TOWN OF JACKSON
COUNCIL MEETING
AGENDA DOCUMENTATION

PREPARATION DATE: August 15, 2019
MEETING DATE: August 19, 2019

SUBMITTING DEPARTMENT: Parks and Recreation
DEPARTMENT DIRECTOR: Steve Ashworth
PRESENTER: Steve Ashworth

SUBJECT: Karns Meadow Park EA

STATEMENT/PURPOSE

Staff is looking for the Council to accept the presented Environmental Assessment for Karns Meadow Park, and direct staff to submit to TOJ planning. In addition, staff is looking for Council support and authorization to begin drafting a Management Plan for the park and seek formal adoption through the Conditional Use Permit process.

BACKGROUND/ALTERNATIVES

The Town of Jackson purchased Karns Meadow Park in December of 2003. The park is approximately 41.8 acres and is divided into seven (7) tracts, each under a conservation easement held by Jackson Hole Land Trust. The park is primarily undeveloped with Flat Creek being the defining topographic feature of the property. The Town of Jackson through a partnership with Teton Conservation District utilized a state DEQ 319 Grant to develop a treatment wetland on the eastern portion of the property. The constructed wetland is designed to enhance water quality at the outlet of a TOJ stormwater system prior to entering Flat Creek. Additional improvements on the property include a TOJ municipal well with an associated Photovoltaic system.

The Parks and Recreation Dept. has provided basic land management on the property since its purchase. This management has primarily been around the contracting with TC Weed and Pest for noxious weed control, and annual trash pick-up of the site. Until recently, P&R has not been a major player on the property. Public Works was responsible for the design and implementation of the treatment wetland, and Town Council oversees public use, scheduling and oversight of the property. In 2017 P&R, under the direction of the Town Manager, installed two monument signs on the southeast and northwest corners of the property identifying the parcels as Karns Meadow Park. The signs were donated by Jackson State Bank and Trust and were conditions of the original property purchase.

Over the course of the last three to five years the Town has seen increased pressure for development and/or resource management of the site. As a result, the TOJ initiated the first step in effectively managing the property and determining the long-term use of the park by completing and comprehensive Environmental Assessment (EA). The EA process began in October of 2018 through a contract with EcoConnect Consulting LLC. The consultant team reviewed all allowable future uses of the property as identified by the purchase agreement and conservation easements. The EA, by its definition does not determine if an improvement should occur, rather what would be the impact of such improvement, alternative options, and potential mitigation for impacts of the improvement. The purpose of this document is to provide the owner (Town of Jackson) analytical information for future decision making on the use, development and management of the parcel.

A recommendation within the plan is for the TOJ to develop a comprehensive resource management and site development plan. Staff concurs with this recommendation and believes the resource management plan and

site development plan should encompasses only the tracts identified as park and open space. Tracts identified for future non-park development (Tracts 4 & 5) should be managed and planned in the future by their respective agency representatives.

In discussion with TOJ Administration and Planning, staff is seeking direction and approval to begin the comprehensive resource management and site development plan for the parcels 1, 2, 3, 6, and 7. Upon development of a draft plan, staff will submit for public review and council approval through the formal Conditional Use Permit process. The EA would be utilized in the evaluation of the Conditional Use Permit.

ATTACHMENTS

Karns Meadow Environmental Analysis (May 28, 2019)

FISCAL IMPACT

Currently there is no additional funding for the development of the resource management and site plan process. Staff has reviewed their work plan and is recommending the project be a high priority to be completed in-house. The Town Council and County Commissioners will be reviewing the Parks and Recreation Department work plan on September 9, 2019.

RECCOMENDATION

Staff is recommending acceptance of the Karns Meadow Environmental Analysis dated May 28, 2019.

Staff is requesting authorization to submit the EA document to the TOJ Planning Department as official record.

Staff is requesting authorization to initiate the development of a draft resource management and site development plan for tracts 1, 2, 3, 6 and 7 to be submitted for public review and council approval through the formal Conditional Use Permit process by January 2020.

SUGGESTED MOTION

I move to accept the Karns Meadow Environmental Analysis (EA) dated May 28, 2019, direct staff to submit the EA to the Town of Jackson Planning Department, and to direct staff to initiate the planning and drafting of a Comprehensive Resource Management and Site Development Plan for tracts 1, 2, 3, 6, and 7 to be submitted for a Conditional Use Permit by January of 2020.

Karns Meadow
Environmental Analysis

Town of Jackson

Jackson, WY

May 28, 2019

Prepared for:
Town of Jackson
Attn: Steve Ashworth, Director
Teton County/ Jackson Parks and Recreation Department

Prepared By:

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EXECUTIVE SUMMARY

The Karns Meadow property is unique both within the Town of Jackson as well as within the larger landscape. Environmental and planning documents, including the Jackson/ Teton County Comprehensive Plan, have continually reaffirmed this statement for the past sixteen years. The location of this property, primarily a wetland complex, within the Town of Jackson presents a distinct challenge to those responsible for its management. This distinct challenge is to maintain natural resource quality and wildlife connectivity through the property while upholding the easements' conservation values in the face of increasing development pressures both on the property as well as from the surrounding area.

When considering development options on the property, it is essential to remember that allowable uses are just that, allowable. Allowable uses are not a checklist of development projects that need to be completed. For every allowable use that is implemented, there will be both seen and unforeseen impacts to the conservation values and purposes of the easements. Likewise, when considering development options in the vicinity of the property, it is essential to consider the implications of that development, as well as the cumulative effects of all surrounding development, on the unique natural resources and wildlife movement corridors contained within and associated with the property.

For all ecological systems and natural areas, there are thresholds of human development and activity that impact the ecological systems. These thresholds and associated impacts are difficult to assess and include diverse variables. Furthermore, the timeline of human development is much faster than the timeline of ecological adaptation and recovery. Therefore, the unique challenge associated with this property includes that any development must be done in a careful and methodical manner as to not unintentionally overstep a threshold that would significantly or irreversibly damage the property's ecological function and conservation values through the implementation of allowable uses.

The property's most critical ecological functions originate with its riparian community and open space natural resources. Within the context of the Town of Jackson, Karns Meadow is a key component to movement corridors both along the riparian corridor (northeast to southwest) as well as between the adjoining buttes and public lands (north to south). Ensuring the continued health and longevity of these ecological and movement corridors is a significant component of the property's value to the larger landscape function. Furthermore, maintaining wildlife movement corridors also benefits Jackson and Teton County's human community and economy.

This environmental analysis addresses both a generalized assessment of impacts to vegetative cover as well as an assessment of impacts to habitat viability and movement from fragmentation and human use at both the property and vicinity scales. While specific development plans may result in additional impacts, those addressed represent an initial filter. Development impacts on the natural resources of Karns Meadow differ based on vegetation, seasonality and management of use, location of the development, type of human use, time of day of use, and if lighting is required. The gains to our community from development may be outweighed by the impacts to wildlife habitat.

In an effort to effectively balance both the community needs for the Karns Meadow property as well as the unique challenge associated with managing this property for the benefit of wildlife and people, this environmental analysis recommends the development of a master plan for the property. A master plan should be inclusive of both the community's goals and priorities as well as a plan to enhance and uphold the conservation and landscape values unique to the Karns Meadow property.

PROJECT OVERVIEW

INTRODUCTION

EcoConnect Consulting LLC has conducted an Environmental Analysis (EA) under contract with the Town of Jackson (October 1, 2018). The purpose of this project is to complete a comprehensive environmental review of all allowable uses at the site (October 1, 2018 TOJ Town Meeting Agenda Document). Environmental analyses coordinate the application of natural resource protection standards through identification of natural resources on the site and analysis of potential impacts to these natural resources from proposed development. An EA review results in recommended natural resource protections not in the approval of proposed development applications (Town of Jackson, 2018).

This Karns Meadow EA contains recent work conducted by EcoConnect Consulting (EcoConnect) in collaboration with Pioneer Environmental Services (Pioneer) and Cannon Heritage Consultants (CHC). Pioneer Environmental Services conducted a comprehensive, Aquatic Resources Inventories (ARI) (Appendix F) while Cannon Heritage Consultants conducted a Class III Cultural Resources Survey (Appendix G) for the entire property.

This Environmental Analysis was conducted in accordance with the Town of Jackson Land Development Regulations (Town of Jackson, 2018) and the Teton County Land Development Regulations outlined in Article 5, Division 5.1, *General Environmental Standards* and Division 5.2, *Environmental Standards Applicable in Specific Areas* when appropriate (Teton County, 2018).

The project area addressed in this EA is commonly referred to as Karns Meadow and contains eight parcels as outlined in the Parcels Overview. Karns Meadow is approximately 41.6 acres in size and encumbered by multiple Jackson Hole Land Trust Conservation Easements. The property is fully contained within the Natural Resources Overlay (NRO) which extends both north and south of the property (Figure 1). The property is zoned as Neighborhood Low Density (NL-1) by the Town of Jackson.

PARCELS OVERVIEW

The following information summarizes the parcels addressed collectively in this document as "Karns Meadow" or "the Property". The collective Karns Meadow property is composed of eight parcels owned by the Town of Jackson with the exception of the Jackson Hole Land Trust parcel. All parcels are managed as a single entity.

Table 1. Tract Name, Identifying Information and Recorded Document Location

TRACT NAME	PIDN	OWNERSHIP	DATE	RECORDED DOCUMENT
Tract 1	22-41-16-33-2-00-026	Town of Jackson	2003/ 2009 Amendment	Bk 536 Pg 105-158 Am. Bk 747 Pg 419-438
Tract 2	22-41-16-33-1-00-033	Town of Jackson	2005	Bk 578 Pg 688-760
Tract 3	22-41-16-33-1-00-034	Town of Jackson	2005	Bk 613 Pg 589-620
Tract 4	22-41-16-33-1-00-035	Town of Jackson	2008	Bk 669 Pg 213-246
Tract 5 Restrictive Covenant	22-41-16-33-2-00-028	Town of Jackson	2008 Rerecorded	Bk 713 Pg 952-974
Tract 6	22-41-16-33-2-00-031	Town of Jackson	2009	Bk 715 Pg 917-991
"The Well Tract"	22-41-16-33-2-00-011	Town of Jackson	2003/ 2009 Amendment	Bk 536 Pg 105-158 Am. Bk 747 Pg 419-438
Tract 8 – "The Trust Parcel"	22-41-16-33-2-00-027	JHLT	2003	Bk 536 Pg 105-158

Throughout this document, if a particular tract's conservation easement is quoted, the tract is referenced. The conservation easements are similar in context therefore, a quoted easement is meant to be representative of all applicable easement documents.

PREVIOUS ENVIRONMENTAL DOCUMENTATION FOR KARNS MEADOW

The following past environmental documentation on Karns Meadow provided insight into previous conditions in the project area. The following partial listing of additional environmental documentation of the property may be informative to the interpretation of this Environmental Analysis.

Past documentation of the property for both natural and cultural resources have had a less comprehensive scope than this EA and focused primarily on specific areas. While these previous documents were reviewed and incorporated where appropriate, the scope considered in this environmental analysis is more comprehensive in nature. Regardless of scope of analysis, previous environmental documentation and this environmental analysis share a central theme that the natural resources present in Karns Meadow are a unique resource both within the Town of Jackson and within the larger landscape.

Past Environmental Documentation

- Natural Resources Inventory for Karns Meadow and Addendums - Jackson Hole Land Trust (2003-2009)
- Wildlife Observations System Data – Wyoming Game and Fish Department (WGFD) (2000-2019)
- Monitoring Avian Productivity and Survivorship Reports – Teton Science Schools (2009-2013)
- Nature Mapping Jackson Hole Observation Data – Jackson Hole Wildlife Foundation (2009-2018)
- Mule Deer Movement and Habitat Use Patterns in Relation to Roadways in Northwest Wyoming – Teton Science Schools (2013)
- Karns Meadow Pathway Environmental Field Review Report – Alder Environmental (2014)
- Teton County's Wildlife Crossings Master Plan - Western Transportation Institute (2018)

COMPREHENSIVE PLAN

The Jackson/ Teton County Comprehensive Plan (Principle 1.4 - Protect and steward open space) states that "avoid[ing] development in critical wildlife habitat and wildlife movement corridors is a central goal of the community… Small areas can also provide critical habitat and may be just as important to ensuring countywide habitat connectivity". Karns Meadow is widely regarded, by both the research community and the concerned, general public, as one such small area that provides critical habitat and plays an important role in countywide habitat connectivity.

The Comprehensive Plan identifies districts and subareas. Within these designations, Karns Meadow (Subarea 4.5) is the eastern most subarea of the Midtown district (District 4) and is identified as a "Preservation" subarea.

Preservation Subareas are described as areas:

- *That ensure the protection of wildlife habitat, scenic vistas, agriculture, and rural character* (Comp Plan ES-15)
- *In which no change to the existing undeveloped character of the scenic resources and wildlife habitat is necessary* (Comp Plan CV-2-4)
- *Where additional amenities and infrastructure are inappropriate* (Comp Plan CV-2-4)
- *That may benefit from some clustered residential development that improves the overall preservation of open space* (Comp Plan CV-2-4)

As a preservation subarea, the Karns Meadow's character defining features are described as:

> "This Preservation subarea should continue to serve as wildlife habitat and a key wildlife movement corridor in the future. Moving forward wildlife needs will need to be carefully

balanced with providing the recreational and other amenities envisioned in the original land owners conveyance of the property. The ~~future addition of a~~ street connection [i.e. Karns Meadow Drive] through this district will improve connectivity for all modes of transportation and create a separation between the developed and undeveloped portions of the area" (Comp Plan IV-41) (strikethrough added to indicate current status).

Flat Creek and Karns Meadow are identified as significant natural features in the midtown district (Comp Plan IV-36). The Comprehensive Plan also calls for increased residential population in midtown (Comp Plan IV-36). An increase in the residential population of midtown and immediately adjacent to the eastern boundary of Karns Meadow (District 3, Town Residential Core) increases outside development pressures on the natural resources of Karns Meadow including both aquatic and terrestrial ecological systems. The Comprehensive Plan recognizes the conflicting nature of these two goals when it states that (*italics added*):

> "A key characteristic of this area is the mule deer movement corridor between East Gros Ventre Butte and Karns Meadow, and consequently, the high rate of wildlife vehicle collisions along West Broadway Avenue. The natural resources found in or *adjacent to* this district should be considered in the course of future planning, with development being located in a way that protects wildlife habitat and facilitates wildlife movement through the district. Future enhancements and redevelopment should seek to incorporate Flat Creek as a recreational and ecological amenity for the entire community." (Comp Plan IV-36).

This challenge to locate development "in a way that protects wildlife habitat and facilitates wildlife movement" is echoed throughout the 2012 Comprehensive Plan (Jackson/ Teton County Planning, 2012), in the 2003 Karns Meadow Baseline Inventory (Segerstrom & Dittmar, 2003), in the 2018 Teton County Wildlife Crossings Master Plan (Huijser, et al., 2018) as well as in this Environmental Analysis.

METHODS

In addition to on-site inventories of the property, EcoConnect Consulting LLC consulted with property representatives, studied current and historic aerial photographs, USGS topographic maps, Teton County's vegetative cover GIS data and species of the region to become as familiar as possible with the landscape. Site visits to the Karns Meadow property were conducted on October 8, 2018 and February 1, 2019 to record baseline information in addition to site visits conducted for aquatic resource and cultural resource inventories (Appendix F & Appendix G). Equipment used included a Garmin GPSMAP 64 Global Positioning System unit with ±6ft accuracy, a compass and a digital camera. The site visit was conducted by walking the property surveying land use, wildlife use, vegetation and distinct natural features. A wetland delineation was conducted by Pioneer Environmental Services and is documented in an attached Aquatic Resources Inventories (Appendix F) as well as incorporated into this environmental analysis. Additionally, a cultural resources inventory was conducted by Cannon Heritage Consulting (Appendix G). Methodologies for these two inventories are included in the respective report appendices. Representative photographs of vegetation communities and other significant natural and human-made features were taken. Vegetation, wildlife, infrastructure and other information were recorded in field notes and on aerial photographic field maps.

One-foot resolution, Teton County aerial photographs (all available years), Google Earth aerial photography (6/21/2017), NAIP 2015 & 2017 Imagery (9/12/2015 and 10/25/2017) and Teton County's Vegetative Cover Types GIS Data, based on 2011 aerial imagery (Cogan & Johnson, 2013), were used to supplement on-site observations. Information recorded here pertaining to vegetation cover, water resources and other landscape observations are therefore based on a combination of site visit observations and information taken from the aerial photographs and existing data. Vegetative cover types were digitized from aerial photography and the wetland delineation data. The Cogan and Johnson (2013) Teton County Vegetative Cover Types GIS Data layer was used as a reference for vegetation type characteristics. Vegetative cover type definitions were based on those published in the Teton County Land Development Regulations Article 5, Section 5.2.1.F, *Vegetative Cover Type Standards* (Teton County, 2018).

HABITAT INVENTORY

PROJECT AREA

The project area, Karns Meadow, is approximately 41.6 acres in size and generally described as a wetlands complex bisected by Flat Creek and bordered on all four sides by roadways (Broadway/ Hwy 89, Flat Creek Drive, Snow King Avenue and Karns Meadow Drive).

The habitat inventory detailed here is based on a combination of information including field observations, Teton County's 2017 1-ft aerial imagery and the aquatic resources inventory conducted by Pioneer (Appendix F). The vegetative cover types information contained in this habitat inventory and the aquatic resources inventory will differ slightly in that the two inventories are measures of different characteristics of the project area. A vegetative cover types inventory is based purely on vegetation as is described by local land development regulations. An ARI uses vegetation, as described by the Army Corps of Engineers, as one of three characteristics of wetland type definitions.

VEGETATIVE COVER TYPES

The vegetative cover types located in Karns Meadow, the project area, are typical of a wetland complex and, more specifically, natural areas found between a natural water feature, Flat Creek, and adjacent development (e.g. Snow King Avenue, residential and commercial businesses, etc.). A primary function of wetland complex systems is the ability to absorb and filter water, a central component of a riparian system. This variation of water content in the system, and a wetland complex's ability to absorb excess water, can result in changes in an area's designated wetlands over time. Areas designated as wetlands contain three characteristics: wetland soils, wetland vegetation and adequate hydrology to sustain hydric soils and vegetation (for further explanation, please refer to the Aquatic Resources Inventory in Appendix F).

The vegetative cover types listed in this EA were based on field observations and the most recent, aerial imagery (2017 Teton County 1-ft) as well as information contained in Pioneer's Aquatic Resources Inventory (Appendix F). In this wetlands complex, small depressions and other natural features affect wetland designations. Since there are three characteristics required for wetland designation, these designations do not always align perfectly with the vegetative cover types (vegetation being only one of the wetland characteristics variables). Furthermore, the Teton County 2017 aerial imagery was taken on June 8, 2017 a time of high water and therefore displays Karns Meadow during a period of increased water holding capabilities. The project areas' vegetative cover types are illustrated in Figure 2, summarized in Table 2 and described below.

Table 2. Vegetative Cover Types and Ordinal Rankings

VEGETATIVE COVER TYPE	ORDINAL RANKING*	AREA (ACRES)	PERCENTAGE OF TOTAL
Scrub-Shrub Wetland	10	10.3	25%
Scrub-Shrub Wetland – 2018 mitigation plantings	10	0.3	1%
Open Water (Flat Creek and Constructed)	n/a	5.4	13%
Emergent Wetland	9	4.0	10%
Cottonwoods	6	1.0	2%
Agricultural Meadow	1	15.6	37%
Disturbed/ Developed	n/a	5.0	12%
TOTAL		**41.6**	**100%**

***** Ordinal ranking is determined by Teton County Land Development Regulations Section 5.2.1.F.4.a, *Ordinal Ranking* and employs a scale from 1 to 10 with 10 being the highest value. Vegetative Cover Types are not listed in the Town of Jackson Land Development Regulations but are pertinent to this property and therefore included here.

Scrub-Shrub Wetland

Scrub-shrub wetlands are wetlands that primarily consist of woody vegetation less than 20 feet tall. In Karns Meadow, scrub-shrub wetlands are comprised of a willow system and constitute 10.3 acres or 25% of the property. Additionally, 0.3 acres of willow habitat enhancements were planted in the fall of 2018. While these areas are not yet scrub-shrub wetlands, they were included here for future reference (Teton County Engineering Pathways, 2018). The primary willow species are coyote willow (*Salix exigua*), Bebb's willow (*salix bebbiana*) and Drummond willow (*salix drummondiana*). Willow species (*Salix* spp.) generally prefer stream banks and flood plains and coyote willow in particular prefers coarse soils from gravel to silt (Dorn & Dorn, 1997). This project area is in the flood zone of Flat Creek. Scrub-shrub wetlands are important to many species of wildlife including both ungulates and avian species. Therefore, in Teton County, scrub-shrub wetland cover types receive an ordinal ranking of 10 and are a protected resource under the Town of Jackson's land development regulations.

Open Water – Flat Creek and Constructed Open Water

Flat Creek, a major tributary of the Snake River, runs through the project area. Flat Creek is fed to the north on the National Elk Refuge by snowmelt from the mountains, ground water and geothermal sources. Traveling south, Flat Creek then moves through an area of relatively high density commercial and residential development before crossing under Highway 89 and entering Karns Meadow. Flat Creek constitutes approximately 4.2 acres within Karns Meadow. Ecologically, Karns Meadow functions as an area of expansion for Flat Creek allowing the creek to handle higher flows and meander along a natural watercourse. To the south of Karns Meadow, Flat Creek crosses under Snow King Avenue and travels through residential and agricultural areas before joining the Snake River approximately 8 miles south of Karns Meadow. Rivers and streams are protected resources under the Town of Jackson's land development regulations but do not receive an ordinal ranking for vegetative cover types.

The constructed open water areas constitute approximately 1.2 acres or 3% of the meadow. These open waters are a component of the constructed wetlands storm water treatment project on the east side of the meadow. The amount of open water contained within this treatment project area will fluctuate based on the amount of water flowing through this constructed system. Regardless of their function for human development (treating storm water before it enters Flat Creek) these constructed wetlands also provide habitat for avian species (e.g. ducks, sandpipers and songbirds) and likely small mammals and rodents.

Flat Creek and constructed open water were mapped as a total of 5.4 acres or 13% of Karns Meadow. As noted, the amount of open water contained in Karns Meadow will fluctuate throughout the year based on snowmelt, groundwater and flooding activities.

Emergent Wetland

Emergent wetlands are wetlands that primarily consist of herbaceous vegetation. In Karns Meadow, the emergent wetland cover type is located proximate to Flat Creek and scrub shrub wetlands and constitute approximately 4.0 acres or 10% of the project area. Representative species found in these areas included Nebraska sedge (*Carex nebrascensis*), hard-stem bulrush (*Schoenoplectus acutus*), field mint (*Mentha arvensis*), scouring rush (*Equisetum hyemale*), blue-joint reedgrass (*Calamagrostis canadensis*), Kentucky bluegrass (*Poa pratensis*) and creeping spikerush (*Eleocharis palustris*). Emergent wetland areas and the associated water systems are important to wildlife species and receive an ordinal ranking of 9. Designated emergent wetlands are a protected resource under the Town of Jackson's land development regulations.

Agricultural Meadow

Agricultural meadows in the project area are remnants of historic pasture and hay operations. Agricultural meadow areas were cultivated, used for pasturing horses, picnicking and in association with the rodeo grounds (Teton County 1945 aerial photography, Pete Karns *pers. commun*.). It is apparent from historic aerial photography that the agricultural meadow areas were once flood irrigated by lateral irrigation ditches fed from Flat Creek. During times of high water/ flood stages of Flat Creek, the agricultural meadow upland areas will become inundated with water serving an important function to limit floodwaters downstream of Karns Meadow in developed areas. These areas are a mix of native and non-native grass species. Representative species include unidentified wiregrass (*Cymbopogon spp*.), smooth brome (*Bromus inermis*), and slender wheatgrass (*Elymus trachycaulus*). Based on a lack of species diversity, agricultural meadows are given an ordinal ranking of 1. Agricultural meadow in Karns Meadow was mapped as 15.6 acres or 37% of the project area.

Disturbed/ Developed

Disturbed/ developed areas mapped within Karns Meadow include 5.0 acres or 12% of the project area. The newly developed Karns Meadow Drive is located on the western boundary of Karns Meadow and Snow King Avenue (a major travel corridor) is located on the southern boundary of the property. Roadways located to the north (Broadway/ Highway 89) and to the east (Flat Creek Drive) of the Meadow are not contained within the property boundary and therefore not included in the 5.0 acres of disturbed/ developed cover type. Disturbed/ developed areas other than roadways within the project area include a fenced pump cabin, associated solar panels and gravel driveway and a historic cabin on Tracts 1, 5 and the Town of Jackson parcel. Additionally, there is an area of recent fill near the northern boundary of Tract 6 and an area used to process materials on Tract 4. Disturbed areas do not receive an ordinal ranking under Teton County's land development regulations.

PROTECTED WATERBODIES, WETLAND RESOURCES AND BUFFERS

Protected Waterbody and Buffer

Flat Creek is the primary water source for the Karns Meadow wetland complex (Figure 3). Flat Creek is a protected stream under the Town of Jackson's land development regulations and afforded a 50-ft setback along this section of the waterway. Both Flat Creek, a tributary of the Snake River, and the Snake River are Waters of the US and therefore fall under the jurisdiction of the Army Corps of Engineers.

The Town of Jackson defines a stream as a body of running water that is not an identified river (e.g. the Snake River) and has an average flow level of 3 cfs or greater and/ or provides Trumpeter Swan winter habitat or Cutthroat Trout spawning habitat (Section 5.1.1.C.1.b., *Stream*). In the project area, Flat Creek has both an average flow of greater than 3 cfs and provides Trumpeter Swan winter habitat. It is likely that Cutthroat Trout spawning habitat is also contained in this stretch but redd surveys were not conducted as a component of this EA.

Water and Wetland Buffers

An aquatic resources inventory (Appendix F) was conducted by Pioneer Environmental Services, Inc as a component of this EA. The aquatic resources inventory identified 16.2 acres of scrub shrub wetlands and emergent wetlands combined (39% of the entire property). This acreage includes constructed wetlands that were built in 2010 to treat stormwater. Naturally occurring wetlands have an associated 30-ft development setback that precludes terrain disturbance except for permitted uses such as flood protection, wildlife habitat enhancement or public pathways (TOJ LDRs Section 5.1.1. D.2.g. *Buffer*) (Figure 3).

Flat Creek is a unique waterway in that it is fed by geothermal waters on the National Elk Refuge to the north before passing through the Town of Jackson where the stream's natural hydrology and biotic function have been altered due to development. The section of Flat Creek in Karns Meadow is the only section in the Town of Jackson containing natural vegetation on both banks. Furthermore, this meadow serves a critical function as an area where flood waters are able to naturally rise and recede through this riparian corridor. In the winter months, Flat Creek is subject to the formation of frazil ice during cold periods which contributes to wintertime ice formation and subsequent winter flooding activities. The rock weirs in the stream were placed in an effort to manage wintertime flooding events downstream. Likewise, Thaw Well #1 located on Tract 1 can add warmer groundwater to the stream during colder periods of the winter thereby limiting ice formation.

WILDLIFE HABITATS PROTECTED BY NATURAL RESOURCES OVERLAY

"The purpose of the Natural Resources Overlay is to provide protection to the most important and sensitive natural areas" (Town of Jackson, 2018). Town of Jackson LDRs define the NRO as areas that include the habitats listed in Section 5.2.1.B, *Establishment of the NRO*. The presence of NRO defining habitats both in the project area and within ½ mile vicinity are listed in Table 3. Based on this site-specific analysis of the project area and ½ mile vicinity, it is reasonable to conclude that the project area is appropriately mapping within the NRO.

Table 3. Wildlife Habitats Protected by the NRO

WILDLIFE HABITAT	MAPPED AS SUITABLE HABITAT*	IN THE PROJECT AREA	WITHIN ½ MILE OF PROJECT AREA
Elk Crucial Winter Range	Yes	No	Yes
Mule Deer Crucial Winter Range	Yes	No	Yes
Moose Crucial Winter Range	Yes	No	No
Trumpeter Swan Nesting Habitat	Yes	No	Possible
Trumpeter Swan Winter Habitat	Yes	Yes	Yes
Snake River Cutthroat Trout Spawning Habitat	Yes	Yes	Yes
Bald Eagle Nesting Habitat	Yes	No	Yes
Bald Eagle Crucial Winter Habitat	Yes	Yes	Yes
Big Game Migration Corridors (Mule Deer & Elk) (WGFD, 2012)	n/a	No	No
Big Game Movement Areas (Mule Deer) (Riginos, et al., 2013)	n/a	Yes	Yes

* Suitable Habitat is based on Teton County's Suitable Habitat Mapping Project (EcoConnect, 2018)

Crucial Winter Ranges and Suitable Habitats

Town of Jackson and Teton County Land Development Regulations include "crucial" winter ranges for elk, mule deer, moose and Bald Eagles as protected natural resources. Crucial winter ranges as identified by the Wyoming Game and Fish Department (WGFD, 2012; WGFD, 2017), are coarse datasets that lends some insight into these species use of the area during the most stressful portions of the winter season but are too generalized to provide dependable information at the parcel scale. Suitable habitats, as defined by the Teton County 2018 Focal Species Habitat Mapping Project (EcoConnect, 2018), are the identification of habitats that could provide for species' needs (e.g. foraging, cover and nesting resources) during a particular season or throughout the year. The seasonality of these layers differ by species. These suitable habitat GIS layers are a less coarse landscape tool than WGFD's crucial range information. Therefore, at the parcel scale, suitable habitat layers can be informative but cannot provide precise information. Where the two datasets are helpful and informative within the context of an environmental analysis of a property is to consider the two datasets in tandem. By overlaying the winter and yearlong suitable habitat layers on top of the crucial winter range layers, the viewer is able to quickly assess a subset area where habitat is likely found that would fulfill the resource needs for a particular species during the most crucial time periods. The suitable habitat layers that are located within crucial winter range selects the portion of the crucial winter range where the appropriate natural resources for that species may be found. Therefore, crucial winter ranges as identified by WGFD, as defined by local land regulations and suitable habitat layers are all included here to provide insight into areas where natural resources depended on by protected species for survival are likely be found.

Elk Crucial Winter Range

Crucial elk winter range consists primarily of xeric and mesic sagebrush-grasslands, mixed shrub, mesic and xeric open grassland and agricultural meadows that are used by elk 8 out of every 10 years (5.2.1.B.3, *NRO Definitions*). Karns meadow is designated by WGFD as spring, summer and fall range for elk (WGFD, 2012). The National Elk Refuge is approximately 1-mile northeast of the project area. The National Elk Refuge is elk crucial winter range. The refuge is separated from the project area by a barrier fence and by the Town of Jackson. Nonetheless, from a historic perspective, it is likely that Karns Meadow was once prime winter range for elk. While both suitable winter range and historic winter range are located in the project area, and ½ mile vicinity, management by federal and state agencies currently discourage elk use of the project area (Figure 4). *Note:* The winter of 2018/2019 was a high snow year and a small herd of elk did overwinter in and around Karns Meadow.

Mule Deer Crucial Winter Range

Mule deer crucial winter range consists of scrub-shrub grasslands located at lower elevations and on south facing slopes that are used by mule deer 8 out of every 10 years (5.2.1.B.3, *NRO Definitions*). More specifically, wintering mule deer in Teton County use south facing, 22-45° slopes below approximately 8,000 ft in elevation (Riginos, et al., 2013).

WGFD crucial winter and crucial winter yearlong range are located within the ½ mile project area vicinity (Figure 5). A further refinement of appropriate mule deer winter range can be found by examining suitable habitat models for mule deer. Based on these models, suitable habitat within ½ mile of the project area could be located on the hillsides to the north as well as within the Karns Meadow project area (EcoConnect, 2018). An analysis of mule deer winter habitat combining WGFD crucial winter range with Teton County's suitable winter habitat, illustrates the connections between the south-facing shrub areas (foraging and cover), with meadow (forage and cover) and surrounding conifer (cover) habitats. Karns Meadow lays at the heart of this winter habitat for mule deer. Therefore, while the WGFD's mapping of crucial winter and crucial winter yearlong range encompass buttes to the north and southwest of the project area, mule deer utilize winter habitat found in Karns Meadow in conjunction with the surrounding south facing xeric shrub hillsides (Riginos, et al., 2013; Segerstrom & Dittmar, 2003; EcoConnect, 2018) (Riginos et al; Figure 21).

In addition to winter habitat, the meadow is a bottleneck in landscape connectivity for mule deer. The JHLT's Natural Resources Inventory (Segerstrom & Dittmar, 2003) supports this winter use analysis of mule deer habitat by stating that one of the "key ecological features" of the property is "the connectivity facilitated by the Property between the ungulate winter ranges … on East Gros Ventre Butte to the north and the mountainous summer habitat to the south of the Property" (Segerstrom & Dittmar, 2003). Furthermore this natural resources inventory (Segerstrom & Dittmar, 2003) states that Karns Meadow is "more important [to mule deer] than is indicated by the official [WGFD] habitat designations" (Segerstrom & Dittmar, 2003). This connectivity was further illustrated by Riginos et al's work in 2013 that mapped mule deer movements from the buttes north of Highway 89, through Karns Meadow and surrounding areas, and on to the public lands south of the meadow (Riginos, et al; Figure 9).

Moose Crucial Winter Range

Crucial moose winter habitat consists primarily of riparian and wetland shrub-willow and cottonwood forests, highly mesic cottonwood/spruce forests, upland forest-subalpine fir habitat types, and secondarily xeric and mesic sagebrush-grasslands and mixed shrub types. These habitats are used by moose during the crucial winter months 8 out of every 10 years (5.2.1.B.3, *NRO Definitions*).

The project area is located on lands designated by WGFD as winter yearlong and spring, summer, fall moose ranges (WGFD, 2012). The line between these two ranges bisects the meadow into eastern and western portions. Since these seasonal ranges are drawn in a coarse manner, it is reasonable to consider the entirety of Karns Meadow to function as winter yearlong range for moose. Furthermore, the overlay of mapped suitable habitat for wintering moose (EcoConnect, 2018) indicates that the willow habitat contained within Karns Meadow functions in conjunction with the conifer, moose cover habitat, located within ½ mile of the project area on the slopes of Snow King Mountain (Figure 6).

Trumpeter Swan Nesting Habitat

Trumpeter Swan nesting habitat is found on wetland and aquatic sites that have adequate open water, aquatic vegetation (forage) and protection from predators. Nesting locations are typically islands located in ponds and wetlands (5.2.1.B.3, *NRO Definitions*). There are no known nesting ponds in the area or within ½ mile of the project area. The nearest known swan nesting locations to the project area are found on the National Elk Refuge upstream of the project area. Nonetheless, Flat Creek in the project area does have the potential for nesting to take place, particularly within areas protected from human disturbance and predators.

Trumpeter Swan Winter Habitat

Trumpeter Swan winter habitat consists of aquatic sites with abundant vegetation that stay open throughout the winter months (5.2.1.B.3, *NRO Definitions*). Many side channels and streams along the Snake River corridor provide winter habitat for Trumpeter Swans (Patla, 2018). Flat Creek is one of the tributaries of the Snake River that remains open for the majority of the winter months.

Teton County's suitable habitat layers mapped Flat Creek as both suitable habitat in winter and summer (EcoConnect, 2018). Observations of Trumpeter Swans in Flat Creek both in Karns Meadow and to the north and south (JHWF, 2019; WGFD, 2019) indicate a higher utilization of this stream in the winter than in the summer. Flat Creek is fed by geothermal waters to the north and therefore is more likely to remain open than other streams of similar size.

The Flat Creek corridor is known to function as a flyway for swans throughout the year but primarily in the winter between foraging areas to the north and south (Segerstrom & Dittmar, 2003; Patla, 2018). Swans use riparian corridor flyways for navigation during low visibility and as a means of avoiding development and disturbance. Swans have been killed on the powerlines immediately to the west of the project area (Patla, 2018).

Snake River Cutthroat Trout Spawning Habitat

Snake River cutthroat trout spawning habitat is located in riffles along the Snake River and its tributaries. Inland cutthroat trout species are native to western rivers and streams and have been recognized as a significant species in Teton County (Section 5.2.1.B.3, *NRO Definitions*).

Flat Creek, a major tributary of the Snake River, is mapped by Teton County's suitable habitat layers as spawning habitat for cutthroat trout. This mapping is largely based on WGFD's classification of Flat Creek as a Yellow Ribbon stream. A Yellow Ribbon stream is a regionally important stream that is estimated to contain approximately 20-300 pounds of trout per mile (WGFD, 2018). JHLT's Natural Resources Inventory (Segerstrom & Dittmar, 2003) supports this classification as it identifies Flat Creek through Karns Meadow as a significant trout stream and a fishery of regional importance.

Bald Eagle Nesting Habitat

Prime nesting habitat consists of uneven-aged stands of riparian forest with old-growth attributes and perching branches near watercourses or waterbodies that provide foraging opportunities (5.2.1.B.3, *NRO Definitions*).

There are no known Bald Eagle nests within the project area or its ½ mile vicinity. The nearest known Bald Eagle nests are found on High School Butte to the southwest and to the west of the National Elk Refuge. The section of Flat Creek that runs through Karns Meadow is known to be used by the High School Butte nesting pair as foraging territory. The few cottonwood trees found within the project area are close to development and human disturbance and therefore not ideal Bald Eagle nest locations.

