

**WETLAND CONSERVATION STRATEGY
FOR THE HIGH VALLEYS OF THE SALMON RIVER, IDAHO**

Prepared by

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TABLE OF CONTENTS

SUMMARY	1
ACKNOWLEDGMENTS	2
INTRODUCTION	3
SURVEY AREA.....	4
METHODS	5
FIELD METHODS.....	5
Reference Areas and Sample Sites	5
Field Data Collection	5
OFFICE METHODS	6
National Wetlands Inventory	6
Wetland Plant Associations	7
Site and Community Databases	7
Site Ranking.....	8
RESULTS	10
WETLAND ACREAGE AND TYPES	10
WETLAND OWNERSHIP AND PROTECTION STATUS.....	11
WETLAND CONDITION.....	11
Wetland Losses	15
Functional Shifts	15
WETLAND DIVERSITY.....	17
Wetland Plant Associations	17
RARE FLORA.....	21
RARE ANIMALS.....	22
CONSERVATION PRIORITIES FOR WETLANDS	24
Class I Sites.....	24
Class II Sites	28
Reference Sites.....	29
Habitat Sites	30
Other Sites and Priorities for Conservation	30
How This Information Can be Used	31
How To Request Additional Information	31

LITERATURE CITED	32
APPENDIX A	35
IDAHO CONSERVATION DATA CENTER SITE AND COMMUNITY REPORTING FORMS	35
APPENDIX B	42
GUIDELINES FOR ASSIGNING ELEMENT (SPECIES AND PLANT ASSOCIATION) RANKS	42
APPENDIX C	44
SITE SUMMARIES FOR WETLANDS IN THE HIGH VALLEYS OF THE SALMON RIVER.....	44
BANNER CREEK FEN	45
BULL MOOSE FEN.....	47
CHILCOOT PEAK.....	49
DITCH CREEK MEADOWS.....	51
MAYS CREEK FEN	53
MUD LAKE, VALLEY COUNTY	55
POKER MEADOWS.....	56
TULE LAKE.....	60
WARDENHOFF MEADOWS	61
WARM LAKE	63
AYERS MEADOW	65
BEAR VALLEY CREEK HEADWATERS	68
BEAR VALLEY-ELK CREEK FLOODPLAIN.....	71
BEAVER CREEK FEN	76
BLIND SUMMIT FEN.....	80
CACHE CREEK LAKES	82
CORDUROY MEADOWS	84
CROOKED CREEK EASEMENT.....	88
CUB CREEK PEATLAND	89
ELK MEADOW	92
GOAT CREEK	97
HUCKLEBERRY CREEK FEN	98

MYSTERY LAKE.....	100
POLE CREEK MEADOWS.....	101
REDFISH LAKE MORAINE	106
SHELL ROCK - RAINBOW LAKES.....	108
SOLDIER LAKES.....	110
BRUCE MEADOWS.....	112
CAPE HORN MEADOWS-DRY CREEK	115
TYNDALL MEADOWS	117
APPENDIX D.....	122
ACRES OF WETLAND AND DEEPWATER HABITAT FOR DIGITIZED MAPS BY HYDROLOGIC UNIT.....	122
APPENDIX E	126
KEY TO WETLAND AND RIPARIAN PLANT ASSOCIATIONS IN THE HIGH VALLEYS OF THE SALMON RIVER.....	126
APPENDIX F.....	142
CHARACTERIZATION ABSTRACTS FOR HIGH RANKING PLANT ASSOCIATIONS IN THE SURVEY AREA.....	142
APPENDIX G.....	199
TAXONOMY, RANGE, STATUS, AND MANAGEMENT OF RARE WETLAND AND RIPARIAN PLANT SPECIES IN THE HIGH VALLEYS OF THE SALMON RIVER	199
APPENDIX H.....	232
ANIMAL SPECIES OF SPECIAL CONCERN IN THE HIGH VALLEYS OF THE SALMON RIVER.....	232

LIST OF TABLES

Table 1.	Definition of wetland and deepwater habitat systems (Cowardin <i>et al.</i> 1979).....	6
Table 2.	Definitions and indicators of criteria for allocating wetland sites into management categories.....	9
Table 3.	Acres of wetland and deepwater habitat and management status.....	15
Table 4.	Wetland and riparian plant associations in the high valleys of the Salmon River arranged by Cowardin system, class, and subclass.....	18
Table 5.	Plant species of special concern in the survey area, conservation rank, and Idaho Native Plant Society (INPS) category.	22
Table 6.	Wetland associated animal species of special concern in the survey area.....	23
Table 7.	Wetland sites in the high valleys of the Salmon River.	25
Table 8.	Accessing wetlands-related data housed at Idaho Department of Fish and Game.	32

LIST OF FIGURES

Figure 1.	Location of wetland and deepwater habitat for digitized maps in the survey area by system.	12
Figure 2.	Acerage of wetland and deepwater habitat in Hydrologic Unit 17060201 (Upper Salmon River).	13
Figure 3.	Acerage of wetland and deepwater habitat in Hydrologic Unit 17060205 (Upper Middle Fork Salmon River).....	13
Figure 4.	Acerage of wetland and deepwater habitat in Hydrologic Unit 17060208 (South Fork Salmon River).....	14
Figure 5.	Landownership of wetlands in the project area.	14
Figure 6.	Location of wetland sites in the high valleys of the Salmon River.	27

SUMMARY

The Idaho Conservation Data Center has received wetland protection grant funding from the Environmental Protection Agency under the authority of Section 104 (b)(3) of the Clean Water Act to enhance existing wetland information systems. The goal is to identify the following:

- 1) Where are the wetlands?
- 2) What is the condition and management status of wetlands?
- 3) What kind of wetlands are they?

This information can then be applied to state biodiversity, conservation, and water quality enhancement projects on a watershed basis. This builds on previous inventories in the state to create a consistent source of wetland information. Previous project areas included the Henrys Fork Basin, Big Wood River Basin, southeastern Idaho watersheds, the Idaho Panhandle, east-central basins, and Spokane River Basin, the middle and western Snake River and lower reaches of its major tributaries, the upper Snake River including the Portneuf drainage, and the west-central mountain valleys of Idaho. This document summarizes our findings in the high valleys of the Salmon River. The survey area includes the upper Salmon River and its tributaries in the Sawtooth Valley, tributaries of the upper Middle Fork Salmon River and tributaries in the upper South Fork of the Salmon River.

We used the United States Fish and Wildlife Service National Wetlands Inventory (NWI) to gain a broad perspective on the extent and types of wetlands in the survey area. Landownership and management layers were overlaid on the NWI to determine ownership and the protected status of wetlands. Plant associations occurring in the survey area were placed into the hierarchical NWI classification and provide information relative to on-the-ground resource management.

Assessment of the quality and condition of plant associations and the occurrence of rare plant and animal species allowed us to categorize 30 wetland sites based on conservation intent. Twenty-seven wetlands occur in a relatively natural condition and full protection is the priority. The biological significance of the surveyed wetland sites, abstracts for rare plant communities, and summaries of animal species are provided to guide management activities. Land managers can apply the process presented here to categorize wetlands that were not surveyed.

