category 1 Wetland: Must satisfy **one** of the following criteria; otherwise go to Category 2

☒ Score of 0.9 to 1 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
☐ Score of 0.9 or 1 functional point for Uniqueness; **or**
☐ Score of 0.9 or 1 functional point for Water Storage **and** answer to Question 14Dii is "yes"; **or**
☐ Score of 0.9 or 1 functional point for General Fish Support; **or**
☒ Percent of possible score ≥ 70% (round to nearest whole number); or
☐ Percent of possible score ≥ 50% **and** 6th level hydrologic unit has already experienced ≥15% land development.

Category 2 Wetland: Criteria for Category 1 not satisfied **and** meets any **one** of the following criteria; otherwise go to Category 4

☐ Score of 0.8 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
☐ Score of 0.9 or 1 functional point for General Wildlife Support; **or**
☐ Score of 0.6 to 0.8 functional point for General Fish Support; **or**
☐ Score of 0.8 functional point for Uniqueness; **or**
☐ Score 0.7 or 0.8 functional point for Water Storage **and** answer to Question 14Dii is "yes"; **or**
☐ Percent of possible score ≥ 50% (round to nearest whole number).

Category 3 Wetland: Criteria for Categories 1, 2, and 4 are not satisfied

☐ Does not qualify as Category 1, 2, or 4

Category 4 Wetland: Criteria for Categories 1 and 2 not satisfied **and** all of the following criteria are met; if not, go to Category 3

☐ Vegetated wetland component of AA < 1 acre (do not include upland vegetated buffer); **and**
☐ Score of 0.5 or lower for Uniqueness; **and**
☐ General Wildlife Support is 0.4 or lower; **and**
☐ General Fish Support score is 0.3 or lower; **and**
☐ If answer to 14Dii is "no", score for Water Storage is 0.2, 0.1, or NA; **and**
☐ Is not rated "High" for any function or service; **and**
☐ Percent of possible score < 35% (round to nearest whole number).

OVERALL ASSESSMENT AREA RATING: (check appropriate category based on the criteria outlined above)

Category: ☒1 ☐2 ☐3 ☐4

Appendix A
Wetland Assessment Data Form

Digital Form – Use only if completing on a computer. Otherwise, use form in AKWAM manual.
Use this form to assess areas that are primarily wetlands (versus waterbodies). For waterbodies, use the Waterbody Categorization Form.

1. Project name: Charles Etok Edwardsen Mitigation Bank

2. Assessment Area #(s): **AA2 - Palustrine Depressional**

3. Evaluation date: Mo. 07 Day 30-31 Yr. 2015

4. Evaluator(s) and affiliation: **SLI, EKJ: ABR**

5. Purpose of evaluation:

☐ Wetland/waterbody potentially affected by a proposed project

☐ Mitigation wetlands; post-construction

☐ Mitigation wetlands; pre-construction

☒ Other Mitigation wetlands; preservation; Current/with project condition

6. Wetland location(s):

Legal: T. 22N R. 17W; S. 4-10,16-18; T. 22N R. 18W; S. 1; Umiat Meridian

Lat. (dec. deg.)**:** 71.2823 Long.: -156.5088 **Datum:** NAD 83 **Nearest community:** Utqiaġvik, AK

Watershed: *Elson Lagoon - Frontal Beaufort Sea (12th level HUC 190602020105)*

Ecoregion (from USCOE 2007): _____

7. Identifying numbers of related data: wetland determination forms **BEO-24, BEO-25, BEO-26, BEO-27, BEO-29** photos s**ee ABR Baseline Assessment Appendices A and C** GPS waypoint # _____ other

Map (#) showing AA: Figure 6 (closely follow the User's Manual instructions for identifying the AA)

Briefly describe the ~~features~~ that define the limits of the AA (e.g., tributary, wetland/upland boundary, extreme low tide elevation)**:**

AA2 consists of NWI class palustrine depressional wetlands (PEM1F), as part of a larger wetland complex. For the purposes of AKWAM, the boundaries of the AA are considered to be almost all within the edges of the project boundary because the southern boundary it is bordered by other wetland or open water body types.

8. Wetland size (total acres, not just AA): 1000+acres (visually estimated) or ____ acres (measured, e.g., in GIS)

9. Assessment area (AA) size: acres (visually estimated) or approximately **400** acres (measured)

Note: Waterbodies were not considered in this AA even when adjacent to wetlands because there was not direct connection. 328.63 acres of this AA are within the project site.

Acreage of the AA MINUS the part that is waterbody that will be separately assessed using the waterbody form: **400** acres of wetland in AA

10. Classification of Wetland and Waterbody in the Wetlland AA:

Class (Cowardin)	Water Regime (Cowardin)	Modifier (if any; Cowardin)	% of AA
EM - PEM1F	S/I		100%

HGM Class (Brinson)	% of AA
D	100%
	%
	%
	%

HGM Classes: Riverine (**R**), Depressional (**D**), Slope (**S**), Flat (**F**), Lacustrine Fringe (**LF**)

Abbreviations:

Cowardin Classes: Forested Wetland (**FO**), Scrub-Shrub Wetland (**SS**), Emergent Wetland (**EM**), Moss-lichen Wetland (**ML**), Aquatic Bed (**AB**), Unvegetated (**UN**)

Water (Inundation) Regimes: Permanent/Perennial (**P/P**), Seasonal/Intermittent (**S/I**), Temporary/Ephemeral/Saturated (**T/E**)

Modifiers: Excavated (**X**), Impounded (**I**), Diked (**D**), Partly Drained (**PD**), Farmed (**F**), Artificial (**A**), Beaver-modified (**B**)

11. Estimated relative abundance of similar wetlands within the same 6th level hydrologic unit subregion (see definitions in user's manual)**:**

(check one) ☐Unknown ☐Rare ☒Common ☐Abundant

What information sources did you use for this estimate?

Estimate based on visual observation of palustrine depressional wetlands within HUC.

12. **General condition of AA:**

i. Disturbance (see user's manual for descriptions of disturbance levels; check appropriate box):

Conditions adjacent to AA / ***Conditions within AA***	***Predominant conditions adjacent to (within 500 feet of) the AA, plus any area that drains into the AA***		
	Adjacent land is in a natural state	***Adjacent land has experienced minimal or minor disturbance***	***Adjacent land is substantially disturbed***
AA is in a natural state	☒ low disturbance	☐ low disturbance	☐ moderate disturbance
AA has experienced minimal or minor disturbance	☐ moderate disturbance	☐ moderate disturbance	☐ high disturbance
AA is substantially disturbed	☐ high disturbance	☐ high disturbance	☐ high disturbance

Describe the disturbance within the AA (type, age, intensity, source of disturbance, location)**:** ***Very isolated instances of minimal disturbance found, like small equipment or a few ATV tracks, mostly outside of this AA. Considered to be essentially natural.***

ii. Consider the 6th level HU containing the AA again. If you estimate that **more than 10% of the land in the 6th level HU is disturbed**, check

here ☐, and choose (below) the disturbance level that is one level higher:

☐ low disturbance ☐ moderate disturbance ☐ high disturbance

iii. List any noxious or invasive plant or animal species in the AA or surrounding lands (specify which are in the AA): ***None.***

iv. Briefly describe the AA and surrounding land use and habitat types (dominant species, water source, topography, approximate slope, inlets and outlets, land use, relationship to other AAs, adjacent vegetation types and land uses)**:**

AA1 consists of NWI class palustrine (PEM1F), depressional (HGM) semipermanently flooded graminoid (sedge) meadow tundra with small pools of open water, part of a larger wetland complex with flat wetlands and larger open water ponds and lakes. Semipermanently Flooded Wet Graminoid Meadow is the most common functional class, which has low centered polygons supporting obligate wet sedge with some small open bodies of standing water. The second most common functional class is Wet Graminoid Meadow and Shallow Open Water Complex, which is similar in structure but with more pronounced shallow open water ponds. Both occur within low-lying areas around lakes/ponds or in a drained lake basin to the east of East Twin Lake. Typical graminoid species include Carex aquatilis and Eriophorum angustifolium.

13. **Structural Diversity of AA** (based on number of simplified Cowardin **vegetated** classes present, listed in #10 above):

Existing # of Cowardin vegetated classes in AA	***Rating***
≥3 classes; or 2 classes if 1 is forested	☐ H
2 classes; or 1 class if forested	☐ M
1 class, and humans do not prevent establishment of additional classes	☒ M
1 class, and humans limit establishment of additional classes	☐ L

14A. Habitat for Federally Listed or Candidate Threatened or Endangered Plants or Animals or Other Species of Concern:

i. AA is Documented (D) or Suspected (S) to contain (check one based on definitions contained in instructions):

Primary or critical habitat (**list species**) ☒ D ☐S species: Steller's eider (T),

Secondary habitat (**list species**) ☐ D ☒S species: Polar Bear (T), Spectacled Eider

Incidental habitat (**list species**) ☐ D ☐(T) _____

None or unknown ☐ S species:

ii. Rating (use the conclusions from 14A.i. above and the matrix below to arrive at [check] the functional points and rating):

Highest Habitat Level	*doc/ primary*	*sus/ primary*	*doc/ secondary*	*sus/ secondary*	*doc/ incidental*	*sus/ incidental*	*None*
One or more of the species listed in 14A.i. is a federally Listed or Candidate Threatened or Endangered Species	☒ 1H	☐ .9H	☐ .8M	☐ .7M	☐ .3L	☐ .1L	☐ 0L
Species listed 14A.i. are all "Other Species of Concern" (i.e., not listed under the Endangered Species Act)	☐ .8M	☐ .7M	☐ .6M	☐ .5M	☐ .2L	☐ .1L	☒ 0L

Sources for documented or suspected use (e.g., observations, records, etc):
Two threatened sea duck species, Steller's Eider (Polysticta stelleri) and Spectacled Eider (Somateria fischeri), are present in the area during the breeding season (ABR Report, BEO Master Plan 2013, Barrow Comprehensive Plan 2014). A Stellar's Eider was documented in palustrine depressional wetlands within the AA (ALCC 2012 from ABR Baseline Assessment, Appendix C). Based on expected habitat use (see ABR report), both eider species are expected to use palustrine depressional wetlands at some point in their life cycle. The AA is within the 2010 Polar Bear critical habitat zone (although it is under review).

iii. Final Score and Rating: **1.0H** Enter on the summary page on the Habitat for Federally Listed Species row.

14B. General Wildlife Support Rating:

i. Evidence of overall wildlife use in the AA(check substantial, moderate, or low based on supporting evidence):

Substantial (based on any of the following [check]):

- ☐ observations of abundant wildlife #s or high species diversity (during any period) during peak use periods
- ☒ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ presence of extremely limiting habitat features not available in the surrounding area sources
- ☒ interviews with local biologists with knowledge of the AA or its habitat type

Minimal (based on any of the following [check]):

- ☐ few or no wildlife observations
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food
- ☐ interviews with local biologists with knowledge of the AA

Moderate (based on any of the following [check]):

- ☐ observations of scattered wildlife groups or individuals or relatively few species during peak periods
- ☐ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ upland food sources exist in moderate quantity
- ☐ interviews with local biologists with knowledge of the AA or its habitat type

ii. Wildlife habitat features Working from top to bottom, check appropriate AA attributes in the matrix to arrive at the rating.
Structural diversity is from question #13.
For class cover to be considered evenly distributed, the most and least prevalent **vegetated** classes must be within 20% of each other in terms of their percent age of the AA (see #10).
Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent. See instructions for further definitions of these terms.

Structural diversity (from #13)	***High***								***Moderate***								***Low***			
Class cover distribution (all vegetated classes)	***Even***				***Uneven***				***Even***				***Uneven***				***Even***			
Longest duration of surface water in ≥ 10% of AA, or immediately abutting the AA	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***
***Low** disturbance at AA (see #12i & 12ii)*	☐ E	☐ E	☐ E	☐ H	☐ E	☐ E	☐ H	☐ H	☐ E	☐ H	☐ H	☐ M	☐ E	☒H	☐ M	☐ M	☐ E	☐ H	☐ M	☐ M
***Moderate** disturbance at AA (see #12i & 12ii)*	☐ H	☐ H	☐ H	☐ H	☐ H	☐ H	☐ H	☐ M	☐ H	☐ H	☐ M	☐ M	☐ H	☐ M	☐ M	☐ L	☐ H	☐ M	☐ L	☐ L
***High** disturbance at AA (see #12i & 12ii)*	☐ M	☐ M	☐ M	☐ L	☐ M	☐ M	☐ L	☐ L	☐ M	☐ M	☐ L	☐ L	☐ M	☐ L	☐ L	☐ L	☐ L	☐ L	☐ L	☐ L

iii. Rating (use the conclusions from i. and ii. above and the matrix below to arrive at [check] the functional points and rating)

	Wildlife habitat features rating (ii)			
Evidence of wildlife use (i)	***Exceptional***	***High***	***Moderate***	***Low***
Substantial	☐ 1E	☒ .9H	☐ .8H	☐ .7M
Moderate	☐ .9H	☐ .7M	☐ .5M	☐ .3L
Minimal	☐ .6M	☐ .4M	☐ .2L	☐ .1L

iv. Final Score and Rating: **0.9H** Enter on the summary page on the General Wildlife Support row.

Comments:

The AA evaluation included evidence of use by loons, goose, swan, grazers, fox, and other species. In addition, the ABR Baseline Assessment included a review of wildlife use by wetland functional class for the region including the AA.

14C. **General Fish Support Rating:** (Assess this function if any part of the AA (including the waterbody part of a wetland AA) is used by fish or the existing situation is "correctable" such that the AA could be used by fish. If the AA is not used by fish, fish use is not restorable, or is not desired from a management perspective, then check ☐**NA** here and proceed to 14D.)

i. Habitat Quality and Known / Suspected Fish Species in AA (use matrix to arrive at [check] the functional points and rating)

Duration of surface water in AA	***Permanent / Perennial***			***Seasonal / Intermittent***			***Temporary / Ephemeral***		
Aquatic hiding / resting / escape cover in waterbody (Table 3 in manual)	*Optimal*	*Adequate*	*Poor*	*Optimal*	*Adequate*	*Poor*	*Optimal*	*Adequate*	*Poor*
Anadromous salmon species	☐ 1E	☐.8H	☐.6M	☐.9H	☐.7M	☐.5M	☐.7M	☐.5M	☐.3L
Resident and non-salmon sport and subsistence species	☐.9H	☐.7M	☐.5M	☐.8H	☐.6M	☐.4M	☐.6M	☐.4M	☐.2L
Other resident species	☐.8H	☐.6M	☐.4M	☒.7M	☐.5M	☐.3L	☐.5M	☐.3L	☐.1L

ii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1)

a) Is fish use of the AA precluded or substantially reduced by a culvert, dike, or other man-made structure or activity ***or*** *is the waterbody included on the current Alaska Department of Environmental Conservation list of Category 5 / Section 303(d) Impaired Waterbodies (unless its impaired uses are named and aquatic life is not listed as impaired)?*

☐**Y** ☒**N** *If yes, reduce the score in 14C.i. by 0.1:* _____ *(If no, do not change the score.)*

b) Do noxious or invasive plant species or invasive fish species (see Appendices F and G) occur in the AA?

☐**Y** ☒**N** *If yes, reduce the score in 14C.i. by 0.1:* _____ *(If no, do not change the score.)*

iii. Final Score and Rating: **0.7M** Enter on the summary page on the General Fish Support row.

Comments: Fish were not observed during the Baseline Assessment, but are assumed to be present during the growing season in the Wet Graminoid Meadow and Shallow Open Water Complex, where there are small seasonal ponds present. East Twin Lake and some other mapped ponds could provide a source of fish when water levels are sufficient to allow movement between the larger waterbodies and the wetland-open water complex.