Bald Eagle Crucial Winter Habitat

Bald Eagle crucial winter habitat is found in riparian areas near ungulate crucial winter range and in Bald Eagle nesting habitat. The Bald Eagle winter diet is comprised primarily of carrion from dead carcasses with the remainder comprised of fish and waterfowl (5.2.1.B.3, *NRO Definitions*). The proximity of the project area and Flat Creek to West Gros Ventre Butte, the National Elk Refuge and other areas where winter carrion and open waters may be found provide for good winter Bald Eagle habitat both within the project area and its ½ mile vicinity.

Migration Corridors and Wildlife Movement

Mule deer and elk migration corridors are protected characteristics of the Natural Resources Overlay (5.2.1.B.3, *NRO Definitions*). As defined by the Town of Jackson's LDRs, mule deer and elk migration corridors are designated as crucial if used 8 out of every 10 years.

WGFD data indicate that mule deer migration corridors pass to the north and south of the project area's ½ mile vicinity buffer. While it is uncommon to have elk utilizing Karns Meadow, as discussed above, mule deer studied by Riginos, et al (2013) make extensive use of Karns Meadow in conjunction with the south facing hillsides of East Gros Ventre Butte to the north both during migration and daily movements.

In addition to Riginos et al (2013), the JHLT Natural Resources Inventory for Karns Meadow and the associated conservation easements identify wildlife movement as an important conservation value of the project area. The JHLT Natural Resources Inventory states that "the larger undeveloped area within which the Property is located acts as a bottleneck location that funnels wildlife movement between East Gros Ventre Butte and Snow King Mountain" and that "connectivity between the winter ranges and the Property will be challenging to maintain, but doing so is critical for maintaining the conservation values" (Segerstrom & Dittmar, 2003).

Riparian communities are known movement corridors for many terrestrial species including ungulates, carnivores, avian and aquatic species. Therefore, in addition to terrestrial wildlife movements between the buttes and ridges, the Flat Creek riparian corridor also facilitates movements between the Snake River and the National Elk Refuge. As mentioned above, Trumpeter Swans and other large avian species use this area as a flyway, trout migrate between wintering and spawning areas, beavers move up and down stream in search of new territories and carnivores travel riparian corridors on foraging expeditions capitalizing on the cover provided for movements.

Other Wildlife Species

A multitude of species have documented use of Karns Meadow (WGFD, 2019; JHWF, 2019) ranging from small canines, rodents and avian species to large, predator species such as black bears and mountain lions. The following species are not identified in Teton County's Land Development Regulations (Teton County, 2018) but have been particularly active in Karns Meadow and are therefore included here.

Beaver

In the fall of 2018, significant beaver activity was present on the southwestern portion of the meadow. Beaver activity is a natural component of a riparian system. The natural flooding of areas proximate to a waterway and the trimming of willow species that result from beaver activity (e.g. building a lodge, damming a waterway, etc.) benefit wetland areas and vegetative cover types, such as willow, that aggressively regenerate after a disturbance. Beavers have likely inhabited Flat Creek periodically over the years moving up and down the creek to occupy available territories with adequate food resources. The Jackson Hole Land Trust has documented beaver use in 4 of 15 years of easement monitoring (JHLT, 2019). The management of Flat Creek wintertime flooding, including the removal of surface ice, may have a negative effect on beavers' current use of the area. Beavers typically overwinter in their lodge, leaving only to retrieve food resources from underwater food caches.

Fox/ Coyote

Canine species such as fox and coyote are known occupants of Karns Meadow using the area primarily as foraging habitat (JHWF, 2019) with undocumented denning activities in the interior of the meadow. In the summer of 2008, a particularly famous fox family denned close to Snow King Avenue on Tract 3, highlighting the wildlife use of Karns Meadow for the general public. While fox and coyote are territorial and can be aggressive toward the other species, they likely both use Karns Meadow for similar life function needs throughout the year.

Avian Species

The songbird community in Karns Meadow has been studied through the Teton Science Schools' MAPS (Monitoring Avian Productivity and Survivorship) on-going, research project. MAPS is a long-term, banding study of avian productivity and survivorship. The research project has transferred to the Jackson Hole Wildlife Foundation and Karns Meadow is not currently an active research site. The species of songbirds found in Karns Meadow were comparable with other banding stations across a gradient of residential development indicating that this meadow serves as an important refuge for avian species within the highly developed Town of Jackson (CRC, 2009-2013). However, nest survival within Karns Meadow was found to be lower than at banding stations with less human development (Hall & McCabe, 2010). Furthermore, it is well documented that fragmentation resulting from human development decreases both species richness and species diversity in avian populations particularly in riparian systems (Smith & Wachob, 2006).

Raptor Species (Other than Bald Eagle)

Many raptor species depend on rodents found in open meadows for forage. Cooper's Hawk, Golden Eagle, Great Horned Owl, Osprey, Red-tailed Hawk, Rough-legged Hawk, Sharp-shinned Hawk and Swainson's Hawk have all been observed within Karns Meadow (JHWF, 2019). Similar to songbird species, Karns Meadow provides a refugium for raptor species within this developed landscape as well as a connecting habitat between the open sagebrush landscape of East Gros Ventre Butte to the north and forested habitats found on Snow King Ridge to the south.

DEVELOPMENT IMPACT ASSESSMENT

ALLOWABLE USES AND DEVELOPMENT OPTIONS

The conservation easements (and one restrictive covenant) governing Karns Meadow development direct what allowable uses and specific allowable development options were retained when the easements were enacted. Allowable uses and development options vary between tracts but are considered here across the entirety of the meadow. In other words, an allowable use on Tract 1 for example is considered within the context of the entire property rather than on Tract 1 alone. This consideration of an allowable use or development option within the context of the entire property will better represent the ecological systems that do not function at the level of a specific tract but rather have implications across the meadow, riparian corridor and larger landscape.

Allowable uses and development options are briefly described below within the subcategories of Development Completed Since 2003, On-going Allowable Uses and Allowable Development Options. For further detail on a specific allowable use, please refer to the Conservation Easements Assessment (Appendix EAppendix D) and the specific conservation easement documents. A fundamental concept is that allowable uses are precisely that, allowable. The suite of allowable uses does not constitute a checklist of development projects that need to be completed in Karns Meadow. Furthermore, impacts resulting from allowable uses can likely be avoided or significantly reduced through careful planning and adjustments to development plans as is the case with all proposed development. As is discussed further in the Alternatives Analysis section, the preservation of this property and the role it plays in the landscape is best maintained through a planning process and thinking creatively as a community rather than after development has been implemented.

For every allowable use and development option that is implemented, there will be both seen and unforeseen impacts to natural resources and the viability of the easements' conservation values and purposes. As the original Natural Resource Inventory document states, maintaining both wildlife and natural resource connectivity through the property will be "challenging… but doing so is critical [to] maintaining the conservation values". Furthermore, "the property's location is within the only reach of Flat Creek remaining in the Town of Jackson that is natural on both banks and surrounding environs… The manner in which the Property is conserved will, to a degree, determine the function and health of the entire Flat Creek drainage" (Segerstrom & Dittmar, 2003).

One of the critical questions for the management of Karns Meadow is: what is the threshold of use and development that pushes this ecological system to a decreased level of function where wildlife species are no longer able to find suitable habitat? Thresholds of human use/ activity and impacts from development on natural systems are difficult to assess and include a variety of variables working in concert, or discordance, with each other. The temporal pace of human development is much faster than that of ecological adaptation and recovery. The unique location of Karns Meadow surrounded by human development makes the determination of these thresholds even more difficult. What is too much development? What allowable uses will significantly impact wildlife and which will not? A visual comparison of aerial photographs from 1945 (the first available) to 2003 (the first easement) to 2017 (the last available photograph) displays how this property has slowly reclaimed the riparian corridor once agricultural operations ceased as well as how development of the Town of Jackson has continually increased in density around the meadow (Appendix D). The "challenging" mandate to preserve the property's conservation values relies on the property owner, the Town of Jackson, to conduct any development in a careful and methodical manner. This challenge is to not overstep a development or use threshold that significantly or irreversibly damages the property's conservation purposes, values and ecological function.

Development Options Completed Since 2003

The following development options have been implemented since the first easement agreement in 2003.

Public Drive (Karns Meadow Drive)

Karns Meadow Drive was completed in 2014 in conjunction with the START Bus Barn/ Transit Center development to the west of Karns Meadow. The completion of this roadway, originally designed to be a complete street including a separated pathway, fulfills the allowable use of a public drive on Tracts 1, 5 and 6.

Dike or Levee on the West Side of Flat Creek

A dike or levee is an allowable use on Tracts 1 & 2 while all other easements are silent on the topic. While no dike or levee has been built on Tract 2, a berm was installed along Karns Meadow Drive across Tracts 1, 5 & 6 during the construction of the roadway. This berm appears to be spoils from road construction and was left to revegetate passively resulting in the presence of weed species. While these spoils are not a proper dike or levee, the use has been included in this section of completed development options. If a proper dike or levee were to be installed, the conservation easements require that it be at least 50ft from the edge of Flat Creek unless to protect Karns Meadow Dr from flooding.

The impacts from a dike or levee built on a small scale (such as the spoils piles along Karns Meadow Drive) are minimal to wildlife use of the area. The current situation may visually provide some protection between human activities at the START Bus Barn and wildlife activities in the meadow. The current impacts to natural resources (primarily vegetation) resulted from a lack of revegetation and therefore the establishment and propagation of weed species through this portion of the meadow and along a transportation corridor. Transportation corridors are known conduits for the spread of weed species.

Thaw Well and Thaw Well Access

Thaw Well #1 on the Flat Creek Thaw Well system is located in Karns Meadow. Access to this thaw well is given through the Town of Jackson inholding parcel contained within Tract 1. The Town of Jackson inholding parcel is not encumbered by a conservation easement and contains a town water supply pump house. Access to these facilities is granted along an access easement across Tract 5. The pump house was installed prior to 2003. Furthermore, the conservation easement for Tract 1 was amended in 2009 to allow the installation of solar panels adjacent to the pump house. Impacts to natural resources from the thaw well and thaw well access are minimal as the operation of the thaw well, when used, is on a gravel driveway in the winter when snow covers the ground.

Stormwater Treatment Plant

The development of a wetland stormwater treatment plant, completed in 2010, on the eastern side of Karns Meadow (Tract 4) fulfilled this allowable use. This stormwater treatment system facilitates the treatment of stormwater from the Snow King Avenue storm drain pipe (Snow King Tube), the area of Town that drains to the Kelly Avenue storm drain pipe (Kelly Tube) and the Fairgrounds catch basin. The total estimated area of stormwater treated by this facility is approximately 27% of the Town, 250 acres of the Snow King ski area and trails and snow storage at the Fairgrounds from 42 miles of town streets (Alder & IMA, 2012). Once treated, water from

these drainage systems re-enter the Karns Meadow wetlands complex and ultimately flow into Flat Creek.

Snow Storage

While snow storage is not a completed use, it was categorized here since snow storage as an allowable use on Tract 5 is not currently used and will be removed in the future. All tract documents, other than Tract 5, are silent on the topic of snow storage. The use of Tract 5 for snow storage is allowable if done in a manner that treats and manages the snow "to prevent damage to the water quality of Flat Creek". Furthermore, this use "shall not be permitted after development of the real property [to the west]" includes residential development. The property to the west houses the START Bus Barn facility which is slated for expansion inclusive of residential housing units. Once this residential development takes place, the allowable use of snow storage on Tract 5 will be extinguished. However, given that snow storage is currently located at the Fairgrounds to the east of Karns Meadow with melt water from these storage operations treated through the water treatment facility located on Tract 4, it does not seem reasonable that additional snow storage facilities would be needed on Tract 5. The use of Tract 5 for snow storage would need to include water treatment systems to assure the protection of Flat Creek's water quality.

Snow King Avenue and Related Improvements

Snow King Avenue is located on the southern border of the Karns property and is encompassed by Tracts 1, 3 and 4. Snow King Avenue was improved to include a separated sidewalk on both sides in 2003 (simultaneously with or before conservation easements were enacted depending on the Tract under consideration). The current Snow King Avenue improvements are located in the entirety of the road easement therefore no further direct impacts from this on-going use are expected to the natural resources found on the property (e.g. vegetation removal). If future improvements to this roadway are proposed, they will need to be located within the current footprint as lands to the south of the roadway are also encumbered by a conservation easement. This community transportation corridor provides travelers with views of Karns Meadow as well as wildlife watching opportunities both of which are listed as one of the property's scenic and open space values for the public.

On-going Allowable Uses

The following allowable uses are on-going and not associated with a specific development option but rather are specific to uses and activities that are allowed on the property. While not specific development, human use and activities have impacts on the ecological components of the property. Often these impacts are short-term and/ or seasonally based. Nonetheless, the management of human use over time can influence the degree to which human uses impact natural resources and ecological systems.

Natural Park

One of the primary functions of the Karns Meadow properties is the use of the area for limited and informal recreational opportunities (All Tracts; Appendix E). The development impacts resulting from this use of the land are directly tied to the management of these activities, uses deemed allowable and the season in which the activities take place. Impacts could be to vegetation and natural systems as well as to wildlife from interactions with humans. Current uses of the property as a "natural park" appear to be limited to use of the park to exercise dogs

(off-leash) and camping, both of which are prohibited uses, and limited recreational walking along unmaintained paths.

Planting

Plantings are included as allowable uses on all tracts but Tract 5. Plantings have been conducted as a component of the stormwater treatment plant installation and associated habitat enhancements on Tract 4 (Alder & IMA, 2012). Plantings are also planned or have been conducted on Tracts 1 and 2 as habitat enhancements/ mitigation associated with the development of the START Bus Barn (Alder Environmental, 2012) and the Highway 22 Pathways Project (Pathways, 2018). These plantings are of riparian species and are intended to expand the riparian corridor vegetation on the northwestern portion of Flat Creek. Future plantings that are in kind with the natural vegetation types currently found in Karns Meadow will likely have positive impacts on the natural resources present. Future plantings located throughout the meadow should be consistent with the water regimes and upland versus wetland resources present in the areas where plantings are located.

Chemical Use

Chemical use is included as an allowable use on all tracts except Tract 5. The Tract 5 Restrictive Covenant is silent on the topic of chemical use. Chemical use in an "ecologically safe" manner on Tract 5 may be an allowable use under "A.7 Other Uses" of the restrictive covenant. The use of chemicals in an "ecologically safe" manner throughout Karns Meadow would likely have no significant negative effects on the natural resources of the property. Furthermore, there is an immediate need for chemical use on the property for the eradication of weed species throughout the meadow, inclusive of Tract 5. The use of chemicals to combat the weed issues in the meadow would have a long-term, positive effect on the natural resources of the property providing for the natural vegetation to expand into areas where weed species are currently propagating.

Removal of Vegetation

As with chemical use, the removal of vegetation is an allowable use on all tracts except Tract 5. The removal of vegetation is allowable for safety reasons and as a component of other allowable development. Therefore, the impacts from vegetation removal are best considered within the context of other allowable development. Furthermore, the Karns Meadow property is contained within the Natural Resources Overlay (Greenwood Mapping, Inc, 2019). Therefore, the removal of vegetation for development purposes would be subject to land development regulations regarding mitigation and habitat enhancements.

Habitat Improvements

As with chemical use and removal of vegetation, habitat improvements are specifically listed as an allowable use on all tracts except Tract 5. The conservation easements list improvements to Flat Creek for the purposes of improving aquatic and wildlife habitat as example habitat improvements. Habitat improvements would be intended to improve the natural resources on the property and therefore likely have a positive effect on the natural resources present.

Use of Vehicles

Use of vehicles is limited to the established roadways and within the meadow for maintenance purposes. The use of vehicles within the meadow for maintenance purposes could have short-term, minimal impacts on vegetation. Conducted appropriately, if vehicle use in the meadow is

done during dry periods and limited to areas of agricultural meadow cover type, the impacts and potential damage to natural resources would likely be minor and short-term.

Scientific Study and Educational Use

Scientific study and educational use have limited negative impact on the natural resources on the property. Known, past scientific and educational uses include the Teton Science Schools' Monitoring for Avian Productivity and Survival (MAPS) station, a nest searching project location associated with the MAPS site and smaller scale, educational research projects. Additionally, the Jackson Hole Wildlife Foundation's Nature Mapping Jackson Hole volunteers have collected observational data in Karns Meadow. The property is uniquely suited for the allowable use of scientific and educational study as it is an intact riparian system situated proximate to both private and public development as well as public lands. Access to the meadow aids in the feasibility of this use. The impacts from scientific and educational uses should be minimal and short-term as the intent of this use is to learn about the natural resources present not to negatively affect them or change the ecological systems in any way.

Recreational Activities

The informal and limited public recreational activities allowed under the conservation easements "do not require … improvements of any kind … except as expressly reserved by [the other provisions of the easements]". As with the assessment of the allowable use as a natural park addressed above, the development impacts resulting from recreational activities in the meadow are directly tied to the management of these activities, uses deemed allowable and season in which the recreational activities take place. Development impacts could be impacts to vegetation and natural systems as well as impacts to wildlife from interactions with humans. Current recreational uses of the property are limited and include recreational walking along unmaintained paths, cross-country skiing along an unmaintained route and the landing of paragliders (listed as an allowable use on Tract 6). Recreational activities such as these that do not require maintenance or development of facilities are limited in scope. Since the current quantity of people engaging in these activities is low, these activities likely have minimal impacts on the natural resources of the property. Potential impacts include the further spread of invasive species (weeds) through the property, the creation of an unorganized trail system (trampling of natural vegetative cover) and the impacts on wildlife species from unpredictable interactions with humans. Under current circumstances, the majority of these recreational activities appear to take place on the periphery of the meadow, during daylight hours and primarily in the summer months. Wildlife use of the meadow is more crucial between dusk and dawn (evening hours), associated with areas of cover within the water, willow and forested areas and during the winter months.

Commercial Photography

Commercial photography and picture painting are allowed under the conservation easement terms provided that structures are not constructed or located on the property. Under these terms, the impacts from commercial photography and picture painting on the property are similar to those addressed under recreational activities and a natural park.

Special Events

Special events (limited in number and size) are allowable uses on Tracts 5 and 6. All other easements are silent on this allowable use. Similar to recreational activities and natural parks above, the impacts to natural resources and wildlife from special events are directly tied to the

management of this allowable use. The negative impacts resulting from special events depend on the season in which an event takes place, the size of the event, noise levels and the time of day. For example, a small number of people, gathering at the end of the growing season (when the ground is dry) in a dispersed manner (not under a temporary structure that would concentrate impacts) without noise amplification and during the day is likely to have different impacts on the natural resources than a larger event, with concentrated activity, noise amplification, in the evening and during spring and fall when wildlife are migrating.

This allowable use clearly illustrates how it is not purely the allowable use that determines the level of impacts but, more importantly, the management of that allowable use that has implications for impacts to the natural resources of the property as well as preserving the conservation values of the easement.

Maintenance Activities

Mowing, bush hogging and similar maintenance activities are allowable uses on Tracts 5 and 6 to maintain the property. Maintenance activities conducted in an ecologically sound manner have the potential to improve the quality and quantity of natural resources (particularly vegetation such as shrubs, trees and grasses for which disturbance stimulates growth).

Future Allowable Uses and Development Options

The development of *all* of the following development options and associated human uses have the potential to be deleterious to the natural resources and ecological systems currently found in Karns Meadow. As was mentioned above, the threshold of use may be found somewhere within the following list of development options. This threshold of use concern is in line with the Natural Resource Inventory's concern that "the manner in which the Property is conserved will, to a degree, determine the function and health of the entire Flat Creek drainage" (Segerstrom & Dittmar, 2003).

For every allowable use and development option that is implemented, there will be both predicted and unforeseen impacts to the natural resources and ecological systems both on the property as well as within the context of connectivity across the landscape. It is therefore advised that any proposed development be done in a careful, thoughtful and incremental manner with respect for both the timeframe of ecological systems as well as the development needs and desires of the Town of Jackson's citizens.

When appropriate below, alternative development approaches are considered that may limit the impacts to natural resources and ecological systems. As with most development, impacts to vegetation, intensity of human use and potential impacts to wildlife can be mitigated within the planning process more effectively than in hindsight. One challenge to mitigating impacts from human use is that these mitigation options are often associated with the *management* of human use. Planning to mitigate impacts of development through passive management of human use is both preferred and more effective than relying on active enforcement.

Combination Bicycle, Pedestrian & Cross-Country Pathway

All conservation easements include the allowable use of a combination bicycle, pedestrian and cross-country skiing pathway (henceforth "pathway"). This pathway is to "not exceed 10 feet in width, and bridge over Flat Creek" (Tract 1). This pathway's approximate location is identified in the conservation easement's exhibit (e.g. Tracts 2 & 4) and has a loop alignment around the perimeter of the meadow (Figure 7). The conservation easements allow for the pathway to contain downcast lighting no more than eight feet in height (Tract 1). "Such lighting shall only be used from November through March and shall be turned off after 10:00 pm" (Tract 1). The

pathway allowable use parallels the equestrian pathway (see below) on the eastern and southern boundaries of the meadow and stands alone as a development on the western and northern portions of the meadow.

Currently pedestrian and cross-country skiing use of the meadow is along unmaintained social trails. The meadow does not currently promote use by either bicyclists or cross-country skiers. Cross-country skier use on unmaintained trails has been observed within the meadow (*pers. obs.*, Winter 2019). Bicycle use of the four roads surrounding Karns Meadow is allowed along either separated pathways (Broadway), designated bicycle lanes (Flat Creek Drive and Karns Meadow Drive) or along a designated bicycle lane that is visually protected during the summer months (Snow King Avenue). Historically, when the Karns Meadow conservation easements were developed between 2003-2009, resources for non-motorized travel and recreation along all four exteriors of the meadow were either not available or newly developed (e.g. Snow King Avenue unprotected bike lane). Likewise, in 2003 cross-country skiing facilities within the Town of Jackson were limited. In town Nordic skiing facilities can now be found on the Schools Trail Loop (0.8 mi.) and at May Park (0.5 mi.) as well as elsewhere in the County. Since the early 2000s, Nordic skiing and bicycling facilities throughout Teton County have grown as a public resource. In 2003, there was a total of 24.6 miles of pathways in Teton County and in 2018 there was a total of 65.7 miles (including Grand Teton National Park pathways). Many of these pathways are available for winter use with a variety of grooming and plowing winter maintenance to improve accessibility for skiers and pedestrians alike.

Development impacts from a pathway on the natural resources of Karns Meadow differ based on vegetation, seasonality and management of use. For a thorough understanding, these development impacts should be considered in terms of direct impacts to resources, alignment of the pathway, user mode of travel, seasonality of use, time of day, and whether lighting is required. For instance, a pathway through of the meadow that is only used in the summer months and is not lit has less of an impact on wildlife than one that is used year-round and lit at night. Furthermore, proposed pathway segments on the perimeter of the meadow (particularly the eastern and southern segments) have less of an impact on wildlife use of the meadow than segments on the northern and western interior of the meadow.

Time of day and seasonality are particularly important development impact variables. Wildlife use of the meadow is highest from dusk to dawn. Therefore, human use during this timeframe will have greater impacts on wildlife than during daylight hours. Likewise, wildlife's access to similar habitats is more limited in the winter months than in the summer. During high snow years, wildlife (particularly ungulates) are pushed into town in search of appropriate habitat. High snow years are also when snow persists and extends the Nordic skiing season. This scenario of limited wildlife habitat during high snow years, and these years also being favorable conditions for Nordic skiing, inherently impact wildlife in winter habitat. The implicit increase of human use in a limited wildlife resource increases the probability for human wildlife conflicts.

The implementation of a loop, paved and lighted pathway through the meadow not only contradicts the stated goals of the Jackson/ Teton County Comprehensive Plan to protect and steward open space but may also have a negative impact on surrounding habitat. It should be noted that WGFD discouraged the construction of a loop pathway in their 2012 comment letter on this project (WGFD, 2012). The gains to recreational opportunities by an approximately 1.0 mile loop pathway are outweighed by the wintertime impacts to wildlife habitat. A summertime only pathway, built in uplands and using existing bridges would have significantly less impact on

wildlife and a natural walking path that did not duplicate existing pedestrian infrastructure would be the least impactful to natural resources and wildlife.

Equestrian Pathway

Several of the conservation easements (e.g. Tract 2 & 4) include an exhibit that indicates the alignment of an equestrian pathway along the eastern and southern boundaries of the meadow. This exhibit also indicates a pedestrian/ bicycle pathway immediately adjacent to the equestrian pathway. This equestrian pathway is to be located in approximately this location, not to exceed 10 ft in width and to be surfaced with wood chips (not pavement). An equestrian pathway in the approximate location indicated on the conservation easement exhibit would provide connection for equestrian use between W Hansen Avenue to the USFS Wildlife Lane Trailhead (across Snow King Avenue to the south of Tract 1 located on Town of Jackson property encumbered by a JHLT conservation easement).

Currently horse traffic use in this area is limited to traveling either along the bike or pedestrian lanes of Snow King Avenue or on an unmaintained, social path next to the pedestrian facilities but within Karns Meadow. Direct impacts resulting from establishing a 10 foot wide equestrian pathway with a wood chip surface would include a loss of upland vegetation along the perimeter of the meadow, likely greater than 10 feet wide as the slope in this area would need to be graded, and impacts to scrub shrub wetlands (particularly on Tract 1). Furthermore, existing wetland treatment facility habitat enhancements on Tract 3 may be in impacted by grading activities for an equestrian pathway.

The development of an equestrian pathway should be considered in conjunction with the development of a bicycle/ pedestrian pathway. The equestrian pathway allowable use is approximately 0.5 miles long. An alternative to consider could be to only develop an equestrian pathway along the southern perimeter of the meadow. This southern pathway would connect the southwest corner of the Fairgrounds property to the Wildlife Lane Trailhead. While this alternative would lessen impacts to upland vegetation, impacts to wetland communities from grading would persist. A third alternative would be to extinguish this allowable use development option and allow equestrian use to continue as it currently does on the existing pedestrian and bicycle facilities.

The conservation easements are silent on the issue of seasonality of this equestrian pathway allowable use. It is assumed, that equestrian use of this pathway would be limited to non-snow months as the area identified is the recipient of snow removal from Snow King Avenue as well as the existing pedestrian sidewalk. The addition of winter use on an equestrian pathway in this area would functionally expand the plowing efforts and/ or travel corridor of Snow King Avenue into the meadow likely adding roadway salts and sand to the wetland and grassland systems below and to the north of the pathway. These salts and sands would be harmful to the riparian and upland systems. Additionally, maintenance of a wooden chip pathway during the winter months could prove costly in terms of both winter maintenance as well as spring surface repair. The USFS Forest Service lands accessed by the Wildlife Trailhead are closed during the winter months (December 1 – April 30) making the likely destination of the Wildlife Trail impractical during the winter months.

Wooden Signs

The allowable use of wooden signs is limited to “unlighted, wooden or simulated wooden signs for purposes of providing direction” along the allowable pathways or drives (Tract 1). The impacts of these signs to vegetation cover and wildlife would be minimal and independent of

season. Impacts from allowable signs would be an incremental increase in impacts resulting from the associated pathway and/ or drive development.

Water Well

In addition to the Thaw Well allowable use addressed above, Tracts 3, 4, 5 and 6 allow for the installation of a water well on each. This water well must be located greater than 50 feet away from Flat Creek and all associated disturbance activities must be completely revegetated. Tract 4 is the location of both the stormwater treatment facility and the residential development option. Tract 6 is the location of a park including possible picnic shelter and bathroom facilities. The impacts from developing water wells in upland areas can be mitigated through revegetation of the area as is called for in the easement. Impacts on wildlife from the wells themselves would be minimal.

Parking Lot/ Parking Garage

Tract 5's restrictive covenant lists "a public parking lot and/ or parking garage" as an allowable use while Tract 4's conservation easement includes a parking lot as an allowable use. All other tracts' conservation easements are silent on this allowable use. Tract 5's restrictive covenant further stipulates that this development is an allowable use "provided that such improvements are designed, constructed, and maintained to protect the natural resources" (Tract 5). For historic context, when this easement was written (2008) the adjoining parcel to the west was owned by the Teton County Housing Authority and earmarked for a housing project. However, in 2011, the adjoining parcel was transferred to the Town of Jackson for development as the START Barn/ Transit Center that includes a six (6) public parking spaces. The public's use of this facility as a transit center is currently limited and therefore the demand for a parking lot in this location is also limited. A parking lot located on Tract 4 or 5 would result in direct impacts and complete removal of vegetation in and around the area designated for development. At this time, a parking lot size has not been proposed nor is one identified for either Tract.

The conversion of lands from an agricultural meadow cover type to an impervious surface (either paved or gravel) would require that all run-off be engineered to enter a storm water catchment basin system rather than be allowed to enter directly, or indirectly, into Flat Creek in order to "protect the natural resources" of the waterway. Parking lots would have impacts to vegetative cover types in direct correlation to the size of the parking lot (e.g. a larger parking lot would remove more vegetation). Impacts to wildlife would likely stem from associated lighting and vehicles lights (see lighting section below). Furthermore, the demand for a parking lot would indicate an increase in human use of the area greater than what is currently present. The removal of vegetation, greater human activity and potential increase in lighting (either from parking lot lights or from vehicle lights) would all result in a decrease to habitat quality and availability for wildlife use within the meadow, particularly during the winter months when wildlife, predominantly ungulates, use is higher and available habitat is limited.

In addition to the impacts addressed above from the development of a parking lot, the development of a parking garage would significantly increase these impacts. The difference ecologically speaking between the development of a parking lot (which could operate seasonally) versus the development of a parking garage (which would be a building, operate year-round and have lighting throughout the nighttime hours) is significant. A parking garage would in effect move the border between developed and undeveloped areas from Karns Meadow Drive into the meadow. The Jackson/ Teton County Comprehensive Plan (2012) states that Karns Meadow Drive will "create a separation between the developed and undeveloped

portions of the area" (pg IV-41). Placing a parking garage, and to a lesser extent a parking lot, on Tract 5 would decrease the distance, and therefore increase the area of impact, between human development (currently the START Bus Barn) and crucial natural resources in the interior of the meadow (e.g. riparian communities). Adding additional public parking, in the form of a public parking garage if needed, to the current START facilities west of Karns Meadow Drive would significantly decrease the impacts of this development on the natural resources and wildlife use of Karns Meadow.

Lighting on Pathways, Drive and Parking Lot

Lighting is an allowable use in association with Karns Meadow Drive, the parking lot, on the parking garage and along the bicycle/ pedestrian pathway. Lighting for the drive, parking lot and parking garage "shall not exceed twelve feet in height, shall be downcast at 90-degrees and shall be incandescent in color" (Tract 5). Lighting associated with the pathway "shall not exceed eight feet in height and shall only be used from November through March before 10:00 pm" (Tract 1). While the START Barn does have downcast lights, Karns Meadow Drive does not currently have streetlights along the length of the roadway.

The research on impacts to natural resources and wildlife from lighting suggests that lights interfere with wildlife movement and use of an area (Blackwell, DeVault, & Seamans, 2015). There is little to no information suggesting that artificial lighting is a benefit to wildlife (Rich & Longcore, 2006). Much of the research has focused on lighting roadways in areas of wildlife-vehicle collisions and if streetlights assist humans to avoid wildlife-vehicle collisions. The research available on this topic indicate that streetlights do not significantly limit wildlife-vehicle collisions (Rich & Longcore, 2006).

Within this context of Karns Meadow, the addition of overhead lighting would be for the benefit of human use but the question is whether this benefit to humans would outweigh the negative impacts to wildlife. The Karns Meadow Natural Resources Inventory (Segerstrom & Dittmar, 2003) highlights the current unlit nature of the property as a benefit to moose and mule deer in need of cover and movement corridors undisturbed by nighttime human activity. Moose, mule deer and Trumpeter Swans, among other species, are known users of Karns Meadow during nighttime hours.

Trumpeter Swans may also be negatively affected by lighting in Karns Meadow. Wintering swans in the valley use the Flat Creek corridor as a local flyway to travel between the Elk Refuge and foraging/ loafing open water south of town. Swans are often observed conducting low elevation flights along Flat Creek presumably using the creek as a navigational path. Many of these flights are conducted during low light, low cloud cover and at night. Locating lights near the creek could disrupt the flight path of these swans and hinder their ability to navigate around obstacles such as the high voltage power lines to the southwest of Karns Meadow along this flyway. Swan's vision is compromised at best and lights are known to blind them thereby increasing the risk that they will get off course, lose track of their navigational path and potentially run into infrastructure such as powerlines.

Public Bus Stop

A public START bus stop is located along Snow King Avenue on Tract 4. Since the conservation easement on Tract 4 is silent on a public bus stop as an allowable use, this bus stop is likely considered a related improvement to Snow King Avenue. Tract 5's restrictive covenant specifically calls out a public bus stop as an allowable use. The addition of a START bus stop on Tract 5 would logically be located at the START Bus Barn where the infrastructure for a bus stop

is in place other than a curb pullout along Karns Meadow Drive. The addition of a bus stop in association with the START Bus Barn on Tract 5 would likely have minimal additional impacts to the Karns Meadow property beyond those already associated with the proximity of the START Bus Barn, particularly if the bus stop were located on the western side of Karns Meadow Drive in front of the START facility. A bus stop sign is located at the corner of the southern driveway to the bus barn and Karns Meadow Drive; however, this stop is not represented on the START Bus schedules.

Residential Development

The development of three single-family residential lots on Tract 4 along Flat Creek Drive is an allowable use. All other easements are silent on this allowable use. The Tract 4 conservation easement limits this potential development to "single-family residential use only" (Tract 4). These single family residents may include "an attached or detached garage, one guest apartment, utilities and a driveway… on each lot. The size of each such lot shall be approximately 7,500 to 8,000 square feet" (Tract 4). This area is currently zoned as Neighborhood Low Density-1 (NL-1) by the Town of Jackson. The restrictions outlined in the conservation easement are in line with the intent of the current NL-1 zoning.

The area identified for this potential development is along an upland area, adjacent to Flat Creek Drive on the eastern portion of Tract 4, south of neighboring residential development and proximate to the Fairgrounds. The vegetative cover in this area is either disturbed (the area has been used as a staging area for the processing of sand and the construction of the stormwater treatment facilities) and as agricultural meadow. Of all the locations within the Karns Meadow property to locate low-density residential development, this is the least impactful.

Nonetheless, impacts resulting from residential development of any kind are extensive. Direct impacts to vegetative cover (the removal and replacement with either buildings or manicured lawns) are implicit within the development of housing. The location of these residential lots on a bench above the riparian system lessens the impacts to the overall ecological function of the property. The conservation easement directs that exterior lighting associated with this development shall be downcast and not to exceed eight feet in height (Tract 4). This restriction will minimize, but not remove the impacts of light pollution on the meadow. Further minimization of light pollution could be achieved by limiting the lighting allowed on the meadow side of these properties and implementing newer technology. Impacts to wildlife and wildlife movement from residential development are often a result of the amount and timing of human disturbance activities at and near the residence. Noise, unrestrained pets and an abundance of activity increase the level of disturbance to wildlife. The location of single-family residences immediately adjacent to the stormwater treatment facility will likely impact avian species during the summer months. The wetlands in this facility not only treat stormwater but also provide breeding and foraging habitat for avian species, including waterfowl and shorebirds. Increased noise and unrestrained pets as well as an increase in run-off from the developed lots have the potential to disrupt the breeding and foraging habits of avian species likely resulting in a loss of breeding habitat.

A change in zoning of this area to higher density housing (NH-1), and an associated significant increase in residential housing, as is proposed in the 2019/2020 Housing Supply Plan (Jackson/ Teton County Housing, 2019) would have a significant, negative impact on the ecological systems within Karns Meadow in comparison to the three residential units that are currently allowed. The 2019/2020 Housing Supply Plan (2019) proposes NH-1 zoning which would allow approximately 8.7 units on this ±0.50 acre building site up to 3 stories tall. As a point of

comparison, the single-family residences to the north of this land currently have 9 units on 2.0 acres. The four residences directly north of the Tract 4 earmarked area collectively occupy approximately 0.85 acres.

Some of the possible repercussions from an increase in housing that would have negative effects on natural resources include a lack of permeability into and out of the meadow through the development area, an increase in human and pet disturbance (both predictable and unpredictable), an increase in light and noise pollution both within and proximate to the meadow and an increase in non-permeable surfaces and associated run-off from increased development.

Home Occupancy Uses

Home occupancy use on Tract 4 allows for "commercial or professional uses contained entirely within the principal residences" (Tract 4). All conservation easements other than Tract 4 are silent on the topic of home occupancy use. The potential development and use impacts resulting from home occupancy uses are included in the residential development section above.

Bathroom Facilities and Picnic Shelter

Bathroom facilities and picnic shelters for users of the Natural Park are an allowable use on Tract 6. All other conservation easement documents are silent on the topic. Tract 6 allows for the development of these structures not to exceed 5,000 square feet of impervious surface, to be located away from the drip-line of mature trees and over 50 feet from Flat Creek. Furthermore, the construction and maintenance of these structures should not damage any existing mature trees (Tract 6). Lighting of the bathroom facilities entrances are also allowed. Impacts from the potential development of a bathroom facility and picnic shelters on Tract 6 would result from the removal of natural vegetation and human disturbance to wildlife. The conservation easement does not address the seasonality of use for these facilities. However, the Teton County Parks and Recreation Department generally operates public bathrooms on a seasonal basis locking and winterizing them beginning October 1st (www.tetonparksandrec.org). Limiting the amount of potential human disturbance associated with these facilities during the fall, winter and spring months when ungulates are using the Karns Meadow property for daily and seasonal movements as well as for winter foraging and cover habitat would thereby limit the impacts from the development of these facilities on wildlife. The location of these facilities on Tract 6, which is primarily away from the Flat Creek corridor willow system, lessens the impacts from human disturbance on the breeding and foraging habits of wildlife species such as songbirds, waterfowl, shorebirds, mammals and amphibian species using this riparian system during the summer months.