We identify conservation strategies for sites surveyed and for plant communities that are unprotected or under-protected. Approximately 40 percent of the wetland and deepwater habitat is within areas with special management such as Research Natural Areas, designated wilderness areas, and conservation easements. Palustrine wetlands, which include emergent, forested, scrub-shrub and aquatic bed wetlands, represent 92 percent of the wetlands with special management status. As is the case in much of the United States, most of the wetlands have been impacted by previous land uses. Maintaining existing wetland functions should be a high priority throughout the survey area. An emphasis may be placed on those areas that continue to support native vegetation, unaltered hydrology, or critical wildlife habitat.

Only portions of the information from the NWI maps and data base records are summarized in this conservation strategy. All information contained in the databases is available for public use except a limited amount of threatened and endangered species information considered sensitive by the U.S. Fish and Wildlife Service. Contacts for accessing digital and analog data are included at the end of this manuscript.

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INTRODUCTION

The broad definition of wetlands describes land areas where water regimes determine the soil characteristics and distribution of plant and animal species. This definition includes not only jurisdictional wetlands, supporting wetland hydrology, hydric soils, and hydrophytic vegetation (Environmental Laboratory 1987) but a broader range of ecologically significant areas such as riparian corridors and vernal pools (World Wildlife Fund 1992, Cowardin *et al.* 1979). In spite of the significance of wetlands, these highly productive land areas have often been overlooked with studies focusing on aquatic or terrestrial ecosystems.

Upon European settlement, wetlands were regarded as areas with little economic value. Human settlements typically began and grew out from river channels and government programs were enacted which encouraged the development of wetlands. In Idaho, an estimated 386,000 acres of wetland habitat (56 percent) were lost from 1780 to 1980 (Dahl 1990). Many remaining wetlands have been degraded by actions such as hydrologic alteration and impacts to vegetation and soils, reducing wetland functions.

In the past two decades it has become widely recognized that functions provided by wetlands including water quality protection, storm water control, ground water protection, and fish and wildlife habitat provide value greatly disproportionate to the small land area that they occupy. As an example, the global ecosystem services provided by wetlands are estimated to total \$4.9 trillion a year (Constanza *et al.* 1997). This awareness has resulted in regulations, incentive programs, research, and protection of wetland habitat. Wetlands status and trends results may reflect the success of these programs as the rate of wetland loss has decreased dramatically (by 80 percent) in the most recent reporting period (Dahl 2000).

To set priorities for wetland conservation, information on the extent, type, and quality of wetlands is necessary to ensure that protection efforts capture the full range of wetland diversity. The United States Fish and Wildlife Service National Wetlands Inventory (NWI) provides a broad-scale view of the types and extent of wetlands. Plant associations nest into the hierarchical NWI classification at the dominance level and provide fine-scale information relative to on-the-ground management. The biological significance of specific wetland sites, as well as quality, may be assessed using plant association information and rare plant and animal occurrence data.

The purpose of this conservation strategy is to enhance our ability to identify and classify wetlands in order to set priorities for conservation. It is our goal to make wetlands related information available to agencies and organizations involved in planning activities and the protection of wetlands and watersheds. The broad-scale data may be used to set basin-wide or county-wide goals for wetlands protection. Fine-scale information on specific wetland sites can be used to identify proposed conservation sites, sites with opportunities for restoration, and to comment on potential projects or permit activities.

The framework presented here, describing wetlands based on plant associations, can be applied by land managers to sites that were not surveyed as part of this project. Evaluation of NWI data can be used to assess wetland size and diversity of vegetation classes. An onsite visit is recommended to assess condition and to identify the diversity of plant associations within the

vegetation classes. Rare plant and animal data can be requested from the Idaho Conservation Data Center (IDCDC) and the site significance may be assessed. Description, management, and status of rare plant associations and animal species summaries are included to guide management activities. Additional data including Geographic Information System (GIS) data layers, containing NWI maps and species distributions, and analog database records are available at the IDCDC. The methods for accessing this information are included at the end of this document (Table 8).

SURVEY AREA

The survey area includes watershed groupings that are collectively referred to as the high valleys of the Salmon River. The survey area includes portions of Blaine, Custer, Lemhi and Valley counties. For purposes of sampling and discussion, the main survey area was divided into reaches and/or drainages based primarily on 4th level U.S.G.S. hydrologic units as follows:

- ◆ Upper Salmon River (includes Hydrologic Unit 17060201)
- ◆ Upper Middle Fork Salmon River (includes Hydrologic Unit 17060205)
- ◆ South Fork Salmon River (including Johnson Creek in Hydrologic Unit 17060208)

The high valleys of the Salmon River are mostly within the Idaho Batholith (M332A) Section of the Middle Rocky Mountain Steppe. The Idaho Batholith is a heavily glaciated region with large U-shaped valleys with wide bottoms such as the Sawtooth Valley. Alpine ridges and cirques are common. The batholith is mostly comprised of highly weathered granites with localized areas of sediments and basalts (McNab and Avers 1994). As in other mountainous areas of the Idaho Batholith, headwater streams often originate in cirque basins then flow as high gradient, steep channels in narrow valley bottoms.

The headwaters of the Salmon River are located in the mountains south of Stanley. From its headwaters the river flows northward for about 30 miles through a broad glacial valley bordered by the Sawtooth Mountains and the Whitecloud Peaks before turning eastward near Stanley.

Bear Valley Creek and Marsh Creek, whose confluence forms the Middle Fork Salmon River, lie north of Stanley. The Middle Fork Salmon River flows generally northward toward the Main Salmon for over 100 miles.

From its headwaters in the Salmon River Mountains, Johnson Creek flows northward into the East Fork of the South Fork Salmon River near Yellow Pine. Upper Johnson Creek meanders through a wide valley bottom containing a few large meadows bordered by forested hills before entering a generally deep and sometimes narrow canyon for the remainder of its length.

There are no major impoundments on rivers or streams in the survey area. Most are free flowing, however flow regimes of some streams have been impacted by irrigation diversions. Streamflow information is available for the upper Salmon River portion of the survey area from a gage located on the Salmon River below the Yankee Fork near Clayton. Data from this gage are available from 1922 through 2001 and indicate mean annual discharge between 458 cfs and

1,593 cfs. Streamflow information for the Upper Middle Fork Salmon River portion of the survey area comes from a gage located near Middle Fork Lodge on the Middle Fork and provides data from 1974 to 2001. Mean annual discharge ranges from 567 cfs to 2,665 cfs at this gage. A gage located on Johnson Creek near Yellow Pine provides data from 1929 to 2001 and indicates mean annual discharge from 131 cfs to 607 cfs.