14D. **Water Storage:** (Applies to wetlands that flood or pond from overbank flooding, precipitation, or overland flow from uplands. If no wetlands in the AA are subject to inundation or ponding, check ☐ **NA** here and proceed to 14E.)

i. Rating

Estimate the variation in the water volume stored in the **wetland** portion of the AA **that experiences surface ponding or flooding** during the typical year, between break-up and freeze-up. First, identify the part of the AA that is both wetland and has surface water sometime between breakup and freezeup (the "flooded wetland"). Estimate its area in acres: ***368*** acres = A.
Second, estimate the range in that flooded wetland's water surface elevation between its lowest and highest elevation during the unfrozen period, in feet. Call this D for depth: **1.0 feet** = D. For example, if the water table is typically one foot below the ground surface during the driest part of summer, and is typically 6 inches above the surface following breakup, the range is 18 inches, or 1.5 feet. Consider evidence such as water marks, staining on vegetation or rocks, drift lines, and the depth to the water table in your soil pit. Consider also the elevation of the wetland surface relative to the elevation of the water surface in an adjacent stream (i.e., does the channel overflow its banks into the wetland?). During a flood, the depth of water over a stream channel is likely to be double its depth when the stream is full to its banks. Consider the area the stream would flood when the water is that deep. Multiply the range in the flooded wetland's water surface elevation (D) times the area (A) to estimate the maximum storage volume

in acre-feet. D **1.0** feet X A **400** acres = **400** acre-feet. Use this storage volume estimate in the matrix below.

Next, determine the portion of the flooded wetland that is forested, shrub-dominated, or is neither of those but is dominated by hummocks or tussocks at least one foot in height:
% of AA that experiences water surface fluctuation that is forested or scrub/shrub **0** %
plus the additional % of the flooded wetland that is hummocky **30** %
= **30** % of flooded wetland with water-slowing roughness. Use this percentage in the second row of the matrix below.

Working from top to bottom, use the matrix below to arrive at [check] the functional points and rating.

Estimated maximum acre-feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding	***>5 acre-feet***			***1 to 5 acre-feet***			***<1 acre-foot***		
% of flooded wetland classified as forested or scrub/shrub or dominated by hummocks > 1 foot tall	*>75%*	*25-75%*	*<25%*	*>75%*	*25-75%*	*<25%*	*>75%*	*25-75%*	*<25%*
AA contains ***no outlet or restricted outlet***	☐ 1H	☒ .9H	☐ .6M	☐ .8H	☐ .7M	☐ .5M	☐ .4M	☐ .3L	☐ .2L
AA contains ***unrestricted outlet***	☐ .9H	☐ .8H	☐ .5M	☐ .7M	☐ .6M	☐ .4M	☐ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: **0.9H** Enter on the summary page on the Water Storage row.

Comments:

Wetlands within AA are subject to seasonal inundation and ponded water is present during those periods. There were no channelized outlets observed, but sheet flow to and from surrounding wetlands is likely.

iii. Potential PropertyProtection

Are ≥10 acres of wetland in the AA subject to flooding AND are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA (check)? ☐ Y ☒ N (This information will be used later.)

Comments:

14E. **Sediment/Nutrient/Toxicant Retention and Removal:** (Applies to wetlands with potential to receive sediments, nutrients, or toxicants through influx of surface or ground water or direct input. If no wetlands in the AA are, or with the planned project will be, subject to such input, check ☐ **NA** here and proceed to 14F.)

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating [H = high, M = moderate, or L = low])

Sediment, nutrient, and toxicant input levels within AA	*AA receives or surrounding land use (including proposed future land use) has potential to deliver levels of sediments, nutrients, or toxicants at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication are present, or sources are suspected.*				*Waterbody is on Alaska's Section 303(d) List of Impaired Waterbodies or AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or toxicants such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, unnatural turbidity, or signs of eutrophication are present.*			
% cover of vegetation in AA	≥ 70%		< 70%		≥ 70%		< 70%	
Evidence of flooding / ponding in AA	Yes	No	Yes	No	Yes	No	Yes	No
AA contains ***no or restricted outlet***	☒ 1H	☐ .8H	☐ .7M	☐ .5M	☐ .5M	☐ .4M	☐ .3L	☐ .2L
AA contains ***unrestricted outlet***	☐ .9H	☐ .7M	☐ .6M	☐ .4M	☐ .4M	☐ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: **1.0H** Enter on the summary page on the Sediment/Nutrient/Toxicant Retention row.

Comments:

AA likely receives sediments, nutrients, and/or toxicants from adjacent areas. ABR Baseline Report contains details on vegetation and ponding observed. Vegetation percentage includes bryophytes.

14F. Sediment/Shoreline Stabilization: (Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action. If 14F does not apply, check ☐ X **NA** here and proceed to 14G.)

For the <u>wetland</u> area subjected to erosive forces, % cover of species with deep, soil-binding root masses	***Duration of surface water adjacent to rooted vegetation in the AA***		
	Permanent / Perennial	***Seasonal / Intermittent***	***Temporary / Ephemeral***
≥ 65%	☐ 1H	☐ .9H	☐ .7M
35-64%	☐ .7M	☐ .6M	☐ .5M
< 35%	☐ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: **N/A** Enter on the summary page on the Sediment/Shoreline Stabilization row.

Comments: ***Ponds within the AA are too small to support wave action, and the AA wetlands do not have a direct connection with the adjacent East Twin Lake that would support shoreline stabilization.***

14G. Production Export/Terrestrial and Aquatic Food Chain Support:

i. Level of Biological Activity (synthesis of wildlife and fish habitat ratings from 14B and 14C [check appropriate box in matrix])

General Fish Habitat Rating (14C.iii.)	*General Wildlife Habitat Rating (14B.iii.)*		
	E/H	***M***	***L***
E/H	☐ H	☐ H	☐ M
M	☒ H	☐ M	☐ M
L	☐ M	☐ M	☐ L
NA	☐ M	☐ M	☐ L

ii. Rating Working from top to bottom, use the matrix below to arrive at the functional points and rating.
Factor A = acreage of vegetated wetland component in the AA; Factor B = level of biological activity rating from above (14G.i.); Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to duration of surface water in the AA, where P/P, S/I, and T/E are as defined under #10 above, and A = "absent")

A	***Vegetated component >5 acres***						***Vegetated component 1-5 acres***						***Vegetated component <1 acre***					
B	***High***		***Moderate***		***Low***		***High***		***Moderate***		***Low***		***High***		***Moderate***		***Low***	
C	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***
P/P	☐ 1H	☐ .7M	☐ .8H	☐ .5M	☐ .6M	☐ .4M	☐ .9H	☐ .6M	☐ .7M	☐ .4M	☐ .5M	☐ .3L	☐ .8H	☐ .6M	☐ .6M	☐ .4M	☐ .3L	☐ .2L
S/I	☐ .9H	☒ .6M	☐ .7M	☐ .4M	☐ .5M	☐ .3L	☐ .8H	☐ .5M	☐ .6M	☐ .3L	☐ .4M	☐ .2L	☐ .7M	☐ .5M	☐ .5M	☐ .3L	☐ .3L	☐ .2L
T/E or A	☐ .8H	☐ .5M	☐ .6M	☐ .3L	☐ .4M	☐ .2L	☐ .7M	☐ .4M	☐ .5M	☐ .2L	☐ .3L	☐ .1L	☐ .6M	☐ .4M	☐ .4M	☐ .2L	☐ .2L	☐ .1L

iii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1.)

A **Vegetated Upland Buffer** is an area with ≥ 30% plant cover, ≤ 2% noxious or invasive plant cover, and that is not subjected to periodic mowing or clearing (unless for weed control).

a) Is there an average ≥50-foot-wide vegetated upland buffer around ≥75% of the AA circumference?

☒**Y** ☐**N** *If yes, add 0.1 to the score in* ***14G.ii.*** *above and adjust the rating accordingly:*

iv. Final Score and Rating: **0.7M** Enter on the summary page on the Production Export row.

Comments: ***There are no uplands present around the AA, so 14Giii was answered based on the vegetated wetland buffer of palustrine flat wetlands around the majority of the AA.***

14H. **Groundwater Discharge/Recharge:** (Check the appropriate indicators in i. and ii. below.)

i. Discharge Indicators

- ☐ The AA is a slope wetland (HGM type)
- ☐ Springs or seeps are known or observed
- ☐ Vegetation growing during dormant season
- ☐ Wetland occurs at the toe of a natural slope
- ☐ AA permanently flooded during dry periods
- ☐ Wetland contains an outlet, but no inlet
- ☐ Other: _____

ii. Recharge Indicators ☐ **(NA for fringe wetlands)**

- ☐ Permeable substrate present without underlying impeding layer
- ☐ Wetland contains inlet but no outlet
- ☐ Stream is a known 'losing' stream; discharge decreases downstream
- ☐ Other: _____

iii. Rating (use the information from i. and ii. above and the table below to arrive at [check] the functional points and rating)

Criteria	*Duration of saturation at AA wetlands FROM GROUNDWATER DISCHARGE OR WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM*			
	P/P	***S/I***	***T/E***	***None***
Groundwater discharge or recharge indicators exist	☐ 1H	☐ .7M	☐ .4M	☐ .1L
Permafrost underlies the wetland or insufficient information exists	☒ NA			

iv. Final Score and Rating: **N/A** Enter on the summary page on the Groundwater Discharge/Recharge row.

Comments:
There is permafrost present.

14l. Uniqueness:

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating)

Replacement potential	*AA contains irreplaceable wetland types [fens, bogs, springs, seeps, or mature forested wetland type] OR a plant association listed as S1, S2, G1, or G2 by the AKNHP (Appendix J)*			*AA does not contain irreplaceable wetland types and structural diversity (#13) is high OR contains plant association listed as S3, G3, S?, or G? by the AKNHP (Appendix J)*			*AA does not contain irreplaceable wetland types and structural diversity (#13) is low to moderate (Appendix J)*		
Estimated relative abundance of wetland types (from 11)	***rare***	***common***	***abundant***	***rare***	***common***	***abundant***	***rare***	***common***	***abundant***
Low disturbance at AA (from 12i and ii)	☐ 1H	☐ .6M	☐ .5M	☐ .8H	☐ .5M	☐ .4M	☐ .7M	☒ .4M	☐ .3L
Moderate disturbance at AA (from 12i and ii)	☐.9H	☐ .5M	☐ .4M	☐ .7M	☐ .4M	☐ .3L	☐ .6M	☐ .3L	☐ .2L
High disturbance at AA (from12i and ii)	☐ .7M	☐ .3L	☐ .2L	☐ .5M	☐ .2L	☐ .1L	☐ .4M	☐ .1L	☐ .1L

ii. Final Score and Rating: **0.4M** Enter on the summary page on the Uniqueness row.

Comments:

14J. Recreation/Education Potential: (affords "bonus" points if AA provides recreation or education opportunity)
i. Is the AA a known or potential recreation or education site: (check) ☒**Y** ☐ **N** (if 'Yes' continue with the evaluation; if 'No' then check ☐ **NA** here and proceed to the overall summary and rating page)

ii. Check categories that apply to the AA:

☒Educational/scientific study ☐ Consumptive recreation ☐ Non-consumptive recreation ☒Other Subsistence Use

iii. Rating (use the matrix below to arrive at [check] the functional points and rating)

Known or Potential Recreation or Education Area	*Known*	*Potential*
Public ownership or public easement with general public access (no permission required)	☐ .2H	☐ .15H
Private ownership with general public access (no permission required)	☒ .15H	☐ .1M
Private or public ownership without general public access, or requiring permission for public access	☐ .1M	☐ .05L

iv. Final Score and Rating: **0.15H** Enter on the summary page on the Recreation/Education Potential row.
Comments:

Property is currently under private ownership but does not appear to prohibit subsistence use by the public. ATV trails occur occasionally near the AA. Scientific use requires a permit.

General Site Notes:

FUNCTION AND SERVICE SUMMARY AND OVERALL RATING FOR WETLAND AA #(s):

AA1 - Estuarine Wetlands

Functions and Services	Rating (E, H, M, L)	Actual Functional Points (0 to 1.0)	Possible Functional Points	Optional: Functional Units Affected (Actual Points x AA Acreage Affected)	Indicate the four most prominent functions with a check
A. Habitat for Federally Listed/Candidate T&E Species or Other Species of Concern	H	1.0	1.0		☒
B. General Wildlife Support	H	0.9	1.0		☒
C. General Fish Support	M	0.7	1.0		☐
D. Water Storage	H	0.9	1.0		☒
E. Sediment/Nutrient/Toxicant Removal	H	1.0	1.0		☒
F. Sediment/Shoreline Stabilization	N/A	N/A	1.0		☐
G. Production Export/Food Chain Support	M	0.7	1.0		☐
H. Groundwater Discharge/Recharge	N/A	N/A	N/A		☐
I. Uniqueness	M	0.4	1.0		☐
J. Recreation/Education Potential (bonus points)	H	0.15			☐
Totals:		5.75	7.0		
Percent of Possible Score (actual points divided by possible points)		82%			

Category 1 Wetland: Must satisfy **one** of the following criteria; otherwise go to Category 2

☒ Score of 0.9 to 1 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
☐ Score of 0.9 or 1 functional point for Uniqueness; **or**
☐ Score of 0.9 or 1 functional point for Water Storage **and** answer to Question 14Dii is "yes"; **or**
☐ Score of 0.9 or 1 functional point for General Fish Support; **or**
☒ Percent of possible score ≥ 70% (round to nearest whole number); or
☐ Percent of possible score ≥ 50% **and** 6th level hydrologic unit has already experienced ≥15% land development.

Category 2 Wetland: Criteria for Category 1 not satisfied **and** meets any **one** of the following criteria; otherwise go to Category 4

☐ Score of 0.8 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
☐ Score of 0.9 or 1 functional point for General Wildlife Support; **or**
☐ Score of 0.6 to 0.8 functional point for General Fish Support; **or**
☐ Score of 0.8 functional point for Uniqueness; **or**
☐ Score 0.7 or 0.8 functional point for Water Storage **and** answer to Question 14Dii is "yes"; **or**
☐ Percent of possible score ≥ 50% (round to nearest whole number).

Category 3 Wetland: Criteria for Categories 1, 2, and 4 are not satisfied

☐ Does not qualify as Category 1, 2, or 4

Category 4 Wetland: Criteria for Categories 1 and 2 not satisfied **and** all of the following criteria are met; if not, go to Category 3

☐ Vegetated wetland component of AA < 1 acre (do not include upland vegetated buffer); **and**
☐ Score of 0.5 or lower for Uniqueness; **and**
☐ General Wildlife Support is 0.4 or lower; **and**
☐ General Fish Support score is 0.3 or lower; **and**
☐ If answer to 14Dii is "no", score for Water Storage is 0.2, 0.1, or NA; **and**
☐ Is not rated "High" for any function or service; **and**
☐ Percent of possible score < 35% (round to nearest whole number).

OVERALL ASSESSMENT AREA RATING: (check appropriate category based on the criteria outlined above)

Category: ☒1 ☐2 ☐3 ☐4

Appendix A
Wetland Assessment Data Form

Digital Form – Use only if completing on a computer. Otherwise, use form in AKWAM manual.
Use this form to assess areas that are primarily wetlands (versus waterbodies). For waterbodies, use the Waterbody Categorization Form.