An alternative to the construction of a bathroom facility on Tract 6 could be to build a public bathroom within or attached to the START Bus Transit Center located approximately 300 feet to the southwest. The construction of picnic facilities could then be in the absence of water and electric utilities and contained to a smaller footprint thereby lessening potential impacts to natural vegetation.

HABITAT IMPACT ASSESSMENT

A habitat impact assessment at the most basic level focuses solely on the direct impacts to vegetation. However, a complex property such as Karns Meadow that contains both upland and wetland ecological systems, crucial winter ranges and known wildlife movement corridors, would not be well served by a habitat assessment focused solely on the vegetative component of habitat. A species habitat is the combination of all the natural resource and location characteristics that a particular species needs to thrive throughout the year. Additionally, a species' specific habitat requirements may change seasonally. Strategies some species use to fulfilling their habitat requirements include migration and short distance, daily movements. Therefore, the habitat impact assessment below addresses both a generalized assessment of impacts to vegetative cover as well as an assessment of impacts to habitat viability and movement from fragmentation, human use and lighting. While specific development plans may result in additional impacts, those listed below represent an initial filter to assess impacts.

Impact to Vegetative Cover

Under Town of Jackson Land Development Regulations (Town of Jackson, 2018), impacts to vegetation are calculated based on direct impacts to the vegetative cover types through the removal of vegetation. Within the context of Karns Meadow, impacts to vegetation could also include indirect impacts resulting from a change in water regimes. Thirty-nine percent (39%) of Karns Meadow is delineated as wetlands (Appendix F). The Karns Meadow wetland *complex* is defined as the combined area of wetlands, open water, associated development buffers and small areas of uplands contained within these delineated wetland and water features. The wetland complex therefore constitutes 24.6 acres or 59% of Karns Meadow. If development were to occur, or the water regime were to be altered, within this wetland complex, impacts to the wetland resources would be expected.

Furthermore, direct impacts to vegetation may also result from unorganized human disturbance such as social trails and camping as is currently present in the meadow. Current human use is at low levels therefore direct impacts tend to be the trampling of vegetation as opposed to the removal of vegetation. Nonetheless, an increase of human disturbance along social trails would correlate to an increase in impacts to vegetation cover types.

The invasion of weed species (i.e. non-native species) into natural communities is another impact to natural vegetation that is difficult to quantify but has an impact on both vegetative natural resources as well as the quality and quantity of forage available for wildlife species. Non-native vegetation is able to establish faster and grow in less than ideal conditions thereby outcompeting native vegetation. Over time, competition from non-native species will begin to dominate an area over native species.

Initial, conceptualized calculations for minimum direct impacts to vegetation from proposed development projects include the following (Figure 7):

Table 4. Conceptual Direct Impacts to Vegetative Cover

DEVELOPMENT	WETLAND (ACRES)	UPLAND MEADOW (ACRES)	DISTURBED (ACRES)	TOTAL (ACRES)
LOOP PATHWAY INCLUDING EQUESTRIAN TRAIL	0.2	1.8	-	**2.0**
RESIDENTIAL DEVELOPMENT	-	0.2	0.3	**0.5**
TOTAL	**0.2**	**2.0**	**0.3**	**2.5**

Impact to Wildlife Habitat Viability and Movement

Impacts to wildlife are more complex than impacts to vegetation because the majority of impacts to wildlife are indirect, seasonally dependent, and based on variables that affect specific species in different ways. The assessment is further complicated by the fact that wildlife move. The statement that wildlife move is obvious but often proposed as a possible solution (which it is not) rather than acknowledged as a complicating factor in an impacts analysis.

All wildlife species have specific habitat requirements based on annual life cycles (e.g. crucial winter range, parturition areas, nesting habitat, foraging habitat, resting cover, etc.) as well as activity (e.g. breeding, foraging, migration and movement). Habitat viability and movement corridors for each species are important considerations within the broader context of impacts from development. Use of an area by a particular species does not equate to that area providing high quality habitat. Often, particularly when species are squeezing out an existence in close proximity to humans, marginal habitat is used even though it does not provide the highest quality natural resources and characteristics needed for species to thrive. When using marginal habitat, wildlife species may also suffer from higher stress levels resulting in higher energy output, decreased physical fitness and unsuccessful breeding attempts. Increased stress levels are particularly damaging to wildlife species during crucial portions of the annual cycle when a species' margin of error for survival is limited (e.g. winter and spring for ungulates and the spring/ summer nesting and brooding season for avian species).

Karns Meadow is an important bottleneck in the movement patterns of wildlife, particularly mule deer, moose and Trumpeter Swans, providing dark skies, cover habitat, nutritious forage and a riparian corridor with limited to no human disturbance during the fall, winter and spring. This statement has been continually stated over the past two plus decades in town and county documents including:

- JHWF 1994 Wildlife Collisions Report
- Karns Meadow Baseline Report (Segerstrom & Dittmar, 2003)
- Wyoming Game and Fish Pathways Comment Letters (WGFD, 2012)
- Jackson/ Teton County Comprehensive Plan (Jackson/ Teton County Planning, 2012)
- START Bus Facility Environmental Analysis (Alder Environmental, 2012)
- WYDOT/ Conservation Research Center's Mule Deer Movement and Habitat Use Patterns in Relation to Roadways in Northwest Wyoming (Riginos, et al., 2013)
- Teton County Wildlife Crossings Master Plan (Huijser, et al., 2018)

A bottleneck is an area where wildlife's movement patterns are constricted by "topography, vegetation, landscape features or development" (Kauffman, et al., 2018) and furthermore "the potential to disrupt… or disturb animals is exacerbated in these narrow regions [bottlenecks], especially when alternate routes do not exist" (Kauffman, et al., 2018). The cumulative effects of development pressures (both inside and outside of the property), changes in habitat quantity and quality and human use disturbance all contribute to the overall viability of the habitat. Three foundational, but often overlooked, concepts that affect habitat viability and movement areas, are impacts resulting from fragmentation, artificial lighting and human recreational use.

Fragmentation

Karns Meadow provides the last remaining, large section of unfragmented habitat in the Town of Jackson from both an aquatic and a terrestrial perspective. This section of Flat Creek is also the last remaining, intact riparian community with natural vegetation on *both sides* of the creek. This intact riparian community is constricted at the northern and southern ends where Flat

Creek enters and exits Karns Meadow by roads (Broadway and Snow King) and associated automobile bridges. Nonetheless, the riparian community, and Flat Creek itself, provide aquatic connectivity from the northeast to the southwest through Karns Meadow. From a terrestrial perspective, this intact riparian corridor, inclusive of associated uplands, is the last remaining terrestrial connection of undeveloped lands through the Town of Jackson and provides connectivity to public lands to the north and south. Maintaining connectivity of the landscape is essential to maintaining migration and movement patterns as well as the health of an ecosystem.

A loss of this connectivity is fragmentation at the landscape scale. Impacts to wildlife resulting from an increase in fragmentation at the landscape scale includes the loss of migration and movement corridors with both regional and population level impacts, a loss of wildlife's ability to adapt to changing development pressures because they cannot adjust their use to neighboring viable habitats and a decline in the overall habitat quality (Smith & Wachob, 2006). Marginal habitat likely does not provide all of the natural resources needed to sustain life. However, the ability to connect marginal habitats does allow wildlife species to access the natural resources needed through a combination of neighboring locations. If movement corridors are lost, then a species' ability to "squeeze out a living" is lost and the area no longer contributes to viable habitat.

Fragmentation at a finer scale is an impact to intact vegetation communities such as the willows within Karns Meadow. When sections of the willow community are removed, such as for the construction of a path through the willow community, there is an increase in edge effects. Edge effects result in impacts such as greater access to interior locations for nest predators and disturbance by humans and pets in areas that were previously undisturbed, interior habitat. Karns Meadow, as with other natural areas experiencing pressure from human development, has seen an increase in corvid populations (e.g. Magpies) and other avian predators (CRC, 2009-2013). The fragmentation of this willow community would result in an increase of nest predation on songbirds and other avian species that rely on the density of the willow community for shelter and protection. Fragmentation would thereby lessen the habitat quality of the willow system. The long-term study of songbirds in Karns Meadow has reported approximately 60 bird species, including over 40 songbird species (CRC, 2009-2013). In addition to songbirds, Karns Meadow provides habitat to waterfowl and Trumpeter Swans all of which are susceptible to human disturbance. The location of powerlines in the area (some of which are high-powered) increase the dangers of waterfowl flushing from disturbance (WGFD, 2012).

Human Use

The area around a road, trail, pathway or other human disturbance corridor were wildlife change their behavior based on the disturbance element (e.g. automobile, recreating human, pet, etc.) is referred to as the area of influence. Within the area of influence, wildlife experience higher stress levels, display a higher level of vigilance (e.g. forage less) and generally display reactions to the disturbance similarly to how they would react to a predator. In a study of mule deer road crossings in Western Wyoming, deer were found to be more vigilant within 100-200 meters of roadways (Riginos, et al., 2013). Similarly, in a study of mule deer reactions to recreating humans (e.g. hikers and mountain bikers) on Antelope Island in Utah, mule deer exhibited a higher probability of flushing within 100-meters of the disturbance (Taylor & Knight, 2003). Interestingly, mule deer were often observed to flee only to the nearest cover before stopping and flight distances were greater in the morning than in the evening which may have indicated a higher importance of evening feeding (Taylor & Knight, 2003). Mule deer may take

greater risks (not moving away as quickly or as far) in order to continue with high importance activities (e.g. foraging). This scenario would certainly correlate to mule deer's reluctance to react to a disturbance during the wintertime when energy conservation and foraging abilities are of utmost importance.

Interestingly, the Taylor and Knight (2003) results in Utah did not differ in area of influence between mountain biking and hiking on a trail. However, their results did differ between on-trail and off-trail recreation. This may have been because on-trail recreation became somewhat predictable while off-trail recreation was more non-predictable. Nonetheless, "even on-trail recreation may have negative consequences for wildlife and could result in displacement from otherwise suitable habitat" (Miller, Knight, & Miller, 2001; Taylor & Knight, 2003). Additionally, an "area of influence will increase if recreationalists allow their dogs to roam away from a trail" or give chase to the wildlife (Miller, Knight, & Miller, 2001). Therefore, suitable habitat may become unsuitable through the impacts of recreational use on wildlife particularly in areas where the timing of recreational use and wildlife use are aligned (Taylor & Knight, 2003).

These studies of impacts on mule deer from recreational use have direct implications for a potential increase of recreation use in Karns Meadow. Mule deer and moose use of Karns Meadow is typically highest during the evening and morning hours, particularly in the winter months. Therefore, the impacts of recreational use in Karns Meadow would be greatest when impacting crucial wildlife activities such as resting in cover habitat and foraging between dusk and dawn. Greater impacts to wildlife use of an area contribute to a decrease in that area's viability as suitable habitat. A decrease in suitable habitat "may be of particular concern where 'islands' of public lands are surrounded by urban or suburban development, because wildlife in these areas may not be able to extend their home ranges to include less disturbed habitat (Miller, Knight, & Miller, 2001). If management objectives include minimizing disturbance to wildlife habitat, new trails should follow existing edges and avoid water and forage resources, wildlife travel corridors, and escape terrain" (Taylor & Knight, 2003).

Artificial Lighting

Artificial lighting is an important issue within the discussion of wildlife and human conflict. The majority of the research on lighting is focused on wildlife-vehicle collisions and, within this body of research, much of the work studies how lighting affect's the driver's ability to see wildlife rather than the effects of lighting on wildlife's ability to navigate a roadway. Nonetheless, there are elements of this research which can be informative to an analysis of the impacts of lighting for human purposes on the suitability of habitat for wildlife.

The ability of wildlife species to adjust their vision to a change in light, particularly a rapid change such as a streetlight, is as varied as the species themselves. While bright lights have a blinding effect on Trumpeter Swans (to such an extent that this is one technique used for capture), ungulates tend to have some capacity to adjust to a sudden change in light. Nonetheless, ungulates' eye structure does not allow their vision to adjust immediately and they will undergo a period of blindness (Rich & Longcore, 2006) much like humans. Therefore, "from the animal's perspective, less is better… The lowest possible lighting level consistent with human safety is the best for mammals crossing roads" (Rich & Longcore, 2006).

Furthermore, "street lighting negatively affects a mammal's ability and willingness to cross a road or to move though any area with artificial night lighting" (Rich & Longcore, 2006). This research finding was echoed in the Teton County Wildlife Crossings Master Plan (2018) through the recommendation that "streetlights would not be installed near the suggested wildlife

overpass on Broadway so that wildlife [are] not discouraged from using the overpass" (Huijser, et al., 2018; pg. 103-104).

It follows then that the insertion of lighting into a currently dark area of habitat would negatively affect that area's use by wildlife and therefore the viability of the habitat. Recommendations from the literature to maintain landscape corridors include "the general rule that less light is better for animal movement" (Rich & Longcore, 2006) and "an obvious solution to managing negative effects of road lighting in conservation areas is to avoid the use of road lighting altogether" (Blackwell, DeVault, & Seamans, 2015).

Project Vicinity Impact Statement

As the development density increases around Karns Meadow (Figure 8), this increase in neighboring density has an effect on the natural resources and habitat quality for wildlife within Karns Meadow. Current, approved development projects slated for adjoining parcels to Karns Meadow include the residential development of the Sagebrush Apartments which will house 90 units and allow pets, the development of a carwash north of the START Bus Barn property and the expansion of the START Bus Barn facility to encompass the full development potential of its parcel. These projects are in addition to the development of residential units on the eastern portion of Tract 4 as well as the potential increased density of housing development along Flat Creek Drive approved by the recent zoning change from Neighborhood Low Density (NL-1) to Neighborhood High Density (NH-1). Other future development immediately adjacent to Karns Meadow could include the redevelopment of mixed-use parcels along Broadway (Commercial Residential-3; CR-3) and the development of currently vacant lots along Rodeo Drive (Neighborhood Low Density-2; NL-2). Intermixed with this existing, planned and potential development, neighboring conservation easements are located to the south of Karns Meadow connecting the Karns Meadow conservation easements with USFS lands.

In the presence of increased development pressures from outside of the meadow (Figure 8), protecting and enhancing the movement corridor (e.g. installing a wildlife overpass) through the project vicinity as well as protecting and enhancing the habitat quality within Karns Meadow is critical to upholding the conservation values and purposes of the conservation easements. The increase in development in the project vicinity increases the importance of preserving, protecting and enhancing the natural resources within Karns Meadow. Healthy, well-functioning ecological systems and the natural resources (e.g. vegetation, hydrology, soil and wildlife) that contribute to those systems will likely persist and withstand greater development pressures from outside of the meadow than marginally functioning systems could. If development surrounding the meadow continues to increase, repercussions within the meadow could be the cessation of wildlife movement through Karns Meadow connecting the habitats found on East Gros Ventre Butte with Snow King Ridge, an increase in light and noise pollution within the meadow that could lessen the habitat quality for wildlife species requiring dark, cover habitat, an increase in run-off from incremental increases in surrounding non-permeable surfaces, a potential increase in unorganized, human and domestic pet disturbances within the meadow during crucial seasons for wildlife and a decrease or elimination of escape routes for wildlife.

While there is a threshold of use on the Karns Meadow property that may convert marginal habitat to non-viable habitat, there is also likely a threshold of use in the project vicinity which will block movement into the meadow as well as contribute to the degradation of habitat within the meadow. In order for Karns Meadow to continue to function as an intact ecological system, provide natural resources for wildlife, uphold the easements' conservation values and purposes and fulfill the Comprehensive Plan's vision of ensuring the protection of wildlife habitat, future development, redevelopment and zoning changes in the project vicinity must consider cumulative impacts to the meadow during the planning process.

Threatened and Endangered Species

No known threatened or endangered plant or vertebrate species were observed while on the property. It is unlikely that the species listed below would pass through or be located on the property. However, a property such as this adjacent to USFS and other public lands could be subject to a wide variety of vertebrate species' movement patterns.

While the USFS lands to the south of the project area (Snow King Ridge) are mapped as critical lynx habitat, it is unlikely that this area is used extensively by Canada lynx. Canada lynx require dense conifer forest containing healthy snowshoe hare populations (their primary food resource). While the Snow King Ridge could potentially support Canada lynx, the human disturbance in this area likely limits the true functionality of this habitat, particularly during the summer months. The mapping of critical lynx habitat is done at a broad scale and includes an expansive portion of USFS lands within northwestern Wyoming.

USFWS Teton County Species List (USFWS, 2019):

- Canada Lynx (Threatened)
- Grizzly Bear (Threatened)
- North American Wolverine (Proposed Threatened)
- Yellow-billed Cuckoo (Threatened)
- Whitebark Pine (Candidate)
- Canada Lynx Critical Habitat (Designated)

ALTERNATIVES ANALYSIS

The Jackson/ Teton County Comprehensive Plan (Principle 1.4 - Protect and steward open space) states that "small areas can also provide critical habitat and may be just as important to ensuring countywide habitat connectivity". Karns Meadow is an excellent example of a small area that plays an outsized role in the larger landscape. The preservation of this property and the role it plays in the landscape is best maintained at the point of development proposals and thinking creatively as a community rather than after development has been implemented. To this end, the following are some alternatives to consider with regard to current development discussions.

Pathway

While the conservation easements allow for a year-round, pathway with lighting that is groomed for cross-country skiing in the winter months, this environmental analysis suggests that serious consideration be given to alternative development proposals. Alternatives that would allow the community to have predictable (to wildlife) access to the Karns Meadow property during less crucial seasons (e.g. summer), utilize existing infrastructure and do not substantially increase fragmentation to wetlands and other important vegetative cover types would significantly reduce the impacts to habitat viability and wildlife use of the property. One alternative that could achieve the desired outcomes listed above would be a natural (non-paved) footpath through the meadow utilizing existing, pedestrian access points, clustering with utility easements, in upland areas along the periphery of the meadow and requiring minimal direct impacts to the willow system. This footpath could be coordinated with the allowable development (Tract 1) of a small, fishing platform to provide access for citizens with less physical abilities. The exclusion of winter use, lighting within the interior of the meadow and an independent loop pathway (opposed by WGFD Comment Letter; WGFD, 2012) would be significantly less impactful to the natural resources present on the property. An alternative such as this would better align human use of the property with the management of adjoining USFS lands and conservation easements.

POSSIBLE ALIGNMENT ALTERNATIVES						
Loop Pathway, with lighting, used year-round	Loop Pathway, without lighting, used year-round	Loop Pathway, without lighting, used in summer only	Northern and Western Pathway Segments only, no lighting, in interior, summer only	Northern and Western Pathway Segments only, no lighting, on periphery, summer only	Eastern and Southern Pathway Segments only, no lighting, year-round (duplicative of sidewalks)	Natural walking path (not paved) use current eastern and southern walkways, no lighting, summer use only
MOST IMPACT						**LESS IMPACT**

Equestrian Pathway

The development of an independent, equestrian pathway would be duplicative of the existing infrastructure, potentially impactful to wetland resources and potentially costly to maintain. Therefore, it is recommended that equestrian use be combined with that of pedestrians utilizing both current and future infrastructure.

Residential Development

The alternative of higher density housing along the eastern edge of Tract 4 would have significantly more negative impact than what is currently allotted as an allowable use and should not be pursued. Furthermore, alternative design elements that could be implemented in an effort to minimize impacts to the ecological systems of Karns Meadow, while providing housing within the parameters outlined in the conservation easement, could include minimizing lighting on the western/ meadow side of the development, downcast all necessary lighting and implement both interior and exterior design features to minimize light pollution from all windows facing the meadow. For instance, a picture window containing a chandelier projects a significant amount of light outside of the structure. Implementing design features that would minimize light pollution outside of the residence from interior features is recommended.

Parking Lot or Parking Garage

The Tract 5 restrictive covenant allows for "a public parking lot and/ or parking garage, provided that such improvements are designed, constructed, and maintained to protect the natural resources existing on the Trust Parcel and other real property adjoining the Property" (Tract 5). Tract 5's restrictive covenant does not address the dimensions or capacity of this parking lot and/ or parking garage. As was addressed above, the impacts of a parking garage would be significantly more than those of a parking lot particularly with regard to level of disturbance, light pollution and visual impacts. Alternative approaches to consider would be to minimize the size of proposed parking facilities to those necessary for the proposed use, to limit the facility's season of use (e.g. summer only) and/ or to combine this facility with the proposed expansions of the START Bus Barn immediately to the west of Tract 5 thereby removing the parking lot/ parking garage use from Karns Meadow.

Lighting in General

Several allowable uses include the addition of lighting (e.g. parking facilities, pathway, park bathrooms, etc.). The Natural Resource Inventory for Karns Meadow specifically calls out the dark nature of this property and the lack of human disturbance at night as one of its unique features (Segerstrom & Dittmar, 2003). Therefore, any lighting associated with development within and on the periphery of the property should be limited to the greatest extent possible. Since 2003, advances have been made in lighting technology that limit the impacts of lighting outside of the intended area. Artificial lighting has been named one of the greatest threats to wildlife biodiversity worldwide and current research interests include the effects of differing color spectrums on wildlife species and humans. Boise State University is initiating an experiment at Colter Bay in Grand Teton National Park that will examine the effects of ecologically friendly lighting on wildlife, humans and wildlife-human interactions (Barber, 2019). The results from this and similar research should be incorporated into any lighting designs proposed for Karns Meadow in an effort to minimize impacts from artificial lighting.

Park Facilities

Tract 6 of Karns Meadow allows the development of park facilities such as a picnic shelter and public restrooms. The conservation easement does not address seasonality. As with other public park facilities in the Town of Jackson, restricting use of these facilities to summer months would minimize impacts to wildlife use of Karns Meadow. One of the primarily paths used by mule deer to enter the meadow in the winter months traverses Tract 6 moving from the western parking lot of the Centennial Building toward the cottonwood and willow cover habitat to the south (*pers. observation*, 2013-2019). A potential alternative to building a public bathroom

facility (with exterior lighting) would be to add an easily accessible public bathroom facility to the START Barn/ Transit Center. The public building does not currently have an easily accessible public bathroom but one could be added to future construction phases. This alternative would minimize the need for water and electricity to be installed on Tract 6. The distance from the START Barn to Tract 6 could be less than the distance between the Phil Baux picnic shelter and the public bathrooms on S Cache St. The clustering of restroom facilities with the START facilities could be both cost effective as well as beneficial toward minimizing impacts to natural resources.

An alternative to a picnic shelter could be the installation of an ADA compliant viewing platform, including benches, that would promote the conservation easements' vision of promoting the observation and enjoyment of nature in Karns Meadow. Minimizing this infrastructure would minimize impacts while also promoting the enjoyment of this Natural Park.

CONCEPTUAL HABITAT ENHANCEMENT PLAN

Since specific development plans have not been proposed, a specific habitat enhancement plan cannot be developed therefore conceptual habitat enhancement suggestions are included here. Under Town of Jackson Land Development Regulations (Town of Jackson, 2018), habitat enhancements are typically required for impacts to vegetation. The habitat enhancements suggested here go beyond the basis of 2 acres of mitigation/ habitat enhancements created for every 1 acre of impacted vegetation. Habitat enhancements specific to Karns Meadow could be more productive than traditional habitat enhancements and work toward improving, or enhancing, the overall habitat quality found in the meadow. The following activities would benefit the ecological systems on the property.

Weed Treatment – Weed treatments in Karns Meadow have fallen behind and there is an immediate need to eradicate non-native and noxious species throughout the meadow. These weed species are found in both wetland and upland areas. The thorough treatment of weeds should be addressed before any ground disturbing development activities or increase in human use of the meadow commences. Ground disturbing activities and human use both contribute to the spread of weed species. Therefore, meaningful treatments prior to disturbance as well as on-going treatment activities during and after disturbance are required for the health of the vegetative community present on the property.

Willow Disturbance – Willow systems benefit from disturbance events that promote the regeneration of immature age-classes. The willow plants within this riparian corridor benefit from periodic flooding events and are dominated by mature individuals. Selective trimming, thinning, cutting and planting of the willow stems would add diversity to the age classes present on the property and therefore the long-term health of the willow community and increase the nutritional value of the forage available for wildlife.

Conservation Values and Movement – Nontraditional "habitat enhancements" that protect the conservation values and wildlife movement corridors associated with this property could be beneficial to the long-term health of the ecological systems both on and off the property. The long-term future of the ungulate movement corridor between East Gros Ventre Butte, Karns Meadow and USFS lands to the south is in jeopardy (Huijser, et al., 2018). This "green corridor" as it is referred to in the Teton County Wildlife Crossings Master Plan (2018) is being strained by increased development along the transportation corridors around the meadow. Conservation efforts that could increase wildlife access to and from the property include expansion of the automobile bridges over Flat Creek on Broadway and Snow King Avenue to function as wildlife underpasses as well as a wildlife overpass connecting East Gros Ventre Butte to Karns Meadow. This wildlife overpass was deemed "essential" in the Wildlife Crossings Master Plan to maintain this movement corridor (Huijser, et al., 2018).

RECOMMENDATION: DEVELOP MANAGEMENT AND MASTER PLANS

"Complete a comprehensive site development and resource management master plan for the entire facility" was listed in the 2004 Karns Meadow Park Interim Resource Management Plan as a priority. Fifteen (15) years later, this analysis reiterates the need for a long-term, master plan as well as a short-term, existing conditions management plan.

While a master plan could take a few months to develop, in the short-term, inclusive of the 2019 growing season, some immediate management is needed on the existing conditions. Therefore, the immediate development of a management plan for existing conditions should address:

- an increase in weed management through both Teton County Weed and Pest chemical treatments as well as volunteer group assistance through mechanical treatments,
- regeneration of the willow community through mechanical disturbance techniques (could also be a volunteer group effort),
- continued trash cleanup efforts,
- enforcement of pet policy,
- enforcement of no camping policy, and
- management of upcoming land disturbance activities within the property's utility easements.

Having addressed some of the immediate needs to improve the existing conditions in Karns Meadow, a long-term, master plan for the property would be recommended. Master plans are a means of ensuring that the community's vision and goals for the property are incorporated in the future use and associated management. Since 2003, the Karns Meadow properties have been operating under the guidance of the conservation easements. However, much has changed in the Jackson community during the ensuing 15 years including an increase in outside development pressures on the meadow and the wildlife that depend on these lands.

A Karns Meadow Master Plan should address:

- the community's goals and objectives for the Karns Meadow property,
- a prioritization of allowable uses to be implemented,
- existing utility easements on the property and expected land disturbance activities,
- habitat enhancements to improve habitat quality within the meadow,
- specific and cumulative impacts of the proposed development,
- conservation efforts to assist in mitigating the impacts of proposed development, and
- adaptive management and decision-making strategies to protect the property's conservation values as allowable uses are implemented.

These components of a master plan would ensure that Karns Meadow continues to provide functional habitat and movement corridors for wildlife, upholds the property easements' conservation values and purposes and supports the community's vision. Additionally, there are several utility easements (power, sewer, water, etc.) present on the property. The future management of these easements and associated land disturbance activities have not been addressed in this environmental analysis and should be included in a master plan.

APPENDIX

APPENDIX A: REFERENCES

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APPENDIX B: FIGURES

Figure 1. Vicinity

Figure 2. Vegetation

Figure 3. Water and Wetlands

Figure 4. Elk

Figure 5. Mule Deer

Figure 6. Moose

Figure 7. Impacts and Resource Buffers

Figure 8. Project Vicinity Development

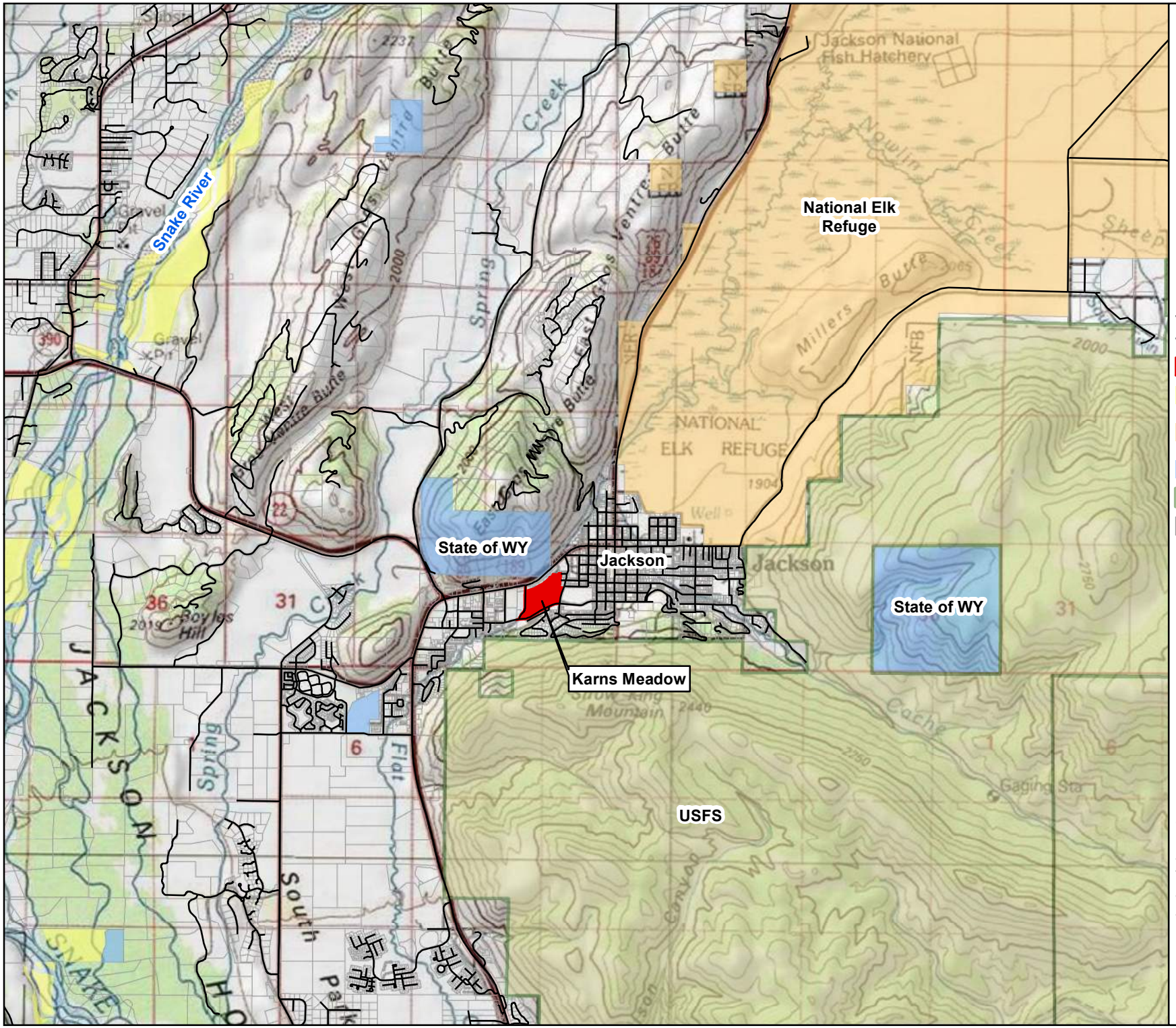

Figure 1:
Vicinity

Karns Meadow Environmental Analysis

Sources
USGS
- Topo
Teton County
- Roads
- Parcels

May 28, 2019

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Figure 2:
Vegetation

Karns Meadow Environmental Analysis

Legend

- Open Water
- Scrub-Shrub Wetland
- Mitigation Willow Plantings
- Emergent Wetland
- Cottonwoods
- Agricultural Meadow
- Disturbed/ Developed
- Karns Meadow

1 in = 300 feet

N

0 300 Feet

Sources
Teton County
- Roads
- Parcels
- 2017 Aerial Imagery

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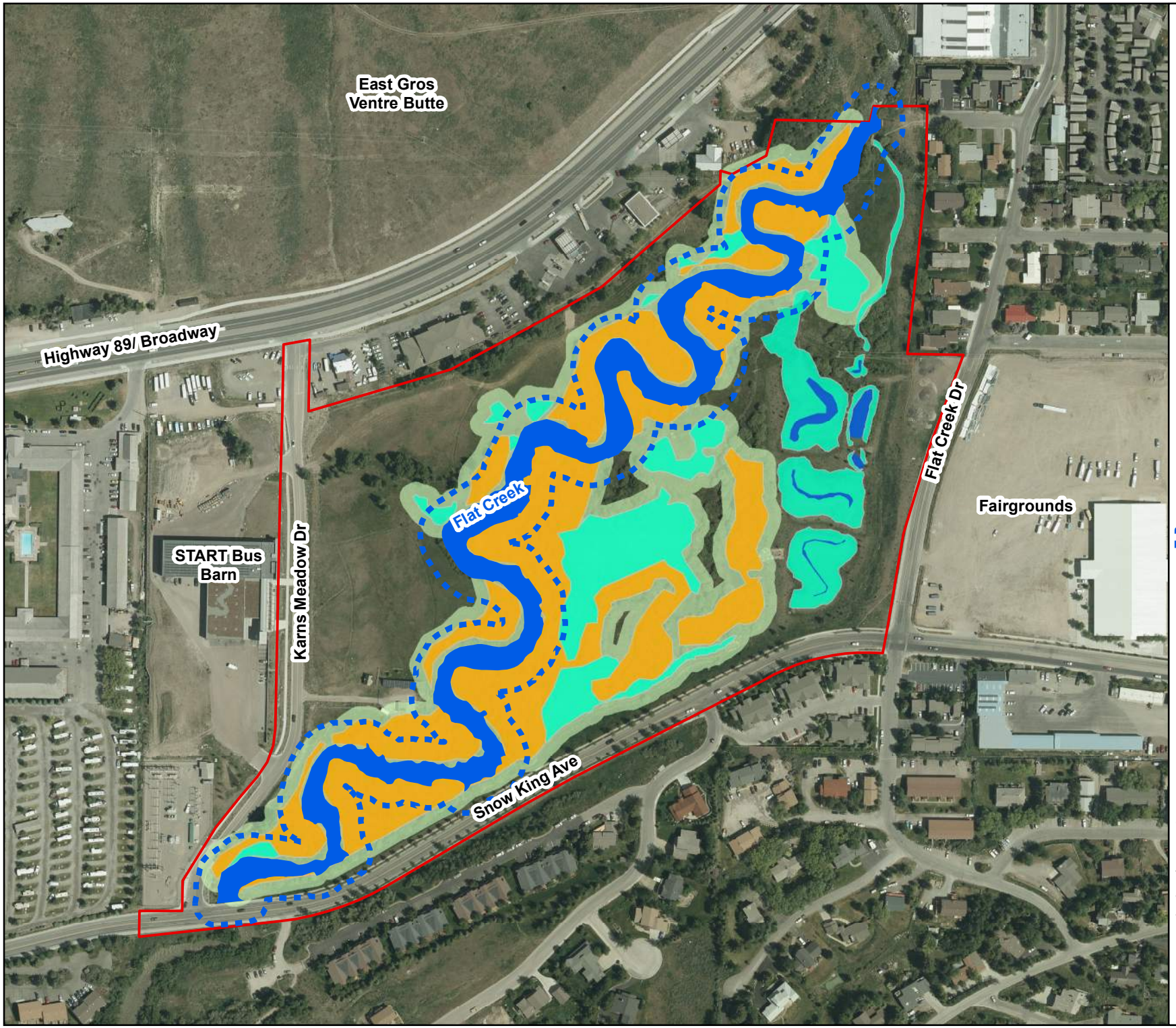

Figure 3:
Water and Wetlands

Karns Meadow Environmental Analysis

Legend

- Open Water
- Emergent Wetland
- Scrub-Shrub Wetland
- 30-ft Wetland Buffer
- 50-ft Stream Buffer
- Karns Meadow

1 in = 300 feet

N

0 300 Feet

Sources
Pioneer
- ARI
Teton County
- Parcels
- Aerial Imagery

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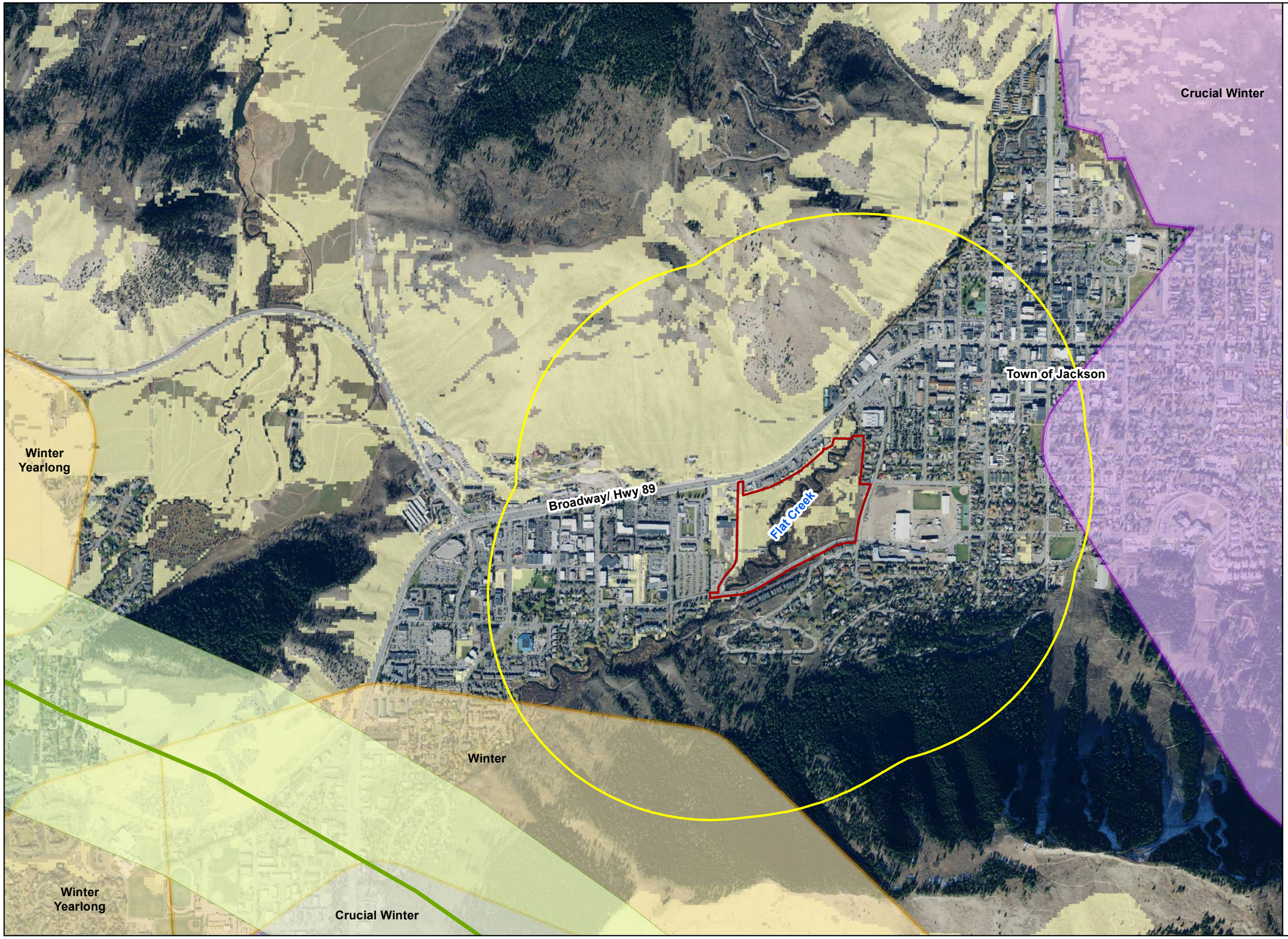