The area has a Pacific maritime climate, characterized by mild, moist winters with heavy snowfall in the mountains. During the summer months, continental climatic conditions prevail with low cloud cover and frequent thunderstorms. Temperatures and precipitation are mostly consistent across the survey area with slight variations due to elevation. Stanley, at 1,911m in elevation (6,270 feet), has average daily high temperatures near 25.7°C (78.3°F) in July and average daily low temperature of -18.4°C (-1.2°F) in January. Stanley receives an average of 38.5cm (15.17inches) of precipitation annually (Abramovich *et al.* 1998).

METHODS

FIELD METHODS

Reference Areas and Sample Sites

A list of potential survey sites was generated by reviewing lists in the Idaho Wetland Information System (Pfieffer and Toweill 1992) and querying the Biotics data system for known sites and managed areas (Conservation Data Center 2001). “Hot spots” supporting high concentrations of species of concern were also identified. In addition, wetland complexes were identified by inspecting USGS topographic quadrangle maps and NWI maps. This list was distributed to interested individuals within federal, state, and private land management agencies. Input was sought on the condition and biological significance of listed sites as well as suggestions for additional sites that were overlooked or of local concern. Land ownership information was also acquired. The goal was to focus sampling on wetlands supporting relatively natural stands of vegetation. Sites were surveyed during the summers of 2001, 2002 and 2003 following Heritage Network Methodology to assess site condition, catalog plant associations, and document rare plant and animal occurrences (Bougeron *et al.* 1992).

Field Data Collection

During the field inventory, information was collected using a standard set of IDCDC forms (Appendix A) for both the site and the individual plant associations:

Site Information - Site Survey Forms were used for documenting information on site location, occurrences of plant associations and rare species, general site description, key environmental factors, biodiversity significance, and management needs. The Site Survey Form in Appendix A provides more details.

Plant Associations - Sites were surveyed from vantage points and/or on foot to identify major vegetation types. For each major vegetation type or plant association in the site, one of two forms was used to document its occurrence. Most associations were sampled using a 10 X

10 meter plot to document the composition, structure, and environmental condition. Occasionally plot dimensions were varied for linear stands (20 x 5 meters) or a smaller plot was used for smaller stands of vegetation. The plots were placed in homogeneous stands of vegetation that best represented the vegetation mosaic within the site. Standard ecological sampling techniques developed by Natural Heritage and Conservation Data Centers in the western U.S. were used (Bourgeron *et al.* 1992). Forms used for these plots correspond to Form II (Community Survey Form) and Form III (Ocular Plant Species Data) in Appendix A. An abbreviated form, called the Idaho Community Observation Form (Appendix A), was typically used to document types encountered where the composition and structure is well known in Idaho or when time was limited.

Species of Special Concern - Information on known locations of species of special concern was taken into the field. If known occurrences or new occurrences were found, a plant observation form was completed.

OFFICE METHODS

National Wetlands Inventory

The United States Fish and Wildlife Service (USFWS) has conducted inventories of the extent and types of our nation's wetlands and deepwater habitats. The National Wetland Inventory (NWI) maps wetlands at a scale of 1:24,000 as lines, points, and polygons. The maps use a hierarchical classification scheme for map units. Systems and subsystems are at the most general level of the hierarchy and progress to class and subclass with optional modifiers. Systems and subsystems reflect hydrologic conditions. Classes describe the dominant life form or substrate. Modifiers are used to describe water regime, water chemistry, soils, and human or natural activities such as impoundments or beaver use (Cowardin *et al.* 1979). The five major systems characterizing wetland and deepwater habitats are summarized in Table 1. Palustrine systems describe wetland habitats only, the remaining systems include both deepwater and wetland habitat. As an example, the Lacustrine system includes limnetic (deepwater) and littoral (wetland) subsystems. Lacustrine limnetic subsystems include deepwater habitat at a depth of over 2 meters below the annual low water mark. Lacustrine littoral subsystems are all wetland habitats within the Lacustrine system that extend from the shore to a depth of 2 meters below low water. Available NWI data was digitized and entered into a Geographic Information System for river corridors in the survey area.

Table 1. Definition of wetland and deepwater habitat systems (Cowardin *et al.* 1979).

System	Definition
Marine	Open ocean and its associated high-energy coastline.
Estuarine	Deepwater tidal habitats and adjacent tidal wetlands, generally enclosed by land with periodic access to the open ocean.
Lacustrine	Lakes and ponds exceeding 2 meters in depth.
Riverine	Wetland and deepwater habitats contained within a channel.
Palustrine	All nontidal wetlands dominated by trees, shrubs, persistent emergents, and emergent mosses and lichens.

Wetland Plant Associations

The USFWS wetland classification system provides uniform terminology for defining the resource and has a variety of applications at higher levels for administrative, research, educational, and scientific purposes (Cowardin *et al.* 1979). The classification broadly organizes ecological units based on homogeneous natural attributes. The units, however, often include many dissimilar vegetation types with wide-ranging biological significance and unique management implications. The plant association is a vegetation unit that nests into the USFWS classification at the dominance level of the classification hierarchy. Plant associations are used to guide management, as a coarse filter for preservation of biodiversity, and to assess biological significance (Hansen *et al.* 1995, Kovalchik 1993, Padgett *et al.* 1989, Youngblood *et al.* 1985, Reid *et al.* 2000).

The plant association represents repeating assemblages of plant species that occur in response to complex environmental factors. It can be used as an indicator of difficult to measure or poorly understood environmental or site attributes such as hydrologic functions. This information can be used to make predictions about the effects of management decisions and expected trends on similar units of land. Additionally, plant association descriptions, stand tables, and on-the-ground reference sites provide a baseline for replicating vegetation types in restoration efforts.

Our nation's biological resources are so great that management and protection of individual species is often impractical or ineffective. Community level conservation promotes protection of a more thorough range of biotic elements including rare, little known, or cryptic species whose priority for conservation has not been documented. The plant community or plant association is considered a coarse filter where species and biotic processes are represented. Species falling through the coarse or community filter are often the most rare species where fine filter protection of viable occurrences is still necessary (Grossman *et al.* 1994).

Plant associations are ranked similarly to the system developed by The Nature Conservancy to rank plant and animal species. The ranking system is intended to allow managers to identify elements at risk and determine management and conservation priorities. Ranks are based primarily on the total number of occurrences and area occupied by the community range-wide. Secondly, trends in condition, threats, and fragility contribute to ranks when the information is known. The ranks are on a scale from G1 to G5 with a G1 indicating that the community is critically imperiled range-wide and a G5 indicating no risk of extinction. Guidelines used to assign community ranks are included in Appendix B.

Review of existing classifications, gray literature, and previous survey work by the IDCDC were used to develop a preliminary list of wetland plant associations in Idaho. Information from surveys was used to generate a list of plant associations occurring specifically in the survey area.

Site and Community Databases

Field data were entered into the Biotics data management system at the IDCDC. The three modules of Biotics described below were the primary ones used for managing and reporting site and community information.