1. Project name: Charles Etok Edwardsen Mitigation Bank

2. Assessment Area #(s): AA3 Riverine

3. Evaluation date: Mo. 07 Day 30-31 Yr. 2015

4. Evaluator(s) and affiliation: SLI, EKJ: ABR

5. Purpose of evaluation:

- ☐ Wetland/waterbody potentially affected by a proposed project
- ☐ Mitigation wetlands; post-construction
- ☐ Mitigation wetlands; pre-construction
- ☒ Other Mitigation wetlands; preservation; Current/with project condition

6. Wetland location(s):

Legal: T. 22N R. 17W; S. 4-10,16-18; T. 22N R. 18W; S. 1; Umiat Meridian

Lat. (dec. deg.)**:** 71.2823 Long.: -156.5088 **Datum:** NAD 83 **Nearest community:** Utqiaġvik, AK

Watershed: *Elson Lagoon - Frontal Beaufort Sea (12th level HUC 190602020105)*

Ecoregion (from USCOE 2007): _____

7. Identifying numbers of related data: wetland wetland determination forms **BEO-V12, BEO-16, BEO-17** photos see **ABR Baseline Assessment Appendices A and C** GPS waypoint # _____ other

Map (#) showing AA: **Figure 6** (closely follow the User's Manual instructions for identifying the AA)

Briefly describe the ~~features~~ that define the limits of the AA (e.g., tributary, wetland/upland boundary, extreme low tide elevation)**:**

AA3 consists of three conveyances classified as NWI class riverine intermittent vegetated streambed wetlands (R4SB7). The AA3 includes the adjacent estaurine waterbody (E2USP, see AA5) for the riverine system that is connected to the Ikpik Slough and Beaufort Sea to the north; it also includes East and West Twin Lakes (L1UBH, see AA7), which connect to the conveyances in the south. For the purposes of AKWAM, the boundaries of the AA are all (99%) within the edges of the project boundary. This AA is bordered by a larger wetland complex of flat and depressional palustrine wetlands.

8. Wetland size (total acres, not just AA): 1000+ acres (visually estimated) or ____ acres (measured, e.g., in GIS)

9. Assessment area (AA) size: _____ acres (visually estimated) or **650** acres (measured)

Note: The total AA area includes an estuary to Ilpik Slough and West and East Twin Lakes.

Acreage of the AA MINUS the part that is waterbody that will be separately assessed using the waterbody form: **13.87** acres of wetland in AA

10. Classification of Wetland and Waterbody in the Wetland AA:

Class (Cowardin)	Water Regime (Cowardin)	Modifier (if any; Cowardin)	% of AA
EM - R4SB7	S/I		2%
UN - E2USP	P/P		1%
UN - L1UBH	P/P		97%

HGM Class (Brinson)	% of AA
R	2%, 100% vegetated AA
	%
	%
	%

HGM Classes: Riverine (**R**), Depressional (**D**), Slope (**S**), Flat (**F**), Lacustrine Fringe (**LF**)

Abbreviations:

Cowardin Classes: Forested Wetland (**FO**), Scrub-Shrub Wetland (**SS**), Emergent Wetland (**EM**), Moss-lichen Wetland (**ML**), Aquatic Bed (**AB**), Unvegetated (**UN**)

Water (Inundation) Regimes: Permanent/Perennial (**P/P**), Seasonal/Intermittent (**S/I**), Temporary/Ephemeral/Saturated (**T/E**)

Modifiers: Excavated (**X**), Impounded (**I**), Diked (**D**), Partly Drained (**PD**), Farmed (**F**), Artificial (**A**), Beaver-modified (**B**)

11. Estimated relative abundance of similar wetlands within the same 6th level hydrologic unit subregion (see definitions in user's manual)**:**

(check one) ☐Unknown ☒Rare ☐Common ☐Abundant

What information sources did you use for this estimate?
Estimate based on visual observation of riverine wetlands within HUC.

12. General condition of AA:

i. Disturbance (see user's manual for descriptions of disturbance levels; check appropriate box):

Conditions adjacent to AA / ***Conditions within AA***	***Predominant conditions adjacent to (within 500 feet of) the AA, plus any area that drains into the AA***		
	Adjacent land is in a natural state	***Adjacent land has experienced minimal or minor disturbance***	***Adjacent land is substantially disturbed***
AA is in a natural state	☒ low disturbance	☐ low disturbance	☐ moderate disturbance
AA has experienced minimal or minor disturbance	☐ moderate disturbance	☐ moderate disturbance	☐ high disturbance
AA is substantially disturbed	☐ high disturbance	☐ high disturbance	☐ high disturbance

Describe the disturbance within the AA (type, age, intensity, source of disturbance, location)**:**
Considered to be essentially natural.

ii. Consider the 6th level HU containing the AA again. If you estimate that **more than 10% of the land in the 6th level HU is disturbed**, check here ☐, and choose (below) the disturbance level that is one level higher:

☐ low disturbance ☐ moderate disturbance ☐ high disturbance

iii. List any noxious or invasive plant or animal species in the AA or surrounding lands (specify which are in the AA):
None.

iv. Briefly describe the AA and surrounding land use and habitat types (dominant species, water source, topography, approximate slope, inlets and outlets, land use, relationship to other AAs, adjacent vegetation types and land uses)**:**

AA3 consists of three conveyances classified as NWI class riverine intermittent vegetated streambed wetlands (R4SB7) and the adjacent estaurine waterbody (E2USP) for the riverine system that is connected to the Ikpik Slough and Beaufort Sea to the north. It is part of a larger wetland complex with flat and depressional wetlands and larger open water ponds and lakes. The riverine wetlands are dominated by emergent vegetation such as Carex aquatilis, Eriophorum spp., Arctophila fulva, and Hippuris vulgaris.

13. Structural Diversity of AA (based on number of simplified Cowardin **vegetated** classes present, listed in #10 above):

Existing # of Cowardin vegetated classes in AA	***Rating***
≥3 classes; or 2 classes if 1 is forested	☐ H
2 classes; or 1 class if forested	☐ M
1 class, and humans do not prevent establishment of additional classes	☒ M
1 class, and humans limit establishment of additional classes	☐ L

14A. Habitat for Federally Listed or Candidate Threatened or Endangered Plants or Animals or Other Species of Concern:

i. AA is Documented (D) or Suspected (S) to contain (check one based on definitions contained in instructions):

Primary or critical habitat (**list species**) ☒ D ☐ S species: Steller's eider (T),
Secondary habitat (**list species**) ☐ D ☒ S species: Polar Bear (T), Spectacled Eider
Incidental habitat (**list species**) ☐ D ☐ (T) _____
None or unknown ☐ S species:

ii. Rating (use the conclusions from 14A.i. above and the matrix below to arrive at [check] the functional points and rating):

Highest Habitat Level	*doc/ primary*	*sus/ primary*	*doc/ secondary*	*sus/ secondary*	*doc/ incidental*	*sus/ incidental*	*None*
One or more of the species listed in 14A.i. is a federally Listed or Candidate Threatened or Endangered Species	☒ 1H	☐ .9H	☐ .8M	☐ .7M	☐ .3L	☐ .1L	☐ 0L
Species listed 14A.i. are all "Other Species of Concern" (i.e., not listed under the Endangered Species Act)	☐ .8M	☐ .7M	☐ .6M	☐ .5M	☐ .2L	☐ .1L	☒ 0L

Sources for documented or suspected use (e.g., observations, records, etc):
Two threatened sea duck species, Steller's Eider (Polysticta stelleri) and Spectacled Eider (Somateria fischeri), are present in the area during the breeding season (ABR Report, BEO Master Plan 2013, Barrow Comprehensive Plan 2014). A Stellar's Eider was documented in open water lakes in AA and in palustrine depressional and flat wetlands near the AA (ALCC 2012 from ABR Baseline Assessment, Appendix C). Based on expected habitat use (see ABR report), both eider species are expected to use habitats within this AA at some point in their life cycle. The AA is within the 2010 Polar Bear critical habitat zone (although it is under review).

iii. Final Score and Rating: **1.0H** Enter on the summary page on the Habitat for Federally Listed Species row.

14B. General Wildlife Support Rating:

i. Evidence of overall wildlife use in the AA (check substantial, moderate, or low based on supporting evidence):

Substantial (based on any of the following [check]):

☒ observations of abundant wildlife #s or high species diversity (during any period) during peak use periods
☐ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
☐ presence of extremely limiting habitat features not available in the surrounding area sources
☒ interviews with local biologists with knowledge of the AA or its habitat type

Minimal (based on any of the following [check]):

☐ few or no wildlife observations
☐ little to no wildlife sign
☐ sparse adjacent upland food
☐ interviews with local biologists with knowledge of the AA

Moderate (based on any of the following [check]):

☐ observations of scattered wildlife groups or individuals or relatively few species during peak periods
☐ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
☐ upland food sources exist in moderate quantity
☐ interviews with local biologists with knowledge of the AA or its habitat type

ii. Wildlife habitat features Working from top to bottom, check appropriate AA attributes in the matrix to arrive at the rating.
Structural diversity is from question #13.
For class cover to be considered evenly distributed, the most and least prevalent **vegetated** classes must be within 20% of each other in terms of their percent age of the AA (see #10).
Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent. See instructions for further definitions of these terms.

Structural diversity (from #13)	***High***								***Moderate***								***Low***			
Class cover distribution (all vegetated classes)	***Even***				***Uneven***				***Even***				***Uneven***				***Even***			
Longest duration of surface water in ≥ 10% of AA, or immediately abutting the AA	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***
***Low** disturbance at AA (see #12i & 12ii)*	☐ E	☐ E	☐ E	☐ H	☐ E	☐ E	☐ H	☐ H	☒ E	☐ H	☐ H	☐ M	☐ E	☐H	☐ M	☐ M	☐ E	☐ H	☐ M	☐ M
***Moderate** disturbance at AA (see #12i & 12ii)*	☐ H	☐ H	☐ H	☐ H	☐ H	☐ H	☐ H	☐ M	☐ H	☐ H	☐ M	☐ M	☐ H	☐ M	☐ M	☐ L	☐ H	☐ M	☐ L	☐ L
***High** disturbance at AA (see #12i & 12ii)*	☐ M	☐ M	☐ M	☐ L	☐ M	☐ M	☐ L	☐ L	☐ M	☐ M	☐ L	☐ L	☐ M	☐ L	☐ L	☐ L	☐ L	☐ L	☐ L	☐ L

iii. Rating (use the conclusions from i. and ii. above and the matrix below to arrive at [check] the functional points and rating)

	Wildlife habitat features rating (ii)			
Evidence of wildlife use (i)	***Exceptional***	***High***	***Moderate***	***Low***
Substantial	☒ 1E	☐ .9H	☐ .8H	☐ .7M
Moderate	☐ .9H	☐ .7M	☐ .5M	☐ .3L
Minimal	☐ .6M	☐ .4M	☐ .2L	☐ .1L

iv. Final Score and Rating: **1.0E** Enter on the summary page on the General Wildlife Support row.
Comments:

The ABR Baseline Assessment included a review of wildlife use by wetland functional class for the region including the AA.

14C. General Fish Support Rating: (Assess this function if any part of the AA (including the waterbody part of a wetland AA) is used by fish or the existing situation is "correctable" such that the AA could be used by fish. If the AA is not used by fish, fish use is not restorable, or is not desired from a management perspective, then check ☐ **NA** here and proceed to 14D.)

i. Habitat Quality and Known / Suspected Fish Species in AA (use matrix to arrive at [check] the functional points and rating)

Duration of surface water in AA	***Permanent / Perennial***			***Seasonal / Intermittent***			***Temporary / Ephemeral***		
Aquatic hiding / resting / escape cover in waterbody (Table 3 in manual)	*Optimal*	*Adequate*	*Poor*	*Optimal*	*Adequate*	*Poor*	*Optimal*	*Adequate*	*Poor*
Anadromous salmon species	☐ 1E	☐.8H	☐.6M	☐.9H	☐.7M	☐.5M	☐.7M	☐.5M	☐.3L
Resident and non-salmon sport and subsistence species	☐.9H	☐.7M	☐.5M	☐.8H	☐.6M	☐.4M	☐.6M	☐.4M	☐.2L
Other resident species	☐.8H	☒.6M	☐.4M	☐.7M	☐.5M	☐.3L	☐.5M	☐.3L	☐.1L

ii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1)

*a) Is fish use of the AA precluded or substantially reduced by a culvert, dike, or other man-made structure or activity **or** is the waterbody included on the current Alaska Department of Environmental Conservation list of Category 5 / Section 303(d) Impaired Waterbodies (unless its impaired uses are named and aquatic life is not listed as impaired)?*

☐**Y** ☒**N** *If yes, reduce the score in 14C.i. by 0.1:* _____ *(If no, do not change the score.)*

b) Do noxious or invasive plant species or invasive fish species (see Appendices F and G) occur in the AA?

☐**Y** ☒**N** *If yes, reduce the score in 14C.i. by 0.1:* _____ *(If no, do not change the score.)*

iii. Final Score and Rating: **0.6M** Enter on the summary page on the General Fish Support row.

Comments: Fish were not observed during the Baseline Assessment, but are assumed to be present in the adjacent estuary and large open water lakes.

14D. Water Storage: (Applies to wetlands that flood or pond from overbank flooding, precipitation, or overland flow from uplands. If no wetlands in the AA are subject to inundation or ponding, check ☐ **NA** here and proceed to 14E.)

i. Rating

Estimate the variation in the water volume stored in the **wetland** portion of the AA **that experiences surface ponding or flooding** during the typical year, between break-up and freeze-up. First, identify the part of the AA that is both wetland and has surface water sometime between breakup and freezeup (the "flooded wetland"). Estimate its area in acres: ***13.87*** acres = A.
Second, estimate the range in that flooded wetland's water surface elevation between its lowest and highest elevation during the unfrozen period, in feet. Call this D for depth: **0.75 feet** = D. For example, if the water table is typically one foot below the ground surface during the driest part of summer, and is typically 6 inches above the surface following breakup, the range is 18 inches, or 1.5 feet. Consider evidence such as water marks, staining on vegetation or rocks, drift lines, and the depth to the water table in your soil pit. Consider also the elevation of the wetland surface relative to the elevation of the water surface in an adjacent stream (i.e., does the channel overflow its banks into the wetland?). During a flood, the depth of water over a stream channel is likely to be double its depth when the stream is full to its banks. Consider the area the stream would flood when the water is that deep. Multiply the range in the flooded wetland's water surface elevation (D) times the area (A) to estimate the maximum storage volume

in acre-feet. D **1.0** feet X A **13.87** acres = **13** acre-feet. Use this storage volume estimate in the matrix below.

Next, determine the portion of the flooded wetland that is forested, shrub-dominated, or is neither of those but is dominated by hummocks or tussocks at least one foot in height:
% of AA that experiences water surface fluctuation that is forested or scrub/shrub **0** %
plus the additional % of the flooded wetland that is hummocky **30** %
= **30** % of flooded wetland with water-slowing roughness. Use this percentage in the second row of the matrix below.

Working from top to bottom, use the matrix below to arrive at [check] the functional points and rating.

Estimated maximum acre-feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding	***>5 acre-feet***			***1 to 5 acre-feet***			***<1 acre-foot***		
% of flooded wetland classified as forested or scrub/shrub or dominated by hummocks > 1 foot tall	*>75%*	*25-75%*	*<25%*	*>75%*	*25-75%*	*<25%*	*>75%*	*25-75%*	*<25%*
AA contains ***no outlet or restricted outlet***	☐ 1H	☐ .9H	☐ .6M	☐ .8H	☐ .7M	☐ .5M	☐ .4M	☐ .3L	☐ .2L
AA contains ***unrestricted outlet***	☐ .9H	☒ .8H	☐ .5M	☐ .7M	☐ .6M	☐ .4M	☐ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: **0.8H** **Enter on the summary page on the Water Storage row.**

Comments:

Flooding from the estuary or large lakes is likely.

iii. Potential Property Protection

Are ≥10 acres of wetland in the AA subject to flooding AND are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA (check)? ☐ Y ☒ N (This information will be used later.)