Figure 4:
Elk Winter Range and Migration

Karns Meadow Environmental Analysis

Legend

- Karns
- 1/2 Mile Vicinity
- WGFD Migration Corridor and Buffer
- Crucial Winter & Winter Yearlong
- Winter & Winter Yearlong
- Mapped Suitable Winter Habitat

1 in = 0.2 miles

0 0.2 Miles

N

Sources
NAIP
- 2017 1 ft Aerial
Teton County
- Roads
- Parcels
WGFD
- Seasonal Ranges
- Migration Corridor

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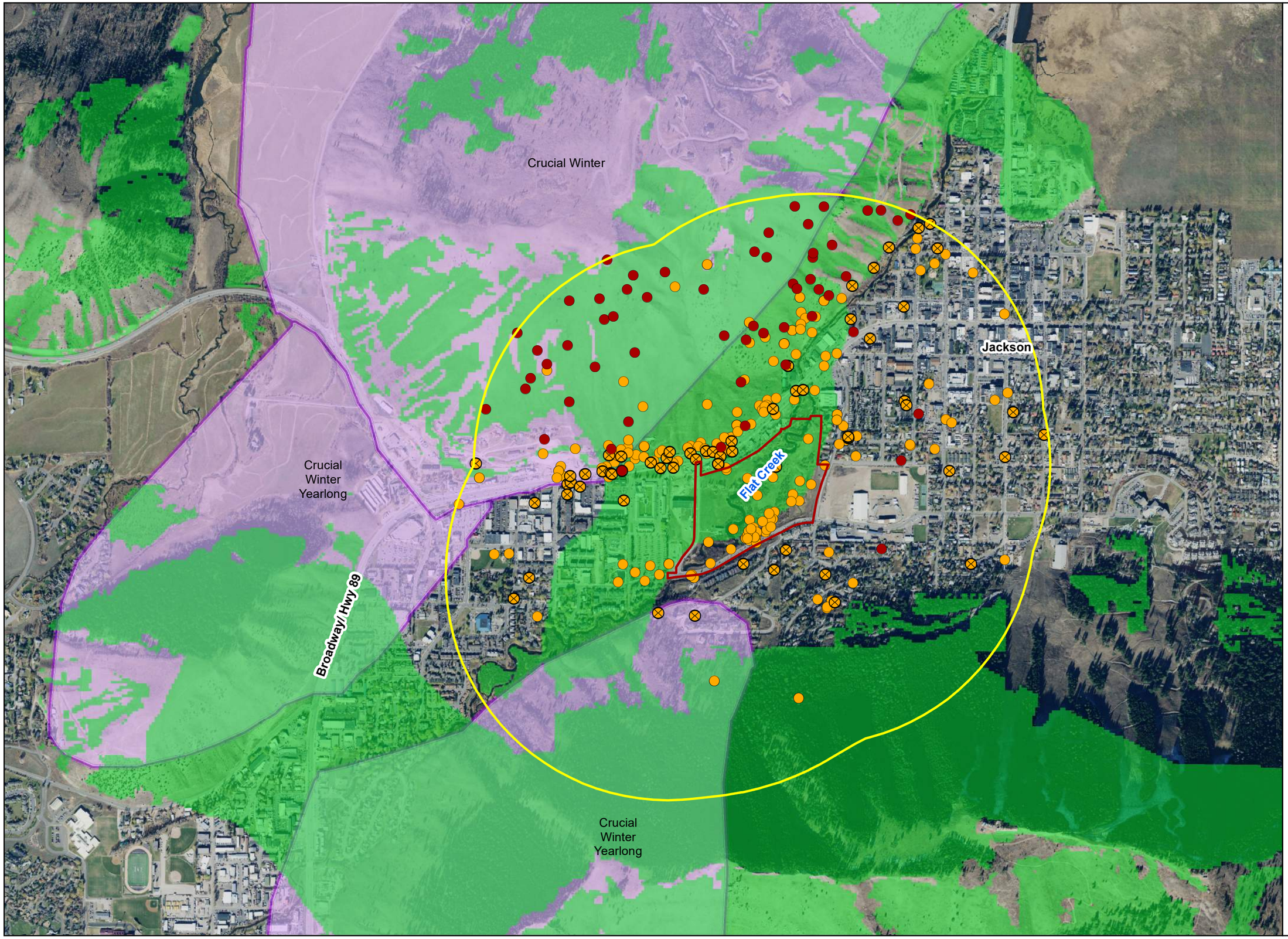

Figure 5:
Mule Deer Winter Range and Movement

Karns Meadow Environmental Analysis

Legend

- Karns Meadow
- 1/2 Mile Vicinity
- WGFD Mule Deer Observations
- Deceased - WGFD Mule Deer Observations
- NMJH Mule Deer Observations
- Mapped Suitable Winter Mule Deer Habitat (includes Movement)

WGFD Ranges

- Crucial Winter and Winter Yearlong

1 in = 0.2 miles

0 0.2 Miles

N

Sources
NAIP
- 2017 1 ft Aerial
Teton County
- Roads
- Parcels
WGFD
- Seasonal Ranges
- Observations (2000-2019)
Nature Mapping Jackson Hole (NMJH)
- Observations (2009-2018)

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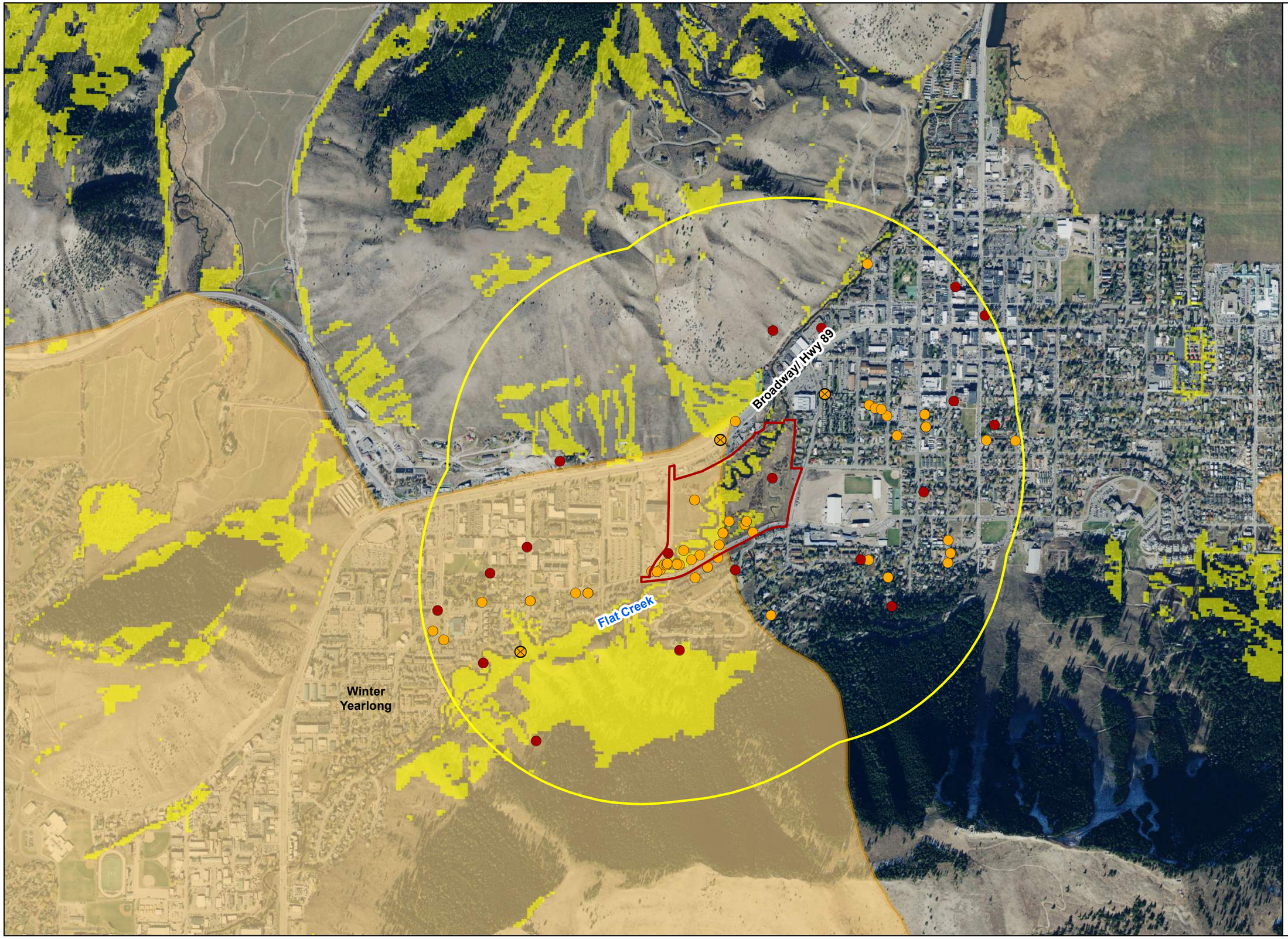

Figure 6:
Moose Winter Range

Karns Meadow Environmental Analysis

Legend

- Karns Meadow
- 1/2 Mile Vicinity
- WGFD Moose Observations
- Deceased - WGFD Moose Observations
- NMJH Moose Observations
- Mapped Suitable Winter Moose Habitat

WGFD Range

- Winter Yearlong

1 in = 0.2 miles

0 0.2 Miles

N

Sources

NAIP
- 2017 1 ft Aerial

Teton County
- Roads
- Parcels

WGFD
- Seasonal Ranges
- Observations (2000-2019)

Nature Mapping Jackson Hole (NMJH)
- Observations (2009-2018)

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Figure 7:
Conceptual
Direct Impacts

Karns Meadow Environmental Analysis

Legend

- Pathway (including Equestrian)
- Residential Development
- Public Parking
- Karns Meadow
- Open Water
- Scrub-Shrub Wetland
- Mitigation Willow Plantings
- Emergent Wetland
- Cottonwoods
- Agricultural Meadow
- Disturbed/ Developed

1 in = 300 feet

N

0 300 Feet

Sources
Teton County
- Parcels
- Aerial Imagery

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Figure 8:
Project Vicinity Development

Karns Meadow Environmental Analysis

Legend

- State & Federal Lands
- Conservation Easement
- Permeable Development
- Future Development
- Redevelopment Could Increase Density
- Approved Development
- Developed

1 in = 600 feet

N

0 600 Feet

Sources
Teton County
- Parcels
- Aerial Imagery

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APPENDIX C: PHOTOGRAPHS

Photo 1. Agricultural meadow, willows, solar panels looking south toward neighboring housing development and Snow King ridge conifer habitat.

Photo 2. Beaver lodge on Flat Creek

Photo 3. Upland meadow and deciduous trees on the northern portion of the property

Photo 4. Willow and meadow interface with social trail

Photo 5. Disturbed area on Tract 6

Photo 6. Flat Creek riparian corridor

Photo 7. Flat Creek riparian corridor, power lines and Snow King ski area in background

Photo 8. Existing residential development east of Karns Meadow

Photo 9. Cache Creek tube confluence with Flat Creek

Photo 10. Pedestrian creek access trail and infrastructure

Photo 11. Constructed wetland stormwater treatment facility

Photo 12. Wildlife movement corridor between East Gros Ventre Butte and Karns Meadow

Photo 13. Snow King Avenue, existing bicycle and pedestrian infrastructure and scrub shrub vegetation

Photo 14. Wildlife tracks indicating winter movement

Photo 15. Wildlife tracks through an open gate along Broadway and Flat Creek accessing Karns Meadow

APPENDIX D: HISTORIC AERIAL IMAGERY

A comparison of aerial photographs from 1945 (the first available) to 2003 (the first easement) to 2017 (the last available photograph) displays how the Karns Meadow property has slowly reclaimed the riparian corridor once agricultural operations ceased as well as how development of the Town of Jackson has continually increased in density around the meadow

1945 – Displays extensive use of the riparian corridor by agricultural operations cultivating crops immediately adjacent to the Flat Creek waterway.

2003 – Density of human development has increased significantly since 1945 on all side of Karns Meadow. While areas of crop cultivation remain visible, the wetland habitat is regenerating.

2017 – Density of human development continues to increase through infill of undeveloped lots particularly to the south in the Karns Hillside Addition neighborhood and along Flat Creek.

APPENDIX E: CONSERVATION EASEMENTS ASSESSMENT

Conservation Easements Assessment Summary Report

Karns Meadow

Town of Jackson

Jackson, WY

Jackson Hole Land Trust – Easement Holder

EcoConnect Consulting LLC
Connecting Ecology and Community
PO Box 13259, Jackson, WY 83002
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CONSERVATION VALUES

"The 'Conservation Values' of the Principal Park are its value for public recreational use, its scenic and open space value to the public, and its unique wetland, aquatic and natural habitat. Flat Creek bisects the Principal Parcel and provides an important aquatic habitat for fish, including native cutthroat trout, and an important riparian corridor for other animals."

Within these conservation values the three pivotal and potentially conflicting values are to support:

- *Public recreational use*
  The public recreational use is allowing for informal recreation such as is outlined in the definition of "Natural Park" and is generally in line with allowable uses of public lands.
- *Scenic and open space value to the public*
  Broadly speaking, open space has differing values. The open space value highlighted in these easements is that of the view corridors and "publicly significant scenic view[s] of open meadow, Flat Creek and wetlands" as seen from Snow King Avenue and Snow King Mountain. Furthermore, "the Property's undisturbed and natural characteristics are rare within the Town limits and contribute to its highly valuable scenic open space" (Segerstrom & Dittmar, 2003).
- *Unique natural wetland, aquatic, and riparian corridor including wildlife movement*
  The conservation easement, inclusive of the natural resources inventory, recognize the unique location of Karns Meadow and the importance of these easements to maintaining ecological corridors through the developed areas of Jackson Hole. While there are several citations within the easement documents that address these unique ecological features, language under Tract 1's *Description of Conservation Values* states that the property "provides important, natural wetland, aquatic and riparian habitat for fish and waterfowl and a corridor for wildlife movement due to its location along Flat Creek and its proximity to the Bridger-Teton National Forest, the National Elk Refuge, and lands owned by the State of Wyoming".

The interplay of these conservation values is important when considering the implementation of allowable uses that need to be "undertaken in a manner that is consistent with the Conservation Purposes". The easements' Conservation Purposes "are (i) to preserve the Conservation Values [listed above] (including, but not limited to, the public recreational values) of the Principal Parcel and (ii) to restrict the use of the Principal Parcel to those uses that are consistent with such values and interests".

For every allowable use that is implemented, there will be both seen and unforeseen impacts to the conservation values and purposes on the easements. As the Natural Resource Inventory states, maintaining both wildlife and natural resource connectivity through the property will be "challenging… but doing so is critical [to] maintaining the conservation values". Furthermore, "the property's location is within the only reach of Flat Creek remaining in the Town of Jackson that is natural on both banks and surrounding environs… The manner in which the Property is conserved will, to a degree, determine the function and health of the entire Flat Creek drainage" (Segerstrom & Dittmar, 2003).

Thresholds of activity and impacts from development on natural systems are difficult to assess and include diverse variables. The timeline of human development is much faster than the timeline of ecological adaptation and recovery. The unique location of Karns Meadow within the Town of Jackson and surrounded by human development makes the determination of these thresholds even more difficult. What is too much development? What allowable uses will significantly impact wildlife and which will not? A visual comparison of aerial photographs from 1945 (the first available) to 2003 (the first easement) to 2017 (the last available photograph) displays how this property has slowly reclaimed the riparian corridor once agricultural operations ceased as well as how development of the Town of Jackson has continually closed in on the Karns Meadow property (Figure 8). The "challenging" mandate

to preserve the property's conservation values must be done in a careful and methodical manner as to not overstep through the implementation of allowable uses and cross a threshold that significantly and irreversibly damages the property's conservation purposes and values.

SELECT DEFINITIONS

Natural Park

The term "Natural Park" shall refer to a public park the use of which is limited to informal and limited public recreational use including fishing, hiking, biking (limited to the pathways provided for in Subsections III.C.2.(a) and (b)), cross-country skiing, handicapped access, picnicking, and other informal recreational activities not requiring alteration of the existing natural condition of the Principal Parcel such as kite flying, and playing catch or Frisbee.

Uses excluded from the term Natural Park include recreational uses requiring significant improvements or other alteration of the natural condition of the Principal Parcel, such as playing fields, sports arenas, ice rinks, or other intensive uses or uses inconsistent with preservation of the existing natural features of the Principal Parcel."

Informal and Limited Public Recreational Use

The phrase "informal and limited public recreational use" shall refer to use by individual members of the public as opposed to use by organized sports teams, leagues, etc., whether or not such teams, etc. are comprised of professionals or amateurs, children, youth, or adults, and whether or not associated with a school. The phrase shall include groups engaging primarily in wildlife observation and/ or study, or social activities such as picnics.

Allowable Uses							
Allowable Use	**Tract 1**	**Tract 2**	**Tract 3**	**Tract 4**	**Tract 5***	**Tract 6**	**Notes**
CE Date	12/1/2003	1/26/2005	12/29/2005	5/20/2008	12/2/2008	1/2/2009	
Natural Park	✓	✓	✓	✓	✓	✓	
Public Drive (Karns Meadow Drive)	✓	silent	silent	silent	✓	✓	
Combination Bicycle, Pedestrian, Cross-Country Pathway	✓	✓	✓	✓	✓	✓	
Equestrian pathway	✓	silent	✓	✓	silent	silent	
Wooden Signs	✓	✓	✓	✓	silent	silent	Unlighted, wooden or simulated wooden pathway signs
Fishing Platform	✓	silent	silent	silent	silent	silent	Size restrictions, N side of Creek
Dike or levee on the west side of Flat Creek	✓	✓	silent	silent	silent	silent	>50 ft from Flat Creek
thaw well	✓	✓	silent	silent	silent	silent	>50 ft from Flat Creek
thaw well access	✓	silent	silent	silent	silent	silent	
Water Well	silent	silent	✓	✓	✓	✓	>50 ft from Flat Creek
Snow King Avenue and improvements	✓	silent	✓	✓	silent	silent	Current location
Planting	✓	✓	✓	✓	silent	✓	
Chemical Use	✓	✓	✓	✓	silent	✓	Limited use – see definition
Removal of Vegetation	✓	✓	✓	✓	silent	✓	Limited use – see definition
Habitat Improvements	✓	✓	✓	✓	silent	✓	
Use of Vehicles	✓	✓	✓	✓	silent	✓	Primarily for maintenance purposes
Scientific Study and Educational Use	✓	✓	✓	✓	silent	✓	
Recreational Activities	✓	✓	✓	✓	✓	✓	See definitions; Tract 6 – paraglider
Commercial Photography	✓	✓	✓	✓	silent	✓	
parking lot	silent	silent	silent	✓	silent	silent	Location shown on CE map
parking lot and/ or parking garage	silent	silent	silent	silent	✓	silent	Undefined location. Must "protect the natural resources"
Lighting on Pathways, Drive, Parking Lot	✓	silent	silent	silent	✓	silent	
public bus stop	silent	silent	silent	silent	✓	silent	
Special Events	silent	silent	silent	silent	✓	✓	No more than 6 annually
Maintenance Activities	silent	silent	silent	silent	✓	✓	mowing bush hogging, etc
Bathroom Facilities	silent	silent	silent	silent	silent	✓	
Picnic Shelter	silent	silent	silent	silent	silent	✓	
Stormwater Treatment Plant	silent	silent	silent	✓	silent	silent	Completed constructed wetlands
Residential Development	silent	silent	silent	✓	silent	silent	Restrictions on size and use
Home Occupancy Uses	silent	silent	silent	✓	silent	silent	Of residential development

Prohibited Uses							
Prohibited Use	**Tract 1**	**Tract 2**	**Tract 3**	**Tract 4**	**Tract 5***	**Tract 6**	**Notes**
CE Date	12/1/2003	1/26/2005	12/29/2005	5/20/2008	12/2/2008	1/2/2009	
Improvements	✓	✓	✓	✓	✓	✓	Other than allowable uses
Land Division	✓	✓	✓	✓	✓	✓	
Snow Storage	silent	silent	silent	silent	✓	silent	Use extinguished after residential development at START Barn
Mining and Mineral Extraction	✓	✓	✓	✓	✓	✓	
Commercial and Industrial Use	✓	✓	✓	✓	✓	✓	
Water Rights Transfer	✓	✓	✓	✓	✓	✓	
Dumping and Storage	✓	✓	✓	✓	✓	✓	
Sound Amplification and Fireworks	✓	✓	✓	✓	✓	✓	
Special Events	✓	✓	✓	✓	✓	✓	Except as allowed
Hunting	✓	✓	✓	✓	✓	✓	
Night-time Use	✓	✓	✓	✓	silent	✓	closed 10PM – Sunrise
Vegetation Removal	✓	✓	✓	✓	silent	✓	
Alteration of Habitat	✓	✓	✓	✓	silent	✓	
Grading and Filling	✓	✓	✓	✓	silent	✓	
Introduction of Non-native Species	✓	✓	✓	✓	silent	✓	
Use of Chemicals	✓	✓	✓	✓	silent	✓	
Roads and Trails	✓	✓	✓	✓	silent	✓	Except as allowed
Use of Vehicles	✓	✓	✓	✓	silent	✓	Except as allowed
Pets	✓	✓	✓	✓	silent	✓	Except leashed on pathway
Manipulation of Water Courses	✓	✓	✓	✓	silent	✓	
Camping and Fires	✓	✓	✓	✓	silent	✓	

silent = Conservation easement is silent on whether these items are allowable or prohibited uses

* JHLT holds a restrictive covenant on Tract 5 rather than a conservation easement

APPENDIX F: AQUATIC RESOURCES INVENTORIES

Aquatic Resources Inventory Report

Karns Meadow

Town of Jackson

Jackson, WY

Provided by Pioneer Environmental Services, Inc.

Aquatic Resources Inventory Report

Karns Meadow

Jackson, Wyoming

Prepared for:

Megan Smith
EcoConnect Consulting LLC

Prepared By:

PIONEER
ENVIRONMENTAL SERVICES, INC.

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December 6, 2018

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Appendices

1.0 Introduction

Pioneer Environmental Services, Inc. (Pioneer) was contracted by EcoConnect Consulting LLC. to complete an Aquatic Resources Inventory (ARI) for the Karns Meadow property in Jackson, Teton County, Wyoming. The work was authorized by an agreement between EcoConnect and Pioneer, to fulfill a request from the Town of Jackson Administration for a complete Environmental Assessment for the Karns Meadow Pathway Project (Town of Jackson 2018).

The subject property is located within the town of Jackson, Teton County, WY, 83001. Karns Meadow is centrally located, with the START Bus Facility to the west, private parcels to the east, and bordered on the north by Highway 89 and to the south by Snow King Drive: Specifically, PT. SW1/4NE1/4, PT. SE1/ENW1/4 & PT. NE1/4SW1/4 SEC. 33, TWP. 41, RNG. 116, N: 43.47386°, W: 110.77361° (Figure 1).

The 41.6-acre property is comprised of seven separate tracts, each owned by the Town of Jackson, and is zoned in the Town of Jackson as NBHD Low Density (NL-1). The property has been used historically for grazing and agricultural purposes, and is currently preserved as open space in the form of conservation easements and mitigation areas. One tract, located at the northwest corner of the property (Parcel ID# 22-41-16-33-2-00-031), is a public park (Karns Meadow Park).

1.1 Background

In 2018, Friends of Pathways (FOP) proposed a pathway development project within the Karns Meadow property to the Town of Jackson, the current landowner of the property (PAP Request: Karns Meadow Pathway 2015). As a requirement, an updated Aquatic Resources Inventory (ARI) report was conducted by Pioneer Environmental Services in October 2018.

Previous wetland delineations for the Karns Meadow property were conducted on several occasions. Headwaters Ecology delineated the property in 1995 (Headwaters 1995), Intermountain Aquatics, Inc. delineated the property in 2007, and Alder Environmental Consulting, LLC delineated the area in 2010, and included the report in 2014 as part of a Biological Assessment for a NEPA Environmental Review (Alder 2014). Approximately half of the project area has been delineated for wetlands in the past, conducted on the eastern parcel (Tract 4) surrounding the stormwater treatment wetlands (2008; valid through 1/8/2013) and on a portion of the southwestern parcel (Tract 1) in conjunction with the neighboring START bus facility EA (2010; valid through 12/28/2015) (Alder 2014).

Wetlands delineated in 1995 by Headwaters identified 10 ac. of mainly palustrine wetlands dominated by sedges and willows adjacent to Flat Creek. Hydrology sources for the wetlands included mostly areas subjected to flooding from Flat Creek, as well as areas adjacent to leaky irrigation features. Headwaters also noted that many areas have indicators of hydric soils, but lack proper hydrology to make these soils function “hydrophytically” (Headwaters 1995).

Intermountain Aquatics delineated the property in 2007, and found 2.38 ac. of wetland within the property, including both palustrine and scrub shrub wetland types. Wetlands mapped were located primarily along Flat Creek and the existing irrigation channels on the property. Intermountain Aquatics noted the difficulty in determining the boundaries of wetlands and uplands throughout the central portion of the site, due to the presence of hydrophytic vegetation and hydrology from Flat Creek. Intermountain Aquatics concluded that areas with dominant, obligate wetland vegetation species (such as Nebraska sedge (*Carex nebrascensis*), reed canarygrass (*Phalaris arundinacea*), and meadow foxtail (*Alopercurus pratensis*)) do qualify as wetlands, despite no longer receiving water from irrigation canals. These wetland areas are associated with a swale, approximately 1-2 ft. lower in elevation than the upland areas within the site. Because of the close elevation to Flat Creek and associated ground water levels supply sufficient water levels to some areas to support hydrophytic vegetation and hydric soils (Intermountain Aquatics 2007).

Alder delineated the western portion of the property in 2010 and found approximately 0.47 ac. of wetlands, including both palustrine and scrub shrub types, and approximately 0.59 ac. of open water/channel (Flat Creek). The wetlands delineated are located primarily along Flat Creek, with some extending along the old irrigation canals (Flat Creek) (Alder 2010).

The decrease of wetland acreage from the 1995 delineation (Headwaters 1995) is likely due to the cease of irrigation activities on the site, resulting in fewer and smaller wetland areas. In 2018, Pioneer observed similar indicators of hydric soils, hydrophytic vegetation, and overall hydrology patterns as observed by Headwaters, Intermountain Aquatics, and Alder, although the sizes and boundaries of wetland areas have changed slightly. This 2018 Aquatic Resources Inventory Report concurs with the findings regarding the presence of swales and wetlands fed by groundwater throughout the property as described by Intermountain Aquatics (Intermountain Aquatics 2007). This report refines the boundaries of aquatic resources within the Karns Meadow Property, with a detailed inventory of the existing vegetation, soils, and hydrology features.

2.0 Methodology

The property was surveyed on September 15th – 18th, 2018 by Anna DiSanto of Pioneer Environmental Services, Inc., Megan Smith of EcoConnect Consulting LLC, and Anna Senecal of the Wyoming Game and Fish Department (WYGF). The methodologies provided in the *1987 Army Corps of Engineers Wetland Delineation Manual and the 2010 Regional Supplement* to the *Corps of Engineers (USACE) Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* were followed.

The wetland survey began by first walking the designated area to identify primary vegetation, drainage patterns, and hydrologic features that might be indicators of wetlands as defined by the USACE. Preliminary wetland boundaries were also identified based on aerial photographs. Soils, where present, were analyzed in representative locations inside and outside of the preliminary

wetland boundaries to determine if they qualified as 'Hydric Soils' as defined by the USACE. Vegetation within the boundaries was identified and percent cover was estimated based on ocular estimates. Channels and other watercourses were also identified that might qualify as other "Waters of the U.S." (WOTUS).

All data were recorded on the *USACE Western Mountains – Wetland Determination Form, Version 2.0* (Appendix C). Preliminary wetland boundaries were finalized and delineated using an Archer^2 GPS with Everglade® wetland delineation software, Version 2.1.

By definition, wetlands are "those areas that are inundated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions" (Environmental Laboratory 1987). Three classification parameters must be met in order for an area to be considered a wetland: hydrophytic plants must be the dominant vegetative cover, hydric soils must be present, and adequate wetland hydrology must be present during the growing season.

3.0 Findings

3.1 Soil Survey –Teton County, Wyoming

Soil information was collected from the *Natural Resources Conservation Services (NRCS) Web Soil Survey for Teton County, Wyoming* (USDA 2018).

Five soil units are identified inside the property, including: 1) Greyback gravelly loam, 0 to 3 percent slopes, 2) Newfork fine sandy loam, 3) Tineman gravelly loam, wet, 4) Greyback-Thayne complex, 10 to 20 percent slopes, and 5) Greyback-Thayne complex, 20 to 30 percent slopes (USDA 2018). The Greyback-Thayne complex soils are mapped at the far northwestern corner of the property, along Karns Meadow Drive, as well as a small portion in the far southeastern corner of the property. These areas are so small and may not actually be present within the property but are mapped according to the boundaries which were drawn at a smaller scale (1:24,000) (USDA 2018). The Greyback-Thayne complex, 20 to 30 percent slopes extends along the southern edge of Broadway Ave; however, the area mapped has since been graded and paved. They Greyback-Thayne complex, 10 to 20 percent slopes extends to the south, and likely was extended on the map farther north than what is actually present in the area. A more detailed description for these soils and those surrounding the property is included in Appendix D.

The only listed hydric soil type present within the project area is Newfork fine sandy loam (USDA 2015). However, Pioneer identified other areas with soils containing characteristics of hydric soils. Most soil samples taken revealed very well drained sandy and sandy loam soil types. The most frequently occurring hydric soil indicators included redox depressions (F8), depleted matrix (F3) and sandy gleyed matrix (S4). Because the soils are well drained and do not stay inundated for a sufficient time period each year, it is likely that hydric soils are prevented from completely developing.

Each sample point was recorded on the appropriate USACE Wetland Determination Data Form for the Western Mountains, Valleys, and Coast Region - Version 2.0 (2010) and are included in Appendix C.

3.2 National Wetlands Inventory (NWI)

The NWI (USFWS 2018) identifies three existing wetland habitat classification types within the property, including: 1) Riverine (R3UBH, R5UBH, and R5UBFx) (Flat Creek), 2) Forested scrub shrub wetland (PSSC), and 3) Freshwater emergent wetland (PEM1C) (Figure 2).

3.3 Vegetation

According to the Teton County vegetation mapping layer (Greenwood 2018), the site is comprised of: disturbed impervious (communications and utilities), disturbed impervious (parking lots), disturbed impervious (road paved), disturbed impervious (structures and driveways), disturbed pervious (lawn and landscaping), flooded wet meadow herbaceous vegetation, irrigated agricultural (cropland and pasture), irrigated agricultural (perennially flooded agricultural fields), irrigation canals, lakes, ponds and reservoirs, mixed ornamental and semi-natural woodlands, mixed *Picea pungens* - *Populus tremuloides* - *Populus* spp. semi-natural planted woodland, mixed planted and introduced grassland herbaceous vegetation, mixed tall deciduous shrubland, non-irrigated agricultural (cropland and pasture), *Populus angustifolia* - *P. balsamifera* riparian forest, *Populus tremuloides* forest, *Salix* spp. shrubland, streams, strip-mines, quarries, and gravel pits, and transitional areas (Figure 3).

During site visits, Pioneer determined that the upland areas within the property are dominated by both native vegetation such as an unidentified wiregrass (*Cymbopogon sp.*), smooth brome (*Bromus inermis*), and slender wheatgrass (*Elymus trachycaulus*). Invasive species are frequently found within the upland areas, including Canada thistle (*Cirsium arvense*), houndstongue (*Cynoglossum officinale*), ox-eyed daisy (*Leucanthemum vulgare*), and musk thistle (*Carduus nutans).*

The shrub stratums in wetland areas and adjacent uplands/riparian zones include narrowleaf cottonwood (*Populus angusitfolia*), black hawthorn (*Crataegus douglasii*), coyote willow (*Salix exigua*), thin-leaf alder (*Alnus incana*), meadow foxtail (*Aopecurus pratensis*), gooseberry (*Ribes inermi*), and Bebb's willow (*Salix bebbiana*). The palustrine emergent wetlands located within the property are dominated by Nebraska sedge (*Carex nebrascensis*), hard-stem bulrush (*Schoenoplectus acutus*), field mint (*Mentha arvensis*), scouring rush (*Equisetum hyemale*), blue-joint reedgrass (*Calamagrostis canadensis*), common reed-grass, Kentucky bluegrass (*Poa pratensis),* and creeping spikerush (*Eleocharis palustris*).

Vegetation is significantly disturbed in several areas within the property, including Parcel ID# 22-41-16-33-2-00-025 (the START Bus Facility), and areas in Parcel ID# 22-41-16-33-2-00-031 and Parcel ID# 22-41-16-33-2-00-028 that have been repeatedly grazed and subjected to other agricultural and development activities over time. A wetland mitigation area exists in Parcel ID#

22-41-16-33-1-00-035, and contains open water excavated ponds/channels, and planted hydrophytic vegetation such as willow *(Salix spp.)*, thinleaf alder (*Alnus inacana*), Nebraska sedge (*Carex nebrascensis*), and hardstem bulrush (*Schoenoplectus acutus*).

3.4 Hydrology

The project area is located within the Flat Creek floodplain. Flat Creek is a naturally occurring tributary to the Snake River, fed by snowmelt, precipitation, springs, groundwater seeps, and by a man-made irrigation diversion from the Gros Ventre River (Alder 2010). Flat Creek is the primary hydrologic feature on site, which runs through the property from the northeast corner, and exits the property at the southwestern corner. Flat Creek empties into the Snake River approximately 8 miles south of the property, south of Game Creek.

The floodplains of Flat Creek reflect the effects of the changes in flow between spring and fall. Average annual flows in Flat Creek are 225 cfs (1991-2018). In 2018, the peak flows in Flat Creek reached approximately 400 cfs which far exceeded the average peak flow levels from 1991-2017 (measured at gage station 13018350 Flat Creek below Cache Creek, near Jackson, WY) (USGS 2018). Wetlands on the property exist within the low-lying areas and riparian zones along Flat Creek, as well as in areas adjacent to old irrigation features which are no longer flooded, but still maintain a high water table and may fill with water during flood events.

Two irrigation ditches including the LaPlant's Ditch (CR CC44/395 – Second Enlargement) and the O'Malley Ditch exist on the property. The La Plant's Ditch runs from Flat Creek to the northwest area of the property, and is no longer in use. The O'Malley Ditch is located on the northeastern corner of the property and carries water from Flat Creek to the stormwater treatment wetlands and wetland mitigation sites located in the southeastern corner of the property.

The 2018 ARI performed by Pioneer observed several indicators of wetland hydrology, including saturation (A3), iron deposits (B5), FAC-neutral test (positive) for hydrophytic vegetation (D5), inundation visible on aerial imagery (B7), saturation visible on aerial imagery (C9), drainage patterns (B10), and geomorphic position (D2).

A wetland mitigation site (Karns Meadow Stormwater Treatment Wetland Project) was constructed in 2010 at the far east area of the property, consisting of several open water ponds, and palustrine and scrub shrub wetlands. Water is supplied to the site through a series of existing irrigation channels that take water from Flat Creek on the northern section of the property, and bring it south to the mitigation area. The water flows through the site, ponding in several areas before ultimately entering another irrigation channel and flowing east across the southern boundary of the property before reaching Flat Creek. A detailed description of the mitigation site can be found on the Teton Conservation District's website (Karns Meadow Stormwater Wetland Project) (TCD 2018).

The project area is located within the FEMA Flood Hazard Zone AE, 100-year floodplain and parts (Map # 56039C2907D) (FEMA 2018).