Site Basic Report (SBR) - This module is used to manage information about important biodiversity conservation sites in the state. The Site Survey Form, mentioned above, was developed to mirror the SBR. Numerous fields are contained in an SBR and are included under such headings as Location, Site Description, Site Design (including boundary description), Site Significance (ratings for biodiversity significance, protection urgency, management urgency, etc.), Protection, Stewardship, and References. Also, all community and rare species occurrences are automatically populated in the record via a relational feature from the Element Occurrence module (see below). In addition to the computer record, the site boundaries are mapped and digitized and a manual (hard copy) file is maintained for each site. These records are available on request from the IDCDC.

Element Occurrence Record (EOR) - This is the same module used to report rare species occurrences. Both species and communities or plant associations are “elements” of biodiversity, hence the generic name Element Occurrence Record. Information for each occurrence, in this case a plant association occurrence, is kept on map, computer, and manual files. Element occurrence records were also completed or updated for observations of plant species of special concern. The computer file contains numerous fields under such headings as Location, Status (quality, dates of observation, etc.), Description, Protection, Ownership, and Documentation (sources of information about an occurrence). As mentioned above, this module is linked to the SBR.

Community Characterization Abstract (CCA) - CCAs provide a short, concise account of the nomenclature, classification, environmental and functional relationships, vegetation structure and composition, and conservation status for a particular natural community or plant association. This information is compiled from all available published and unpublished sources, as well as the personal knowledge and field data collected by IDCDC biologists. Coupled with the statewide wetland and riparian community classifications and the occurrence databases maintained by the IDCDC, CCAs are a valuable resource for developing conceptual and quantitative ecological models for individual plant associations or suites of associations on a floodplain. Our long-term goal is to populate the CCA database for all wetland and riparian plant associations in Idaho and produce a comprehensive reference manual for biologists and managers. In the near term, CCAs are being developed for regions of the state and “mini-guides” generated for specific watersheds or project areas.

Site Ranking

The surveys and information on rare species distributions from Biotics provided a method to allocate sites into management categories (Table 2). The categories differentiate wetlands based on the four factors: richness, rarity, condition, and viability. Sites were given a score of 0 (lowest) to 3 (highest) for each of the factors. The scores were summarized and arranged from highest to lowest. The sites were then divided into four management categories described in the next section. The purpose is to identify wetlands that are irreplaceable or sensitive to disturbance (Washington State Department of Ecology 1991, Bursik and Moseley 1995, Grossman *et al.* 1994).

Table 2. Definitions and indicators of criteria for allocating wetland sites into management categories.

Criteria	Definition	Indicators
Richness	Habitat diversity within the site.	Assemblage of numerous plant associations within a single unit of Cowardin's classification. Assemblage of plant associations or ecological features (beaver ponds, peatlands, lakes...) within several units of Cowardin's classification (=high structural diversity).
Rarity	Presence of state rare plant association, plant, or animal species.	High concentrations of state rare plant or animal species. High quality occurrences of state rare plant associations.
Condition	Extent to which site has been altered from natural conditions.	Irrigation withdrawal, grazing, or logging having minimal impacts on wetland processes. Exotic species sparse or absent. Native species contributing the majority of cover and reproducing.
Viability	Likelihood of continued existence of biota within the site.	Large size. Offsite impacts (including upstream hydrologic alteration, weed infestations, and incompatible land use) minimal.

Additional wetlands are present in the survey area that have not been surveyed for rare plants, rare animals, or plant associations. The information presented in Table 2 can be summarized for unsurveyed or data poor wetlands by consulting NWI maps, requesting plant and animal occurrence data from IDCDC, and on-site evaluation of impacts. In data poor wetlands, development of a plant species list with relative abundance (common, infrequent, rare) and rare plant surveys by a qualified botanist may be necessary to determine the condition and biodiversity significance of the site. Site summaries for surveyed wetlands are included in Appendix C.

Class I Sites

Class I sites represent examples of plant associations in near pristine condition and often provide habitat for high concentrations of state rare plant or animal species. The high quality condition of the plant association is an indicator of intact site features such as hydrology and water quality. Impacts to Class I sites should be avoided as these sites are not mitigatable and alteration (and in some cases enhancement) of these sites will result in significant degradation.

Conservation efforts should focus on full protection including maintenance of hydrologic regimes. Class I federal lands should be designated as Research Natural Area (RNA), Special Interest Area (SIA), Area of Critical Environmental Concern (ACEC), or Wildlife Refuge.

Private lands should be acquired by a conservation organization, or be secured by the establishment of conservation easements to protect biological features.

Class II Sites

Class II wetlands are differentiated from Class I sites based on condition or biological significance. Class II sites may provide habitat for state rare plant or animal species. However, human influences are apparent (i.e., portions of a wetland include remnants that are in excellent condition, however drier, accessible sites may be impacted). Good to excellent assemblages of common plant associations or the occurrence of rare plant associations qualifies a site as Class II. Wetlands with unique biological, geological, or other features may be included here. Impacts and modification to remnants within Class II sites should be avoided. Where impacts such as grazing are present, they should be managed intensively or removed. Class II federal lands should be designated as RNA, ACEC, or SIA. Private lands should be acquired by conservation organizations or have voluntary or legal protection.

Reference Sites

Reference sites represent high quality assemblages of common plant associations in the survey area or areas where changes in management practices can be documented. The use of a reference area as a model for restoration or enhancement projects is the best way to replicate wetland functions and the distribution and composition of native plant associations. Reference areas may also serve as donor sites for plant material. Application of Best Management Practices by the current landowner or manager or fee title acquisition to ensure the continued existence of wetland functions should be the priority for reference sites.

Habitat Sites

Habitat sites have moderate to outstanding wildlife values, such as food chain support or maintenance of water quality, and may have high potential for designation as or expansion of existing wildlife refuges or managed areas. Human influences are often present and management may be necessary to maintain wetland functions. For the sites listed here, livestock and human access management may be the only actions necessary. Public and federal lands should be managed to maintain and improve wildlife values. Voluntary protection and incentives for private landowners to apply Best Management Practices may be used on private lands.

RESULTS

WETLAND ACREAGE AND TYPES

Available National Wetland Inventory (NWI) maps were summarized for the upper South Fork Salmon, upper Middle Fork Salmon and upper Salmon River basins (Figure 1). Not all maps are available for the survey area. Total wetland acreage was summarized by Hydrologic Unit from available digitized NWI quadrangle maps. Acreage of major wetlands based on area occupied by NWI polygons in the upper Salmon River drainage (Figure 2) are Lacustrine (15%), Emergent (58%), Forested (13%), Scrub-Shrub (10%) and Riverine (2%). Major wetlands in the

upper Middle Fork Salmon River drainage (Figure 3) are Lacustrine (10%), Emergent (67%), Forested (18%), Scrub-Shrub (2%) and Riverine (3%). Wetlands in the South Fork Salmon River drainage (Figure 4) are Lacustrine (15%), Emergent (31%), Forested (40%) and Scrub-Shrub (12%). Appendix D summarizes the acres and frequency of occurrence of wetland deepwater habitat by subclass for the survey area.