Comments:

14E. **Sediment/Nutrient/Toxicant Retention and Removal:** (Applies to wetlands with potential to receive sediments, nutrients, or toxicants through influx of surface or ground water or direct input. If no wetlands in the AA are, or with the planned project will be subject to such input, check ☐ **NA** here and proceed to 14F.)

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating [H = high, M = moderate, or L = low])

Sediment, nutrient, and toxicant input levels within AA	*AA receives or surrounding land use (including proposed future land use) has potential to deliver levels of sediments, nutrients, or toxicants at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication are present, or sources are suspected.*				*Waterbody is on Alaska's Section 303(d) List of Impaired Waterbodies or AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or toxicants such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, unnatural turbidity, or signs of eutrophication are present.*			
% cover of vegetation in AA	≥ 70%		< 70%		≥ 70%		< 70%	
Evidence of flooding / ponding in AA	Yes	No	Yes	No	Yes	No	Yes	No
AA contains ***no or restricted outlet***	☐ 1H	☐ .8H	☐ .7M	☐ .5M	☐ .5M	☐ .4M	☐ .3L	☐ .2L
AA contains ***unrestricted outlet***	☐ .9H	☐ .7M	☒ .6M	☐ .4M	☐ .4M	☐ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: **0.6M** Enter on the summary page on the Sediment/Nutrient/Toxicant Retention row.

Comments:
AA likely receives sediments, nutrients, and/or toxicants from adjacent areas. ABR Baseline Report contains details on vegetation and adjacent estuary. Vegetation percentage includes bryophytes.

14F. Sediment/Shoreline Stabilization: (Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action. If 14F does not apply, check ☐ NA here and proceed to 14G.)

For the <u>wetland</u> area subjected to erosive forces, % cover of species with deep, soil-binding root masses	***Duration of surface water adjacent to rooted vegetation in the AA***		
	Permanent / Perennial	***Seasonal / Intermittent***	***Temporary / Ephemeral***
≥ 65%	☐ 1H	☐ .9H	☐ .7M
35-64%	☐ .7M	☐ .6M	☐ .5M
< 35%	☒ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: **0.3L** Enter on the summary page on the Sediment/Shoreline Stabilization row.

Comments:

14G. Production Export/Terrestrial and Aquatic Food Chain Support:

i. Level of Biological Activity (synthesis of wildlife and fish habitat ratings from 14B and 14C [check appropriate box in matrix])

General Fish Habitat Rating (14C.iii.)	*General Wildlife Habitat Rating (14B.iii.)*		
	E/H	*M*	*L*
E/H	☐ H	☐ H	☐ M
M	☒ H	☐ M	☐ M
L	☐ M	☐ M	☐ L
NA	☐ M	☐ M	☐ L

ii. Rating Working from top to bottom, use the matrix below to arrive at the functional points and rating.
Factor A = acreage of vegetated wetland component in the AA; Factor B = level of biological activity rating from above (14G.i.); Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to duration of surface water in the AA, where P/P, S/I, and T/E are as defined under #10 above, and A = "absent")

A	*Vegetated component >5 acres*						*Vegetated component 1-5 acres*						*Vegetated component <1 acre*					
B	*High*		*Moderate*		*Low*		*High*		*Moderate*		*Low*		*High*		*Moderate*		*Low*	
C	*Yes*	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*	*No*
P/P	☒ 1H	☐ .7M	☐ .8H	☐ .5M	☐ .6M	☐ .4M	☐ .9H	☐ .6M	☐ .7M	☐ .4M	☐ .5M	☐ .3L	☐ .8H	☐ .6M	☐ .6M	☐ .4M	☐ .3L	☐ .2L
S/I	☐ .9H	☐ .6M	☐ .7M	☐ .4M	☐ .5M	☐ .3L	☐ .8H	☐ .5M	☐ .6M	☐ .3L	☐ .4M	☐ .2L	☐ .7M	☐ .5M	☐ .5M	☐ .3L	☐ .3L	☐ .2L
T/E or A	☐ .8H	☐ .5M	☐ .6M	☐ .3L	☐ .4M	☐ .2L	☐.7M	☐ .4M	☐ .5M	☐ .2L	☐ .3L	☐ .1L	☐ .6M	☐ .4M	☐ .4M	☐ .2L	☐ .2L	☐ .1L

iii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1.)

A **Vegetated Upland Buffer** is an area with ≥ 30% plant cover, ≤ 2% noxious or invasive plant cover, and that is not subjected to periodic mowing or clearing (unless for weed control).

a) Is there an average ≥50-foot-wide vegetated upland buffer around ≥75% of the AA circumference?

☒**Y** ☐**N** *If yes, add 0.1 to the score in **14G.ii.** above and adjust the rating accordingly:*

iv. Final Score and Rating: **1.0H** Enter on the summary page on the Production Export row.

Comments: ***There are no uplands present around the AA, so 14Giii was answered based on the vegetated wetland buffer of palustrine flat wetlands around the majority of the AA.***

14H. Groundwater Discharge/Recharge: (Check the appropriate indicators in i. and ii. below.)

i. Discharge Indicators

- ☐ The AA is a slope wetland (HGM type)
- ☐ Springs or seeps are known or observed
- ☐ Vegetation growing during dormant season
- ☐ Wetland occurs at the toe of a natural slope
- ☐ AA permanently flooded during dry periods
- ☐ Wetland contains an outlet, but no inlet
- ☐ Other: _____

ii. Recharge Indicators ☐ **(NA for fringe wetlands)**

- ☐ Permeable substrate present without underlying impeding layer
- ☐ Wetland contains inlet but no outlet
- ☐ Stream is a known 'losing' stream; discharge decreases downstream
- ☐ Other: _____

iii. Rating (use the information from i. and ii. above and the table below to arrive at [check] the functional points and rating)

Criteria	*Duration of saturation at AA wetlands FROM GROUNDWATER DISCHARGE OR WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM*			
	P/P	*S/I*	*T/E*	*None*
Groundwater discharge or recharge indicators exist	☐ 1H	☐ .7M	☐ .4M	☐ .1L
Permafrost underlies the wetland or insufficient information exists	☒ NA			

iv. Final Score and Rating: **N/A** Enter on the summary page on the Groundwater Discharge/Recharge row.

Comments:

Not enough information.

14l. Uniqueness:

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating)

Replacement potential	*AA contains irreplaceable wetland types [fens, bogs, springs, seeps, or mature forested wetland type] OR a plant association listed as S1, S2, G1, or G2 by the AKNHP (Appendix J)*			*AA does not contain irreplaceable wetland types and structural diversity (#13) is high OR contains plant association listed as S3, G3, S?, or G? by the AKNHP (Appendix J)*			*AA does not contain irreplaceable wetland types and structural diversity (#13) is low to moderate (Appendix J)*		
Estimated relative abundance of wetland types (from 11)	***rare***	***common***	***abundant***	***rare***	***common***	***abundant***	***rare***	***common***	***abundant***
Low disturbance at AA (from 12i and ii)	☐ 1H	☐ .6M	☐ .5M	☐ .8H	☐ .5M	☐ .4M	☒ .7M	☐ .4M	☐ .3L
Moderate disturbance at AA (from 12i and ii)	☐.9H	☐ .5M	☐ .4M	☐ .7M	☐ .4M	☐ .3L	☐ .6M	☐ .3L	☐ .2L
High disturbance at AA (from12i and ii)	☐ .7M	☐ .3L	☐ .2L	☐ .5M	☐ .2L	☐ .1L	☐ .4M	☐ .1L	☐ .1L

ii. Final Score and Rating: **0.7M** Enter on the summary page on the Uniqueness row.

Comments:

14J. Recreation/Education Potential: (affords "bonus" points if AA provides recreation or education opportunity)
i. Is the AA a known or potential recreation or education site: (check) ☒**Y** ☐ **N** (if 'Yes' continue with the evaluation; if 'No' then check ☐ **NA** here and proceed to the overall summary and rating page)

ii. Check categories that apply to the AA:

☒Educational/scientific study ☐ Consumptive recreation ☐ Non-consumptive recreation ☒Other Subsistence Use

iii. Rating (use the matrix below to arrive at [check] the functional points and rating)

Known or Potential Recreation or Education Area	*Known*	*Potential*
Public ownership or public easement with general public access (no permission required)	☐ .2H	☐ .15H
Private ownership with general public access (no permission required)	☒ .15H	☐ .1M
Private or public ownership without general public access, or requiring permission for public access	☐ .1M	☐ .05L

iv. Final Score and Rating: **0.15H** Enter on the summary page on the Recreation/Education Potential row.
Comments:

Property is currently under private ownership but does not appear to prohibit subsistence use by the public. ATV trails occur occasionally near the AA. Scientific use requires a permit.

General Site Notes:

FUNCTION AND SERVICE SUMMARY AND OVERALL RATING FOR WETLAND AA #(s):

AA1 - Estuarine Wetlands

Functions and Services	Rating (E, H, M, L)	Actual Functional Points (0 to 1.0)	Possible Functional Points	Optional: Functional Units Affected (Actual Points x AA Acreage Affected)	Indicate the four most prominent functions with a check
A. Habitat for Federally Listed/Candidate T&E Species or Other Species of Concern	H	1.0	1.0		☒
B. General Wildlife Support	H	1.0	1.0		☒
C. General Fish Support	M	0.6	1.0		☐
D. Water Storage	H	0.8	1.0		☒
E. Sediment/Nutrient/Toxicant Removal	M	0.6	1.0		☐
F. Sediment/Shoreline Stabilization	L	0.3	1.0		☐
G. Production Export/Food Chain Support	H	1.0	1.0		☒
H. Groundwater Discharge/Recharge	N/A	N/A	N/A		☐
I. Uniqueness	M	0.7	1.0		☐
J. Recreation/Education Potential (bonus points)	H	0.15			☐
Totals:		6.15	8.0		
Percent of Possible Score (actual points divided by possible points)		69%			

Category 1 Wetland: Must satisfy **one** of the following criteria; otherwise go to Category 2

☒ Score of 0.9 to 1 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
☐ Score of 0.9 or 1 functional point for Uniqueness; **or**
☐ Score of 0.9 or 1 functional point for Water Storage **and** answer to Question 14Dii is "yes"; **or**
☐ Score of 0.9 or 1 functional point for General Fish Support; **or**
☐ Percent of possible score ≥ 70% (round to nearest whole number); or
☐ Percent of possible score ≥ 50% **and** 6th level hydrologic unit has already experienced ≥15% land development.

Category 2 Wetland: Criteria for Category 1 not satisfied **and** meets any **one** of the following criteria; otherwise go to Category 4

☐ Score of 0.8 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
☐ Score of 0.9 or 1 functional point for General Wildlife Support; **or**
☐ Score of 0.6 to 0.8 functional point for General Fish Support; **or**
☐ Score of 0.8 functional point for Uniqueness; **or**
☐ Score 0.7 or 0.8 functional point for Water Storage **and** answer to Question 14Dii is "yes"; **or**
☐ Percent of possible score ≥ 50% (round to nearest whole number).

Category 3 Wetland: Criteria for Categories 1, 2, and 4 are not satisfied

☐ Does not qualify as Category 1, 2, or 4

Category 4 Wetland: Criteria for Categories 1 and 2 not satisfied **and** all of the following criteria are met; if not, go to Category 3

☐ Vegetated wetland component of AA < 1 acre (do not include upland vegetated buffer); **and**
☐ Score of 0.5 or lower for Uniqueness; **and**
☐ General Wildlife Support is 0.4 or lower; **and**
☐ General Fish Support score is 0.3 or lower; **and**
☐ If answer to 14Dii is "no", score for Water Storage is 0.2, 0.1, or NA; **and**
☐ Is not rated "High" for any function or service; **and**
☐ Percent of possible score < 35% (round to nearest whole number).

OVERALL ASSESSMENT AREA RATING: (check appropriate category based on the criteria outlined above)

Category: ☒ **1** ☐ **2** ☐ **3** ☐ **4**

Appendix B
Waterbody Data and Categorization Form

Even if all or part of a waterbody is being rated as part of a wetland Assessment Area, it should also be rated separately on this form. Evaluate any waterbody that lies within your project's potential direct or indirect effect area, extending at least as far as the project's right-of-way limits.

The landward extent of the waterbody is the Ordinary High Water line for a non-tidal waterbody or the wetland boundary, whichever of those limits is located least landward.

1. Project name and ADOT&PF #: Charles Etok Edwardsen Mitigation Bank

2. Waterbody name (if applicable)**:**_____ **Project-specific waterbody identifier** (if applicable)**: AA4 - Palustrine Ponds**

3. Evaluation date: Mo. **7** Day **28-31** Yr. **2015** **4. Evaluator(s) and affiliation: SLI, EKJ: ABR**

5. Purpose of evaluation:

____ Waterbody potentially affected by a proposed project ____ Mitigation waterbody; pre-construction

____ Mitigation waterbody; post-construction X Other: **Mitigation waterbody, preservation, with project**

6. Waterbody location(s):

Legal: T. 22N R. 17W; S. 4-10,16-18; T. 22N R. 18W; and T ____ N or S; R ____ E or W; S _____ ; **Umiat** Meridian

Approx. stationing or mileposts or pertinent project component:

_____

Lat/long: 71.2823,-156.5088 Datum: _NAD 83____ **Nearest community: Utqiaġvik, AK**

Watershed: Elson Lagoon - Frontal Beaufort Sea (12th level HUC 190602020105)

(smallest named stream), tributary of _____

7. Relationship to wetland AA:

Is this waterbody also part of one or more wetland AAs? (Y) **N** (circle one) If yes, pertinent AA numbers: **West pond included in AA6 assessment.**

Identifying numbers of related data: photos _____ GPS waypoint # **BEO-15** other: _____

Map (#) showing waterbody: **Figure 6**

8. Waterbody description:

If a pond or lake, total area: **28.19** acres estimated or measured? (circle one)

If a stream: **width** in project area: _____feet (avg) _____feet (range) **gradient** (% slope): _____%

Diameter and condition of any **culverts** in the project area on this waterbody: _____

For any waterbody: avg. **depth at low water 1** feet avg. depth at bankfull **2 (estimated)** feet

description or average diameter of **substrate**, if observable (e.g., silt, sand, 2", 10") _____

Sketch the typical cross-sectional bank shape(s) :

Describe the waterbody and surrounding land use and habitat types (water source, inlets, outlets, topography, adjacent land uses, relationship to other waterbodies and wetlands): ***AA consists of four palustrine ponds of various sizes, surrounded by palustrine depressional sedge wetlands that are semipermanently flooded or palustrine flat seasonally flooded sedge wetlands. One pond on the west side of the project is surrounded by lacustrine fringe (AA6), and is included in that assessment as well.***

Briefly describe the condition of the 6th level hydrologic unit subregion with respect to human activities. Estimate the % that is modified, and list the predominant types of modification. ***At the 6th level hydrologic unit subregion, very little is developed beyond Utqiaġvik, AK (<10%).***

9. Classification of Waterbody:

Is the waterbody a

___ Stream – flowing water

___ Lake – larger than 20 acres in size when full of water

X Pond – a still waterbody smaller than 20 acres in size when full, unvegetated or with floating or submerged vegetation

Class (Cowardin)	Water Regime	Modifier (if any)	% of the Waterbody
UN-PUB1H	P/P		100

Abbreviations:

Cowardin Classes (modified): Aquatic Bed (**AB**), Unvegetated **(UN)**

Water (Inundation) Regimes (see section 10 and Table 1 in the User's Manual): Permanent/Perennial I(**P/P**), Seasonal/Intermittent (**S/I**), Temporary/Ephemeral (**T/E**)

Modifiers: Excavated (**X**), Impounded (**I**), Diked (**D**), Partly Drained (**PD**), Artificial (**A**), Beaver-modified (**B**)

10. **Disturbance of waterbody:** Place check marks in the rows below that describe any past or present types of disturbance that may affect the waterbody within the project area. Describe any disturbance below.