3.4.1 Precipitation and Temperature

The average annual precipitation in the project area is about 17 inches of rainfall and about 67 inches of snow per year. December, January, and February typically receive the most precipitation on average. Temperatures range from the average high of 54ºF to the average low of 24.5ºF (U.S. Climate Data 2018).

3.4.2 Groundwater

Snowpack and Flat Creek flood events are the main water sources that contribute to ground water storage and sustains stream flows from the area. Old irrigation features on site that are no longer used may also retain water from snowpack, flood events, and precipitation, also contributing to the ground water storage.

3.4.3 Surface Run-off from Neighboring Properties

Since most of the seasonal precipitation comes in the form of snow and springtime runoff, a significant portion of this water leaves the impervious surfaces from neighboring properties and empties into the Karns Meadow property, which is located at a lower elevation than surrounding areas to the south, north, and east. Surface water within the site will enter rock fissures and contribute to more extended stream flow and seeps and is either intercepted by existing wetlands adjacent to the project site, Flat Creek, or the old irrigation canals on site.

4.0 Preliminary Aquatic Resources Inventory and Recommendations

The 2018 Aquatic Resources Inventory (ARI) (Pioneer) identified 32 individual wetland areas within the project area, totaling 16.2 acres, and approximately 4.3 ac. of open water, including open pond areas and Flat Creek. Although the only hydric soil (Newfork fine sandy loam) mapped on the property by the *NRCS Soil Survey of Teton County, Wyoming*, the wetland areas delineated contained indicators of hydric soil types. The results of the delineation are graphically depicted in Figure 4. The types and sizes of each wetland are listed in the following table (Table 1).

Table 1: Wetland Characteristics for the Snake River Bend Ranch Site #1.

Wetland ID	Wetland Type*	Square ft.	Acres
W-01	pema	5594.69	0.128
W-02	pema	17108.8	0.39
W-03	pss	13401	0.31
W-04	pema	30007.2	0.69
W-05	pema	1169.8	0.03
W-06	pema	3115.93	0.07
W-07	pss	18730.8	0.43
W-08	pema	304.92	0.01
W-09	pema	435.6	0.01
W-10	pema	21938.37	0.50
W-11	pema	20580.61	0.47
W-12	pss	57804.12	1.33
W-13	pema	80673.12	1.85

Table 1: Wetland Characteristics for the Snake River Bend Ranch Site #1.			
Wetland ID	**Wetland Type***	**Square ft.**	**Acres**
W-14	pss	11761.2	0.27
W-15	pema	53709.48	1.23
W-16	pema	14984.64	0.34
W-17	pss	201290.8	4.62
W-18	pss	2090.88	0.05
W-19	pema	2613.6	0.06
W-20	pss	17424	0.40
W-21	pss	28793.16	0.66
W-22	pss	16465.68	0.38
W-23	pema	1568.16	0.04
W-24	pss	13547.16	0.31
W-25	pema	871.2	0.02
W-26	pema	1568.16	0.04
W-27	pema	2178	0.05
W-28	pss	36808.2	0.85
W-29	pema	653.4	0.02
W-30	pss	7710.12	0.18
W-31	pema	3963.96	0.09
W-32	pss	17903.16	0.41
	Wetland Total	714,151.2	**16.2**
"Waters of the US" ID	**Type**	**Square ft.**	**Acres**
Pond 1	Open Water	264.52	0.01
Pond 2	Open Water	3742.82	0.09
Pond 3	Open Water	660.389	0.02
Pond 4	Open Water	4690.82	0.11
Pond 5	Open Water	1522.77	0.04
Pond 6	Open Water	883.086	0.02
R-01 (Flat Creek)	Riverine	173,897	4.0
	"Waters of the US" Total	185,661.4	**4.3**
***PEMA = Palustrine Emergent Wetland; PSS = Palustrine Shrub Wetland;**			

Pioneer concludes that the wetlands included in Table 1 and depicted in Figure 4 have characteristics common with wetlands as defined by the most recent criteria provided by the USACE (USACE 2010). Pioneer also concludes that Flat Creek is considered other "Waters of the U.S.", and should be afforded such protections.

Pioneer concludes that those areas not identified as having all three wetland characteristics on Figure 4 are uplands. These areas not identified as wetlands have strong upland characteristics with very small patches of soil and/or vegetation that exhibit some wetland characteristics, but not in a dominant fashion.

Pioneer recognizes that it is the sole responsibility of the USACE to determine which areas do and do not qualify as wetlands, and which of those will be considered jurisdictional. This ARI is not intended as a submittal for a 404 Wetland Permit at this point but the information found in it may be used in the future for that purpose.

5.0 Summary

As a result of this Aquatic Resources Inventory (ARI) for the Karns Meadow property, Pioneer identified **16.2 acres** as potential wetlands within the project boundaries. Wetlands included both palustrine and scrub shrub areas, dominated by typical hydrophytic vegetation including sedges and willows. Hydric soil indicators were observed in the larger wetland areas, but were the limiting factor in other areas classified as uplands, despite containing hydrology and hydrophytic vegetation.

Because this area is subject to periodic flooding, it's likely that much of the surrounding area is part of the larger wetland complex found within the property. However, due to the inconsistent nature of the Flat Creek water levels, flood events, and dry periods, it's likely that soils have not experienced sufficient inundation to fully develop into hydric soils. Soils within the site and adjacent areas consist of well-drained, gravelly-sand, and typically do not stay saturated for a sufficient time period to develop hydric characteristics. This sub irrigated wet meadow area contains well drained gravelly sandy loam soils which usually take a long time to develop into hydric soils. In many areas, these pockets of upland are located within a larger wetland complex.

In contrast, many areas that did contain all three criteria for wetlands (hydrophytic vegetation, hydric soils, and hydrology) may not qualify as wetlands in dry years, when hydrology disappears and/or the soils develop into upland soils after several seasons of drought or low water levels. Pioneer delineated a much larger number of wetlands within the property than delineations performed in previous years (including Alder 2010). This is likely due to the high water levels of Flat Creek and the large snowpack over the past two years (2017-2018), which exceeded the average annual and high flows. This likely filled the old irrigation canals, leaking out into the agricultural meadow areas east of Flat Creek. In these areas, Nebraska sedge (*Carex nebrascensis*), an obligate wetland species, is dominant and found in large patches. These areas contained hydric soil indicators, although many soil samples taken in the Nebraska sedge-dominated areas revealed relict redox features and/or not fully developed hydric soils. Therefore, Pioneer delineated only the patches that contained all three wetland criteria; however, it should be noted that these boundaries are likely to change over time and are heavily dependent on precipitation, snowpack, and streamflows in Flat Creek. It should also be noted that the field work associated with this ARI was conducted in late October, when conditions were much drier than during other times of the year. If the fieldwork had been conducted during the growing season, such as early spring, it is likely that the wetland boundaries would be expanded due to more areas showing adequate hydrology that qualifies an area as a wetland (i.e. saturation).

The final determination as to whether or not the aquatic resources including wetlands identified in this report (inside the project area) adequately meet the hydrologic criteria for jurisdiction rests with the USACE.

6.0 References

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Appendix A

Maps and Figures

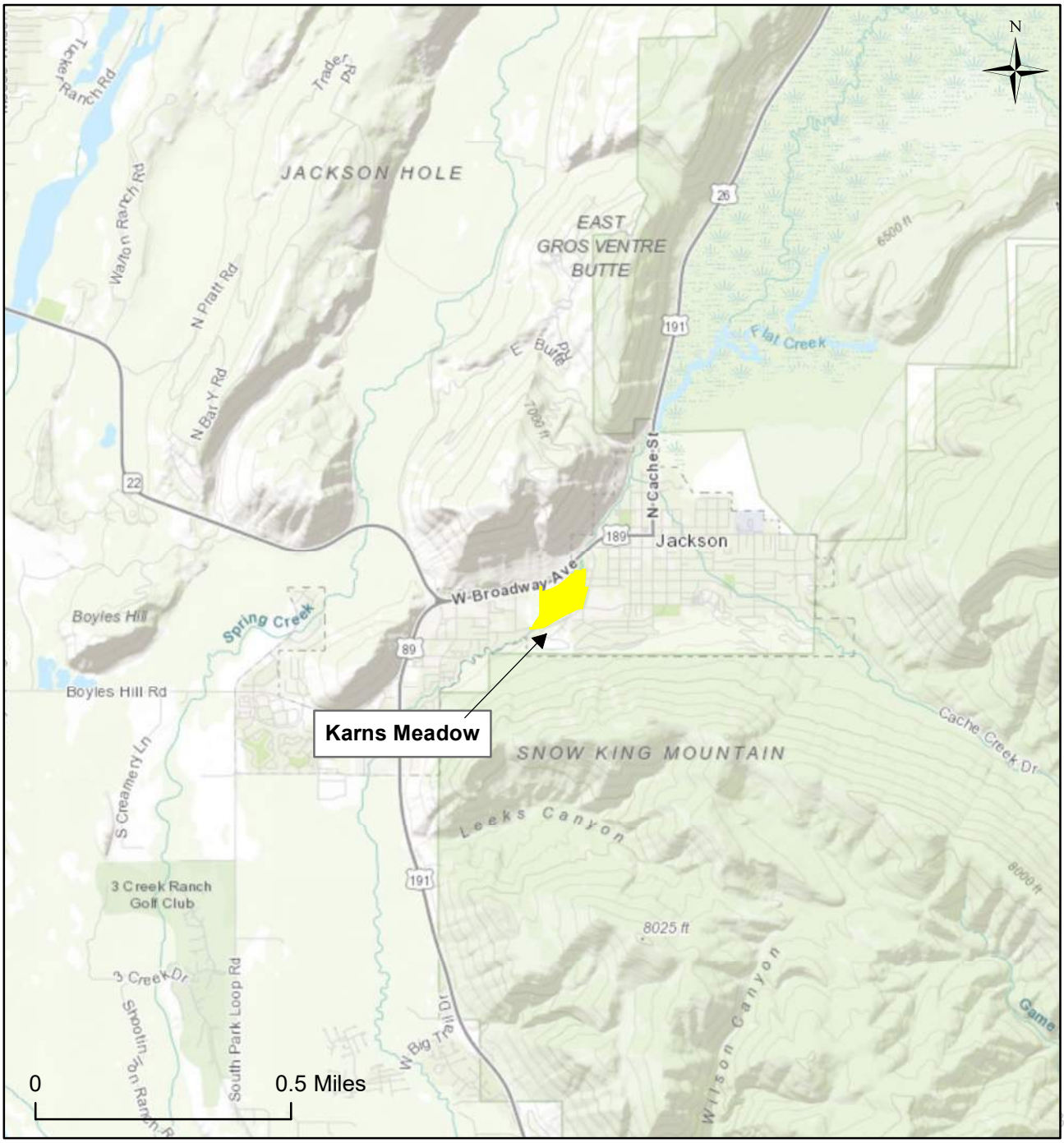

Figure 1. Location and General Vicinity the Karns Meadow Property, Jackson, Teton County, WY.

KarnsProperties

November 28, 2018
Pioneer Environmental Services, Inc.

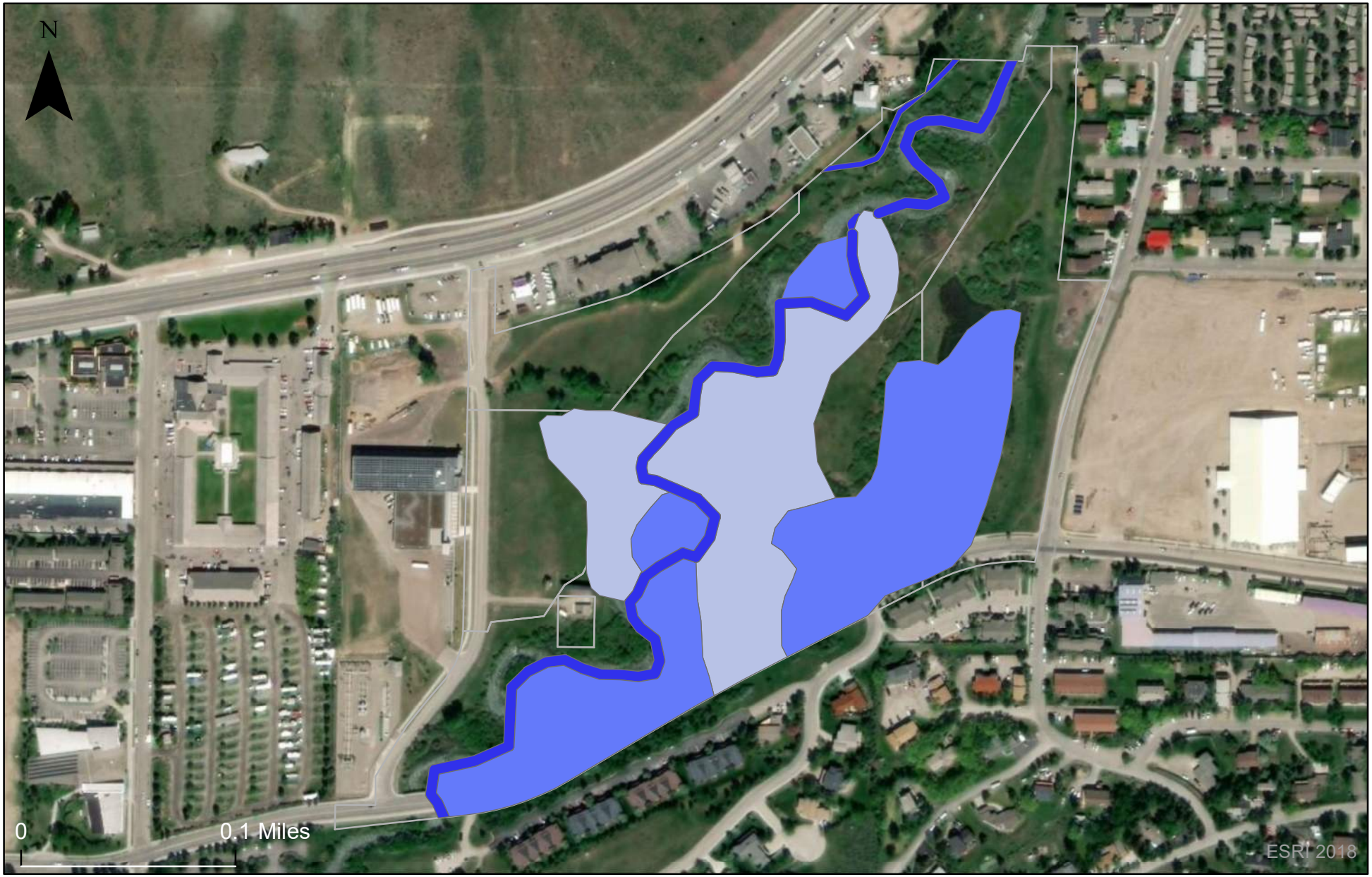

Figure 2. National Wetland Inventory (NWI) Aquatic Resource Types for the Karns Meadow Property, Jackson, Teton County, WY.

November 27, 2018
Pioneer Environmental Services, Inc.
NAD_1983_StatePlane_Wyoming_West_FIPS_4904_Feet

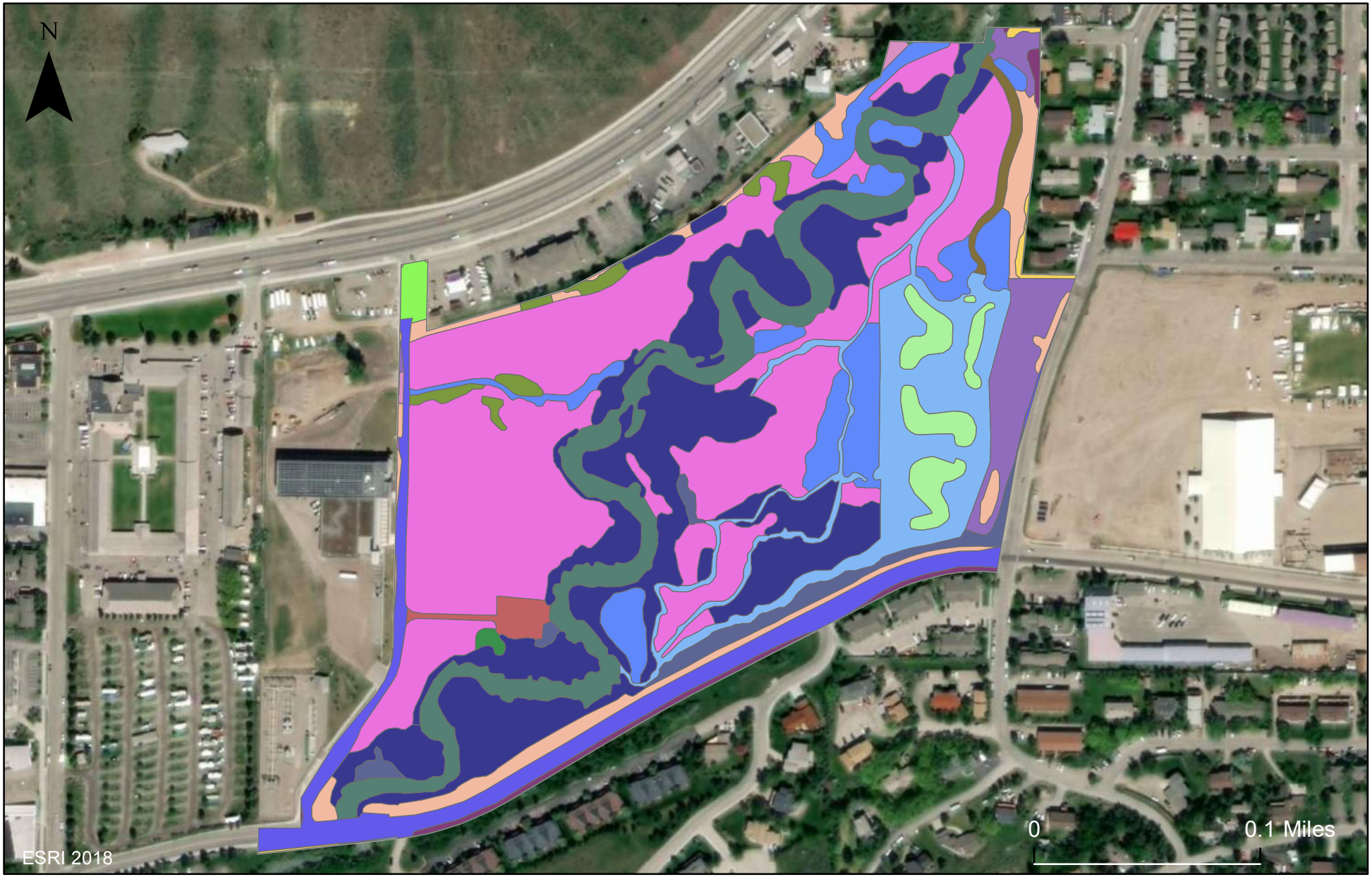

Figure 3. Teton County Vegetation Types for the Karns Meadow Property, Jackson, Teton County, WY.

November 27, 2018
Pioneer Environmental Services, Inc.
NAD_1983_StatePlane_Wyoming_West_FIPS_4904_Feet

Teton County Vegetation

- Disturbed Impervious - (Communications and Utilities)
- Disturbed Impervious - (Parking Lots)
- Disturbed Impervious - (Road Paved)
- Disturbed Impervious - (Structures and Driveways)
- Disturbed Pervious (Lawn and Landscaping)
- Flooded Wet Meadow Herbaceous Vegetation
- Irrigated Agricultural (Cropland and Pasture)
- Irrigated Agricultural (Perennially Flooded Agricultural Fields)
- Irrigation Canals
- Lakes, Ponds, and Reservoirs
- Mixed Picea pungens - Populus tremuloides - Populus spp. Semi-natural Planted Woodland
- Mixed Planted and Introduced Grassland Herbaceous Vegetation
- Mixed Tall Deciduous Shrubland
- Non-Irrigated Agricultural (Cropland and Pasture)
- Populus angustifolia - P. balsamifera Riparian Forest
- Populus tremuloides Forest
- Salix spp. Shrubland
- Streams
- Strip Mines, Quarries, and Gravel Pits
- Transitional Areas

Figure 4. Aquatic Resources Inventory for the Karns Meadow Property, Jackson, Teton County, WY.

December 6, 2018
Pioneer Environmental Services, Inc.
NAD_1983_StatePlane_Wyoming_West_FIPS_4904_Feet

Karns Meadow Properties
Sample Points

Wetland Type
Open Water
Palustrine Emergent
Palustrine Scrub Shrub

Appendix B

Photographs

*All photographs were taken on October 15-18th, 2018.

Photo 1. Scrub shrub vegetation along Flat Creek.

Photo 2. Thick scrub shrub vegetation.

Photo 3. *Equisetum hyemale* in a PEMA wetland area.

Photo 4. Hydrophytic vegetation (PEMA/SS).

Photo 5. Hydrology indicator (iron deposits).

Photo 6. Wetland fringe along Flat Creek.

Photo 7. Upland pocket within wetland complex.

Photo 8. Wetland complex area (seasonally flooded).

Photo 9. Scrub shrub wetland along Flat Creek.

Photo 10. Wetland fringe along Flat Creek on northern part of the property.

Photo 11. Upland area looking west towards the Start Bus facility.

Photo 12. Flooded scrub shrub forested wetland.

Photo 13. *Carex nebrascensis* (OBL) vegetation.

Photo 14. Hydric soil indicators (redox features).

Photo 15. Flat Creek with scrub shrub fringe wetland.

Photo 16. Wetland complex looking southeast.

Photo 17. Wetland area along southern boundary of site.

Photo 18. Sandy, hydric soils with *Carex nebrascensis* vegetation.

Appendix C

Data Sheets

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/15/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp01

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): pond fringe | Local relief (concave, convex, none): none | Slope (%): 0-2

Subregion (LRR): LRR E | Lat: | Long: | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: R4SBC

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
SS wetland

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Picea pungens*	1	No	FAC
2. *Populus angustifolia*	1	No	FACW
3.			
4.			
	2	=Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
Herb Stratum (Plot size:)			
1. *Carex nebrascensis*	75	Yes	OBL
2. *Typha latifolia*	25	No	OBL
3. *Phalaris arundinacea*	40	Yes	FACW
4. *Calamagrostis canadensis*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	145	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 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	100	x 1 =	100
FACW species	46	x 2 =	92
FAC species	1	x 3 =	3
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	147 (A)		195 (B)

Prevalence Index = B/A = 1.33

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp01

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/2	100					Loamy/Clayey	
3-16	10YR 3/2	80	7.5YR 5/6	20	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- x Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 0	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI City/County: Jackson/Teton Sampling Date: 10/15/2018

Applicant/Owner: Town of Jackson State: WY Sampling Point: sp02

Investigator(s): Pioneer Environmental Services, Inc. Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): pond fringe Local relief (concave, convex, none): none Slope (%): 0-4

Subregion (LRR): LRR E Lat: Long: Datum: GCS_WGS_1984

Soil Map Unit Name: n/a NWI classification: R4SBC

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
SS wetland

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1. *Salix exigua*	15	Yes	FACW
2.			
3.			
4.			
5.			
	15 =Total Cover		
Herb Stratum (Plot size:)			
1. *Carex nebrascensis*	70	Yes	OBL
2. *Typha latifolia*	10	No	OBL
3. *Calamagrostis canadensis*	10	No	FACW
4. *Schoenoplectus acutus*	10	No	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 5

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	90	x 1 =	90
FACW species	25	x 2 =	50
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	115 (A)		140 (B)

Prevalence Index = B/A = 1.22

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp02

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/2	100					Loamy/Clayey	
4-15	10YR 3/2	85	7.5YR 5/6	15	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- x Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 0	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/15/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp03

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): pond edge slope | Local relief (concave, convex, none): none | Slope (%): 1

Subregion (LRR): LRR E | Lat: | Long: | Datum:

Soil Map Unit Name: n/a | NWI classification: R4SBC

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
SS wetland

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1. *Salix exigua*	45	Yes	FACW
2.			
3.			
4.			
5.			
	45 =Total Cover		
Herb Stratum (Plot size:)			
1. *Carex nebrascensis*	80	Yes	OBL
2.			
3. *Calamagrostis canadensis*	10	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	80	x 1 =	80
FACW species	55	x 2 =	110
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	135 (A)		190 (B)

Prevalence Index = B/A = 1.41

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:
Very large wetland complex mostly nebraska sedge and willow with some very small upland areas with fac and facu grasses

SOIL

Sampling Point: sp03

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 2/2	95	7.5YR 5/6	5	CS	M	Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- x Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: Rock

Depth (inches): 14

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ? Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 0	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI City/County: Jackson/Teton Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson State: WY Sampling Point: sp04

Investigator(s): Pioneer Environmental Services, Inc. Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): drainage Local relief (concave, convex, none): concave Slope (%): 2

Subregion (LRR): LRR E Lat: Long: Datum:

Soil Map Unit Name: n/a NWI classification: R4SBC

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
SS wetland

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1. *Salix exigua*	15	Yes	FACW
2.			
3.			
4.			
5.			
	15 =Total Cover		
Herb Stratum (Plot size:)			
1. *Carex nebrascensis*	90	Yes	OBL
2. *Phragmites australis*	15	No	FACW
3. *Calamagrostis canadensis*	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	110 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	90	x 1 =	90
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:	125 (A)		160 (B)

Prevalence Index = B/A = 1.28

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:
Drainage wetland area

SOIL

Sampling Point: sp04

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 2/2	95	7.5YR 5/6	5	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- x Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: Rock

Depth (inches): 12

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ? Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 0	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI City/County: Jackson/Teton Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson State: WY Sampling Point: sp05

Investigator(s): Pioneer Environmental Services, Inc. Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): pond fringe Local relief (concave, convex, none): none Slope (%): 10-May

Subregion (LRR): LRR E Lat: Long: Datum:

Soil Map Unit Name: n/a NWI classification: R4SBC

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
SS wetland

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1. *Salix exigua*	15	Yes	FACW
2.			
3.			
4.			
5.			
	15 =Total Cover		
Herb Stratum (Plot size:)			
1. *Carex nebrascensis*	40	Yes	OBL
2. *Phragmites australis*	30	Yes	FACW
3. *Calamagrostis canadensis*	30	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 20

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	40	x 1 =	40
FACW species	75	x 2 =	150
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	115 (A)		190 (B)
Prevalence Index = B/A =	1.65		

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:
Drainage wetland area

SOIL

Sampling Point: sp05

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 2/2	100					Loamy/Clayey	
5-12	10YR 2/2	90	7.5YR 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- x Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: NA

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 0	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:
surface water present in pond w/aquatic vegetation

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp06

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): stream fringe | Local relief (concave, convex, none): concave | Slope (%): 0-5

Subregion (LRR): LRR E | Lat: 43°28'25.439"N | Long: 110°46'18.032"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: PSSC

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No ____	**Is the Sampled Area within a Wetland?** **Yes** x **No** ____
Hydric Soil Present?	Yes x	No ____	
Wetland Hydrology Present?	Yes x	No ____	

Remarks:
surrounding stream area moving flow 10/16/18

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ =Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1. *Salix exigua*	25	Yes	FACW
2.	1	No	
3.			
4.			
5.			
	26 =Total Cover		
Herb Stratum (Plot size: ____)			
1. *Carex nebrascensis*	50	Yes	OBL
2. *Calamagrostis canadensis*	30	Yes	FACW
3. *Schoenoplectus acutus*	50	Yes	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	130 =Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ =Total Cover		

% Bare Ground in Herb Stratum 1

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	100	x 1 =	100
FACW species	55	x 2 =	110
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	155 (A)		210 (B)

Prevalence Index = B/A = 1.35

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ 5 - Wetland Non-Vacular Plants[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No** ____

Remarks:

SOIL

Sampling Point: sp06

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/2	100					Loamy/Clayey	
2-18	10YR 2/2	97	7.5YR 5/6	3	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- x Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: NA

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Dark soil with very few redox depressions and areas of gleying/mottling

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 0	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp07

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): streamside | Local relief (concave, convex, none): none | Slope (%): 0-Jan

Subregion (LRR): LRR E | Lat: 43°28'25.398"N | Long: 110°46'18.051"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: PSSC

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No ____	**Is the Sampled Area within a Wetland?** **Yes** x **No** ____
Hydric Soil Present?	Yes x	No ____	
Wetland Hydrology Present?	Yes x	No ____	

Remarks:
surrounding stream area moving flow 10/16/18

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix exigua*	25	Yes	FACW
2.	1	No	
3.			
4.			
5.			
	26	=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	50	Yes	OBL
2. *Calamagrostis canadensis*	30	Yes	FACW
3. *Schoenoplectus acutus*	50	Yes	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	130	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 1

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	100	x 1 =	100
FACW species	55	x 2 =	110
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	155 (A)		210 (B)

Prevalence Index = B/A = 1.35

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ 5 - Wetland Non-Vacular Plants[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No** ____

Remarks:

SOIL

Sampling Point: sp07

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/2	100					Loamy/Clayey	
1-16	10YR 2/1	97	7.5YR 5/6	3	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- x Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: NA

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Dark soil with very few redox depressions and areas of gleying/mottling - same as SP06

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 0	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp08

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): none | Slope (%): 0-Jan

Subregion (LRR): LRR E | Lat: 43°28'29.936"N | Long: 110°46'18.748"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No ____	**Is the Sampled Area within a Wetland?** **Yes** x **No** ____
Hydric Soil Present?	Yes x	No ____	
Wetland Hydrology Present?	Yes x	No ____	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	35	Yes	OBL
2. *Deschampsia cespitosa*	15	No	UPL
3. *Cirsium arvense*	10	No	FAC
4. *Poa pratensis*	20	Yes	FAC
5. *Calamagrostis canadensis*	10	No	FACW
6. *Bromus inermis*	50	Yes	FAC
7. *Phragmites australis*	15	No	FACW
8. *Elymus trachycaulus*	15	No	FAC
9.			
10.			
11.			
	170 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	35	x 1 =	35
FACW species	25	x 2 =	50
FAC species	95	x 3 =	285
FACU species	0	x 4 =	0
UPL species	15	x 5 =	75
Column Totals:	170 (A)		445 (B)

Prevalence Index = B/A = 2.62

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vacular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No** ____

Remarks:

SOIL

Sampling Point: sp08

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 2/1	98	7.5YR 5/6	2	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- x Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: NA

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 16	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

Part of wetland complex - extends North to where the streams converge

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp09

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): none | Slope (%): 0-Jan

Subregion (LRR): LRR E | Lat: 43°28'31.771"N | Long: 110°46'17.375"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No ____	**Is the Sampled Area within a Wetland?** **Yes** x **No** ____
Hydric Soil Present?	Yes x	No ____	
Wetland Hydrology Present?	Yes x	No ____	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	98	Yes	OBL
2.			
3.			
4.			
5. *Calamagrostis canadensis*	1	No	FACW
6.			
7. *Phragmites australis*	1	No	FACW
8.			
9.			
10.			
11.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum 0

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	98	x 1 =	98
FACW species	2	x 2 =	4
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		102 (B)

Prevalence Index = B/A = 1.02

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ 5 - Wetland Non-Vacular Plants[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No** ____

Remarks:

SOIL

Sampling Point: sp09

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 2/1	98	7.5YR 5/6	2	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- x Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: NA

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 16	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:
Part of wetland complex

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp10

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'28.548"N | Long: 110°46'20.872"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	90	Yes	OBL
2.			
3.			
4.			
5. *Calamagrostis canadensis*	7	No	FACW
6.			
7. *Phragmites australis*	3	No	FACW
8.			
9.			
10.			
11.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum 0

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	90	x 1 =	90
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:	100 (A)		110 (B)

Prevalence Index = B/A = 1.10

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp10

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 2/1	98	7.5YR 5/6	2	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- x Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: NA

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 4	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:
Part of wetland complex

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp11

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'27.076"N | Long: 110°46'26.118"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix bebbiana*	50	Yes	FACW
2.			
3.			
4.			
5.			
	50	=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	90	Yes	OBL
2. *Bromus inermis*	10	No	FAC
3.			
4.			
5. *Calamagrostis canadensis*	7	No	FACW
6.			
7. *Phragmites australis*	3	No	FACW
8.			
9.			
10.			
11.			
	110	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum 2

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	90	x 1 =	90
FACW species	60	x 2 =	120
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	160 (A)		240 (B)

Prevalence Index = B/A = 1.50

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp11

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100					Loamy/Clayey	
1-13	10YR 2/1	90	7.5YR 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: Rock

Depth (inches): 13

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 6	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

Part of wetland complex- W9/W3 - wetland western boundary adjacent to Flat Creek.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp12

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'22.42"N | Long: 110°46'27.114"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	90	Yes	OBL
2. *Cirsium arvense*	10	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	90	x 1 =	90
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		120 (B)

Prevalence Index = B/A = 1.20

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp12

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100					Loamy/Clayey	
1-15	10YR 2/1	90	7.5YR 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 6	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

Part of wetland complex- W9/W3 - wetland western boundary adjacent to Flat Creek.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI City/County: Jackson/Teton Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson State: WY Sampling Point: sp13

Investigator(s): Pioneer Environmental Services, Inc. Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace Local relief (concave, convex, none): none Slope (%):

Subregion (LRR): LRR E Lat: 43°28'21.477"N Long: 110°46'27.847"W Datum: GCS_WGS_1984

Soil Map Unit Name: n/a NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	90	Yes	OBL
2. *Cirsium arvense*	10	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	90	x 1 =	90
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		120 (B)

Prevalence Index = B/A = 1.20

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp13

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100					Loamy/Clayey	
1-15	10YR 2/1	90	7.5YR 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 6	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

Part of wetland complex- W9/W3 - wetland western boundary adjacent to Flat Creek.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp14

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'21.51"N | Long: 110°46'26.669"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix bebbiana*	40	Yes	
2.			
3.			
4.			
5.			
	40 =Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	80	Yes	OBL
2. *Cirsium arvense*	10	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	80	x 1 =	80
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		110 (B)

Prevalence Index = B/A = 1.22

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp14

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100					Loamy/Clayey	
1-18	10YR 2/1	90	7.5YR 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 5	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

Part of wetland complex- W9/W3 - wetland western boundary adjacent to Flat Creek.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp15

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'23.252"N | Long: 110°46'24.953"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	20	Yes	OBL
2. *Cirsium arvense*	10	No	FAC
3. *Schoenoplectus acutus*	50	Yes	OBL
4. *Equisetum hyemale*	20	Yes	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	70	x 1 =	70
FACW species	20	x 2 =	40
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		140 (B)

Prevalence Index = B/A = 1.40

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp15

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100					Loamy/Clayey	
1-15	10YR 2/1	80	7.5YR 5/6	20	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): ___

Water Table Present? Yes ___ No x Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes x No ___ Depth (inches): 5

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

Part of wetland complex- W9/W3 - wetland western boundary adjacent to Flat Creek.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp16

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'25.082"N | Long: 110°46'22.902"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	90	Yes	OBL
2.			
3.			
4. *Equisetum hyemale*	10	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum 0

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	90	x 1 =	90
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:	100 (A)		110 (B)

Prevalence Index = B/A = 1.10

Hydrophytic Vegetation Indicators:

- x 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- 5 - Wetland Non-Vacular Plants[1]
- Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp16

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100					Loamy/Clayey	
1-12	10YR 2/1	85	7.5YR 5/6	15	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: rock

Depth (inches): 12

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 8	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

Part of wetland complex- W9/W3 - wetland western boundary adjacent to Flat Creek.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/172018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp17

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): concave | Slope (%): 0-Jan

Subregion (LRR): LRR E | Lat: 43°28'26.978"N | Long: 110°46'21.181"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No x	

Remarks:
drainage ditch

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	2	No	OBL
2. *Poa pratensis*	15	No	FAC
3. *Bromus inermis*	50	Yes	FAC
4. *Cirsium arvense*	10	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	77 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 10

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	2	x 1 =	2
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	77 (A)		227 (B)

Prevalence Index = B/A = 2.95

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ 5 - Wetland Non-Vacular Plants[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes x No ____

Remarks:

SOIL

Sampling Point: sp17

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR 2/2	100					Loamy/Clayey	
								gravel/rock

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: rock

Depth (inches): 13

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology Present? **Yes** ___ **No** x

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

Remarks:
ditch

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp18

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'27.908"N | Long: 110°46'20.705"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	90	Yes	OBL
2.			
3.			
4. *Equisetum hyemale*	10	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	90	x 1 =	90
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:	100 (A)		110 (B)

Prevalence Index = B/A = 1.10

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp18

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100					Loamy/Clayey	
1-17	10YR 2/1	80	7.5YR 5/6	20	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 6	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

Part of wetland complex- W9/W3 - wetland western boundary adjacent to Flat Creek.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp19

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'26.465"N | Long: 110°46'19.235"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix exigua*	10	Yes	FACW
2. *Salix bebbiana*	15	Yes	FACW
3.			
4.			
5.			
	25	=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	40	Yes	OBL
2. *Poa pratensis*	20	Yes	FAC
3.			
4. *Equisetum hyemale*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	65	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum 5

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	40	x 1 =	40
FACW species	30	x 2 =	60
FAC species	20	x 3 =	60
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		160 (B)

Prevalence Index = B/A = 1.78

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp19

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100					Loamy/Clayey	
1-14	10YR 2/1	90	7.5YR 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 12	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

Part of wetland complex- W9/W3 - wetland western boundary adjacent to Flat Creek.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/16/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp20

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): none | Slope (%): 0-Jan

Subregion (LRR): LRR E | Lat: 43°28'26.552"N | Long: 110°46'31.117"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No 0	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus angustifolia*	15	Yes	FACW
2.			
3.			
4.			
	15	=Total Cover	
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix exigua*	15	Yes	
2.			
3.			
4.			
5.			
	15	=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1. *Elymus trachycaulus*	40	Yes	FAC
2. *Poa pratensis*	30	Yes	FAC
3. *Bromus inermis*	25	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	95	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	15	x 2 =	30
FAC species	95	x 3 =	285
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	110 (A)		315 (B)