WETLAND OWNERSHIP AND PROTECTION STATUS

The ownership and level of protection for wetlands in the survey area was determined by overlaying a management layer on the NWI. The management layer included land areas administered to maintain natural resource values such as Research Natural Areas, designated wilderness areas, and conservation easements. Four percent of the wetlands on digitized quadrangle maps along the upper Salmon, upper Middle Fork Salmon and South Fork Salmon Rivers are in private ownership (Figure 5).

Approximately 14,739 acres of wetland and deepwater habitat are currently within special management areas in the survey area. The acres by class of wetland and deepwater habitats within special management areas are summarized in Table 3.

WETLAND CONDITION

The World Wildlife Fund (1992) developed a general framework for assessing wetland losses and gains that can be used to address the condition of and threats to wetlands. Wetland functions are the basis for the framework. Wetland losses occur when functions are eliminated and an area no longer meets the definition of a wetland. Wetlands may also undergo functional shifts including impairments, type changes, or enhancements.

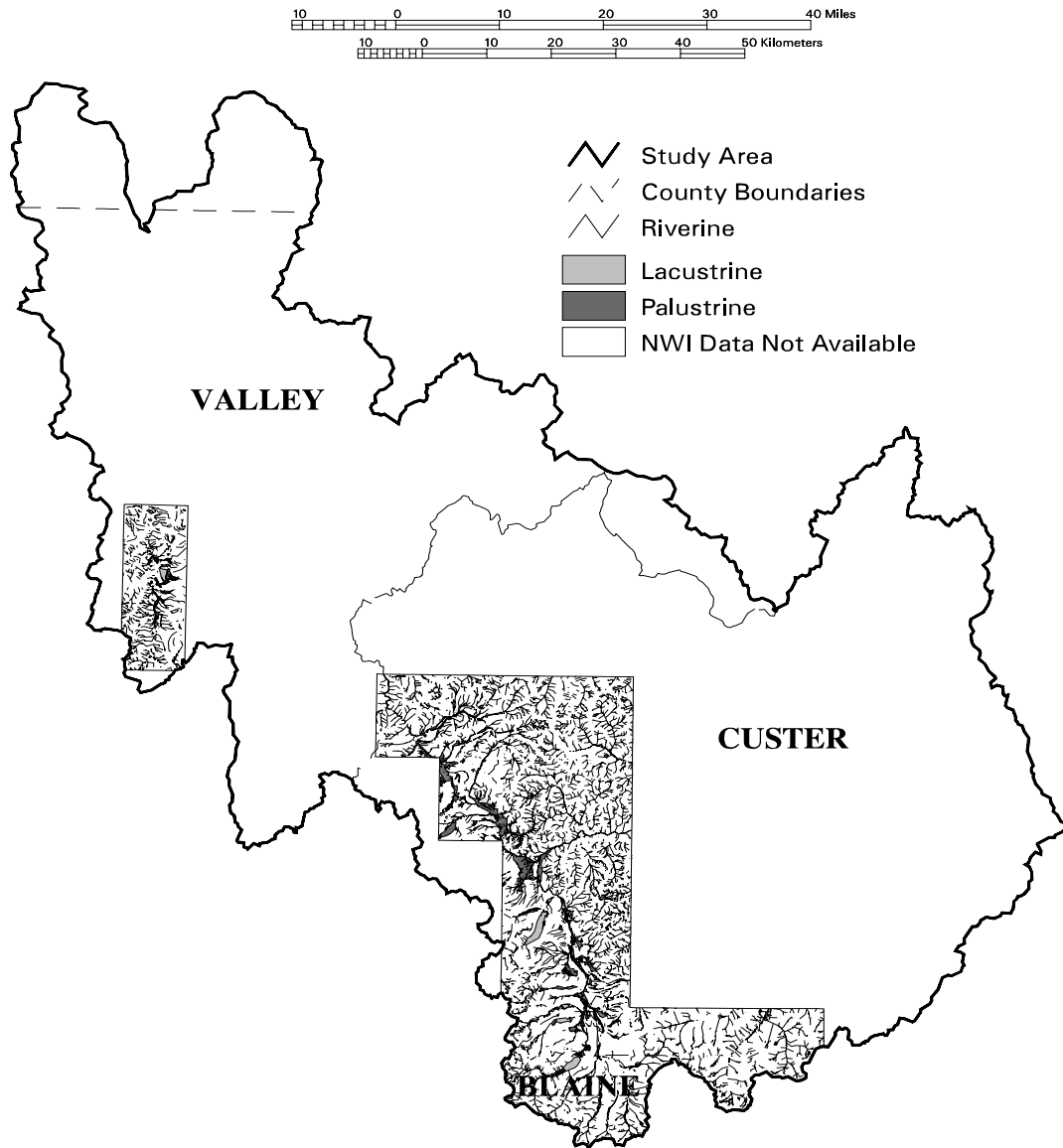


Figure 1. Location of wetland and deepwater habitat for digitized maps in the survey area by system.

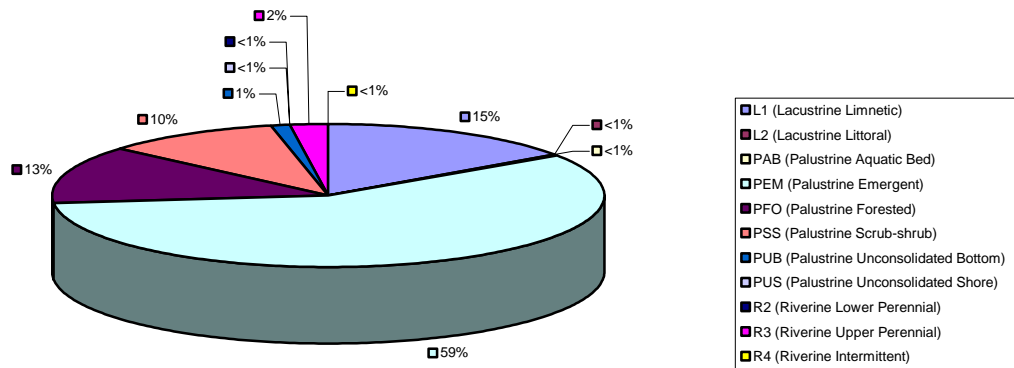


Figure 2. Acreage of wetland and deepwater habitat in Hydrologic Unit 17060201 (Upper Salmon River).

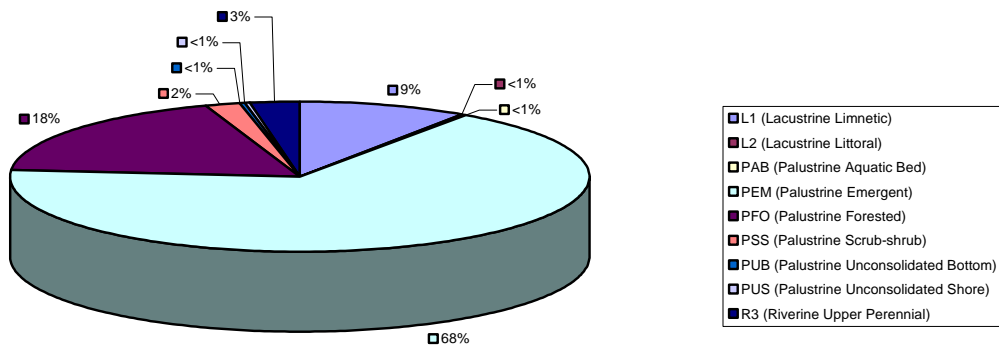


Figure 3. Acreage of wetland and deepwater habitat in Hydrologic Unit 17060205 (Upper Middle Fork Salmon River).