____ On the Category 5/Section 303(d) Impaired Waterbodies list (see Appendix I).

____ Receives potentially low-quality runoff from development within the project area.

____ Receives potentially low-quality runoff as non-point discharges from human activities upstream.

____ Pipes discharge water from human developments upstream of, or within, the project area.

____ Within the project area, the waterbody's banks or bed have been altered by grading, re-routing, placement of fill, excavation, or similar activities.

____ The hydrologic regime has been altered by upstream developments (extensive storm drain systems, water withdrawals, a dam, etc.).

____ The banks or bed are mildly altered by human activities such as trampling, removal of some vegetation, building or clearing to the top of bank.

____ The waterbody has been affected by disturbance such as described above, but it has physically regained some features of natural banks or bed ("naturalized") such as development of pools and riffles, slight sinuosity, vertical or overhanging banks, overhanging vegetation.

____ Known or suspected to contain invasive or exotic plants or animals – anywhere in the waterbody. (See User's manual Appendix F for noxious and invasive plant information and Appendix G for a list of invasive animal species.) Write **NA** if not within your expertise.

____ Disturbance other than described above.

__X__ None of the above; waterbody is in essentially pristine condition.

Describe any disturbance (types, age, intensity, source, location):

None

List any noxious or invasive plant or animal species in the waterbody (Appendices F and G). If it is not within your expertise to accurately answer this question, or you were unable to investigate this, just cross out this question or record explanatory notes.

None

11. Habitat for Federally Listed or Candidate Threatened or Endangered Animals or Other Species of Concern (see Appendix H):

Waterbody is Documented (D) or Suspected (S) to support (circle one based on definitions contained in instructions):

Primary or critical habitat (**list species**) (D) S **Stellar's Eider**

Secondary habitat (**list species**) D (S) **Spectacled Eider, Polar Bear**

Incidental habitat (**list species**) D S

Sources for documented use (e.g., observations, records, etc): **ABR baseline Assessment, BEO Master Plan 2013, Barrow Comprehensive Plan 2014**

12. Wildlife Habitat:

Evidence of overall wildlife use in/on the waterbody (circle substantial, moderate, or low based on supporting evidence):

Substantial (based on any of the following [check]):

__ observations of abundant wildlife or high species diversity (during any period)

__X__ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.

__ presence of extremely limiting habitat features not available in the surrounding area

__X__ interviews with local biologists with knowledge of the AA

Minimal (based on any of the following [check]):

__ few or no wildlife observed during peak use periods

__ little to no wildlife sign

__ sparse adjacent upland food sources

__ interviews with biologists with knowledge of the AA

Moderate (based on any of the following [check]):

__ observations of scattered wildlife groups or individuals or relatively few species during peak periods

__ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.

__ adequate adjacent upland food sources

__ interviews with local biologists with knowledge of the AA

Other special wildlife features not addressed above:

13. **Fish Habitat:** (Answer this if the waterbody is used by fish or the existing situation is "correctable" such that the waterbody could be used by fish. If the waterbody is not used by fish, fish use is not restorable, or is not desired from a management perspective, then circle **NA**.)

Is the part of the waterbody within the project area shown in the ADF&G Anadromous Waters Catalog? **Y** (**N**)

Fish species or groups known or suspected to use the waterbody (any part of it):

Other resident species assumed. None observed in field visit.

Sources used for identifying fish species potentially found in the waterbody:

Aquatic cover category (see Table 3) (circle one): Optimal (Adequate) Poor

Is fish use of the waterbody precluded or substantially reduced by a culvert, dike, or other man-made structure or activity? **Y** **N**

Does the waterbody contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area, etc.- specify in comments) for anadromous fish or sport fish? **Y** **N**

Do noxious or invasive plant species (see **Appendix F**) or invasive fish species (see **Appendix G**) occur in the waterbody (anywhere)?
Y **N**
Comments, or refer to section 10 above:

14. Recreation or Subsistence Potential:

Is the waterbody a known or potential recreation site? **Y** **N** Used for subsistence activities? **Y** **N**
If 'Yes,' describe (travel, transport, boating, fishing, trail parallels or crosses it, next to a park or camping area, in proximity to where kids play, etc.).

Which best describes the current waterbody ownership in the project area?

____ Public ownership or public easement with general public access (no permission required)

X Private ownership with general public access (no permission required)

____ Private or public ownership without general public access, or requiring permission for public access

Chart for Assignment of a Waterbody to a Management Category

Determine the appropriate category for the waterbody by working through the chart below. Look at the choices in the first column and choose the one that best describes the waterbody. Then, look at the choices in the second column to the right of the category you chose in column 1; choose the best type from column 2. To the right of that choice, select the best choice from column 3. Continue working to right through the chart until you reach the last column, where the Waterbody Category is assigned.

Waterbody Type	Waterbody Characteristics				Category
Flowing Waterbody	Any flowing waterbody that is documented or suspected critical or primary habitat for listed or candidate threatened or endangered species (see Appendix H)				1
	Any flowing waterbody that is secondary habitat for listed or candidate threatened or endangered species or primary habitat for other species of concern (see Appendix H)				2
	stream	open channel—perennial, seasonal, intermittent, temporary, or ephemeral	natural (undisturbed) or naturalized (recovered from disturbance, with natural-like banks, sinuosity, substrate)	supports salmon	1
				Supports resident and other non-salmon fish species	2
				Not known or thought to support fish	3
			Channelized and not naturalized	supports salmon	1
				does not support salmon	3
		Originally a stream, now in a culvert			4
	ditch (originally formed by excavation; did not originally replace a stream)	open channel, supports salmon			2
		Naturalized, does not support salmon			3
		Not naturalized, does not support salmon			4
	Inactive (abandoned) channel	Seasonally or more often connected to active channel			same as active channel
		irregularly (less than annually) connected to active channel that is…	Category 1		2
			Category 2		3
			Category 3		
			Category 4		4
		No existing connection to an active channel, even at high water			4
Still Waterbody (pond, lake)	*Any still waterbody that is documented or suspected critical or primary habitat for listed or candidate threatened or endangered species (see Appendix H)*				1
	Any still waterbody that is secondary habitat for listed or candidate threatened or endangered species or primary habitat for other species of concern (see Appendix H)				2
	Other still waterbodies	supports *salmon*	Spawning or rearing in potentially affected area		1
			Affected area is migratory route only		2
		Supports resident and other non-salmon fish species used for subsistence or recreation	Spawning or rearing in potentially affected area		1
			Affected area is migratory route only		2
		Supports fish not used by humans			3
		Does not support fish			3

Assigned Waterbody Category: (1) 2 3 4

FUNCTION AND SERVICE SUMMARY AND OVERALL RATING FOR WETLAND AA #(s): AA4

Functions and Services	Rating (E, H, M, L)	Actual Functional Points (0 to 1.0)	Possible Functional Points	Optional: Functional Units Affected (Actual Points x AA Acreage Affected)	Indicate the four most prominent functions with an asterisk (*)
A. Habitat for Federally Listed/Candidate T&E Species or Other Species of Concern	H	1.0	1.0		
B. General Wildlife Support	H	0.9	1.0		
C. General Fish Support	M	0.6	1.0		
D. Water Storage	NA	NA	NA		
E. Sediment/Nutrient/Toxicant Removal	M	0.5	1.0		
F. Sediment/Shoreline Stabilization	NA	NA	NA		
G. Production Export/Food Chain Support	H	0.9	1.0		
H. Groundwater Discharge/Recharge	NA	NA	NA		
I. Uniqueness	M	0.4	1.0		
J. Recreation/Education Potential (bonus points)	H	0.15	NA		
Totals:		4.45	6.0		
Percentage of Possible Score (actual points divided by possible points)		74 %			

Category 1 Wetland: Must satisfy **one** of the following criteria; otherwise go to Category 2.

___ Score of 0.9 to 1 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
___ Score of 0.9 or 1 functional point for Uniqueness; **or**
___ Score of 0.9 or 1 functional point for Water Storage **and** answer to Question 14D.ii. is "yes"; **or**
___ Score of 0.9 or 1 functional point for General Fish Support; **or**
___ Percent of possible score ≥ 70% (round to nearest whole number); or
___ Percent of possible score ≥ 50% **and** 6th level hydrologic unit subregion has already experienced ≥15% land development.

Category 2 Wetland: Criteria for Category 1 not satisfied **and** meets any **one** of the following criteria; otherwise go to Category 4.

___ Score of 0.8 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
___ Score of 0.9 or 1 functional point for General Wildlife Support; **or**
___ Score of 0.6 to 0.8 functional point for General Fish Support; **or**
___ Score of 0.8 functional point for Uniqueness; **or**
___ Score 0.7 or 0.8 functional point for Water Storage **and** answer to Question 14D.ii. is "yes"; **or**
___ Percent of possible score ≥ 50% (round to nearest whole number).

Category 3 Wetland: Criteria for Categories 1, 2, and 4 are not satisfied.

___ Does not qualify as Category 1, 2, or 4

Category 4 Wetland: Criteria for Categories 1 and 2 not satisfied **and** all of the following criteria are met; if not, go to Category 3.

___ Vegetated wetland component of AA < 1 acre (do not include upland vegetated buffer); **and**
___ Score of 0.5 or lower for Uniqueness; **and**
___ General Wildlife Support is 0.4 or lower; **and**
___ General Fish Support score is 0.3 or lower; **and**
___ If answer to 14D.ii. is "no", score for Water Storage is 0.2, 0.1, or NA; **and**
___ Is not rated "High" for any function or service; **and**
___ Percent of possible score < 35% (round to nearest whole number).

OVERALL ASSESSMENT AREA RATING: (circle appropriate category based on the criteria outlined above)

Category: 1 2 3 4

Appendix B
Waterbody Data and Categorization Form

Even if all or part of a waterbody is being rated as part of a wetland Assessment Area, it should also be rated separately on this form. Evaluate any waterbody that lies within your project's potential direct or indirect effect area, extending at least as far as the project's right-of-way limits.

The landward extent of the waterbody is the Ordinary High Water line for a non-tidal waterbody or the wetland boundary, whichever of those limits is located least landward.

1. Project name and ADOT&PF #: Charles Etok Edwardsen Mitigation Bank

2. Waterbody name (if applicable)**:**_____ **Project-specific waterbody identifier** (if applicable)**: AA5 - Estuarine Waters**

3. Evaluation date: Mo. **7** Day **28-31** Yr. **2015** **4. Evaluator(s) and affiliation: SLI, EKJ: ABR**

5. Purpose of evaluation:

____ Waterbody potentially affected by a proposed project ____ Mitigation waterbody; pre-construction

____ Mitigation waterbody; post-construction X Other: **Mitigation waterbody, preservation, with project**

6. Waterbody location(s):

Legal: T. 22N R. 17W; S. 4-10,16-18; T. 22N R. 18W; S. 1; Umiat Meridian

Approx. stationing or mileposts or pertinent project component:

_____

Lat/long: 71.2823, -156.5088 **Datum:** _NAD 83____ **Nearest community: Utqiaġvik, AK**

Watershed: Elson Lagoon - Frontal Beaufort Sea (12th level HUC 190602020105)

(smallest named stream), tributary of _____

7. Relationship to wetland AA:

Is this waterbody also part of one or more wetland AAs? (Y) **N** (circle one)If yes, pertinent AA numbers: **AA3- Riverine**

Identifying numbers of related data: photos _____

GPS waypoint # **BEO-30,BEO-31** (o**utside project boundary, but similar)** other: _____ Map (#) showing waterbody: **Figure 6**

8. Waterbody description:

If a pond or lake, total area: **3.37** acres estimated or measured ? (circle one)

If a stream: **width** in project area: _____feet (avg) feet (range) **gradient** (% slope): _____%

Diameter and condition of any **culverts** in the project area on this waterbody: _____

For any waterbody: avg. **depth at low water 3** feet avg. depth at bankfull **4 (estimated)** feet

description or average diameter of **substrate**, if observable (e.g., silt, sand, 2", 10") _____

Sketch the typical cross-sectional bank shape(s) :

Describe the waterbody and surrounding land use and habitat types (water source, inlets, outlets, topography, adjacent land uses, relationship to other waterbodies and wetlands): ***AA consists of two small estuaryies; one bounded by Ikpik Slough to the north and adjecent to a riverine section (AA3), and the second bounded by the Beaufort Sea to the east. Both are surrounded by palustrine flats (AA1).***

Briefly describe the condition of the 6th level hydrologic unit subregion with respect to human activities. Estimate the % that is modified, and list the predominant types of modification. ***At the 6th level hydrologic unit subregion, very little is developed beyond Utqiaġvik, AK (<10%).***

9. Classification of Waterbody:

Is the waterbody a

X Stream – flowing water

___ Lake – larger than 20 acres in size when full of water

___ Pond – a still waterbody smaller than 20 acres in size when full, unvegetated or with floating or submerged vegetation

Class (Cowardin)	Water Regime	Modifier (if any)	% of the Waterbody
UN-E2USP	P/P		100

Abbreviations:

Cowardin Classes (modified): Aquatic Bed (**AB**), Unvegetated **(UN)**

Water (Inundation) Regimes (see section 10 and Table 1 in the User's Manual): Permanent/Perennial I(**P/P**), Seasonal/Intermittent (**S/I**), Temporary/Ephemeral (**T/E**)

Modifiers: Excavated (**X**), Impounded (**I**), Diked (**D**), Partly Drained (**PD**), Artificial (**A**), Beaver-modified (**B**)

10. **Disturbance of waterbody:** Place check marks in the rows below that describe any past or present types of disturbance that may affect the waterbody within the project area. Describe any disturbance below.

____ On the Category 5/Section 303(d) Impaired Waterbodies list (see Appendix I).

____ Receives potentially low-quality runoff from development within the project area.

____ Receives potentially low-quality runoff as non-point discharges from human activities upstream.

____ Pipes discharge water from human developments upstream of, or within, the project area.

____ Within the project area, the waterbody's banks or bed have been altered by grading, re-routing, placement of fill, excavation, or similar activities.

____ The hydrologic regime has been altered by upstream developments (extensive storm drain systems, water withdrawals, a dam, etc.).

____ The banks or bed are mildly altered by human activities such as trampling, removal of some vegetation, building or clearing to the top of bank.

____ The waterbody has been affected by disturbance such as described above, but it has physically regained some features of natural banks or bed ("naturalized") such as development of pools and riffles, slight sinuosity, vertical or overhanging banks, overhanging vegetation.

____ Known or suspected to contain invasive or exotic plants or animals – anywhere in the waterbody. (See User's manual Appendix F for noxious and invasive plant information and Appendix G for a list of invasive animal species.) Write **NA** if not within your expertise.

____ Disturbance other than described above.

__X__ None of the above; waterbody is in essentially pristine condition.

Describe any disturbance (types, age, intensity, source, location):

None

List any noxious or invasive plant or animal species in the waterbody (Appendices F and G). If it is not within your expertise to accurately answer this question, or you were unable to investigate this, just cross out this question or record explanatory notes.