Prevalence Index = B/A = 2.86

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ 5 - Wetland Non-Vacular Plants[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes x No ____

Remarks:

SOIL

Sampling Point: sp20

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 3/2	100					Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology Present? **Yes** x **No** ___

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

Remarks:

Technically has hydrology because of "geomorphic position" being within the Flat Creek floodplain.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/172018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp21

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): concave | Slope (%): 0-Jan

Subregion (LRR): LRR E | Lat: 43°28'28.83"N | Long: 110°46'28.338"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No 0	

Remarks:
drainage ditch

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	2	No	OBL
2. *Poa pratensis*	30	Yes	FAC
3. *Bromus inermis*	15	Yes	FAC
4. *Cirsium arvense*	10	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	57 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 30

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	2	x 1 =	2
FACW species	0	x 2 =	0
FAC species	55	x 3 =	165
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	57 (A)		167 (B)

Prevalence Index = B/A = 2.93

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ 5 - Wetland Non-Vacular Plants[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes x No ____

Remarks:

SOIL

Sampling Point: sp21

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 2/2	100					Loamy/Clayey	
								gravel/rock

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: rock/gravel

Depth (inches): 5

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology Present? **Yes** x **No** ___

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

Remarks:
ditch

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI City/County: Jackson/Teton Sampling Date: 10/172018

Applicant/Owner: Town of Jackson State: WY Sampling Point: sp22

Investigator(s): Pioneer Environmental Services, Inc. Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace Local relief (concave, convex, none): concave Slope (%):

Subregion (LRR): LRR E Lat: 43°28'28.586"N Long: 110°46'27.596"W Datum: GCS_WGS_1984

Soil Map Unit Name: n/a NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** Yes No X
Hydric Soil Present?	Yes	No	
Wetland Hydrology Present?	Yes	No 0	

Remarks:
drainage ditch

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	95	Yes	OBL
2. *Poa pratensis*	30	No	FAC
3. *Bromus inermis*	25	No	FAC
4. *Symphyotrichum ascendens*	5	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	155 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	95	x 1 =	95
FACW species	0	x 2 =	0
FAC species	55	x 3 =	165
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	155 (A)		280 (B)

Prevalence Index = B/A = 1.81

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes x No

Remarks:

SOIL

Sampling Point: sp22

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/1	100	7.5YR 5/6	1	CS	M	Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology Present? **Yes** x **No** ___

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

Remarks:

Used hand lense to observe very few coasted sand grain iron deposits/redox features

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp23a

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/terrace | Local relief (concave, convex, none): concave | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'21.477"N | Long: 110°46'27.847"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
borderline area between drainages - sometimes flooded or irrigated - soils have redox but no saturation within 12" of surface, upland and wetland vegetation present. Naturally problematic soils/hydrology likely.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix exigua*	10	Yes	FACW
2.			
3.			
4.			
5.			
	10 =Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	50	Yes	OBL
2. *Phragmites australis*	50	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	50	x 1 =	50
FACW species	60	x 2 =	120
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	110 (A)		170 (B)

Prevalence Index = B/A = 1.55

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp23a

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 2/1	95	7.5YR 6/6	5	CS	M	Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 15	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp23b

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat/streamside | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'31.003"N | Long: 110°46'22.874"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
small depression probably floods during spring/growing season - soils likely still developing into hydric, or used to be inundated more frequently in the past and are now drying up.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix exigua*	20	Yes	FACW
2.			
3.			
4.			
5.			
	20 =Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	90	Yes	OBL
2. *Phragmites australis*	30	Yes	FACW
3. *Calamagrostis canadensis*	5	No	FACW
4. *Scirpus microcarpus*	15	No	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	140 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	105	x 1 =	105
FACW species	55	x 2 =	110
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	160 (A)		215 (B)

Prevalence Index = B/A = 1.34

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp23b

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 2/1	99	7.5YR 5/6	1	CS	M	Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- x Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): ___

Water Table Present? Yes ___ No x Depth (inches): ___

Saturation Present? Yes x No ___ Depth (inches): 10

(includes capillary fringe)

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp24

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): drainage ditch | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'31.835"N | Long: 110°46'22.883"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix bebbiana*	2	No	FACW
2. *Salix drummondiana*	1	No	FACW
3.			
4.			
5.			
	3	=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1.			
2. *Phalaris arundinacea*	100	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	x 1 =	0
FACW species	103	x 2 =	206
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	103 (A)		206 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp24

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 2/2	99	7.5YR 7/6	1	CS	M	Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Soils were very borderline - no strong indicators either way.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): ___

Water Table Present? Yes ___ No x Depth (inches): ___

Saturation Present? Yes x No ___ Depth (inches): 15

(includes capillary fringe)

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI City/County: Jackson/Teton Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson State: WY Sampling Point: sp25

Investigator(s): Pioneer Environmental Services, Inc. Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): none Slope (%):

Subregion (LRR): LRR E Lat: 43°28'31.832"N Long: 110°46'21.934"W Datum: GCS_WGS_1984

Soil Map Unit Name: n/a NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix exigua*	20	Yes	FACW
2.			
3.			
4.			
5.			
	20 =Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	40	Yes	OBL
2. *Phalaris arundinacea*	40	Yes	FACW
3. *Calamagrostis canadensis*	20	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	40	x 1 =	40
FACW species	80	x 2 =	160
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	120 (A)		200 (B)
Prevalence Index = B/A =	1.67		

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp25

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR 2/2	95	7.5YR 5/6	5	CS	M	Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 14	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp26

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'32.226"N | Long: 110°46'20.156"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** Yes No X
Hydric Soil Present?	Yes	No x	
Wetland Hydrology Present?	Yes x	No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix exigua*	10	Yes	FACW
2.			
3.			
4.			
5.			
	10 =Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	20	Yes	OBL
2.			
3. *Calamagrostis canadensis*	80	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	20	x 1 =	20
FACW species	90	x 2 =	180
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	110 (A)		200 (B)

Prevalence Index = B/A = 1.82

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes x No

Remarks:

SOIL

Sampling Point: sp26

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 2/1	100					Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- x 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): ___

Water Table Present? Yes ___ No x Depth (inches): ___

Saturation Present? Yes x No ___ Depth (inches): 16

(includes capillary fringe)

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp27

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'32.899"N | Long: 110°46'20.481"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** Yes No X
Hydric Soil Present?	Yes	No x	
Wetland Hydrology Present?	Yes	No x	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus angustifolia*	35	Yes	FACW
2.			
3.			
4.			
	35	=Total Cover	
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			FACW
2.			
3.			
4.			
5.			
		=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1. *Bromus inermis*	20	Yes	FAC
2. *Cynoglossum officinale*	20	Yes	FACU
3. *Poa pratensis*	20	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	60	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum 0

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	0	x 1 =	0
FACW species	35	x 2 =	70
FAC species	40	x 3 =	120
FACU species	20	x 4 =	80
UPL species	0	x 5 =	0
Column Totals:	95 (A)		270 (B)

Prevalence Index = B/A = 2.84

Hydrophytic Vegetation Indicators:

- x 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- 5 - Wetland Non-Vacular Plants[1]
- Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes x No

Remarks:

SOIL

Sampling Point: sp27

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/3	100					Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: rock

Depth (inches): 10

Hydric Soil Present? **Yes** ___ **No** x

Remarks:
Boundary of W11

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology Present? **Yes** ___ **No** x

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

Remarks:
on hillslope above / North of ditch and wetland area 11

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp28

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): streamside | Local relief (concave, convex, none): concave | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'26.138"N | Long: 110°46'29.704"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: PEMA

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No 0	
Wetland Hydrology Present?	Yes x	No 0	

Remarks:
small depression probably floods during spring/growing season - soils likely still developing into hydric, or used to be inundated more frequently in the past and are now drying up.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus angustifolia*	10	Yes	FACW
2.			
3.			
4.			
	10	=Total Cover	
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix bebbiana*	15	No	FACW
2. *Salix exigua*	70	Yes	FACW
3. *Populus angustifolia*	5	No	FACW
4.			
5.			
	90	=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1. *Carex nebrascensis*	90	Yes	OBL
2. *Calamagrostis canadensis*	10	No	FACW
3. *Poa pratensis*	10	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	110	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum 0

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	90	x 1 =	90
FACW species	110	x 2 =	220
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	210 (A)		340 (B)

Prevalence Index = B/A = 1.62

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp28

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	100					Loamy/Clayey	
6-12	10YR 2/1	99	7.5YR 7/1	1	C	M	Loamy/Clayey	Prominent redox concentrations
12-18	10YR 2/1	100					Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- x Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp29

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): streamside | Local relief (concave, convex, none): concave | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'26.566"N | Long: 110°46'28.925"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No x	
Wetland Hydrology Present?	Yes x	No 0	

Remarks:
boundary line

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			FACW
2.			
3.			
4.			
5.			
	=Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Bromus inermis*	40	Yes	FAC
2. *Taraxacum officinale*	10	No	FACU
3. *Poa pratensis*	10	No	FAC
4. *Chloracantha spinosa*	40	Yes	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	90	x 3 =	270
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	100 (A)		310 (B)

Prevalence Index = B/A = 3.10

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- 5 - Wetland Non-Vacular Plants[1]
- Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp29

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	98	7.5YR 5/6	2	C	M	Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: rock

Depth (inches): 10

Hydric Soil Present? **Yes** ___ **No** x

Remarks:

few redox depressions in upper 8", doesn't quite meet the 5% requirement for hydric soil indicator. - so not present - likely a problematic soil

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI City/County: Jackson/Teton Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson State: WY Sampling Point: sp30

Investigator(s): Pioneer Environmental Services, Inc. Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): streamside Local relief (concave, convex, none): none Slope (%):

Subregion (LRR): LRR E Lat: 43°28'20.898"N Long: 110°46'29.096"W Datum: GCS_WGS_1984

Soil Map Unit Name: n/a NWI classification: N/A

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No 0	
Wetland Hydrology Present?	Yes x	No 0	

Remarks:
boundary line

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix exigua*	5	Yes	FACW
2.			
3.			
4.			
5.			
	5 =Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Phalaris arundinacea*	80	Yes	FACW
2. *Carex nebrascensis*	80	Yes	OBL
3. *Calamagrostis canadensis*	20	No	FACW
4. *Cirsium arvense*	5	No	FAC
5. *Carex rostrata*	10	No	OBL
6.			
7.			
8.			
9.			
10.			
11.			
	195 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	90	x 1 =	90
FACW species	105	x 2 =	210
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	200 (A)		315 (B)

Prevalence Index = B/A = 1.58

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp30

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 2/2	60	7.5YR 5/6	40	CS	M	Sandy	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- x Sandy Redox (S5)
- ? Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:
Sandy/ loamy soils with redox

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology Present? **Yes** X **No** ___

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

Remarks:
Wetland connects to riparian ss to the north

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp31

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): hillslope | Local relief (concave, convex, none): concave | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'23.627"N | Long: 110°46'19.302"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: PSSC

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
southeast corner of property

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix exigua*	40	Yes	FACW
2. *Salix bebbiana*	10	Yes	FACW
3.			
4.			
5.			
	50 =Total Cover		
Herb Stratum (Plot size: 25 sf)			
1.			
2. *Carex nebrascensis*	98	Yes	OBL
3. *Calamagrostis canadensis*	10	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	108 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	98	x 1 =	98
FACW species	60	x 2 =	120
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	158 (A)		218 (B)

Prevalence Index = B/A = 1.38

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp31

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 2/1	95	7.5YR 5/6	2	C	M	Loamy/Clayey	
			10YR 6/6	3	C	M		Prominent redox concentrations

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:
Sandy/ loamy soils with redox

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 15	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp32

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): hillslope/toe / ditch | Local relief (concave, convex, none): concave | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'23.629"N | Long: 110°46'19.3"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: PSSC

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
extends from NW end to the north and east and west as part of the wet meadow wetland complex

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix exigua*	20	Yes	FACW
2.			
3.			
4.			
5.			
	20 =Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Equisetum hyemale*	30	No	FACW
2. *Carex nebrascensis*	90	Yes	OBL
3. *Calamagrostis canadensis*	45	Yes	FACW
4. *Schoenoplectus acutus*	12	No	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	177 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	102	x 1 =	102
FACW species	95	x 2 =	190
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	197 (A)		292 (B)

Prevalence Index = B/A = 1.48

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:
5% open water

SOIL

Sampling Point: sp32

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/1	100					Mucky Loam/Clay	
3-14	10YR 2/1	90	7.5YR 5/6	10	C	M		Prominent redox concentrations
14-18	10YR 3/1	75	7.5YR 5/6	25	CS	M		

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:
Soil is dark 2/1, with 7/5 yr 5/6 redox as sandy grain pockets

HYDROLOGY

Wetland Hydrology Indicators:

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

- 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)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- x Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes x	No ___	Depth (inches): 0		
Water Table Present?	Yes x	No ___	Depth (inches): 0		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 0	**Wetland Hydrology Present?**	**Yes** X **No** ___

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

Remarks:
pema wetland with fringe willows

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp33

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): depression | Local relief (concave, convex, none): concave | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'23.629"N | Long: 110°46'19.3"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: PSSC

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** Yes No x
Hydric Soil Present?	Yes	No x	
Wetland Hydrology Present?	Yes x	No	

Remarks:
extends from NW end to the north and east and west as part of the wet meadow wetland complex

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Crataegus douglasii*	5	Yes	FAC
2.			
3.			
4.			
	5	=Total Cover	
Sapling/Shrub Stratum (Plot size: 25 sf)			
1. *Salix bebbiana*	15	Yes	FACW
2.			
3.			
4.			
5.			
	15	=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1. *Poa pratensis*	35	Yes	FAC
2. *Carex nebrascensis*	20	Yes	OBL
3. *Calamagrostis canadensis*	45	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (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	60	x 2 =	120
FAC species	40	x 3 =	120
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	120 (A)		260 (B)

Prevalence Index = B/A = 2.17

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes x No

Remarks:
5% open water

SOIL

Sampling Point: sp33

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/2	100					Mucky Loam/Clay	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** x

Remarks:
thick loamy soil

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology Present? **Yes** x **No** ___

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

Remarks:
upland area - connects east to the dike and goes north/south

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp34

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): depression | Local relief (concave, convex, none): none | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'28.586"N | Long: 110°46'20.976"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: PEMA

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** **Yes** x **No**
Hydric Soil Present?	Yes x	No	
Wetland Hydrology Present?	Yes x	No	

Remarks:
extends from NW end to the north and east and west as part of the wet meadow wetland complex

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 25 sf)			
1.			
2.			
3.			
4.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			FACW
2.			
3.			
4.			
5.			
		=Total Cover	
Herb Stratum (Plot size: 25 sf)			
1. *Phalaris arundinacea*	5	No	FACW
2. *Carex nebrascensis*	95	Yes	OBL
3. *Scirpus microcarpus*	5	No	OBL
4. *Cirsium arvense*	5	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	110	=Total Cover	
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum 0

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	100	x 1 =	100
FACW species	5	x 2 =	10
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	110 (A)		125 (B)

Prevalence Index = B/A = 1.14

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** x **No**

Remarks:

SOIL

Sampling Point: sp34

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/2	100					Loamy/Clayey	
4-16	10YR 2/1	85	10YR 6/6	10	C	M		Prominent redox concentrations
								gleying present

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- x Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: na

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Mottling - gleyed and redox pockets throughout matricx from approx 4" - 16"

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): 0		
Water Table Present?	Yes ___	No x	Depth (inches): 0		
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 16	**Wetland Hydrology Present?**	**Yes** x **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp35

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat | Local relief (concave, convex, none): convex | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'28.586"N | Long: 110°46'20.976"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: PEMA

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** Yes No x
Hydric Soil Present?	Yes	No x	
Wetland Hydrology Present?	Yes	No x	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			FACW
2.			
3.			
4.			
5.			
	=Total Cover		
Herb Stratum (Plot size: 25 sf)			
1.			
2. *Bromus inermis*	95	Yes	FAC
3. *Agrostis sp.*	5	No	
4. *Cirsium arvense*	5	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	105 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	x 1 =	0
FACW species	0	x 2 =	0
FAC species	100	x 3 =	300
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		300 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes x No

Remarks:

SOIL

Sampling Point: sp35

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR 3/2	100					Loamy/Clayey	

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: rock

Depth (inches): 13

Hydric Soil Present? **Yes** ___ **No** x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology Present? **Yes** x **No** ___

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

Remarks:
upland pocket within wetland complex

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Karns Meadow ARI | City/County: Jackson/Teton | Sampling Date: 10/17/2018

Applicant/Owner: Town of Jackson | State: WY | Sampling Point: sp36

Investigator(s): Pioneer Environmental Services, Inc. | Section, Township, Range: Township 38 North, Range 611

Landform (hillside, terrace, etc.): flat | Local relief (concave, convex, none): convex | Slope (%):

Subregion (LRR): LRR E | Lat: 43°28'35.352"N | Long: 110°46'15.607"W | Datum: GCS_WGS_1984

Soil Map Unit Name: n/a | NWI classification: PEMA

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

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes x 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 x	No	**Is the Sampled Area within a Wetland?** Yes No x
Hydric Soil Present?	Yes	No x	
Wetland Hydrology Present?	Yes	No x	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 25 sf)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 25 sf)			
1.			FACW
2.			
3.			
4.			
5.			
	=Total Cover		
Herb Stratum (Plot size: 25 sf)			
1. *Scirpus microcarpus*	15	No	OBL
2. *Bromus inermis*	75	Yes	FAC
3. *Agrostis sp.*	5	No	
4. *Cirsium arvense*	5	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: 25 sf)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

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	15	x 1 =	15
FACW species	0	x 2 =	0
FAC species	80	x 3 =	240
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		255 (B)

Prevalence Index = B/A = 2.68

Hydrophytic Vegetation Indicators:

x 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0[1]

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

5 - Wetland Non-Vacular Plants[1]

Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes x No

Remarks:

SOIL

Sampling Point: sp36

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR 3/2	100					Loamy/Clayey	

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

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

- ___ Histosol (A1)
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- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: rock

Depth (inches): 13

Hydric Soil Present? **Yes** ___ **No** x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ 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)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___

Wetland Hydrology Present? **Yes** x **No** ___

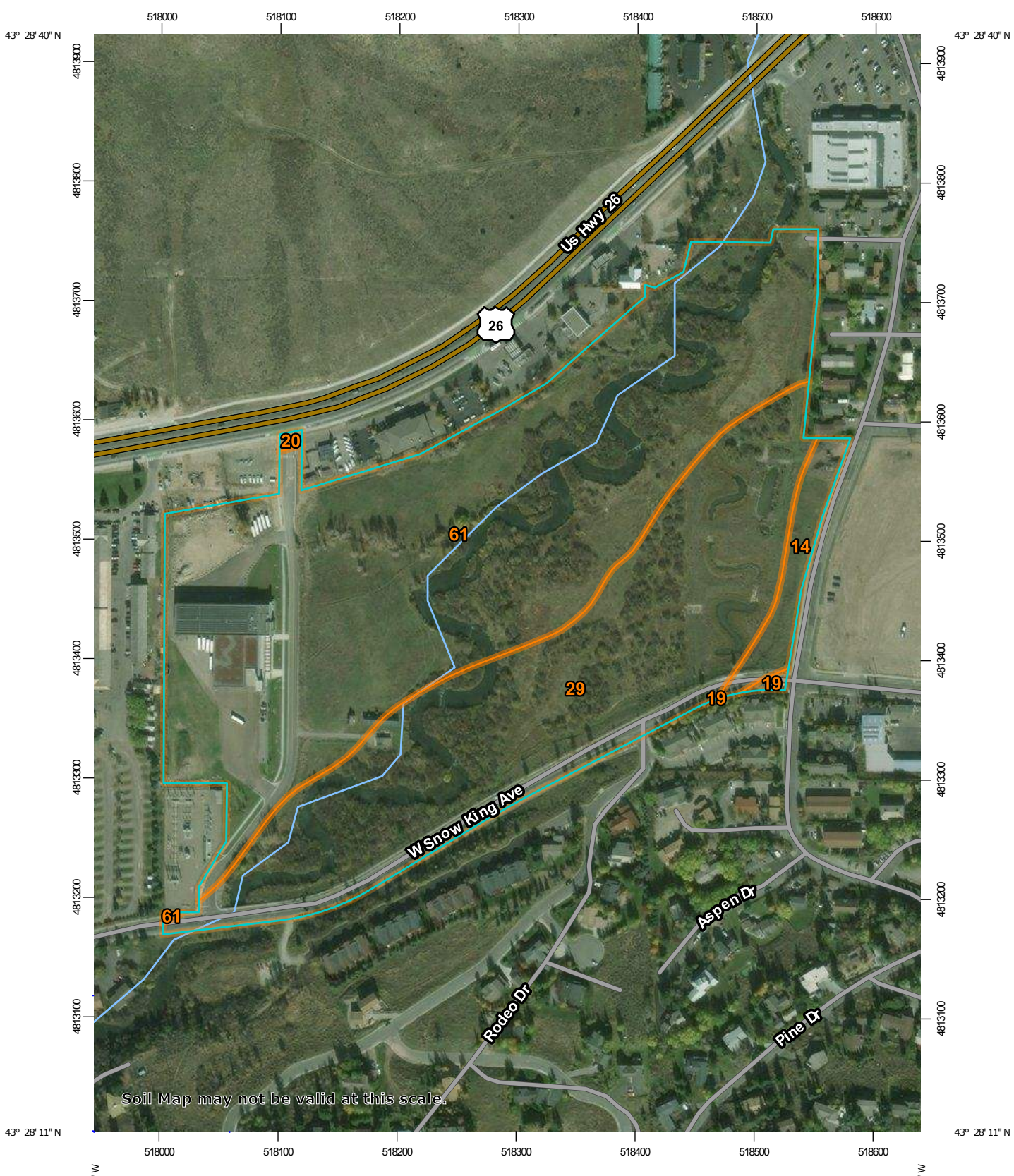
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
upland pocket within wetland complex

Appendix D

Map Unit Descriptions from the Teton County Area, Wyoming

Soil Map—Teton County, Wyoming, Grand Teton National Park Area
(Karns Meadow Soil Map)



Map Scale: 1:4,480 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Teton County, Wyoming, Grand Teton National Park Area
Survey Area Data: Version 13, Sep 15, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 22, 2012—Nov 2, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
14	Greyback gravelly loam, 0 to 3 percent slopes	1.4	3.0%
19	Greyback-Thayne complex, 10 to 20 percent slopes	0.1	0.2%
20	Greyback-Thayne complex, 20 to 30 percent slopes *	0.1	0.1%
29	Newfork fine sandy loam	17.3	36.5%
61	Tineman gravelly loam, wet	28.5	60.2%
Totals for Area of Interest		**47.3**	**100.0%**

APPENDIX G: CULTURAL RESOURCES SURVEY

Class III Cultural Resources Survey Report

Karns Meadow

Town of Jackson

Jackson, WY

Provided by Cannon Heritage Consultants, Inc.

Results of Class III Cultural Resource Survey, Karns Meadow, Teton County, Wyoming

Prepared for
EcoConnect Consulting, LLC
PO Box 13259
Jackson, Wyoming

Submitted by
Kenneth P. Cannon
Houston L. Martin
Jonathan Keith
Molly Boeka Cannon
Stephanie Crockett

CHC Technical Report Number WY-18-010
Wyoming File Search No. 34931
December 2018

Review Draft

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HERITAGE CONSULTANTS

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Prepared by
Cannon Heritage Consultants, Inc.
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Logan, Utah 84321

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Logan, Utah
Boise, Idaho
435.213.9258

RESULTS OF CLASS III CULTURAL RESOURCES SURVEY, KARNS MEADOW, TETON COUNTY, WYOMING

Prepared by

Kenneth P. Cannon, PhD, RPA
Houston Martin
Jonathan Keith
Molly Boeka Cannon
Stephanie Crockett
Cannon Heritage Consultants, Inc.
Logan, Utah

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EcoConnect Consulting, LLC
PO Box 13259
Jackson, Wyoming

Cannon Heritage Consultants Technical Report No. WY-18-010

Wyoming File Search No. 34931

December 2018

ABSTRACT

In December 2003 the Town of Jackson acquired the Karns Meadow Park property from the Karns Family, and along with Teton County are in the process of developing an environmental assessment in preparation for potential future development. As part of the EA the town requested a cultural resource assessment. To complete the cultural resource assessment EcoConnect Consulting LLC of Jackson, Wyoming contracted Cannon Heritage Consultants of Logan, Utah. As of the time of this report no formal management plans have been developed nor presented in a public document.

The Karns Meadow Park is situated in portions of the SE¼ NW¼, SW¼ NE¼, NW ¼ SW ¼, NW ¼ NW ¼ SE ¼ of Section 33, Township 41 North, Range 116 West, in the Town of Jackson, Teton County, Wyoming. The project APE consists of approximately 41.8 acres. Flat Creek is the defining topographic feature of the property and is an important tributary of the Snake River. Flat Creek flows through the project area at a consistent and low gradient. Historic records indicate the meandering course of Flat Creek has remained relatively stable for at least 100 years.

The project area is part of the 160-acre homestead Pete Karns filed in 1903. Up until about 1945 the property was flood-irritated as a pasture for a 31-acre dairy operation. Flood irrigation continued as the property was converted to a horse pasture. During the 1990s-2000s the pasture was leased as a holding area for rodeo horses and in 2001 flood irrigation ceased. In December of 2003 the property was acquired by the city of Jackson and some limited public recreation (e.g., parasail land site) has been allowed.

Fieldwork was conducted on 13 October 2018 with a crew consisting of Kenneth Cannon, Molly Boeka Cannon, and Stephanie Crockett. The pedestrian survey involved 15-m transects supplemented by 10 shovel tests to assess the potential for buried deposits in non-wetland areas. A reconnaissance level (30-m transects) survey was conducted in the wetland portion of the property, in the southern portion of the property, and on the western bench adjacent to the rodeo grounds. Site visibility was generally limited due to heavy meadow vegetation, except in the western portion which represented a higher and drier landform. Ten shovel tests were excavated on both sides of Flat Creek to supplement the pedestrian survey, although only one produced evidence of buried cultural material. Approximately 35% of the project area was surveyed (Intensive=12 acres; Reconnaissance=2.5 acres).

The results of the survey produced two precontact lithic scatters. Site 48TE2137 is small lithic scatter (209 m^2) on the west side of the property. It consists of two small obsidian flakes and a quartzite hammerstone. Seven shovel tests were excavated in this portion of the site but did not produce any evidence of buried cultural deposits. On the eastern bank of Flat Creek a larger lithic scatter site (48TE2138; 3920 m^2) was recorded. The site consists of a single obsidian flake on the surface and an obsidian flake recovered in ST-9 at a depth of approximately 30 cmbs.

Pete Karns provided an examination of an assemblage of projectile points and flaking debris he collected from the property over the past 50 years. The projectile points suggest occupation of the property dating back at least to Late Paleoindian times (8-9 ka). The evidence provided by Mr. Karns, coupled with relatively deep soils, provides support for the recommendation that the two precontact sites represent significant cultural resources and present the potential to have significant research potential qualifying these sites under criterion d.

Karns Meadow has likely been an important settlement area for native groups extending back several millennia. Cannon Heritage Consultants recommends that both sites are eligible for inclusion on the National Register based upon their ability to provide insight into precontact lifeways in Jackson Hole during the early and middle part of the Holocene, a time span of several millennia that is not well understood in northwestern Wyoming (Cannon 2001; Page and Peterson 2015). The ecotonal setting of

Karns Meadow within a riparian zone and adjacent to sagebrush uplands potentially provided relatively easy access to a range of biotic communities and the associated resources (Clark 1999). The Flat Creek valley was probably also an important travel corridor for precontact group conveyance in Jackson Hole.

Once the management plan for the Karns Meadow is articulated and potential impacts to the sites is addressed it may be necessary to conduct a second phase of site assessment. This phase of investigation should minimally include evaluative testing to provide a better understanding of the sites' boundaries and the presence and nature of the buried components. This work may involve minimally invasive techniques which include geophysical prospecting supplemented by systematic auger probing or shovel testing (Cannon et al. 2016).

TABLE OF CONTENTS

LIST OF FIGURES

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CHAPTER 1

UNDERTAKING AND PROJECT DESCRIPTION

In December 2003 the Town of Jackson acquired the Karns Meadow Park property from the Karns Family, and along with Teton County are in the process of developing an environmental assessment in preparation for potential future development. As part of the EA the town requested a cultural resource assessment. To complete the cultural resource assessment EcoConnect Consulting LLC of Jackson, Wyoming contracted Cannon Heritage Consultants of Logan, Utah. As of the time of this report no formal management plans have been developed nor presented in a public document.

The Karns Meadow Park is situated in portions of the SE¼ NW¼, SW¼ NE¼, NW ¼ SW ¼, NW ¼ NW ¼ SE ¼ of Section 33, Township 41 North, Range 116 West, in the Town of Jackson, Teton County, Wyoming (Figure 1). The project APE consists of approximately 41.8 acres. Flat Creek is the defining topographic feature of the property and is an important tributary of the Snake River. Flat Creek flows through the project area at a consistent and low gradient. Historic records indicate the meandering course of Flat Creek has remained relatively stable for at least 100 years.

The project area is part of the 160-acre homestead Pete Karns filed in 1903. Up until about 1945 the property was flood-irritated as a pasture for a 31-acre dairy operation. Flood irrigation continued as the property was converted to a horse pasture. During the 1990s-2000s the pasture was leased as a holding area for rodeo horses and in 2001 flood irrigation ceased. In December of 2003 the property was acquired by the city of Jackson and some limited public recreation (e.g., parasail land site) has been allowed (Segerstrom and Dittmar 2003).

Fieldwork was conducted on 13 October 2018 with a crew consisting of Kenneth Cannon, Molly Boeka Cannon, and Stephanie Crockett. The pedestrian survey involved 15-m transects supplemented by 10 shovel tests to assess the potential for buried deposits in non-wetland areas. A reconnaissance level (30-m transects) survey was conducted in the wetland portion of the property, in the southern portion of the property, and on the western bench adjacent to the rodeo grounds. Site visibility was generally limited due to heavy meadow vegetation, except in the western portion which represented a higher and drier landform. Ten shovel tests were excavated on both sides of Flat Creek to supplement the pedestrian survey, although only one produced evidence of buried cultural material (Figure 2). Approximately 35% of the project area was surveyed (Intensive=12 acres; Reconnaissance=2.5 acres).

The results of the survey produced two precontact lithic scatters. Site 48TE2137 is small lithic scatter (209 m^2) on the west side of the property (Figure 3). It consists of two small obsidian flakes and a quartzite hammerstone. Seven shovel tests were excavated in this portion of the site but did not produce any evidence of buried cultural deposits.

Site 48TE2138 is a larger (3920 m^2) lithic scatter located on the eastern side of Flat Creek (Figure 3). A single obsidian flake was identified in an erosional area near a foot path. A single obsidian flake was recovered in ST-9 at a depth of approximately 30 cmbs.

On 17 October 2018 Ken Cannon and Pete Karns met at the site. Mr. Karns was a long-time resident of the property and produced a large assemblage of projectile points and lithic debris he had collected from the property over the last ~50 years. The projectile point collection came from both sides of Flat Creek, and the bench occupied by the Rodeo Grounds, and suggests a long-term occupation of the area dating back at least to Late Paleoindian times (8-9 ka). The evidence provided by Mr. Karns, coupled with relatively deep soils, provides support for the recommendation that the two precontact sites represent significant cultural resources and present the potential to have significant research potential qualifying these sites under criterion d.

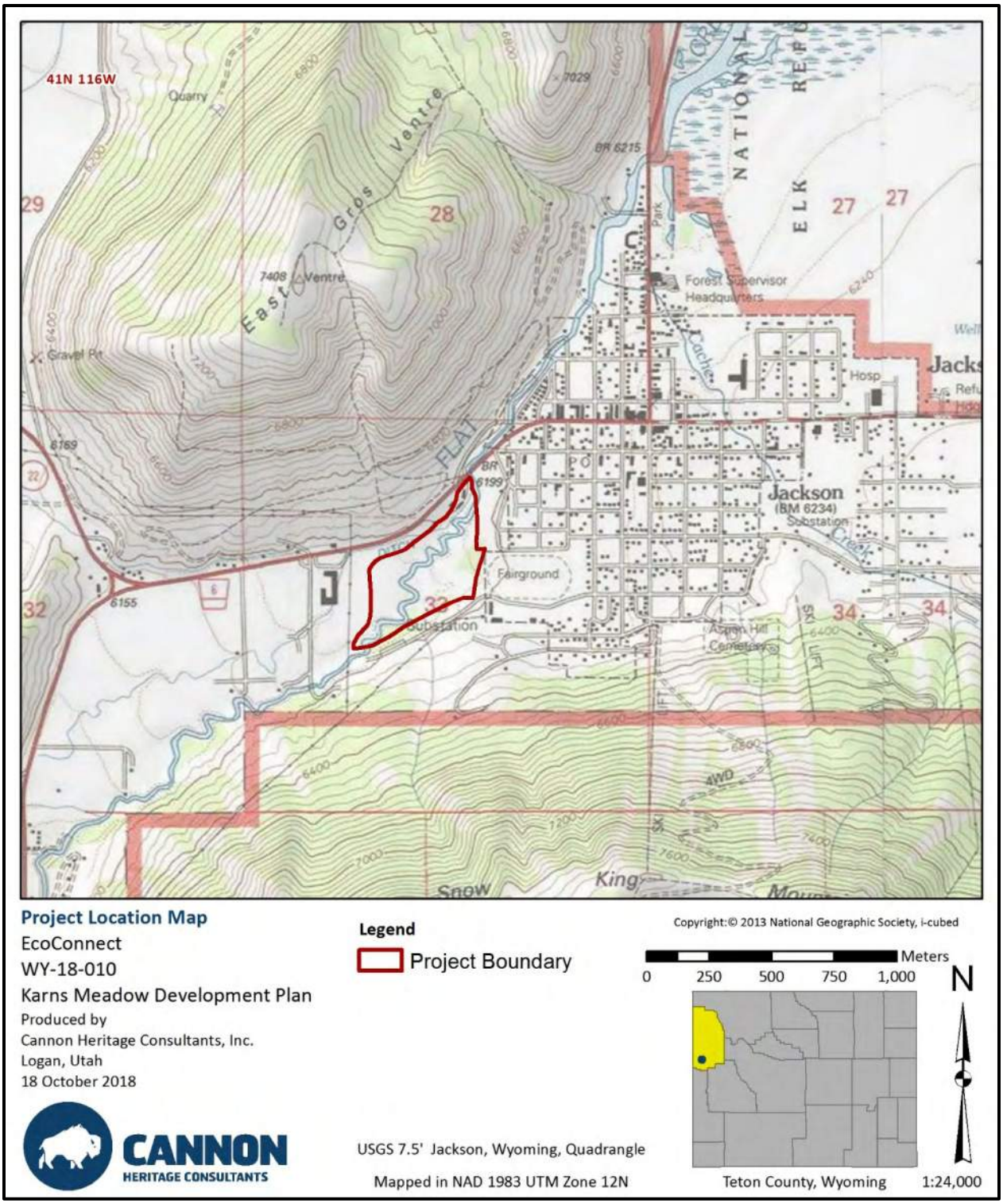

Figure 1. Project location map.

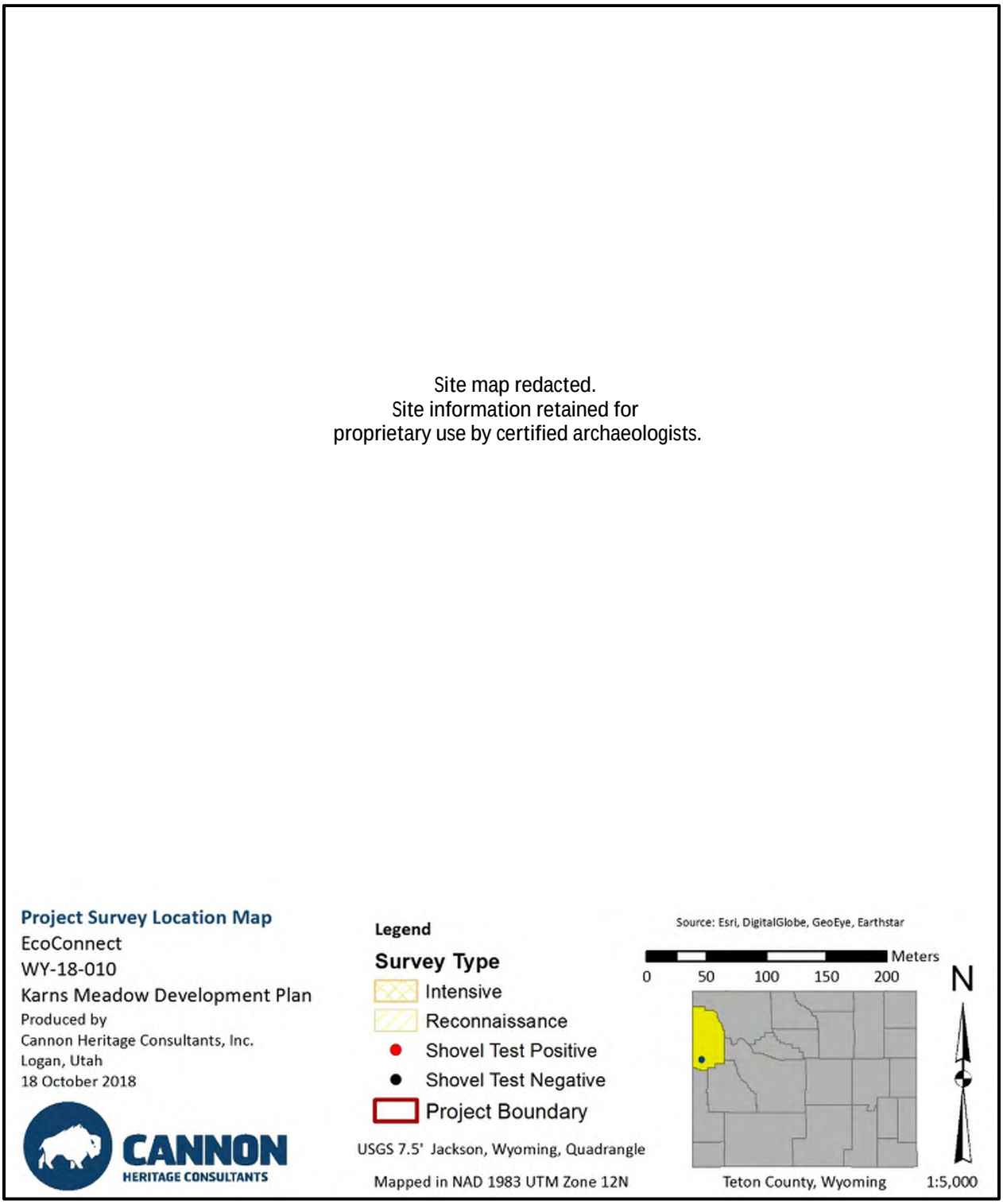

Figure 2. Project map illustrating location of pedestrian survey and shovel testing.