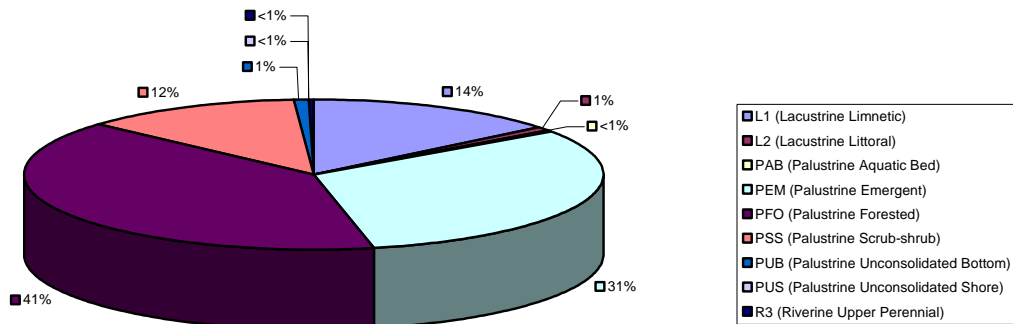


Figure 4. Acreage of wetland and deepwater habitat in Hydrologic Unit 17060208 (South Fork Salmon River).

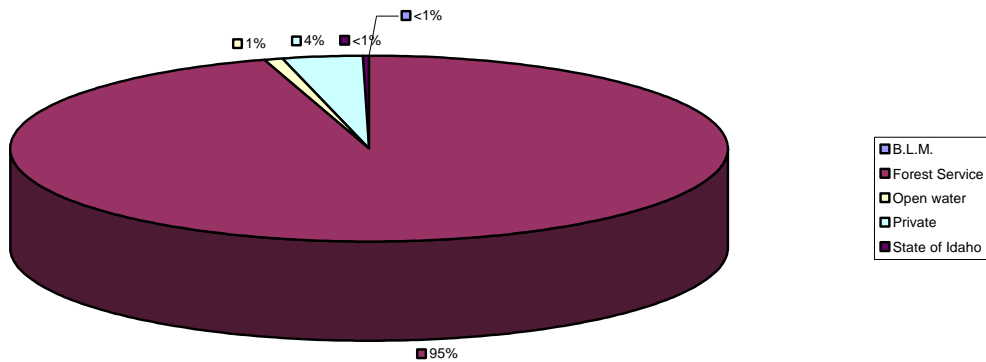


Figure 5. Landownership of wetlands in the project area.

Table 3. Acres of wetland and deepwater habitat and management status.

System	Class (subsystem)	Acres within Managed Areas	Total Acres	% of Type
Palustrine	Emergent	7,896	19,958	39.56
	Scrub-shrub	2,170	3,206	67.68
	Forested	3,122	5,644	55.30
	Aquatic bed	33	48	68.50
	Unconsolidated bottom	266	314	84.64
	Unconsolidated shore	18	38	48.20
	Total all Palustrine		13,505	29,209
Riverine	Intermittent	1	1	100.00
	Lower perennial	5	6	76.65
	Upper perennial	428	746	57.31
	Total all Riverine	434	753	57.54
Lacustrine	Limnetic	783	4,997	15.67
	Littoral	18	83	22.08
	Total all Lacustrine	801	5,081	15.77
Total all types		14,739	35,043	42.06

Wetland Losses

Wetland losses may be permanent or reversible. The distinction is made to identify those areas where restoration may be possible albeit costly. Nationally, urban and rural development, agriculture, and silviculture account for most wetland losses (Dahl 2000). In the survey area, agriculture and development account for most wetland losses. Historically, drainage, land clearing, and conversion to cropland accounted for most wetland loss. As populations continue to increase and economies switch from agricultural based to service based, losses due to development including road construction, home building, and flood control are likely to exceed losses to agriculture.

Functional Shifts

While some of the wetlands in the survey area are inaccessible and have been relatively less impacted by human influences, other wetlands have been impacted, resulting in shifts of wetland functions. *Impairments* are functional shifts that reduce wetland functions and include degradation and fragmentation. Degradation, the loss of one or more wetland functions, is

indicated by shifts in species composition and may result in lowered water quality due to sediment or nutrient input or increased water temperatures (World Wildlife Fund 1992). Fragmentation occurs when functions are lost due to barriers restricting water or gene flow. *Type changes* occur when a wetland is converted from one type to another (e.g., emergent to open water). Functional shifts improving wetland functions are considered *enhancements*.

Impairments

Impairments to wetland functions may result from agricultural activities, urbanization, and hydrologic manipulation. These activities usually result in shifts in species composition when native species such as shrubs and trees are removed, exotics invade or are introduced, or when hydrology is altered. Lowered water quality often results due to loss of thermal cover along streams, loss of filtering and nutrient uptake functions, and decreased bank stability.

The area has a long history of livestock grazing. Pasture development has included placement of ditches and flood irrigation, reseeding or inter-seeding with pasture grasses and removal of native tree and shrub species. Use of wetlands for rangeland affects species composition through the suppression of native woody species, removal and trampling of herbaceous species, introduction of exotic species, and compaction of soils. In addition, grazing can interfere with bird nesting and reduce protective vegetation cover.

Human activities, including livestock grazing, ground disturbance, and recreational activities, may inhibit survival of palatable native species. Physical removal of desirable species and soil compaction creates suitable sites for the establishment of exotic plant species. Large infestations of noxious weeds were not commonly noted in the survey area although species such as *Cirsium arvense* (Canada thistle) and *Cirsium vulgare* (bull thistle) are likely to occur. Other nonnative forbs that become established in disturbed wetlands in the survey area include *Rumex crispus* (curly dock), and *Taraxacum officinale* (common dandelion).

A number of nonnative graminoid species have been introduced into the survey area and have become naturalized. Many of the graminoids, including *Agrostis stolonifera* (redtop), *Agropyron repens* (quack grass), *Alopecurus pratensis* (meadow foxtail), *Bromus inermis* (smooth brome), *Festuca pratensis* (*Lolium pratense*) (meadow ryegrass), *Phalaris arundinacea* (reed canary grass), *Phleum pratense* (Timothy), and *Poa pratensis* (Kentucky bluegrass) lack the soil stabilizing characteristics of sedges and rushes. These species are found in widely scattered locations in the study area but were found to have high cover at only a few sites where they have been seeded as monocultures or inter-seeded with native meadow forbs and graminoids. *Phalaris arundinacea* is one of the most aggressive of these nonnative species and can tolerate a wide range of flooding regimes and habitats ranging from permanently flooded/saturated sites to mudflats along shorelines of streams and lakes.