None

11. Habitat for Federally Listed or Candidate Threatened or Endangered Animals or Other Species of Concern (see Appendix H):

Waterbody is Documented (D) or Suspected (S) to support (circle one based on definitions contained in instructions):

Primary or critical habitat (**list species**) D S _____

Secondary habitat (**ist species**) D (S) **Spectacled Eider, Stellar's Eider,Polar Bear**

Incidental habitat (**list species**) D S _____

Sources for documented use (e.g., observations, records, etc): **ABR baseline Assessment, BEO Master Plan 2013, Barrow Comprehensive Plan 2014**

12. Wildlife Habitat:

Evidence of overall wildlife use in/on the waterbody (circle substantial, moderate, or low based on supporting evidence):

Substantial (based on any of the following [check]):

__ observations of abundant wildlife or high species diversity (during any period)
__ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
__ presence of extremely limiting habitat features not available in the surrounding area
__ interviews with local biologists with knowledge of the AA

Minimal (based on any of the following [check]):

__ few or no wildlife observed during peak use periods
__ little to no wildlife sign
__ sparse adjacent upland food sources
__ interviews with biologists with knowledge of the AA

Moderate (based on any of the following [check]):

__ observations of scattered wildlife groups or individuals or relatively few species during peak periods
__ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
__ adequate adjacent upland food sources
__X__ interviews with local biologists with knowledge of the AA

Other special wildlife features not addressed above:

13. **Fish Habitat:** (Answer this if the waterbody is used by fish or the existing situation is "correctable" such that the waterbody could be used by fish. If the waterbody is not used by fish, fish use is not restorable, or is not desired from a management perspective, then circle **NA**.)

Is the part of the waterbody within the project area shown in the ADF&G Anadromous Waters Catalog? **Y** (**N**)

Fish species or groups known or suspected to use the waterbody (any part of it):

Other resident species assumed. None observed in field visit.

Sources used for identifying fish species potentially found in the waterbody:

Aquatic cover category (see Table 3) (circle one): Optimal (Adequate) Poor

Is fish use of the waterbody precluded or substantially reduced by a culvert, dike, or other man-made structure or activity? **Y** **N**

Does the waterbody contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area, etc.- specify in comments) for anadromous fish or sport fish? **Y** **N**

Do noxious or invasive plant species (see **Appendix F**) or invasive fish species (see **Appendix G**) occur in the waterbody (anywhere)?
Y **N**
Comments, or refer to section 10 above:

14. Recreation or Subsistence Potential:

Is the waterbody a known or potential recreation site? **Y** **N** Used for subsistence activities? **Y** **N**
If 'Yes,' describe (travel, transport, boating, fishing, trail parallels or crosses it, next to a park or camping area, in proximity to where kids play, etc.).

Which best describes the current waterbody ownership in the project area?

____ Public ownership or public easement with general public access (no permission required)

X Private ownership with general public access (no permission required)

____ Private or public ownership without general public access, or requiring permission for public access

Chart for Assignment of a Waterbody to a Management Category

Determine the appropriate category for the waterbody by working through the chart below. Look at the choices in the first column and choose the one that best describes the waterbody. Then, look at the choices in the second column to the right of the category you chose in column 1; choose the best type from column 2. To the right of that choice, select the best choice from column 3. Continue working to right through the chart until you reach the last column, where the Waterbody Category is assigned.

Waterbody Type	Waterbody Characteristics				Category
Flowing Waterbody	Any flowing waterbody that is documented or suspected critical or primary habitat for listed or candidate threatened or endangered species (see Appendix H)				1
	Any flowing waterbody that is secondary habitat for listed or candidate threatened or endangered species or primary habitat for other species of concern (see Appendix H)				2
	stream	open channel—perennial, seasonal, intermittent, temporary, or ephemeral	natural (undisturbed) or naturalized (recovered from disturbance, with natural-like banks, sinuosity, substrate)	supports salmon	1
				Supports resident and other non-salmon fish species	2
				Not known or thought to support fish	3
			Channelized and not naturalized	supports salmon	1
				does not support salmon	3
		Originally a stream, now in a culvert			4
	ditch (originally formed by excavation; did not originally replace a stream)	open channel, supports salmon			2
		Naturalized, does not support salmon			3
		Not naturalized, does not support salmon			4
	Inactive (abandoned) channel	Seasonally or more often connected to active channel			same as active channel
		irregularly (less than annually) connected to active channel that is…	Category 1		2
			Category 2		3
			Category 3		
			Category 4		4
		No existing connection to an active channel, even at high water			4
Still Waterbody (pond, lake)	*Any still waterbody that is documented or suspected critical or primary habitat for listed or candidate threatened or endangered species (see Appendix H)*				1
	Any still waterbody that is secondary habitat for listed or candidate threatened or endangered species or primary habitat for other species of concern (see Appendix H)				2
	Other still waterbodies	supports *salmon*	Spawning or rearing in potentially affected area		1
			Affected area is migratory route only		2
		Supports resident and other non-salmon fish species used for subsistence or recreation	Spawning or rearing in potentially affected area		1
			Affected area is migratory route only		2
		Supports fish not used by humans			3
		Does not support fish			3

Assigned Waterbody Category: 1 **2** 3 4

FUNCTION AND SERVICE SUMMARY AND OVERALL RATING FOR WETLAND AA #(s):_____

Functions and Services	Rating (E, H, M, L)	Actual Functional Points (0 to 1.0)	Possible Functional Points	Optional: Functional Units Affected (Actual Points x AA Acreage Affected)	Indicate the four most prominent functions with an asterisk (*)
A. Habitat for Federally Listed/Candidate T&E Species or Other Species of Concern	M	0.7	1.0		
B. General Wildlife Support	H	0.9	1.0		
C. General Fish Support	M	0.6	1.0		
D. Water Storage	NA	NA	NA		
E. Sediment/Nutrient/Toxicant Removal	M	0.5	1.0		
F. Sediment/Shoreline Stabilization	NA	NA	NA		
G. Production Export/Food Chain Support	M	0.6	1.0		
H. Groundwater Discharge/Recharge	NA	NA	NA		
I. Uniqueness	M	0.7	1.0		
J. Recreation/Education Potential (bonus points)	H	0.15	NA		
Totals:		4.15	6.0		
Percentage of Possible Score (actual points divided by possible points)		69 %			

Category 1 Wetland: Must satisfy **one** of the following criteria; otherwise go to Category 2.
___ Score of 0.9 to 1 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
___ Score of 0.9 or 1 functional point for Uniqueness; **or**
___ Score of 0.9 or 1 functional point for Water Storage **and** answer to Question 14D.ii. is "yes"; **or**
___ Score of 0.9 or 1 functional point for General Fish Support; **or**
___ Percent of possible score ≥ 70% (round to nearest whole number); or
___ Percent of possible score ≥ 50% **and** 6th level hydrologic unit subregion has already experienced ≥15% land development.

Category 2 Wetland: Criteria for Category 1 not satisfied **and** meets any **one** of the following criteria; otherwise go to Category 4.
___ Score of 0.8 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
___ Score of 0.9 or 1 functional point for General Wildlife Support; **or**
___ Score of 0.6 to 0.8 functional point for General Fish Support; **or**
___ Score of 0.8 functional point for Uniqueness; **or**
___ Score 0.7 or 0.8 functional point for Water Storage **and** answer to Question 14D.ii. is "yes"; **or**
___ Percent of possible score ≥ 50% (round to nearest whole number).

Category 3 Wetland: Criteria for Categories 1, 2, and 4 are not satisfied.
___ Does not qualify as Category 1, 2, or 4

Category 4 Wetland: Criteria for Categories 1 and 2 not satisfied **and** all of the following criteria are met; if not, go to Category 3.
___ Vegetated wetland component of AA < 1 acre (do not include upland vegetated buffer); **and**
___ Score of 0.5 or lower for Uniqueness; **and**
___ General Wildlife Support is 0.4 or lower; **and**
___ General Fish Support score is 0.3 or lower; **and**
___ If answer to 14D.ii. is "no", score for Water Storage is 0.2, 0.1, or NA; **and**
___ Is not rated "High" for any function or service; **and**
___ Percent of possible score < 35% (round to nearest whole number).

OVERALL ASSESSMENT AREA RATING: (circle appropriate category based on the criteria outlined above)

Category: 1 2 3 4

Appendix A
Wetland Assessment Data Form

Digital Form – Use only if completing on a computer. Otherwise, use form in AKWAM manual.
Use this form to assess areas that are primarily wetlands (versus waterbodies). For waterbodies, use the Waterbody Categorization Form.

1. Project name: Charles Etok Edwardsen Mitigation Bank **2. Assessment Area #(s):** AA6 - Lacustrine Fringe

3. Evaluation date: Mo. 07 Day 30 Yr. 2015

4. Evaluator(s) and affiliation: **SLI, EKJ,ABR**

5. Purpose of evaluation:

☐ Wetland/waterbody potentially affected by a proposed project ☐ Mitigation wetlands; pre-construction

☐ Mitigation wetlands; post-construction ☒ Other Mitigation wetlands; preservation; Current/ with project condition

6. Wetland location(s):

Legal: T. **22N** R. **17W**; S. **4-10,16-18**; T. **22N** R. **18W**; S. **1**; Umiat Meridian

Lat. (dec. deg.): **71.2823** Long.: **-156.5088** Datum: NAD 83

Nearest community: Utqiaġvik, AK

Watershed: *Elson Lagoon - Frontal Beaufort Sea (12th level HUC 190602020105)*

Ecoregion (from USCOE 2007): _____

7. Identifying numbers of related data: wetland determination forms **BEO-15, BEO-01** photos **see ABR Report Appendices A and C** GPS waypoint # _____ other

Map (#) showing AA: **Figure_6** (closely follow the User's Manual instructions for identifying the AA)

Briefly describe the features that define the limits of the AA (e.g., tributary, wetland/upland boundary, extreme low tide elevation)**:**

AA1 consists of NWI class palustrine (PEM1H, PEM1F), lacustrine fringe (HGM) graminoid (sedge) marsh surrounding 10 - 25 acre ponds (PUBH Shallow Open Water without Islands/L1UBH Deep Open Water without Islands, HGM: Depressional). Occurs along the fringes of 2 small ponds. Vegetation types are aquatic sedge marsh or floating mats with significant moss cover. Typical graminoid species include Arctophila fulva, Carex aquatilis and Eriophorum angustifolium.

8. Wetland size (total acres, not just AA): ____ acres (visually estimated) or **37.35** acres (measured, e.g., in GIS)

9. Assessment area (AA) size: _____ acres (visually estimated) or **37.35** acres (measured)

Note: _____

Acreage of the AA MINUS the part that is waterbody that will be separately assessed using the waterbody form: **3.37** acres of wetland in AA

10. Classification of Wetland and Waterbody in the Wetland AA:

Class (Cowardin)	Water Regime (Cowardin)	Modifier (if any; Cowardin)	% of AA
EM - PEM1H	P/P		7%
EM - PEM1F	S/I		2%
UN - PUBH/L1UBH	P/P		91%

HGM Class (Brinson)	% of AA
LF	9%
	%
	%
	%

HGM Classes: Riverine (**R**), Depressional (**D**), Slope (**S**), Flat (**F**), Lacustrine Fringe (**LF**)

Abbreviations:

Cowardin Classes: Forested Wetland (**FO**), Scrub-Shrub Wetland (**SS**), Emergent Wetland (**EM**), Moss-lichen Wetland (**ML**), Aquatic Bed (**AB**), Unvegetated (**UN**)

Water (Inundation) Regimes: Permanent/Perennial (**P/P**), Seasonal/Intermittent (**S/I**), Temporary/Ephemeral/Saturated (**T/E**)

Modifiers: Excavated (**X**), Impounded (**I**), Diked (**D**), Partly Drained (**PD**), Farmed (**F**), Artificial (**A**), Beaver-modified (**B**)

11. Estimated relative abundance of similar wetlands within the same 6th level hydrologic unit subregion (see definitions in user's manual)**:**

(check one) ☐Unknown ☒Rare ☐Common ☐Abundant

What information sources did you use for this estimate?

Estimate based on visual observation of lacustrine fringe *wetlands within HUC.*

12. **General condition of AA:**

i. Disturbance (see user's manual for descriptions of disturbance levels; check appropriate box):

Conditions adjacent to AA / ***Conditions within AA***	***Predominant conditions adjacent to (within 500 feet of) the AA, plus any area that drains into the AA***		
	Adjacent land is in a natural state	***Adjacent land has experienced minimal or minor disturbance***	***Adjacent land is substantially disturbed***
AA is in a natural state	☒ low disturbance	☐ low disturbance	☐ moderate disturbance
AA has experienced minimal or minor disturbance	☐ moderate disturbance	☐ moderate disturbance	☐ high disturbance
AA is substantially disturbed	☐ high disturbance	☐ high disturbance	☐ high disturbance

Describe the disturbance within the AA (type, age, intensity, source of disturbance, location)**:** *AA is adjacent to PEM1F, Depressional wet sedge meadow tundra with a few ATV trails adjacent to the AA.*

ii. Consider the 6th level HU containing the AA again. If you estimate that **more than 10% of the land in the 6th level HU is disturbed**, check

here ☐, and choose (below) the disturbance level that is one level higher:

☐ low disturbance ☐ moderate disturbance ☐ high disturbance

iii. List any noxious or invasive plant or animal species in the AA or surrounding lands (specify which are in the AA):

None.

iv. Briefly describe the AA and surrounding land use and habitat types (dominant species, water source, topography, approximate slope, inlets and outlets, land use, relationship to other AAs, adjacent vegetation types and land uses)**:**

AA1 consists of NWI class palustrine (PEM1H, PEM1F), lacustrine fringe (HGM) graminoid (sedge) marsh surrounding two small (10 - 25 acre) ponds (PUBH Shallow Open Water without Islands/L1UBH Deep Open Water without Islands, HGM: Depressional). Occurs along the fringes of 2 small ponds. Vegetation types are aquatic sedge marsh or floating mats with significant moss cover. Typical graminoid species include Arctophila fulva, Carex aquatilis and Eriophorum angustifolium. The AA is surrounded by a wetland complex that includes Saturated Graminoid Meadow and Semipermanently Flooded Wet Graminoid Meadow, with virtually no disturbance.

13. **Structural Diversity of AA** (based on number of simplified Cowardin **vegetated** classes present, listed in #10 above):

Existing # of Cowardin vegetated classes in AA	***Rating***
≥3 classes; or 2 classes if 1 is forested	☐ H
2 classes; or 1 class if forested	☒ M
1 class, and humans do not prevent establishment of additional classes	☐ M
1 class, and humans limit establishment of additional classes	☐ L

14A. Habitat for Federally Listed or Candidate Threatened or Endangered Plants or Animals or Other Species of Concern:

i. AA is Documented (D) or Suspected (S) to contain (check one based on definitions contained in instructions):

Primary or critical habitat (**list species**) ☐ D ☒ S species: **Steller's eider (T)**

Secondary habitat (**list species**) ☐ D ☒ S species: **Polar bear (T), Spectacled Eider**

Incidental habitat (**list species**) ☐ D ☐ S species: _____

None or unknown ☐

ii. Rating (use the conclusions from 14A.i. above and the matrix below to arrive at [check] the functional points and rating):

Highest Habitat Level	*doc/ primary*	*sus/ primary*	*doc/ secondary*	*sus/ secondary*	*doc/ incidental*	*sus/ incidental*	*None*
One or more of the species listed in 14A.i. is a federally Listed or Candidate Threatened or Endangered Speceis	☐ 1H	☒ .9H	☐ .8M	☐ .7M	☐ .3L	☐ .1L	☐ 0L
Species listed 14A.i. are all "Other Species of Concern" (i.e., not listed under the Endangered Species Act)	☐ .8M	☐ .7M	☐ .6M	☐ .5M	☐ .2L	☐ .1L	☐ 0L

Sources for documented or suspected use (e.g., observations, records, etc):
Two threatened sea duck species, Steller's Eider (Polysticta stelleri) and Spectacled Eider (Somateria fischeri), are present in the area during the breeding season (ABR Report, BEO Master Plan 2013, Barrow Comprehensive Plan 2014). Stellar's Eider were documented in surrounding palustrine wetlands and deep open water adjacent to the AA (ALCC 2012 from ABR Baseline Assessment, Appendix C). Based on expected habitat use (see ABR report), both eider species are expected to use AA habitat at some point in their life cycle. The AA is within the 2010 Polar Bear critical habitat zone (although it is under review).

iii. Final Score and Rating: 0.9H Enter on the summary page on the Habitat for Federally Listed Species row.