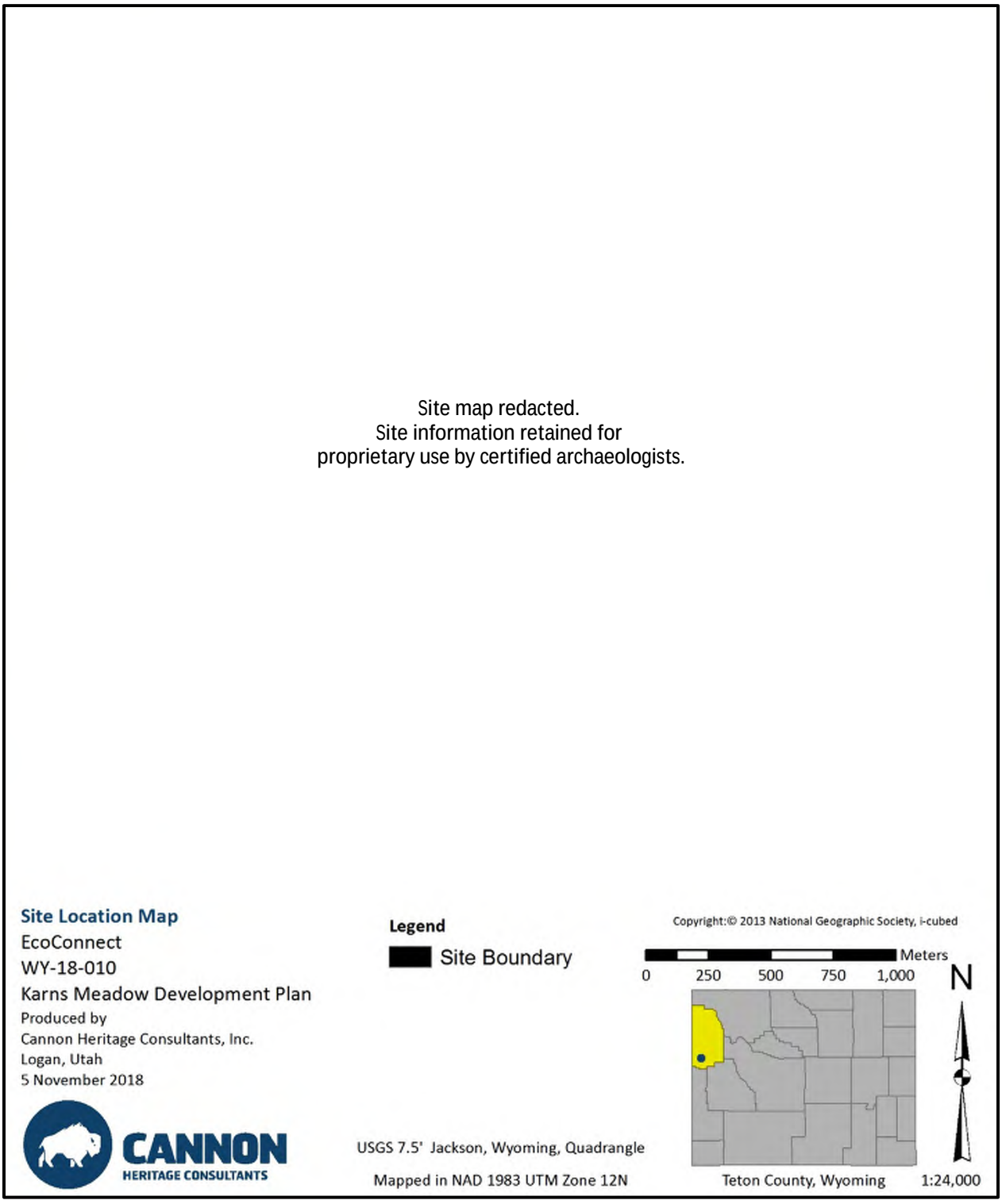

Figure 3. Sites location map.

CHAPTER 2

ENVIRONMENTAL SETTING

Karns Meadow, located between East Gros Ventre Butte and the foot of Snow King Mountain, is on the eastern flank of Jackson Hole, a long north-south trending valley in the Central Rocky Mountains of northwestern Wyoming (Figure 4). Bordered by the steep relief of the Teton Range to the west and the subtle Gros Ventre Range to the east, the geography of the valley and the modern-day landscape bare evidence of its glacial past. Features such as moraines, outwash, and kettles are visible across the region. The Snake River, located approximately four miles west of the project, enters the valley to the north where it enters the deep, glacially scoured Jackson Lake. Trending south, it receives the Gros Ventre River flowing south and west before it abruptly shifts southeast where it exits the valley via the Snake River Canyon. Flat Creek, which flows through the project area, runs to the southwest through Jackson before turning south and joins the Snake River approximately 6 miles south of the project area.

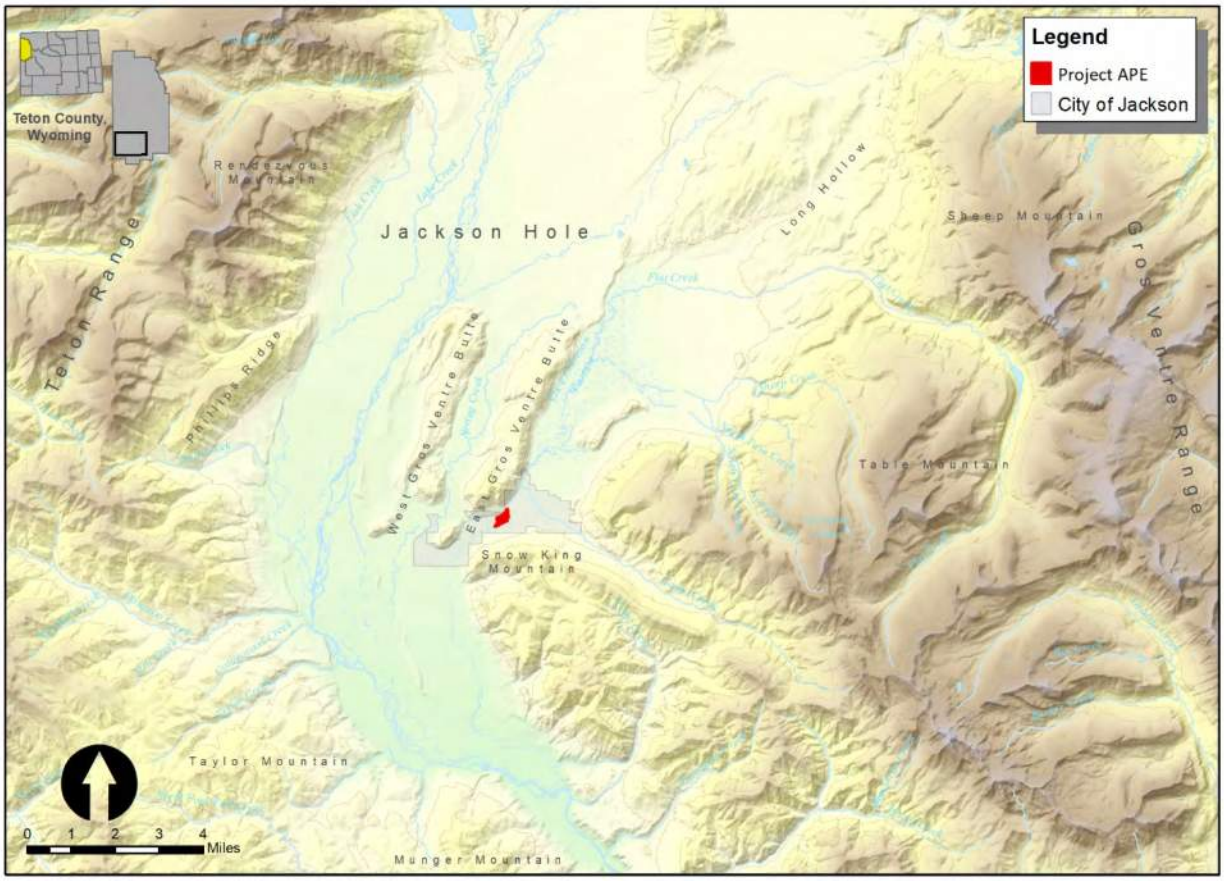

Figure 4. Regional overview of Jackson, Wyoming.

The project area is within a high elevation valley ecozone (EPA 2010), which are characterized by their mixture of wet bottomlands, marshes, stream terraces, alluvial fans, and lower foothill slopes. The project area occurs on Quaternary-aged materials along the valley floor (Figure 5; Love and Reed 2002). Flat Creek meanders through Karns Meadow, depositing alluvium during floods. The Natural Resource Conservation Service (NRCS) classifies soils within the project area as primarily Newfork fine sandy loam or Tineman gravelly loam (NRCS 2018). The former comprises alluvium deposited on flood plains, while the latter consists of glaciofluvial deposits deposited along mountain flanks; both exceed 80 inches of deposition

without any restrictive features (Figure 6). Historically, the meadow was flood-irrigated as a pasture for a dairy and horses for much of the 20th century.

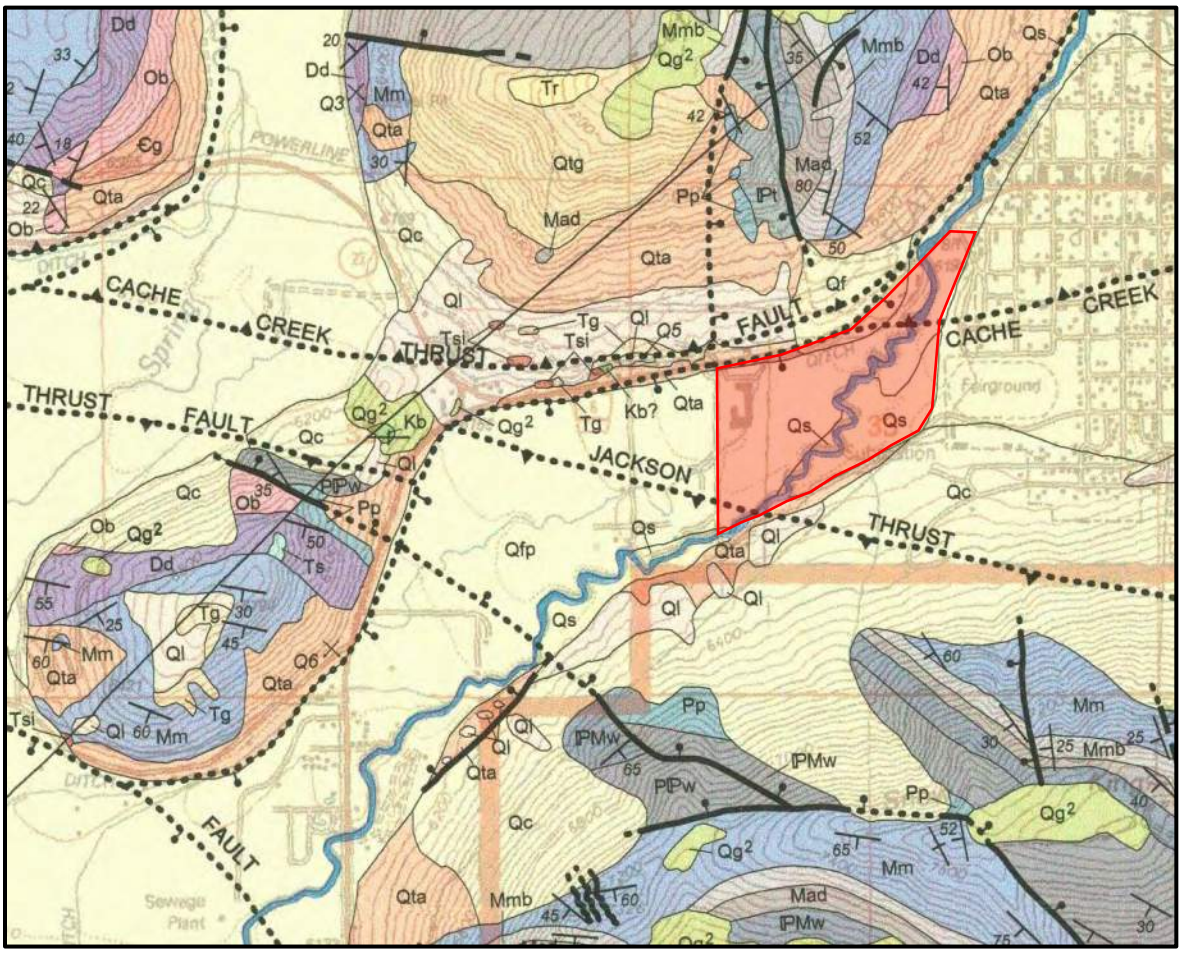

Figure 5. Geological map for the project area (Love and Reed 2002).

The landforms along the valley floor of Jackson Hole are complex, partially the result of pulsating periods of deposition in the past, such as the 1927 flood produced following the failure of a natural dam formed by a landslide that obstructed the Gros Ventre River in 1925 (Love and Love 1988). While the ages of terraces at Karns Meadow have not been determined, elsewhere the lowest terrace along Flat Creek has been known to have materials dating to the Middle to Late Holocene, such as at the Game Creek archaeological site (42TE1573). The Game Creek site is located along lower terraces immediately north of the confluence of Flat Creek and the Snake River approximately 6 miles south of Jackson, and these terraces may owe their origin to the episodic floods produced following events such as the Gros Ventre Slide. Karns Meadow is by no means a geologic analog to the unique context of Game Creek, but the depositional history of the valley suggests high potential for extensive subsurface cultural materials. Projectile points collected by Pete Karns provides evidence to support this.

Currently Flat Creek is a meandering stream cutting through Quaternary glaciofluvial deposits. Stability of the current regime is supported by mid-20th century aerial photos (Figure 7).

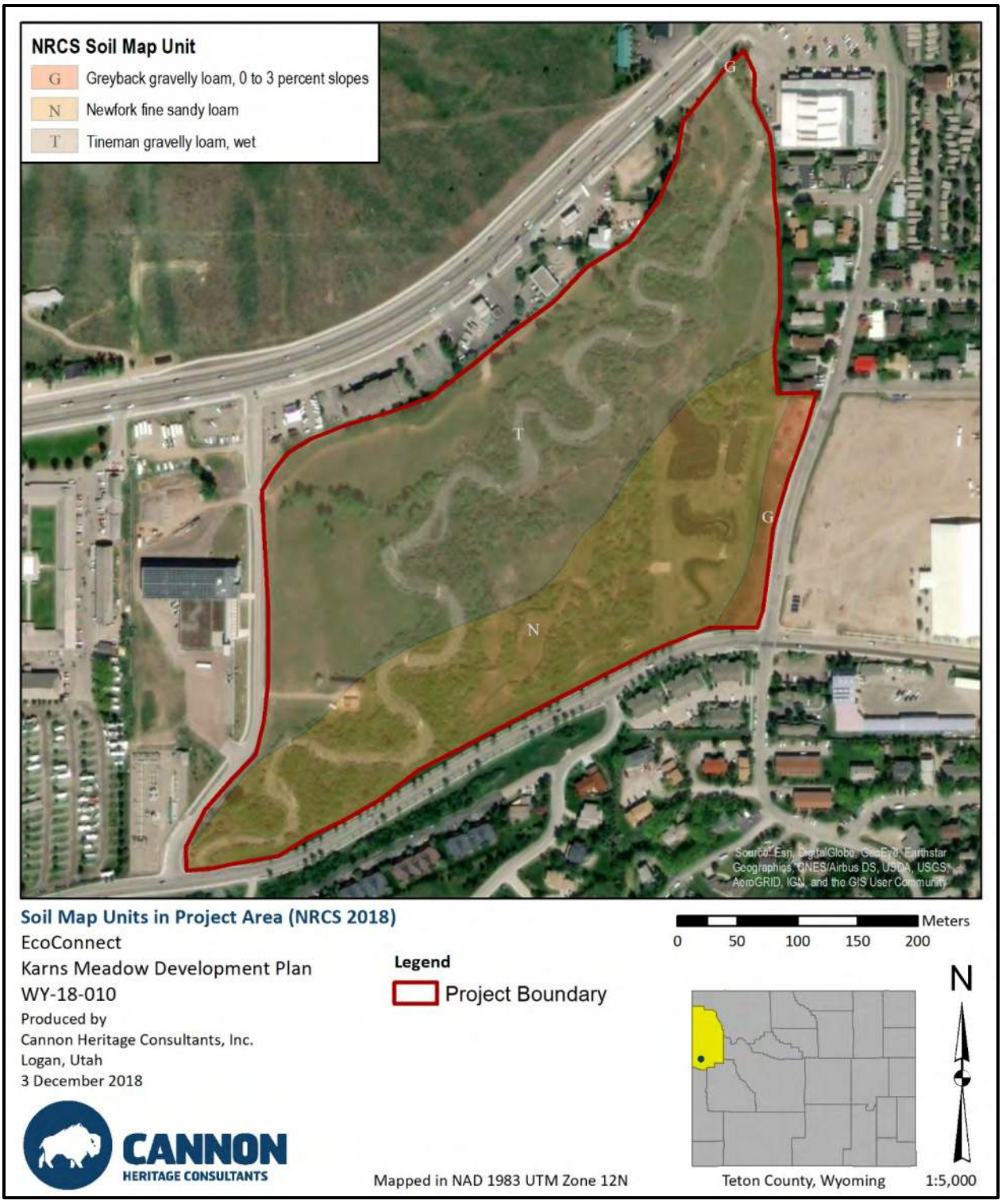

Figure 6. Soils map of project area.

Climate

The climate of the project area is characterized by mild summers and very cold winters. The Western Regional Climate Center (WRCC 2017) maintains historic climate records for Jackson Hole, including

documented temperatures for the Jackson, Wyoming, station (NCDC COOP Station #484910) for a continuous period from 1905 to 2016. During that time, the average maximum temperature in July was 81.8°F; the average lows were 40.8°F. Contrast this with the average January high temperature of 27.0°F, with an average low of 4.1°F. Average annual participation was 15.83 inches of precipitation on average with a mean total snowfall of 76.9 inches.

Figure 7. Comparison of 1945 qerial image of Karns Meadow (https://maps.greenwoodmap.com/tetonwy/mapserver) and contemporary Google Earth image.

Wildlife and Plant Communities

The wildlife of Jackson Hole and the Teton Range are diverse and have long provided viewing opportunities for visitors to the valley. Mammal species include elk (*Cervus canadensis*), bison (*Bison bison*), moose (*Alces alces*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), wolf

(*Canis lupus*), coyote (*Canis latrans*), bighorn sheep (*Ovis canadensis*), grizzly bear (*Ursus arctos*), black bear (*Usus americanus*), American beaver (*Castor canadensis*), American badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), and numerous other small mammals. Avian species—and there are numerous with at least 341 reported in the Jackson Hole region (Raynes 1991)—include bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), northern harrier (*Circus hudsonius*), red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), American kestrel (*Falco sparverius*), sandhill crane (*Antigone canadensis*), great horned owl (*Bubo virginianus*), Canada goose (*Branta canadensis*), pied-bill grebe (*Podilymbus podiceps*), great blue heron (*Ardea herodias*), and greater sage grouse (*Centrocercus urophasianus*).

Plant communities are correlated with elevation and change greatly from the valley floor, which averages over 6,500 ft (2,000 m) ASL, to the summit of Grand Teton in the Teton Range at 13,775 ft (4,199 m) ASL (Clark 1999). Wetlands provide a diverse and unique habitat in the region (USFWS 2007). In marshlands vegetation is characterized by various sedges (*Carex* spp.), rushes (*Juncus* spp.), cattails (*Typha latifolia)*, and bulrushes (*Scripus* spp.), while wet meadows feature sedges and grasses such as foxtail barley (*Hordeum jubatum*), timothy (*Phleum alpinum*), and common horsetail (*Equisetum arvense*). Willows (*Salix* spp.) are very common in these communities.

Native grasslands while in danger of replacement by invasive plants such as cheat grass (*Bromus tectorum*) and crested wheatgrass (*Agropyron cristatum*), still cover parts of the valley and provide important forage for wildlife. Common vegetation includes various bunchgrass species, green rabbitbrush (*Chrysothammus viscidiflous*), rushes, brome snakeweed (*Gutierrezia sarothrae*), yellow salsify (*Tragopogon dubius*), and fringed sage (*Artemesia frigida*). Sagebrush shrublands are distributed throughout the valley. Species within these zones include big sagebrush (*Artemesia tridentate*), bluegrasses (*Poa* spp.), snowberry (*Synphoricarpos oreophilus*), wild rose (*Rosa* spp.), needlegrass (*Stipa* spp.), and rubber rabbitbrush (*Chrysothammus nauseosus*). Riparian and Aspen woodlands follow the waterways and occupy the foothills of the valley. Species present include narrowleaf cottonwood (*Populus angustifolia*), quaking aspen (*Populus tremuloides*), willows, serviceberry (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*), bearberry honeysuckle (*Lonicera involucrata*), and Engelmann spruce (*Picea engelmannii*), as well as many of the species already presented above. Conifers forest, which grow along mountain slopes and lower prominences in the valley, include lodgepole pine (*Pinus contorta*), Douglas fir (*Pseudotsuga menziesii*), limber pine (*Pinus flexilisand*), whitebark pine (*Pinus albicaulis*), Engelmann spruce, and subalpine fir (*Abies bifolia*).

The altitudinal distribution of plants and animals has been argued as an important factor influencing precontact transhumance referred to as high country adaptation (Wright et al., 1980). As the weather warms various plant resources ripen and become available at ever increasing elevation for human subsistence. This theory builds on cross-cultural studies and that of migratory mammals that fatten on newly ripening grasses in the high country during summer descending to the valleys and plains to shelter during the winter.

CHAPTER 3

BACKGROUND RESEARCH

On 9 October 2018 Wyoming SHPO provided the results of a file search request for Section 33, Township 41 North Range 116 W. A total of 12 cultural resource projects (Table 1) and 18 recorded sites (Table 2) were present within the area subject to the file search.

Previous cultural resource projects within the file search area were related to a variety of different types of land-use or development. The impetus for previous cultural resource studies included: communications development (three instances), historic construction evaluation (three instances), road construction and/or improvement (one instance), fire management (one instance), environmental restoration (one instance), parcel related (one instance) and infrastructure improvements (two instances). Class III surveys have included linear, block and combination types.

Based on SHPO provided data, two projects may have overlapped with the project survey area. These projects included SHPO project numbers: 80-1414 and 9-123. Survey of the project area, a combination of intensive pedestrian survey and several shovel-test probes, involved the overlap of previous project survey area portions.

Eighteen sites/cultural properties have been previously recorded within the file search area, 10 of which have been listed on or determined eligible for listing on the NRHP. All 18 recorded sites are historic sites; however, two sites (42TE1217 and 48TE1804) are outside of the 0.5 mile buffer of the project area boundary (Figure 8). Historic site types included primarily motels/hotels, residences and commercial properties. Since none of the known cultural properties occurred with the project APE historic research on individual properties was not conducted. No prehistoric sites were documented in the 0.5 mile buffer of the project area based on the file search results. See Figure 6 for maps of the SHPO file search results and the project area.

General Land Office Records

This project also referenced various documents archived by the Bureau of Land Management General Land Office (BLM GLO) for the project area, including survey plat maps, land patents, historical indices, and master title plats (BLM GLO 2018). The research identified an 1893 survey plat map for T. 41 N, R. 116 N., based on a land survey conducted in October 1892 by William O. Owen (Figure 9). This plat map illustrates multiple features within the northwest quarter of Section 33, including the meanders of Flat Creek—labeled as the Little Gros Ventre River—as well as two intersecting and unnamed roads or trails. The roads do not appear in modern aerial imagery, nor are they clearly visible in historic 1945 imagery, which shows the area adjacent to Flat Creek as meadow and farmland. It is likely that changes in land use or development of permanent roads removed or subsumed these 1893 features.

Individual land patents from the historic period (pre-1950) demonstrate that Peter H. Karns claimed an area which included the current Karns Meadow in 1903 and 1908 under the Homestead Act of 1862 (Accession No. WY0270_.382 and MV-0739-292). The surrounding parcels were held by Webster Laplant (1901 and 1902), whose home is plotted in the southeast quarter of the 1893 plat map above, and Maggie L. Simpson (1901).

Generally, land records demonstrate that use of the Karns Meadow area was underway by the early 1890s, and the first formal claims on the land were made during the first decade of the twentieth century by Karns. Early residents of the region established roads and trails throughout the future Jackson townsite, whose early development largely occurred during the early 1900s.

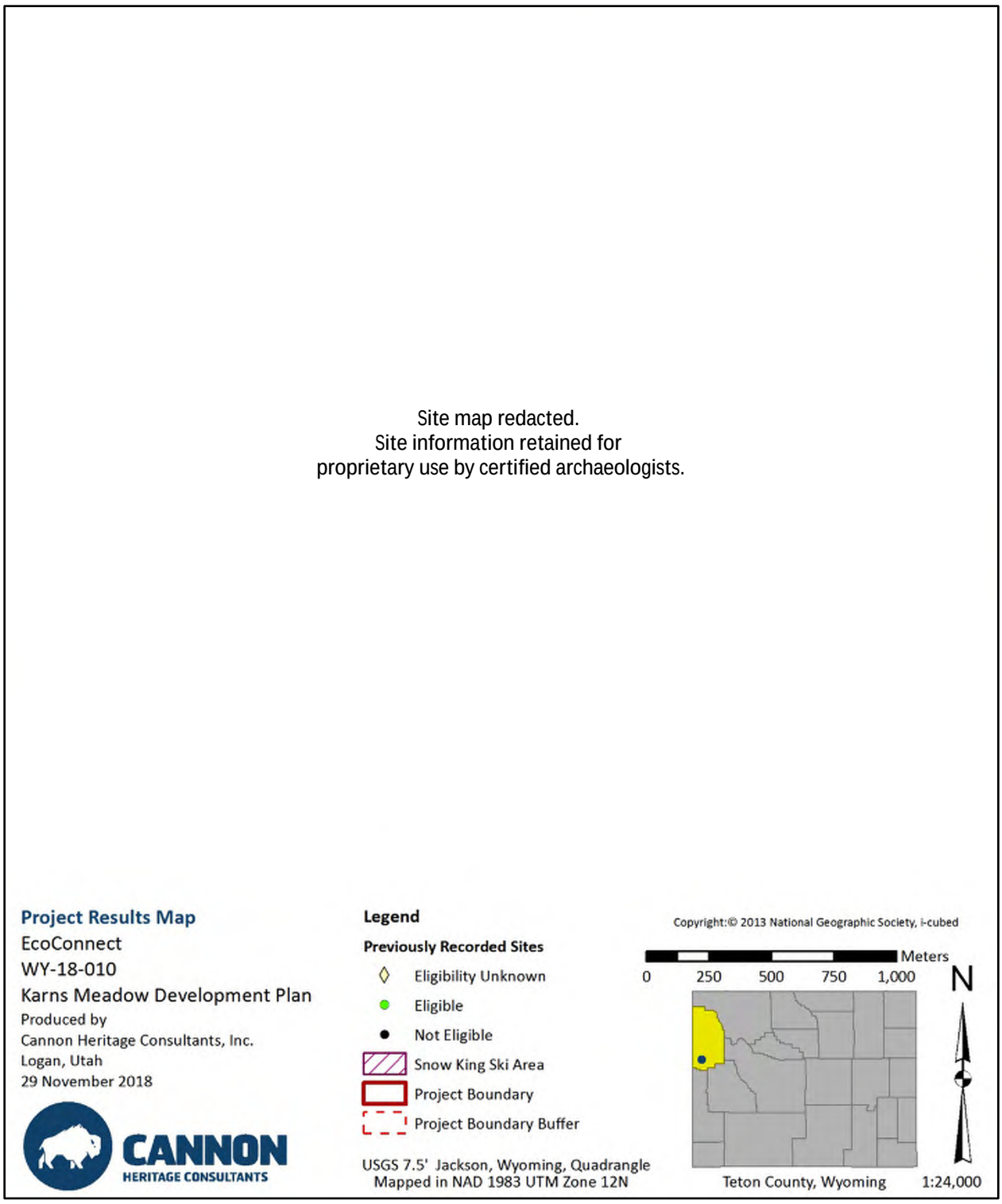

Figure 8. File search results including sites within a half-mile buffer of the project.

Table 1. Cultural resource projects that have occurred neared the project APE.

Project	Year	Project Name	Company	Project Type	Quarter Sect.	Sect	Township/Range
1-1404	2001	Irene Brown Parcel	Stephanie Crockett	Class III Intensive	ESWNWSW WSENWSW	33	T41N R116W
02-168	2002	Snow King Fire Fuel Reduction	Bridger-Teton National Forest	Class III Intensive	NSSE	33	T41N R116W
					NSS	34	
04-2038	2004	Bridges in Time: A Survey of Hist	Historical Research and Photography	Historic Overview – Evaluation	NNE	33	T41N R116W
					WSWNENE ESENWNE WNW WNENW	34	
09-123	2009	Jackson Photovoltaic Install	Stephanie Crockett	Class III Intensive	NWNENWNESW	33	T41N R116W
09-818	2009	Flat Creek Enhancement	Stephanie Crockett	Class III Intensive	SSENWNENW SESWNENWSW	33	T41N R116W
10-798	2010	Broadband Communications Yellowstone	USU Archaeological Services	Class III Intensive	WWSE	5	T40N R116W
					NSW	33	T41N R116W
13-394	2013	IDL04323 & IDL04376 Wireless Antenna	Metcalf Archaeological Consultants	Class III Intensive	NESESWNE	33	T41N R116W
13-684	2013	Teton County Hotels and Motels Evaluation	Preservation Documentation Resource	Misc.	SENENWNENE SWSWSWSWN NESENWNENE	33	T41N R116W
					CSENENWNW CNNWNENWSW NWNENENENW	34	
14-674	2014	T-Mobile Tower #SL02319A	Stephanie Crockett	Class III Intensive	SESESWNE	33	T41N R116W
80-1414	1980	Sewer Line	Office of the Wyoming State Archaeologist	Class III Intensive	WNW	5	T40N R116W
					WNE NSW SENW	33	T41N R116W

Project	Year	Project Name	Company	Project Type	Quarter Sect.	Sect	Township/Range
89-1194	1989	PREB-10-4(25) Jackson Streets	Rosenburg Historical Consultants	Other	NENENE NWNENE	33	T41N R116W
99-1976	1999	Historic Building Survey in Jackson	Historical Research and Photography	Historic Overviews – Evaluations	NENE	33	T41N R116W
					NWNW	34	

Table 2. Cultural resource sites near the project APE.

Site Number	Site Name	Eligibility Determination	Site Class	Type
48TE1217	Multiple Businesses	Not Eligible	Historic	Urban – Building
48TE1218	Multiple Businesses	Not Eligible	Historic	Urban – Building
48TE1224	Frontier Saloon	Not Eligible	Historic	Historic Building (Urban)
48TE1317	Van Vleck House	Unknown	Historic	Urban - Building
48TE1699	Jackson Hole Lodge	Eligible	Historic	Tourism - Building
48TE1703	Livingston Chevrolet	Not Eligible	Historic	Historic Building (Urban)
48TE1708	Red Rock/Cedar Lodge	Eligible	Historic	Tourism - Building
48TE1709	6-K Motel – Six Bar KM	Eligible	Historic	Tourism - Building
48TE1716	Veneta Village	Eligible	Historic	Tourism - Building
48TE1718	Western Motel	Eligible	Historic	Tourism - Building
48TE1721	John Wort Residence	Eligible	Historic	Historic Building (Urban)
48TE1758	Glenwood Property	Unknown	Historic	Historic Building (Urban)
48TE1804	Teton Historical Building	Eligible	Historic	Historic Building (Urban)
48TE1902	Rawhide Motel	Eligible	Historic	Tourism - Building
48TE1905	The Virginian Lodge	Not Eligible	Historic	Tourism - Building
48TE1910	Jackson Pines Resort	Not Eligible	Historic	Tourism - Building
48TE1944	Snow King Ski Area	Eligible	Historic	Recreation - Other
48TE2000	635 S Cache St, Jensen	Eligible	Historic	Historic Building (Urban)

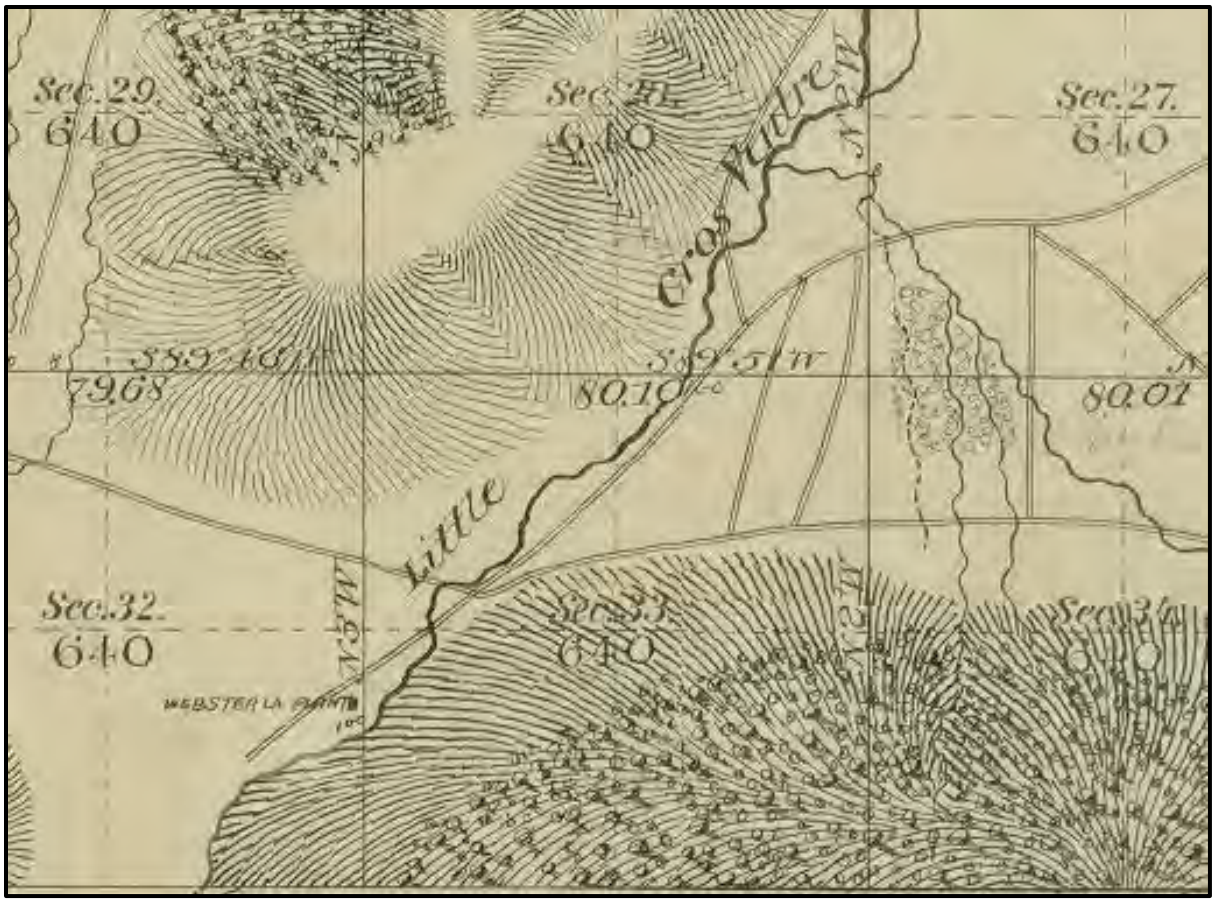

Figure 9. GLO 1893 survey plat map for T41N R116W centered on project area.

Table 3. Historic individual land patents held within Section 33, T. 41N, R. 116W (6th Meridian). Shaded row indicates patents that include the Karns Meadow area.