Shifting river channels create habitat that supports a diverse mosaic of wetland vegetation types including open water sloughs and swales supporting emergent vegetation. The Upper Salmon River and its higher elevation tributaries all support active floodplains with frequent channel migration. Some bank stabilizing measures including rock gabions and tree revetments are in

place. Proper land use planning is necessary to prevent further need for channel stabilization if these dynamic river systems are to be maintained.

Recreational activities can impact wetlands through soil compaction and introduction of invasive species. Use of off-highway vehicles on moist, compactable soils removes protective vegetation cover and creates pathways for erosion and soil loss (Bureau of Reclamation 2000). Water based recreation can also provide transport mechanisms for exotic species. Populations of the noxious aquatic species *Myriophyllum spicatum* (Eurasian watermilfoil) are known from some Idaho reservoirs and could be transported to other water bodies by recreational boat users.

Type changes

Type changes occur when a wetland is converted from one vegetation type to another and results in a shift in wetland functions. This is treated by the World Wildlife Fund (1992) as a gain when the change is to a wetter type and as an impairment when the change is to a drier type. Diversion of water for agricultural use and draining of wetlands accounts for the majority of type changes in the survey area. Most of these developments were done either to provide irrigation water to grow hay crops or to drain water from wetlands to increase land available for pastures and hay crops.

Enhancements

Enhancements increase or improve wetland functions. In the survey area, enhancement projects undertaken to improve water quality and wildlife habitat have taken the form of reducing the amount of livestock grazing allowed in wetlands and riparian areas.

WETLAND DIVERSITY

Wetland Plant Associations

Eighty natural plant associations were identified in the survey area based on field inventories and review of available data (Table 4). A key to the plant associations is included in Appendix E. Descriptions of plant associations and management information have been summarized in many publications. We have compiled information about high-ranking associations occurring in the survey area in Appendix F. The associations are within Cowardin's Palustrine system including the forested, scrub-shrub, emergent (herbaceous), moss-lichen, and aquatic bed classes reviewed in the following sections.

Forested Vegetation

Forested vegetation within the study area includes broad-leaved deciduous forests and coniferous forests. Broad-leaved deciduous forests, while not extensive, are best developed along the Upper Salmon River. Small patches of riparian forest are dominated by *Populus trichocarpa* (black cottonwood) with lesser amounts of *Populus tremuloides* (quaking aspen). At higher elevations, stands of riparian vegetation along streams are dominated by *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce), *Pseudotsuga menziesii* (Douglas fir), and *Pinus contorta*

(lodgepole pine). Stands where *Pinus contorta* appears to be the climax species are also present in spring fed, broad valley bottoms.

Table 4. Wetland and riparian plant associations in the high valleys of the Salmon River arranged by Cowardin system, class, and subclass.

Scientific Name	Common Name	Rank	
<u>Palustrine Forested Plant Associations</u>			
<u>Needle-leaved evergreen</u>			
<i>Abies lasiocarpa/Calamagrostis canadensis</i>	subalpine fir/bluejoint reedgrass	G5	S3
<i>Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum</i> phase	subalpine fir/bluejoint reedgrass, Labrador tea phase	G4	S3
<i>Abies lasiocarpa/Caltha biflora</i>	subalpine fir/white marsh marigold	G3?	S3
<i>Abies lasiocarpa/Menziesia ferruginea</i>	subalpine fir/rusty menziesia	GU	SU
<i>Abies lasiocarpa/Senecio triangularis-Saxifraga odontoloma (S. arguta)</i>	subalpine fir/arrowleaf ragwort-brook saxifrage	GU	SU
<i>Abies lasiocarpa/Streptopus amplexifolius</i>	subalpine fir/twisted-stalk	G4?	S4
<i>Picea engelmannii/Calamagrostis canadensis</i>	Engelmann's spruce/bluejoint reedgrass	G4	S4
<i>Picea engelmannii/Vaccinium uliginosum (V. occidentale)</i>	Engelmann's spruce/bog blueberry	GU	SU
<i>Pinus contorta/Calamagrostis canadensis</i>	lodgepole pine/ bluejoint reedgrass	G5Q	S5
<i>Pinus contorta/Vaccinium uliginosum (V. occidentale)</i>	lodgepole pine/bog blueberry	G4	S2
<i>Pseudotsuga menziesii/Cornus sericea</i>	Douglas-fir/red-osier dogwood	G4	S4
<u>Broad-leaved deciduous</u>			
<i>Populus trichocarpa/Cornus sericea</i>	black cottonwood/red-osier dogwood	G3?	S3
<i>Populus trichocarpa/Alluvial Bar</i>	black cottonwood/alluvial bar	GU	SP
<u>Palustrine Scrub-Shrub Plant Associations</u>			
<u>Persistent</u>			
<i>Alnus incana/Cornus sericea</i>	mountain alder/red-osier dogwood	G3G4	S3
<i>Alnus sinuata/ Claytonia cordifolia(Montia cordifolia)</i>	Sitka alder/heartleaf springbeauty	GU	S3
<i>Artemesia cana/Festuca idahoensis</i>	silver sage/Idaho fescue	G3	S2
<i>Betula glandulosa/Carex utriculata</i>	bog birch/bladder sedge	G4?	S3
<i>Betula glandulosa-Lonicera caerulea/Senecio pseud aureus</i>	bog birch-sweetberry honeysuckle/falsegold groundsel	GQ	S3
<i>Cornus sericea</i>	red-osier dogwood	G4	S3
<i>Crataegus douglasii</i>	black hawthorn		
<i>Dasiphora floribunda (Potentilla fruticosa)/Danthonia intermedia</i>	Shrubby cinquefoil/timber oatgrass	G?	S3
<i>Dasiphora floribunda (Potentilla fruticosa)/Deschampsia cespitosa</i>	Shrubby cinquefoil/tufted hairgrass	G4	S3