14B. General Wildlife Support Rating:
i. Evidence of overall wildlife use in the AA (check substantial, moderate, or low based on supporting evidence):

Substantial (based on any of the following [check]):
- ☒ observations of abundant wildlife #s or high species diversity (during any period) during peak use periods
- ☒ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ presence of extremely limiting habitat features not available in the surrounding area sources
- ☐ interviews with local biologists with knowledge of the AA or its habitat type

Minimal (based on any of the following [check]):
- ☐ few or no wildlife observations
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food
- ☐ interviews with local biologists with knowledge of the AA

Moderate (based on any of the following [check]):
- ☐ observations of scattered wildlife groups or individuals or relatively few species during peak periods
- ☐ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ upland food sources exist in moderate quantity
- ☐ interviews with local biologists with knowledge of the AA or its habitat type

ii. Wildlife habitat features Working from top to bottom, check appropriate AA attributes in the matrix to arrive at the rating.
Structural diversity is from question #13.
For class cover to be considered evenly distributed, the most and least prevalent **vegetated** classes must be within 20% of each other in terms of their percent age of the AA (see #10).
Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent. See instructions for further definitions of these terms.

Structural diversity (from #13)	***High***								***Moderate***								***Low***			
Class cover distribution (all vegetated classes)	***Even***				***Uneven***				***Even***				***Uneven***				***Even***			
Longest duration of surface water in ≥ 10% of AA, or immediately abutting the AA	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***	***P/P***	***S/I***	***T/E***	***A***
***Low** disturbance at AA (see #12i & 12ii)*	☐ E	☐ E	☐ E	☐ H	☐ E	☐ E	☐ H	☐ H	☒ E	☐ H	☐ H	☐ M	☐ E	☐H	☐ M	☐ M	☐ E	☐ H	☐ M	☐ M
***Moderate** disturbance at AA (see #12i & 12ii)*	☐ H	☐ H	☐ H	☐ H	☐ H	☐ H	☐ H	☐ M	☐ H	☐ H	☐ M	☐ M	☐ H	☐ M	☐ M	☐ L	☐ H	☐ M	☐ L	☐ L
***High** disturbance at AA (see #12i & 12ii)*	☐ M	☐ M	☐ M	☐ L	☐ M	☐ M	☐ L	☐ L	☐ M	☐ M	☐ L	☐ L	☐ M	☐ L	☐ L	☐ L	☐ L	☐ L	☐ L	☐ L

iii. Rating (use the conclusions from i. and ii. above and the matrix below to arrive at [check] the functional points and rating)

	Wildlife habitat features rating (ii)			
Evidence of wildlife use (i)	***Exceptional***	***High***	***Moderate***	***Low***
Substantial	☒ 1E	☐ .9H	☐ .8H	☐ .7M
Moderate	☐ .9H	☐ .7M	☐ .5M	☐ .3L
Minimal	☐ .6M	☐ .4M	☐ .2L	☐ .1L

iv. Final Score and Rating: 1.0E Enter on the summary page on the General Wildlife Support row.
Comments:
The AA evaluation included evidence of use by dunlin, goose, swan, grazers, fox, and other species. In addition, the ABR Baseline Assessment included a review of wildlife use by wetland functional class for the region including the AA.

14C. **General Fish Support Rating:** (Assess this function if any part of the AA (including the waterbody part of a wetland AA) is used by fish or the existing situation is "correctable" such that the AA could be used by fish. If the AA is not used by fish, fish use is not restorable, or is not desired from a management perspective, then check ☐ **NA** here and proceed to 14D.)

i. Habitat Quality and Known / Suspected Fish Species in AA (use matrix to arrive at [check] the functional points and rating)

Duration of surface water in AA	***Permanent / Perennial***			***Seasonal / Intermittent***			***Temporary / Ephemeral***		
Aquatic hiding / resting / escape cover in waterbody (Table 3 in manual)	*Optimal*	*Adequate*	*Poor*	*Optimal*	*Adequate*	*Poor*	*Optimal*	*Adequate*	*Poor*
Anadromous salmon species	☐ 1E	☐.8H	☐.6M	☐.9H	☐.7M	☐.5M	☐.7M	☐.5M	☐.3L
Resident and non-salmon sport and subsistence species	☐.9H	☐.7M	☐.5M	☐.8H	☐.6M	☐.4M	☐.6M	☐.4M	☐.2L
Other resident species	☐.8H	☒.6M	☐.4M	☐.7M	☐.5M	☐.3L	☐.5M	☐.3L	☐.1L

Sources used to identify fish species potentially found in AA: ADF&G Anadromous Waters Catalog (ADF&G 2015a); ADF&G Freshwater Fish Inventory (ADF&G 2015b).

ii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1)

*a) Is fish use of the AA precluded or substantially reduced by a culvert, dike, or other man-made structure or activity **or** is the waterbody included on the current Alaska Department of Environmental Conservation list of Category 5 / Section 303(d) Impaired Waterbodies (unless its impaired uses are named and aquatic life is not listed as impaired)?*

☐**Y** ☒**N** *If yes, reduce the score in 14C.i. by 0.1:* _____ *(If no, do not change the score.)*

b) Do noxious or invasive plant species or invasive fish species (see Appendices F and G) occur in the AA?

☐**Y** ☒**N** *If yes, reduce the score in 14C.i. by 0.1:* _____ *(If no, do not change the score.)*

iii. Final Score and Rating: 0.6M Enter on the summary page on the General Fish Support row.
Comments:

14D. **Water Storage:** (Applies to wetlands that flood or pond from overbank flooding, precipitation, or overland flow from uplands. If no wetlands in the AA are subject to inundation or ponding, check ☐ **NA** here and proceed to 14E.)

i. Rating
Estimate the variation in the water volume stored in the **wetland** portion of the AA **that experiences surface ponding or flooding** during the typical year, between break-up and freeze-up. First, identify the part of the AA that is both wetland and has surface water sometime between breakup and freezeup (the "flooded wetland"). Estimate its area in acres: **3.37** acres = A.

Second, estimate the range in that flooded wetland's water surface elevation between its lowest and highest elevation during the unfrozen period, in feet. Call this D for depth: **1.25** feet = D. For example, if the water table is typically one foot below the ground surface during the driest part of summer, and is typically 6 inches above the surface following breakup, the range is 18 inches, or 1.5 feet. Consider evidence such as water marks, staining on vegetation or rocks, drift lines, and the depth to the water table in your soil pit. Consider also the elevation of the wetland surface relative to the elevation of the water surface in an adjacent stream (i.e., does the channel overflow its banks into the wetland?). During a flood, the depth of water over a stream channel is likely to be double its depth when the stream is full to its banks. Consider the area the stream would flood when the water is that deep.

Multiply the range in the flooded wetland's water surface elevation (D) times the area (A) to estimate the maximum storage volume in acre-feet. D **1.25** feet X A **3.37** acres = **4.21** acre-feet. Use this storage volume estimate in the matrix below.

Next, determine the portion of the flooded wetland that is forested, shrub-dominated, or is neither of those but is dominated by hummocks or tussocks at least one foot in height:
% of AA that experiences water surface fluctuation that is forested or scrub/shrub **0**%
plus the additional % of the flooded wetland that is hummocky **30** %
= **30** % of flooded wetland with water-slowing roughness. Use this percentage in the second row of the matrix below.

Working from top to bottom, use the matrix below to arrive at [check] the functional points and rating.

Estimated maximum acre-feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding	***>5 acre-feet***			***1 to 5 acre-feet***			***<1 acre-foot***		
% of flooded wetland classified as forested or scrub/shrub or dominated by hummocks > 1 foot tall	*>75%*	*25-75%*	*<25%*	*>75%*	*25-75%*	*<25%*	*>75%*	*25-75%*	*<25%*
AA contains ***no outlet or restricted outlet***	☐ 1H	☐ .9H	☐ .6M	☐ .8H	☒ .7M	☐ .5M	☐ .4M	☐ .3L	☐ .2L
AA contains ***unrestricted outlet***	☐ .9H	☐ .8H	☐ .5M	☐ .7M	☐ .6M	☐ .4M	☐ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: 0.7M Enter on the summary page on the Water Storage row.

Comments:

Wetlands within AA are subject to seasonal or irregular inundation and likely store water during those periods. There were no channelized outlets observed, but sheet flow to and from surrounding wetlands is likely.

iii. Potential Property Protection

Are ≥10 acres of wetland in the AA subject to flooding **AND** are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA (check)? ☐**Y** ☒ **N** (This information will be used later.)

Comments:

14E. **Sediment/Nutrient/Toxicant Retention and Removal:** (Applies to wetlands with potential to receive sediments, nutrients, or toxicants through influx of surface or ground water or direct input. If no wetlands in the AA are, or with the planned project will be, subject to such input, check ☐ **NA** here and proceed to 14F.)

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating [H = high, M = moderate, or L = low])

Sediment, nutrient, and toxicant input levels within AA	*AA receives or surrounding land use (including proposed future land use) has potential to deliver levels of sediments, nutrients, or toxicants at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication are present, or sources are suspected.*				*Waterbody is on Alaska's Section 303(d) List of Impaired Waterbodies or AA receives or surrounding land use has potential to deliver high levels of sediments, nutrients, or toxicants such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, unnatural turbidity, or signs of eutrophication are present.*			
% cover of vegetation in AA	≥ 70%		< 70%		≥ 70%		< 70%	
Evidence of flooding / ponding in AA	Yes	No	Yes	No	Yes	No	Yes	No
AA contains ***no or restricted outlet***	☐ 1H	☐ .8H	☒ .7M	☐ .5M	☐ .5M	☐ .4M	☐ .3L	☐ .2L
AA contains ***unrestricted outlet***	☐ .9H	☐ .7M	☐ .6M	☐ .4M	☐ .4M	☐ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: 0.7M Enter on the summary page on the Sediment/Nutrient/Toxicant Retention row.

Comments:

AA likely receives sediments, nutrients, and/or toxicants from adjacent areas. ABR Baseline Report contains details on vegetation and ponding observed. Lacustrine Fringe portion of AA is well-vegetated compared to open water portion of AA.

14F. Sediment/Shoreline Stabilization: (Applies only if AA occurs on or within the banks of a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action. If 14F does not apply, check ☐ **NA** here and proceed to 14G.)

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating)

For the <u>wetland</u> area subjected to erosive forces, % cover of species with deep, soil-binding root masses	***Duration of surface water adjacent to rooted vegetation in the AA***		
	Permanent / Perennial	***Seasonal / Intermittent***	***Temporary / Ephemeral***
≥ 65%	☐ 1H	☐ .9H	☐ .7M
35-64%	☒ .7M	☐ .6M	☐ .5M
< 35%	☐ .3L	☐ .2L	☐ .1L

ii. Final Score and Rating: **0.7M** Enter on the summary page on the Sediment/Shoreline Stabilization row.

Comments:

14G. Production Export/Terrestrial and Aquatic Food Chain Support:

i. Level of Biological Activity (synthesis of wildlife and fish habitat ratings from 14B and 14C [check appropriate box in matrix])

General Fish Habitat Rating (14C.iii.)	*General Wildlife Habitat Rating (14B.iii.)*		
	E/H	***M***	***L***
E/H	☐ H	☐ H	☐ M
M	☒ H	☐ M	☐ M
L	☐ M	☐ M	☐ L
NA	☐ M	☐ M	☐ L

ii. Rating Working from top to bottom, use the matrix below to arrive at [check] the functional points and rating.
Factor A = acreage of vegetated wetland component in the AA; Factor B = level of biological activity rating from above (14G.i.); Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to duration of surface water in the AA, where P/P, S/I, and T/E are as defined under #10 above, and A = "absent")

A	***Vegetated component >5 acres***						***Vegetated component 1-5 acres***						***Vegetated component <1 acre***					
B	***High***		***Moderate***		***Low***		***High***		***Moderate***		***Low***		***High***		***Moderate***		***Low***	
C	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***	***Yes***	***No***
P/P	☐ 1H	☐ .7M	☐ .8H	☐ .5M	☐ .6M	☐ .4M	☐ .9H	☒ .6M	☐ .7M	☐ .4M	☐ .5M	☐ .3L	☐ .8H	☐ .6M	☐ .6M	☐ .4M	☐ .3L	☐ .2L
S/I	☐ .9H	☐ .6M	☐ .7M	☐ .4M	☐ .5M	☐ .3L	☐ .8H	☐ .5M	☐ .6M	☐ .3L	☐ .4M	☐ .2L	☐ .7M	☐ .5M	☐ .5M	☐ .3L	☐ .3L	☐ .2L
T/E or A	☐ .8H	☐ .5M	☐ .6M	☐ .3L	☐ .4M	☐ .2L	☐.7M	☐ .4M	☐ .5M	☐ .2L	☐ .3L	☐ .1L	☐ .6M	☐ .4M	☐ .4M	☐ .2L	☐ .2L	☐ .1L

iii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1.)
A **Vegetated Upland Buffer** is an area with ≥ 30% plant cover, ≤ 2% noxious or invasive plant cover, and that is not subjected to periodic mowing or clearing (unless for weed control).
a) Is there an average ≥50-foot-wide vegetated upland buffer around ≥75% of the AA circumference?
☒**Y** ☐**N** *If yes, add 0.1 to the score in **14G.ii.** above and adjust the rating accordingly:*

iv. Final Score and Rating: **0.7M** Enter on the summary page on the Production Export row.

Comments: There are no uplands present around the AA, so 14Giii was answered based on the vegetated wetland buffer around the the AA.

14H. **Groundwater Discharge/Recharge:** (Check the appropriate indicators in i. and ii. below.)

i. Discharge Indicators

☐ The AA is a slope wetland (HGM type)
☐ Springs or seeps are known or observed
☐ Vegetation growing during dormant season
☐ Wetland occurs at the toe of a natural slope
☐ AA permanently flooded during dry periods
☐ Wetland contains an outlet, but no inlet
☐ Other: _____

ii. Recharge Indicators ☒ **(NA for fringe wetlands)**

☐ Permeable substrate present without underlying impeding layer
☐ Wetland contains inlet but no outlet
☐ Stream is a known 'losing' stream; discharge decreases downstream
☐ Other: _____

iii. Rating (use the information from i. and ii. above and the table below to arrive at [check] the functional points and rating)

Criteria	*Duration of saturation at AA wetlands FROM GROUNDWATER DISCHARGE OR WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM*			
	P/P	***S/I***	***T/E***	***None***
Groundwater discharge or recharge indicators exist	☐ 1H	☐ .7M	☐ .4M	☐ .1L
Permafrost underlies the wetland or insufficient information exists	☐ NA			

iv. Final Score and Rating: N/A Enter on the summary page on the Groundwater Discharge/Recharge row.
Comments:
N/A for fringe wetlands.