Accession	Names	Patent Date	Year	Aliquots	Sec. #
WY0160__.456	Simpson, Maggie L	4/9/1901	1901	NE¼NE¼	33
WY0190__.301	Laplant, Webster	10/1/1901	1901	W½SE¼ NE¼SE¼ NW¼SW¼	32 32 33
WY0280__.485	Laplant, Webster	3/17/1902	1902	SW¼NW¼ SE¼NE¼	33 32
WY0270__.382	Karns, Peter H	11/10/1903	1903	SE¼NW¼ NW¼NE¼ S½NE¼	33 33 33
MV-0739-292	Karns, Peter H	2/27/1908	1908	NE¼SW¼	33
997747	Bassett, Grover C	3/16/1927	1927	N½SE¼	33

Previous Archaeological Research

Archaeological investigations of Jackson Hole and the surrounding mountain ranges have occurred periodically over that last five decades. The first overview of Jackson Hole prehistory was provided by Love (1972) and focused on interpretation and comparison of surface assemblages known in the region. This work illustrated the ties prehistoric peoples in Jackson Hole had to other neighboring regions.

During the 1970s and 1980s, much of the research in the Jackson Hole region was conducted by the State University of New York-Albany (SUNY; Wright and Weakly 1974, Bender 1978, Marceau 1978, Wright et al. 1980, Bender 1983, Bender and Wright 1988). Based on their work, Wright and his colleagues proposed a broad-spectrum subsistence model outlining a high-country adaptation, which based the distribution of resources within the ecological zones of Jackson Hole. In this model, Bender and Wright (1988) proposed that past residents of Jackson Hole would schedule seasonal occupations of mountainous areas to obtain the diverse resources available in these zones. The mountains and the resources therein were important to prehistoric hunter-gatherer's adaptive strategies, not merely used by specialized task groups. They predicted that such a pattern of use would results in three types of archaeological site: base camps (BC), secondary base camps (SBC), and special-use sites (SUS). Base camps were long term, repeatedly occupied locations; secondary base camps were occupied less often and targeted specific resource; and special-use sites were very short-term locations, repeatedly occupied, where specific resources were procured. This model has guided much research that followed its publication (Cannon et al. 2001; Cannon et al. 2004)

The Jackson Lake Archaeological Project (Connor 1998) occurred between 1984 and 1988 during reconstruction of the Jackson Lake Dam. During that time the water level of the lake was low enough to expose multiple sites. A total of 109 sites were recorded, and many were also formally excavated (Connor 1998). These data were a substantial addition to the amassed knowledge of Teton County archaeology, and Connor constructed a cultural chronology from the results of the project. Further, Conner (1998) proposed that "use of the mountainous areas [could] be broken into: (1) task-specific use, (2) seasonal use, and (3) year-round use. The factors allowing change between and within these patterns are a complex interaction of climatic change, population dynamics, and technological innovations."

The Henn Site (Larson 1995, Rapson et al. 1995) is a multi-component site with Protohistoric/Prehistoric period and Early Archaic assemblages. Located at the Jackson Fish Hatchery, it was excavated in 1992 and 1993. The most substantial component was the Prehistoric/Protohistoric assemblage, likely a Shoshonean-processing location dating to the early 1800s. Activities at the site were centered around the construction and use of pit-roasting facilities (Rapson et al. 1995).

Kelly (1999) conducted a project to identify Early Holocene archaeological sites in Grand Teton National Park (GTNP). Few sites dating to that period were found, but several factors, including the unique depositional history of Jackson Hole and the lack of prehistoric sites of any age in high probability areas, are obstacles in interpreting this lacuna.

Between 1998 and 2000, the University of Wyoming/Grand Teton National Park Cooperative Archaeology Program (UW/GTNP) conducted a series of reconnaissance surveys within GRNP and revisited many previously recorded sites from Wright's work (Reher 2000).

Wilson-Fall Creek Road (Cannon et al 2001) investigations conducted by the Midwest Archaeological Center (MWAC), conducted data recovery investigations at three sites (the Crescent H Ranch, Fish Creek Ranch, and Burchardt sites) as part of mitigation efforts for reconstruction of Fall Creek Road. This was the first attempt to integrate models of site function and geomorphology in an attempt to demonstrate changes in land use patterns over time. Following Bender and Wright (1988), a series of predictions were made regarding the artifact composition and nature of the different site types (Cannon, et al., 2004; Table 4).

Table 4. Predictions regarding site types in Jackson Hole as defined by Bender and Wright (1988). Adapted from Cannon et al. 2001, Table IXb.

Site Type	Description	Location	Site Size	Assemblage Size	Assemblage Diversity
Base Camp	Long-term, repeat occupation; used by entire group.	Habitable and Accessible	Large	Large	High diversity of artifact types used in various maintenance and domestic activities; high incidence of discarded and worn-out tools.
Secondary Base Camp	Varied occupation; fewer members.	Adjacent to immobile resources, such as plant communities or lithic sources.	Moderate	Moderate	Moderate; large number of artifact classes and material types possible, but low to moderate evenness in their representation.
Special-Use Site	Short-term occupation; small group of users; repeated occupation, if immobile resource.	Variable: adjacent to resource if extraction site; or adjacent to migration routes or feeding areas if hunting game.	Small	Variable depending on reoccupation history.	Few artifact classes present and low evenness in their representation

While a steatite, or soapstone, quarry had been identified by Love (1971), until the early 2000s few additional examples of this site type had been identified in the Teton Range. Research and archaeological survey conducted by Adams (2003, 2004) recorded additional evidence of aboriginal use of this material, including some evidence that soapstone vessels were being manufactured prior to the introduction of stone tools.

As part of mitigation for reconstruction of Hwy 1/89/189/191 The Office of the Wyoming State Archaeologist (OWSA) conducted multi-year data recovery investigations at the Game Creek site (Page and Peterson 2015). Interdisciplinary investigations produced evidence of at least 19 cultural components ranging from Paleoindian to the Late Prehistoric period. Discovered in 2001, the site was subsequently excavated in 2001, 2002, and 2010. The multiple radiocarbon dates acquired for the site suggest it was occupied intermittently over the last 10,400 years. The site was the largest, stratified archaeological site in Jackson Hole that was excavated extensively using modern methods. It provided important data illustrating the cultural history of the region and additional evidence that cultural chronologies developed for the Northwestern Plains, Columbia Plateau, or Great Basin cannot be applied indiscriminately to the Jackson Hole region.

Stirn and Sgouros (2014; the Teton Archaeological Project, or TAP) work has concentrated on the high-altitude areas of the Tetons, including passes, basins, and ice patches. They identified evidence of consistent occupation of these high-altitude areas beginning as early as 9,500–10,000 BP. The results, although preliminary, support previous theories regarding the initial use of the Teton Range. Further, they suggest that use was similar to that in other northwestern Wyoming ranges during the Late Prehistoric period (ca. 1400–250 BP). Finally, dated organic specimens from ice patches indicate that some ice patches in the Teton Range have remained intact for at least 6,000 years, and the presence of a culturally-

modified stave-cut fragment of whitebark pine dating to the Late Archaic period illustrates the human presence in the mountains during that time (Sgouros and Stirn 2015).

The lack of sites with abundant bison bone in Jackson Hole has gained the attention of multiple researchers (Wright 1984, Meager 1973, Cannon et al. 2015) and has generated discussion regarding the past range of bison in the valley and their importance as a resource. The dearth of bison bone has been suggested to be taphonomic (Cannon and Cannon 2016).

Prehistoric Cultural Chronology

While cultural chronology from the Northwestern Plains—as well as for the foothill/mountain areas—continues to be applied to Jackson Hole and the surrounding area (Frison 1991, Kornfeld et al. 2010), it has been demonstrated that it does not reflect the specific cultural history of the area (Wright 1981, Connor 1998, Cannon 2001, Page and Peterson 2015). Connections to other regions continue to be demonstrated through raw material sourcing and projectile point typology. Both Wright (1981) and Connor (1998) have proposed chronologies for the region, and recent excavations at the Game Creek have provided additional vital data regarding prehistoric use of the region (Page and Peterson 2015). Connor's chronology was constructed using radiocarbon and obsidian hydration data, as well as seriation of projectile point styles. However, there remains a dearth of radiocarbon dates for Teton County; a total of 119 have been obtained, based on the investigations by Page and Peterson (2015) at Game Creek and records in the Wyoming SHPO online WYOCRO radiocarbon date database (WY SHPO 2018).

Early Holocene (11,700 to 8,200 BP). Few sites with terminal Pleistocene and Early Holocene-age cultural material have been recorded in Jackson Hole, and attempts to locate archaeologic sites and artifacts from this time period have been largely unsuccessful (Kelly 1999). Early Paleoindian (ca. 14,000–10,200 BP) materials, commonly incorporating the fluted point complexes, are represented by a handful of artifacts. A potential Clovis point was identified by Connor (1998), although the validity of the identification has been questioned (cf. Kelly 1999). Some Folsom points have been reported (Kelly 1999, Cannon et al. 2001).

Typical Middle Paleoindian projectile points, such Agate Basin points and members of the Cody Complex, are well represented in the Valley (Connor 1998, Page and Peterson 2015, Stirn and Sgouros 2015), as well as in the Greater Yellowstone Ecosystem (GYE) by sites such as Osprey Beach (Johnson et al. 2004). Furthermore, Foothill/Mountain tradition projectile point types, such as Birch Creek, Pryor Stemmed, Lovell Constricting, and Angostura area also common. These Early and Middle Paleoindian complexes are largely encompassed by Connor's Jackson Hole Phase I (JH I). Game Creek provided several radiocarbon dates between 10,500 and 10,200 BP and 9800 and 9500 BP associated with cultural material.

Populations appear to be increasing during the Late Paleoindian period (ca. 9000–8000 BP), which corresponds to the beginning of Connor's JH II. A broad-spectrum subsistence strategy had likely been established by this time if not earlier, as the faunal assemblage at Game Creek dating to ca. 9600 BP is quite diverse (Page and Peterson 2015). The population may have greatly decreased in the valley 8700–8500 BP based the Game Creek radiocarbon data, which also corresponds well with broader patterns in the Rocky Mountains during this time (Kelly et al. 2013).

Middle Holocene (8,200 to 4,200 BP). The Early Archaic period (ca. 8,000–4,500 BP) was represented at Game Creek and other sites in Jackson Hole and corresponded with Connor's JH III. Large side-notched projectile points began to appear in the region (e.g., Henn site [Larson 1995]), although well-dated Early Archaic components at Game Creek featured projectile points resembling Hanna-variant McKean or Elko Eared points. There was an increase in fire-cracked rock at many sites, which may suggest increased stone-boiling or use of roasting pits.

Like neighboring areas, the population seemed to decrease during parts of the mid-Holocene Climatic Optimum (ca. 9,000–5,000 BP). Based on the increase of the gravel fraction at Game Creek between 7,500 and 5,700 BP, it has been suggested that vegetation had decreased (Page and Peterson 2015). While this harsher environment may have led some prehistoric inhabitants elsewhere, it is also possible that the denudation of hill slopes and shifting of the Snake River channel created higher potential for erosion and the removal of cultural occupations. However, populations in the region appears to have begun increasing again by 5,500 BP and roasting pit features, perhaps associated with root and tuber processing, increased in frequency at places such as Jackson Lake. By the end of the middle Holocene, members of the Middle Archaic (ca. 4,500–3,000) McKean complex (i.e., McKean, Duncan, Hanna) are present in the valley. This is the beginning of Connor's JH IV.

Late Holocene (4,200 to Present). The Middle Archaic continued into the late Holocene. Along Jackson Lake, roasting pits targeting plant resources appear in large numbers. While populations elsewhere in western Wyoming appear to decline at this time, this area and the Central Rocky Mountains actually are increasing population. It has been suggested that decreased winter snow during this period provided greater hunting opportunities and served as a population draw.

The Late Archaic (3,000–1,450 BP) was characterized by an increase in site frequencies (Connor JH V). Corner-notched dart points of the Pelican Lake and Elko varieties were common, and residents of the valley appeared to use them for hunting larger game, such as bison, mule deer, and mountain sheep. Fire-cracked rock and roasting pits appear often at sites during this time, and groundstone technology was represented in much higher numbers than preceding cultural periods. At Game Creek, faunal remains had been pulverized and may indicate intensive processing to access bone marrow. Populations appeared to greatly increase towards the end of this period (Connor's JH VI), and residential structures, represented by stone circles, begin to appear on the landscape.

The beginning of the Late Prehistoric period (ca. 1,450–250 BP) is largely heralded by the appearance of the bow and arrow. Wright (1984) suggested that Jackson Hole and the Teton Range were largely uninhabited during this period. However, further work has demonstrated that use of higher elevation areas of the Tetons was widespread (Stirn and Sgouros 2015), and Game Creek has Rose Spring-style points associated with cultural levels dating between 900 and 500 BP Intermountain-style ceramics, as well as soapstone vessels, also appear in the region (Adams 2003, 2004; Stirn and Sgouros 2015), as well as Desert side- and tri-notched points, which became more common toward the end of this cultural period at the Game Creek Site (Page and Peterson 2015).

There are few sites dating to the Protohistoric period, a critical period of initial contact between native groups and Euroamericans—either through direct or indirect contact. Multiple causes have been suggested, including climate change (Mackay et al. 1982, Page and Peterson 2015), the introduction of epidemic diseases by Europeans (Trimble 1989), poor preservation, or a combination of these factors. During this period, it is known that the Eastern Shoshone had strong connections to Jackson Hole and groups would seasonally visit the valley in the spring and early summer. One example is the Henn Site, which was a Shoshonean processing location dating to the early 1800s (Larson 1995).

Euroamerican Settlement and Land Use

The first Euroamericans to enter the valley were trappers and mountain men. While it is possible that John Colter was the first to visit Jackson Hole in 1807, it is well established that representatives of the American Fur Company, or the "Astorians", traveled through the valley in 1811 and 1812 (Daugherty 1999). Jackson Hole became an important crossroads for fur trappers and played a prominent role in the fur industry. While the fur trade had largely collapsed by 1840, explorers and scientists continued to visit

the valley through the mid-to-late-nineteenth century. Prospectors, led by Walter W. DeLacy, entered the valley in 1863 searching for gold. They were largely unsuccessful.

The first permanent settlers entered Jackson Hole in 1884, when John Holland and his companions homesteaded in the area. By 1888 there were 23 residents of the valley, which rapidly grew to over 600 by 1900 with large numbers of Mormon settlers arriving from Utah and Idaho (Daugherty 1999). Homesteading accounted for much of the early settlement of the valley. Early communities arose surrounding the first rural post office. Jackson, Wilson, and Kelly were the first towns, and Jackson was established as the primary community between 1901 and 1914 with the first post office, general store, and community buildings. It became the Teton county seat in 1921.

The most prominent early industry was cattle ranching which included the introduction of cultivated grasses for forage. Irrigation development was slow, and most systems were the results of individual or group efforts and resulted in numerous small ditches crossing the landscape to serve individual farmers or small groups.

Tourism was an important aspect of Jackson Hole long before the creation of Grand Teton National Park. Wealthy visitors from the east coast or Europe were being guided to the valley in the late nineteenth century, Moran was formed in 1903 as a headquarters for an outfitting enterprise and included a hotel and general store. The creation of Yellowstone National Park in 1872 and later reliable transportation led to more people visiting Jackson Hole. Dude ranching occurred in the valley in the first decade of the twentieth century and continues to be a small part of the tourism industry today. The creation of Grand Teton National Pak has brought millions of visitors to the valley since its inception in 1929 (Daugherty 1999).

CHAPTER 4

METHODOLOGY

For the purposes of this project, CHC applied the Wyoming SHPO definition of sites and isolates (Wyoming Resource Definitions and Recording Guidelines 2012):

a. A *prehistoric site* is defined as 15 or more spatially associated artifacts within a 30-meter diameter; alternatively, a cultural feature, such as a hearth, is considered a site.
b. A *historic site* is defined as 50 or more spatially associated artifacts within a 30-meter diameter.
c. A *prehistoric isolate* is defined as 14 or fewer associated artifacts where no buried cultural materials are thought to exist.
d. A *historic isolate* is defined as 49 or fewer associated artifacts where no buried cultural materials are thought to exist.

Further, unnamed canals and ditches not designated by name on USGS topographic maps are considered non-sites excluding those that exhibit significant architectural or engineering features or associated with National Register-eligible sites (Wyoming Resource Definitions and Recording Guidelines 2012). No canals or irrigation ditches were recorded during this project.

Spatial location data were collected using either a Trimble Geo XH handheld GPS using TerraServer software. This data was differentially corrected using Pathfinder Office. Photos were taken with a Nikon D700 DSLR using an AF-S Nikkor 55-300 mm f4.5-5.6 lens. Further spatial data processing and mapping occurred in ArcGIS 10.5.1 software.

Fieldwork was conducted on 13 October 2018 with a crew consisting of Kenneth Cannon, Molly Boeka Cannon, and Stephanie Crockett. The pedestrian survey involved 15-m transects supplemented by 10 shovel tests to assess the potential for buried deposits in non-wetland areas. A reconnaissance level (30-m transects) survey was conducted in the wetland portion of the property, in the southern portion of the property, and on the western bench adjacent to the rodeo grounds. Site visibility was generally limited due to heavy meadow vegetation, except in the western portion which represented a higher and drier landform. Ten shovel tests were excavated on both sides of Flat Creek to supplement the pedestrian survey, although only one produced evidence of buried cultural material (Figure 2; Table 5). Approximately 35% of the project area was surveyed (Intensive=12 acres; Reconnaissance=2.5 acres).

The results of the survey produced two precontact lithic scatters. Site 48TE2137 is small lithic scatter (209 m^2) on the west side of the property (Figure 3). It consists of two small obsidian flakes and a quartzite hammerstone. Seven shovel tests were excavated in this portion of the site but did not produce any evidence of buried cultural deposits.

Site TE2138 is a larger (3920 m^2) lithic scatter located on the eastern side of Flat Creek (Figure 3). A single obsidian flake was identified in an emotional area near a foot path. A single obsidian flake was recovered in ST-9 at a depth of approximately 30 cmbs.

On 17 October 2018 Ken Cannon and Pete Karns met at the site. Mr. Karns was a long-time resident of the property and produced a large collection of projectile points and lithic debris he had collected from the property over the last 50 years. The projectile point collection came from both sides of Flat Creek, plus the Rodeo Grounds, and suggests a long-term occupation of the area dating back at least to Late Paleoindian times (8-9 ka). The evidence provided by Mr. Karns, coupled with relatively deep soils, provides support for the recommendation that the two precontact sites represent significant cultural resources and present the potential to have significant research potential qualifying these sites under criterion d.

Table 5. Results of shovel testing.

Shovel Test	Site Number	mE	mN	Depth	Results
ST1	48TE2137			15 cmbs cobbles	0
ST2	48TE2137			25 cmbs cobbles	0
ST3	48TE2137			18 cmbs cobbles	0
ST4	48TE2137			15 cmbs cobbles	0
ST5	48TE2137			40 cmbs	0
ST6	48TE2137			30 cmbs	0
ST7	48TE2138			25 cmbs	0
ST8	48TE2138			40 cmbs and upslope from obsidian flake	0
ST9	48TE2138			30 cmbs	1 obsidian flake at 30 cmbs
ST10	48TE2138			45 cmbs	0
All in NAD 83 UTM Zone 12 - UTMs retained for proprietary use by certified archaeologists.					

CHAPTER 5

RESULTS

Site 48TE2137

Site 48TE2137 is small lithic scatter (209 m^2) on the west side of the property (Figure 3). It consists of two small obsidian flakes and a quartzite hammerstone (Figure 10). Seven shovel tests were excavated in this portion of the site but did not produce any evidence of buried cultural deposits (Figure 11). The two obsidian flakes were recovered adjacent to an irrigation ditch and were likely brought up from the subsurface during ditch excavation.

Figure 10. Obsidian flakes and possible quartzite hammerstone recorded on surface of 48TE2137.

Soils on the site have been labeled as Tineman gravelly loam (Figure 6). These soils tend to be on mountain flanks with a parent material of gravelly glaciofluvial deposits. These soils are somewhat poorly drained and have a depth of more than 80 inches (203 cm). Vegetation on the site is a mix of introduced grasses with willows along the creek and overstory species of aspen and cottonwood (Figure 12).

Although the material assemblage is limited, but the depth of the soils and the presence of significant archaeological deposits in similar settings along Flat Creek (e.g., Game Creek site) supports the probability that this site has buried deposits. Additional evidence for buried precontact deposits is provided by the collection of material Pete Karns has collected over the past 50 and discussed below. Based upon these criteria CHC recommends site 48TE2137 is eligible for inclusion on the National Register under criterion d.

CHC further recommends that when the Karns Meadow management plan is articulated potential impacts to the site should be addressed and if adverse effects are identified a second phase of evaluative testing should occur. This evaluative phase should minimally include subsurface testing to assess the nature of the buried deposits, a more refined site boundary based upon systematic shovel testing or augering, and recommendations on further investigations if warranted.

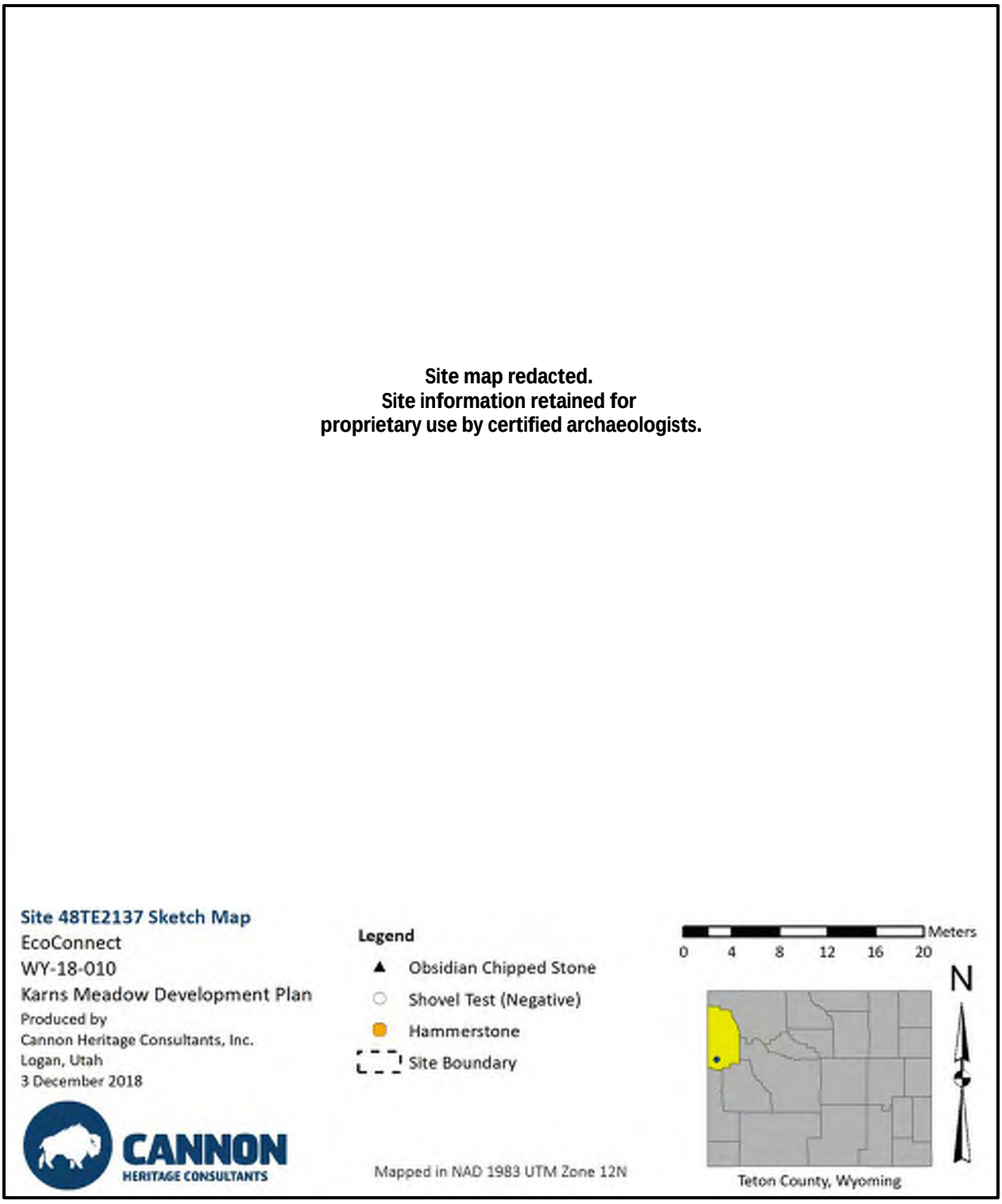

Figure 11. 48TE2137 site sketch map overlying Google Earth image.

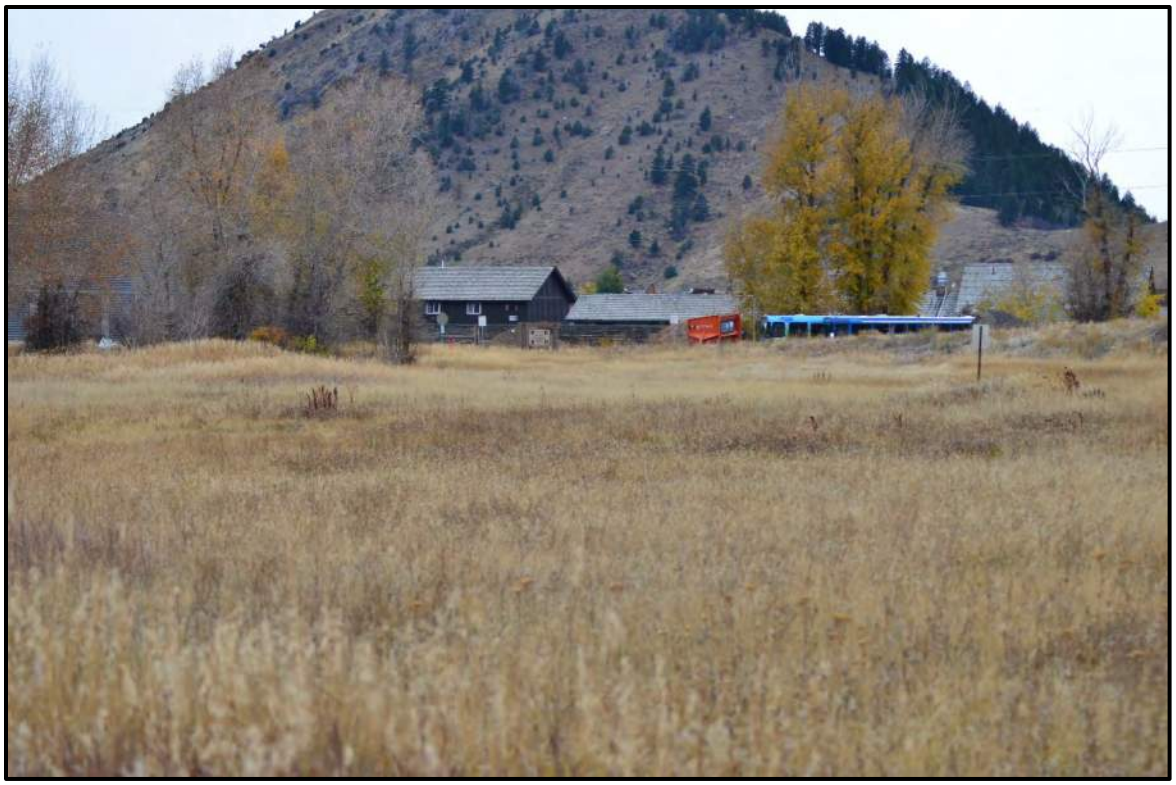

Figure 12. Overview of site 48TE2137. View is from westside of Flat Creek to the south-southeast (photo by Molly Cannon, 13 October 2018).

Site 48TE2138

Site TE2138 is a larger (3920 m^2) lithic scatter located on the eastern side of Flat Creek (Figure 13). Two obsidian flakes were identified in an erosional area near a foot path (Figure 14) and a single obsidian flake was recovered in ST-9 at a depth of approximately 30 cmbs.

Soils on the site have been labeled as Tineman gravelly loam (Figure 6). These soils tend to be on mountain flanks with a parent material of gravelly glaciofluvial deposits. These soils are somewhat poorly drained and have a depth of more than 80 inches (203 cm). Vegetation on the site is largely wet meadow grasses with willows along the creek (Figure 15).

As with 48TE2137 this material assemblage is limited, but the depth of the soils and the presence of significant archaeological deposits in similar settings along Flat Creek (e.g., Game Creek site) supports the probability that this site has buried deposits. Additional evidence for buried precontact deposits is provided by the collection of material Pete Karns has collected over the past 50 and discussed below. Based upon these criteria CHC recommends site 48TE2138 is eligible for inclusion on the National Register under criterion d.

CHC further recommends that when the Karns Meadow management plan is articulated potential impacts to the site should be addressed and if adverse effects are identified a second phase of evaluative testing should occur. This evaluative phase should minimally include subsurface testing to assess the nature of the buried deposits, a more refined site boundary based upon systematic shovel testing or augering, and recommendations on further investigations if warranted.

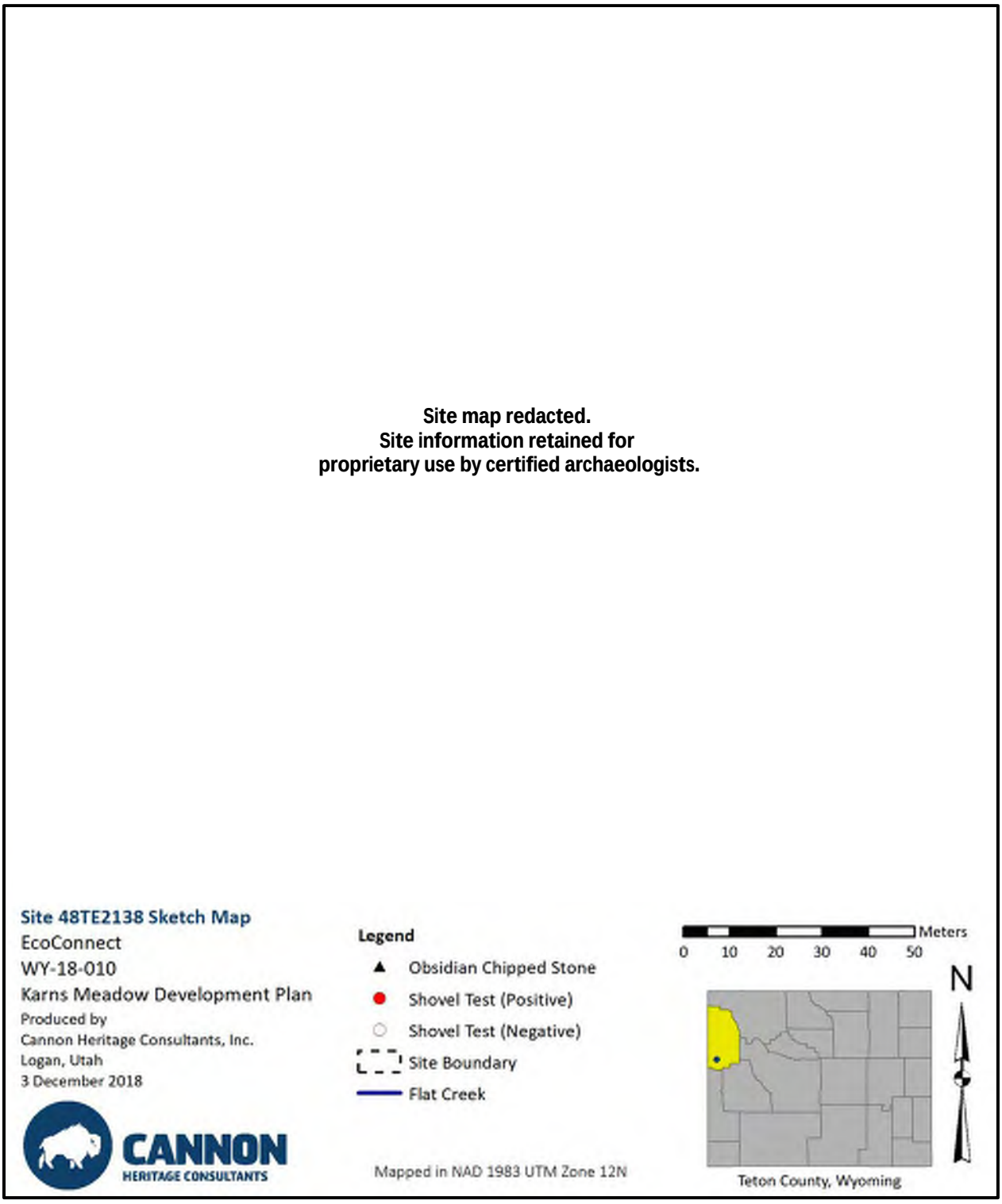

Figure 13. 48TE2138 site sketch map overlying Google Earth image.

Figure 14. Small obsidian flakes identified in northeastern portion of site 48TE2138.

Figure 15. Shovel testing in central area of site 48TE2138. Notice dense meadow vegetation. View is to northeast (photo by Molly Cannon, 13 October 2018).

Pete Karns, whose family originally homesteaded the meadow area, provided a mounted series of obsidian projectile points and other tools that he collected from the meadow over the past 50 years (Figure 16). Mr. Karns also had a large bag of debitage that he also indicated was from the meadow area. The assemblage provides a range of Holocene project point styles that may date back as early as the Late

Paleoindian period (8-9 ka) through the Middle Archaic (upper left corner-notched point). Two possible Early Archaic side-notched points (right side of image) are also present in the assemblage. Although Mr. Karns was adamant that the assemblage was from the meadow the exact location of each individual artifact was less clear with the exception of the center artifacts (east side of Flat Creek) and the base of a possible Late Paleoindian point from the Rodeo Grounds.

Figure 16. Artifacts collected from Karns Meadow by Pete Karns longtime resident of the area.

CHAPTER 6

NRHP RECOMMENDATIONS AND CONCLUSION

In December 2003 the Town of Jackson acquired the Karns Meadow Park property from the Karns Family, and along with Teton County are in the process of developing an environmental assessment in preparation for potential future development. As part of the EA the town requested a cultural resource assessment. To complete the cultural resource assessment EcoConnect Consulting LLC of Jackson, Wyoming contracted Cannon Heritage Consultants of Logan, Utah. As of the time of this report no formal management plans have been developed nor presented in a public document.

The Karns Meadow Park is situated in portions of the SE¼ NW¼, SW¼ NE¼, NW ¼ SW ¼, NW ¼ NW ¼ SE ¼ of Section 33, Township 41 North, Range 116 West, in the Town of Jackson, Teton County, Wyoming. The project APE consists of approximately 41.8 acres. Flat Creek is the defining topographic feature of the property and is an important tributary of the Snake River. Flat Creek flows through the project area at a consistent and low gradient. Historic records indicate the meandering course of Flat Creek has remained relatively stable for at least 100 years.

The project area is part of the 160-acre homestead Pete Karns filed in 1903. Up until about 1945 the property was flood-irritated as a pasture for a 31-acre dairy operation. Flood irrigation continued as the property was converted to a horse pasture. During the 1990s-2000s the pasture was leased as a holding area for rodeo horses and in 2001 flood irrigation ceased. In December of 2003 the property was acquired by the city of Jackson and some limited public recreation (e.g., parasail land site) has been allowed.

Fieldwork was conducted on 13 October 2018 with a crew consisting of Kenneth Cannon, Molly Boeka Cannon, and Stephanie Crockett. The pedestrian survey involved 15-m transects supplemented by 10 shovel tests to assess the potential for buried deposits in non-wetland areas. A reconnaissance level (30-m transects) survey was conducted in the wetland portion of the property, in the southern portion of the property, and on the western bench adjacent to the rodeo grounds. Site visibility was generally limited due to heavy meadow vegetation, except in the western portion which represented a higher and drier landform. Ten shovel tests were excavated on both sides of Flat Creek to supplement the pedestrian survey, although only one produced evidence of buried cultural material. Approximately 35% of the project area was surveyed (Intensive=12 acres; Reconnaissance=2.5 acres).

The results of the survey produced two precontact lithic scatters. Site 48TE2137 is small lithic scatter (209 m^2) on the west side of the property. It consists of two small obsidian flakes and a quartzite hammerstone. Seven shovel tests were excavated in this portion of the site but did not produce any evidence of buried cultural deposits. On the eastern bank of Flat Creek a larger lithic scatter site (48TE2138; 3920 m^2) was recorded. The site consists of a single obsidian flake on the surface and an obsidian flake recovered in ST-9 at a depth of approximately 30 cmbs.

Pete Karns provided an examination of an assemblage of projectile points and flaking debris he collected from the property over the past 50 years. The projectile points suggest occupation of the property dating back at least to Late Paleoindian times (8-9 ka). The evidence provided by Mr. Karns, coupled with relatively deep soils, provides support for the recommendation that the two precontact sites represent significant cultural resources and present the potential to have significant research potential qualifying these sites under criterion d.

Karns Meadow has likely been an important settlement area for native groups extending back several millennia. Cannon Heritage Consultants recommends that both sites are eligible for inclusion on the National Register based upon their ability to provide insight into precontact lifeways in Jackson Hole during the early and middle part of the Holocene, a time span of several millennia that is not well

understood in northwestern Wyoming (Cannon 2001; Page and Peterson 2015). The ecotonal setting of Karns Meadow within a riparian zone and adjacent to sagebrush uplands potentially provided relatively easy access to a range of biotic communities and the associated resources (Clark 1999). The Flat Creek valley was probably also an important travel corridor for precontact group conveyance in Jackson Hole.

Once the management plan for the Karns Meadow is articulated and potential impacts to the sites is addressed it may be necessary to conduct a second phase of site assessment. This phase of investigation should minimally include evaluative testing to provide a better understanding of the sites' boundaries and the presence and nature of the buried components. This work may involve minimally invasive techniques which include geophysical prospecting supplemented by systematic auger probing or shovel testing (Cannon et al. 2016).

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APPENDIX A
SITE FORMS

Site Forms not available for public viewing.
Retained for proprietary use by certified archaeologists.