14l. Uniqueness:

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating)

Replacement potential	*AA contains irreplaceable wetland types [fens, bogs, springs, seeps, or mature forested wetland type] OR a plant association listed as S1, S2, G1, or G2 by the AKNHP (Appendix J)*			*AA does not contain irreplaceable wetland types and structural diversity (#13) is high OR contains plant association listed as S3, G3, S?, or G? by the AKNHP (Appendix J)*			*AA does not contain irreplaceable wetland types and structural diversity (#13) is low to moderate (Appendix J)*		
Estimated relative abundance of wetland types (from 11)	***rare***	***common***	***abundant***	***rare***	***common***	***abundant***	***rare***	***common***	***abundant***
Low disturbance at AA (from 12i and ii)	☐ 1H	☐ .6M	☐ .5M	☐ .8H	☐ .5M	☐ .4M	☒ .7M	☐ .4M	☐ .3L
Moderate disturbance at AA (from 12i and ii)	☐.9H	☐ .5M	☐ .4M	☐ .7M	☐ .4M	☐ .3L	☐ .6M	☐ .3L	☐ .2L
High disturbance at AA (from12i and ii)	☐ .7M	☐ .3L	☐ .2L	☐ .5M	☐ .2L	☐ .1L	☐ .4M	☐ .1L	☐ .1L

ii. Final Score and Rating: 0.7M Enter on the summary page on the Uniqueness row.

Comments:

14J. Recreation/Education Potential: (affords "bonus" points if AA provides recreation or education opportunity)
i. Is the AA a known or potential recreation or education site: (check) ☒**Y** ☐ **N** (if 'Yes' continue with the evaluation; if 'No' then check ☐ **NA** here and proceed to the overall summary and rating page)

ii. Check categories that apply to the AA:

☒ Educational/scientific study ☐ Consumptive recreation ☐ Non-consumptive recreation ☒Other **Subsistence Use**

iii. Rating (use the matrix below to arrive at [check] the functional points and rating)

Known or Potential Recreation or Education Area	*Known*	*Potential*
Public ownership or public easement with general public access (no permission required)	☐ .2H	☐ .15H
Private ownership with general public access (no permission required)	☒ .15H	☐ .1M
Private or public ownership without general public access, or requiring permission for public access	☐ .1M	☐ .05L

iv. Final Score and Rating: 0.1M Enter on the summary page on the Recreation/Education Potential row.
Comments:
Property is currently under private ownership but does not appear to prohibit subsistence use by the public. ATV trails occur occasionally near the AA. Scientific use requires a permit.

General Site Notes:

FUNCTION AND SERVICE SUMMARY AND OVERALL RATING FOR WETLAND AA #(s):

AA1 - Estuarine Wetlands

Functions and Services	Rating (E, H, M, L)	Actual Functional Points (0 to 1.0)	Possible Functional Points	Optional: Functional Units Affected (Actual Points x AA Acreage Affected)	Indicate the four most prominent functions with a check
A. Habitat for Federally Listed/Candidate T&E Species or Other Species of Concern	H	0.9	1.0		☒
B. General Wildlife Support	H	1.0	1.0		☒
C. General Fish Support	M	0.6	1.0		☐
D. Water Storage	M	0.7	1.0		☐
E. Sediment/Nutrient/Toxicant Removal	M	0.7	1.0		☒
F. Sediment/Shoreline Stabilization	M	0.7	1.0		☐
G. Production Export/Food Chain Support	M	0.7	1.0		☒
H. Groundwater Discharge/Recharge	N/A	N/A	N/A		☐
I. Uniqueness	M	0.7	1.0		☐
J. Recreation/Education Potential (bonus points)	H	0.15			☐
Totals:		6.15	8.0		
Percent of Possible Score (actual points divided by possible points)		77%			

Category 1 Wetland: Must satisfy **one** of the following criteria; otherwise go to Category 2

☒ Score of 0.9 to 1 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
☐ Score of 0.9 or 1 functional point for Uniqueness; **or**
☐ Score of 0.9 or 1 functional point for Water Storage **and** answer to Question 14Dii is "yes"; **or**
☐ Score of 0.9 or 1 functional point for General Fish Support; **or**
☒ Percent of possible score ≥ 70% (round to nearest whole number); or
☐ Percent of possible score ≥ 50% **and** 6th level hydrologic unit has already experienced ≥15% land development.

Category 2 Wetland: Criteria for Category 1 not satisfied **and** meets any **one** of the following criteria; otherwise go to Category 4

☐ Score of 0.8 functional point for Threatened or Endangered Species or Other Species of Concern; **or**
☐ Score of 0.9 or 1 functional point for General Wildlife Support; **or**
☐ Score of 0.6 to 0.8 functional point for General Fish Support; **or**
☐ Score of 0.8 functional point for Uniqueness; **or**
☐ Score 0.7 or 0.8 functional point for Water Storage **and** answer to Question 14Dii is "yes"; **or**
☐ Percent of possible score ≥ 50% (round to nearest whole number).

Category 3 Wetland: Criteria for Categories 1, 2, and 4 are not satisfied

☐ Does not qualify as Category 1, 2, or 4

Category 4 Wetland: Criteria for Categories 1 and 2 not satisfied **and** all of the following criteria are met; if not, go to Category 3

☐ Vegetated wetland component of AA < 1 acre (do not include upland vegetated buffer); **and**
☐ Score of 0.5 or lower for Uniqueness; **and**
☐ General Wildlife Support is 0.4 or lower; **and**
☐ General Fish Support score is 0.3 or lower; **and**
☐ If answer to 14Dii is "no", score for Water Storage is 0.2, 0.1, or NA; **and**
☐ Is not rated "High" for any function or service; **and**
☐ Percent of possible score < 35% (round to nearest whole number).

OVERALL ASSESSMENT AREA RATING: (check appropriate category based on the criteria outlined above)

Category: ☒1 ☐2 ☐3 ☐4

Appendix B
Waterbody Data and Categorization Form

Even if all or part of a waterbody is being rated as part of a wetland Assessment Area, it should also be rated separately on this form. Evaluate any waterbody that lies within your project's potential direct or indirect effect area, extending at least as far as the project's right-of-way limits.

The landward extent of the waterbody is the Ordinary High Water line for a non-tidal waterbody or the wetland boundary, whichever of those limits is located least landward.

1. Project name and ADOT&PF #: Charles Etok Edwardsen Mitigation Bank

2. Waterbody name (if applicable)**:**_____ **Project-specific waterbody identifier** (if applicable)**: AA7 - Lakes**

3. Evaluation date: Mo. **7** Day **28-31** Yr. **2015** **4. Evaluator(s) and affiliation: SLI, EKJ: ABR**

5. Purpose of evaluation:

____ Waterbody potentially affected by a proposed project ____ Mitigation waterbody; pre-construction

____ Mitigation waterbody; post-construction X Other: **Mitigation waterbody, preservation, with project**

6. Waterbody location(s):

Legal: T. 22N R. 17W; S. 4-10,16-18; T. 22N R. 18W; and T ____ N or S; R ____ E or W; S _____ ; **Umiat** Meridian

Approx. stationing or mileposts or pertinent project component:

_____

Lat/long: 71.2823,-156.5088 Datum: _NAD 83____ **Nearest community: Utqiaġvik, AK**

Watershed: Elson Lagoon - Frontal Beaufort Sea (12th level HUC 190602020105)

(smallest named stream), tributary of _____

7. Relationship to wetland AA:

Is this waterbody also part of one or more wetland AAs? (Y) **N** (circle one) If yes, pertinent AA numbers: **West small lake included in AA6 assessment.** Identifying numbers of related data: photos _____ GPS waypoint # **BEO-33, BEO-02** other: _____

Map (#) showing waterbody: **Figure 6**

8. Waterbody description:

If a pond or lake, total area: **723.35** acres estimated or measured ? (circle one)

If a stream: **width** in project area: _____feet (avg) _____feet (range) **gradient** (% slope): _____%

Diameter and condition of any **culverts** in the project area on this waterbody: _____

For any waterbody: avg. **depth at low water 1-6** feet avg. depth at bankfull **>6 (estimated)** feet

description or average diameter of **substrate**, if observable (e.g., silt, sand, 2", 10") _____

Sketch the typical cross-sectional bank shape(s) :

Describe the waterbody and surrounding land use and habitat types (water source, inlets, outlets, topography, adjacent land uses, relationship to other waterbodies and wetlands): ***AA consists of four open water lakes of various sizes, surrounded by palustrine depressional sedge wetlands that are semipermanently flooded or palustrine flat seasonally flooded sedge wetlands. One smaller lake on the west side of the project is surrounded by lacustrine fringe (AA6), and is included in that assessment as well.***

Briefly describe the condition of the 6th level hydrologic unit subregion with respect to human activities. Estimate the % that is modified, and list the predominant types of modification. ***At the 6th level hydrologic unit subregion, very little is developed beyond Utqiaġvik, AK (<10%).***

9. Classification of Waterbody:

Is the waterbody a

___ Stream – flowing water

X Lake – larger than 20 acres in size when full of water

___ Pond – a still waterbody smaller than 20 acres in size when full, unvegetated or with floating or submerged vegetation

Class (Cowardin)	Water Regime	Modifier (if any)	% of the Waterbody
UN-PUB1H	P/P		100

Abbreviations:

Cowardin Classes (modified): Aquatic Bed (**AB**), Unvegetated **(UN)**

Water (Inundation) Regimes (see section 10 and Table 1 in the User's Manual): Permanent/Perennial I(**P/P**), Seasonal/Intermittent (**S/I**), Temporary/Ephemeral (**T/E**)

Modifiers: Excavated (**X**), Impounded (**I**), Diked (**D**), Partly Drained (**PD**), Artificial (**A**), Beaver-modified (**B**)

10. **Disturbance of waterbody:** Place check marks in the rows below that describe any past or present types of disturbance that may affect the waterbody within the project area. Describe any disturbance below.

____ On the Category 5/Section 303(d) Impaired Waterbodies list (see Appendix I).

____ Receives potentially low-quality runoff from development within the project area.

____ Receives potentially low-quality runoff as non-point discharges from human activities upstream.

____ Pipes discharge water from human developments upstream of, or within, the project area.

____ Within the project area, the waterbody's banks or bed have been altered by grading, re-routing, placement of fill, excavation, or similar activities.

____ The hydrologic regime has been altered by upstream developments (extensive storm drain systems, water withdrawals, a dam, etc.).

____ The banks or bed are mildly altered by human activities such as trampling, removal of some vegetation, building or clearing to the top of bank.

____ The waterbody has been affected by disturbance such as described above, but it has physically regained some features of natural banks or bed ("naturalized") such as development of pools and riffles, slight sinuosity, vertical or overhanging banks, overhanging vegetation.

____ Known or suspected to contain invasive or exotic plants or animals – anywhere in the waterbody. (See User's manual Appendix F for noxious and invasive plant information and Appendix G for a list of invasive animal species.) Write **NA** if not within your expertise.

____ Disturbance other than described above.

__X__ None of the above; waterbody is in essentially pristine condition.

Describe any disturbance (types, age, intensity, source, location):

None

List any noxious or invasive plant or animal species in the waterbody (Appendices F and G). If it is not within your expertise to accurately answer this question, or you were unable to investigate this, just cross out this question or record explanatory notes.

None

11. Habitat for Federally Listed or Candidate Threatened or Endangered Animals or Other Species of Concern (see Appendix H):

Waterbody is Documented (D) or Suspected (S) to support (circle one based on definitions contained in instructions):

Primary or critical habitat (**list species**) (D) S **Stellar's Eider**

Secondary habitat (**list species**) D (S) **Spectacled Eider, Polar Bear**

Incidental habitat (**list species**) D S

Sources for documented use (e.g., observations, records, etc): **ABR baseline Assessment, BEO Master Plan 2013, Barrow Comprehensive Plan 2014**

12. Wildlife Habitat:

Evidence of overall wildlife use in/on the waterbody (circle substantial, moderate, or low based on supporting evidence):

Substantial (based on any of the following [check]):

__ observations of abundant wildlife or high species diversity (during any period)

__X__ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.

__ presence of extremely limiting habitat features not available in the surrounding area

__X__ interviews with local biologists with knowledge of the AA

Minimal (based on any of the following [check]):

__ few or no wildlife observed during peak use periods

__ little to no wildlife sign

__ sparse adjacent upland food sources

__ interviews with biologists with knowledge of the AA

Moderate (based on any of the following [check]):

__ observations of scattered wildlife groups or individuals or relatively few species during peak periods

__ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.

__ adequate adjacent upland food sources

__ interviews with local biologists with knowledge of the AA

Other special wildlife features not addressed above:

13. **Fish Habitat:** (Answer this if the waterbody is used by fish or the existing situation is "correctable" such that the waterbody could be used by fish. If the waterbody is not used by fish, fish use is not restorable, or is not desired from a management perspective, then circle **NA**.)

Is the part of the waterbody within the project area shown in the ADF&G Anadromous Waters Catalog? **Y** (**N**)

Fish species or groups known or suspected to use the waterbody (any part of it):

Other resident species assumed. None observed in field visit.

Sources used for identifying fish species potentially found in the waterbody:

Aquatic cover category (see Table 3) (circle one): Optimal (Adequate) Poor

Is fish use of the waterbody precluded or substantially reduced by a culvert, dike, or other man-made structure or activity? **Y** **N**

Does the waterbody contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area, etc.- specify in comments) for anadromous fish or sport fish? **Y** **N**

Do noxious or invasive plant species (see **Appendix F**) or invasive fish species (see **Appendix G**) occur in the waterbody (anywhere)?
Y **N**
Comments, or refer to section 10 above:

14. Recreation or Subsistence Potential:

Is the waterbody a known or potential recreation site? **Y** **N** Used for subsistence activities? **Y** **N**
If 'Yes,' describe (travel, transport, boating, fishing, trail parallels or crosses it, next to a park or camping area, in proximity to where kids play, etc.).

Which best describes the current waterbody ownership in the project area?

____ Public ownership or public easement with general public access (no permission required)

X Private ownership with general public access (no permission required)

____ Private or public ownership without general public access, or requiring permission for public access

Chart for Assignment of a Waterbody to a Management Category

Determine the appropriate category for the waterbody by working through the chart below. Look at the choices in the first column and choose the one that best describes the waterbody. Then, look at the choices in the second column to the right of the category you chose in column 1; choose the best type from column 2. To the right of that choice, select the best choice from column 3. Continue working to right through the chart until you reach the last column, where the Waterbody Category is assigned.

Waterbody Type	Waterbody Characteristics				Category
Flowing Waterbody	Any flowing waterbody that is documented or suspected critical or primary habitat for listed or candidate threatened or endangered species (see Appendix H)				1
	Any flowing waterbody that is secondary habitat for listed or candidate threatened or endangered species or primary habitat for other species of concern (see Appendix H)				2
	stream	open channel—perennial, seasonal, intermittent, temporary, or ephemeral	natural (undisturbed) or naturalized (recovered from disturbance, with natural-like banks, sinuosity, substrate)	supports salmon	1
				Supports resident and other non-salmon fish species	2
				Not known or thought to support fish	3
			Channelized and not naturalized	supports salmon	1
				does not support salmon	3
		Originally a stream, now in a culvert			4
	ditch (originally formed by excavation; did not originally replace a stream)	open channel, supports salmon			2
		Naturalized, does not support salmon			3
		Not naturalized, does not support salmon			4
	Inactive (abandoned) channel	Seasonally or more often connected to active channel			same as active channel
		irregularly (less than annually) connected to active channel that is…	Category 1		2
			Category 2		3
			Category 3		
			Category 4		4
		No existing connection to an active channel, even at high water			4
Still Waterbody (pond, lake)	*Any still waterbody that is documented or suspected critical or primary habitat for listed or candidate threatened or endangered species (see Appendix H)*				1
	Any still waterbody that is secondary habitat for listed or candidate threatened or endangered species or primary habitat for other species of concern (see Appendix H)				2
	Other still waterbodies	supports *salmon*	Spawning or rearing in potentially affected area		1
			Affected area is migratory route only		2
		Supports resident and other non-salmon fish species used for subsistence or recreation	Spawning or rearing in potentially affected area		1
			Affected area is migratory route only		2
		Supports fish not used by humans			3
		Does not support fish			3

Assigned Waterbody Category: (1) 2 3 4