Scientific Name	Common Name	Rank	
<i>Salix boothii/Carex utriculata</i>	Booth's willow/ bladder sedge	G4	S4
<i>Salix boothii/Mesic graminoid</i>	Booth's willow/mesic graminoid	G3?	S3?
<i>Salix commutata/Carex scopulorum</i>	undergreen willow/mountain sedge	G3	S3
<i>Salix drummondiana/Calamagrostis canadensis</i>	Drummond's willow/ bluejoint reedgrass	G3	S2
<i>Salix drummondiana/Carex utriculata</i>	Drummond's willow/bladder sedge	G3	S3
<i>Salix eastwoodiae/Calamagrostis canadensis</i>	mountain willow/bluejoint reedgrass	GU	SU
<i>Salix eastwoodiae/Carex aquatilis</i>	mountain willow/water sedge	G2	S2
<i>Salix eastwoodiae/Carex utriculata</i>	mountain willow/bladder sedge	G2	S2
<i>Salix geyeriana/Calamagrostis canadensis</i>	Geyer's willow/bluejoint reedgrass	G5	S4
<i>Salix geyeriana/Carex utriculata</i>	Geyer's willow/bladder sedge	G5	S4
<i>Salix geyeriana/Mesic graminoid</i>	Geyer's willow/mesic graminoid	G2G3Q	S3
<i>Salix lemmonii</i>	Lemmon's willow	GU	SU
<i>Salix lemmonii/Calamagrostis canadensis</i>	Lemmon's willow/bluejoint reedgrass	GU	SU
<i>Salix melanopsis/Cobble Bar</i>	dusky willow/cobble bar	G4	S?
<i>Salix planifolia var. monica/Carex aquatilis</i>	planeleaf willow/water sedge	G5	S4
<i>Salix planifolia var. monica/Carex scopulorum</i>	planeleaf willow/mountain sedge	G4	S3
<i>Salix planifolia var. monica/Carex utriculata</i>	planeleaf willow/bladder sedge	G3Q	S3
<i>Salix wolfii/Carex aquatilis</i>	Wolf's willow/water sedge	G4	S4
<i>Salix wolfii/Carex microptera</i>	Wolf's willow/smallwing sedge	G3	S3
<i>Salix wolfii/Carex utriculata</i>	Wolf's willow/bladder sedge	G4	S4
<i>Salix wolfii/Deschampsia cespitosa</i>	Wolf's willow/tufted hairgrass	G3	S2
<i>Salix wolfii/ Mesic Forb</i>	Wolf's willow/mesic forb	G3	S2
<i>Salix wolfii/Swertia perennis-Pedicularis groenlandica</i>	Wolf's willow/felwort-elephanthead lousewort	G2	S2

Palustrine Emergent Plant Associations

Persistent

<i>Agrostis scabra/Alluvial Bar</i>	rough bentgrass/ alluvial bar	GU	SU
<i>Artemisia ludoviciana</i>	prairie sage	G3	S2
<i>Aster integrifolius-Festuca idahoensis</i>	thickstem aster-Idaho fescue	G?	S3
<i>Calamagrostis canadensis</i>	bluejoint reedgrass	G4	S4
<i>Carex aquatilis</i>	water sedge	G5	S4
<i>Carex buxbaumii</i>	Buxbaum's sedge	G3	S1
<i>Carex cusickii</i>	Cusick's sedge	GQ	S3
<i>Carex lasiocarpa</i>	slender sedge	G4	S2
<i>Carex limosa</i>	mud sedge	G3	S1
<i>Carex livida</i>	livid sedge	GQ	S2
<i>Carex luzulina</i>	woodrush sedge	GU	SU
<i>Carex microptera</i>	small wing sedge	G4	S3

Scientific Name	Common Name	Rank	
<i>Carex nebrascensis</i>	Nebraska sedge	G4	S3
<i>Carex praegracilis</i>	clustered field sedge	G2G3Q	S2
<i>Carex saxatilis</i>	rock sedge	GU	SU
<i>Carex scopulorum</i>	mountain sedge	G5	S3
<i>Carex simulata</i>	short-beaked sedge	G4	S2
<i>Carex utriculata</i>	bladder sedge	G5	S4
<i>Carex vesicaria</i>	inflated sedge	GU	S3
<i>Danthonia intermedia</i>	timber oatgrass	GU	SU
<i>Deschampsia cespitosa</i>	tufted hairgrass	G4	S3
<i>Eleocharis palustris</i>	creeping spikerush	G5	S3
<i>Eleocharis pauciflora</i>	few-flowered spikerush	G4?	S1
<i>Eleocharis pauciflora/Sphagnum spp.</i>	undescribed peatland	GU	SU
<i>Eriophorum angustifolium (E. polystachion)</i>	tall cottongrass		
<i>Juncus balticus</i>	Baltic rush	G5	S5
<i>Hordeum brachyantherum</i>	meadow barley	GU	SU
<i>Phalaris arundinacea</i>	reed canarygrass	G5	S5
<i>Scirpus caespitosus (Trichophorum caespitosum)</i>	tufted bulrush	GU	SU
<i>Scirpus caespitosus (Trichophorum caespitosum)-Carex livida</i>	tufted bulrush-livid sedge	G1	S1
<i>Typha latifolia</i>	common cattail	G5	S4
<u>Palustrine Aquatic Bed and Lacustrine Littoral Plant Associations</u>			
<i>Menyanthes trifoliata</i>	buckbean	GU	SU
<i>Nuphar polysepalum</i>	yellow pond lily	G5	S4
<i>Potamogeton natans</i>	floating pondweed	GU	SU
<i>Sparganium spp. (includes S. angustifolium & S. minimum)</i>	bur-reed	GU	SU

Scrub-Shrub Vegetation

Shrublands dominated by willows and other shrubs occur in association with springs and on subirrigated floodplains along nearly all of the streams in the survey area. Stands of willows including *Salix drummondiana* (Drummond's willow), *Salix melanopsis* (dusky willow), *Salix geyeriana* (Geyer's willow), and *Salix lemmonii* (Lemmon's willow) along with the shrubs *Alnus incana* (mountain alder), *Cornus sericea* (red osier dogwood), and *Crataegus douglasii* (black hawthorn) are present. At upper elevations, short willows including *Salix planifolia* (Planeleaf willow) and *Salix wolfii* (Wolf's willow) form patches in broad valleys and along streams. *Betula glandulosa* (bog birch) is of occasional occurrence in broad valleys at upper elevations as well as in peatlands that have developed in glacial kettle ponds and abandoned oxbows.

Emergent (Herbaceous) Vegetation

Emergent wetlands are present in backwater sloughs of floodplains, in association with springs, and in flat valley bottoms. Stands of *Carex utriculata* (bladder sedge) are frequently present along overflow channels and in backwater sloughs. Broad valley bottoms in the survey area support a mosaic of graminoids, sedges, and rushes including *Deschampsia cespitosa* (tufted hairgrass), *Eleocharis palustris* (common spikerush), *Juncus balticus* (Baltic rush), and *Carex* spp. such as (*C. microptera* [small wing sedge], *C. nebrascensis* [Nebraska sedge], *C. praegracilis* [clustered field sedge], *C. simulata* [short-beaked sedge], *C. utriculata* [bladder sedge], and *C. vesicaria* [inflated sedge]). These species may occur as near monocultures or in mixed stands where clear dominance by a single species is not apparent. Mixed stands are most common in temporarily flooded meadows.

Peatlands in the survey area typically include emergent vegetation types such as stands of *Carex aquatilis* (water sedge), *Carex cusickii* (Cusick's sedge), *Carex lasiocarpa* (slender sedge), and *Carex simulata* (short-beaked sedge) on organic sedge peat soils. *Potentilla palustris* (marsh cinquefoil) and *Menyanthes trifoliata* (buckbean) are also frequently present. In water tracks and where springs emerge, soils are bottomless, unconsolidated mucks (dark, well decomposed peat) that often support stands of *Eleocharis pauciflora* (few-flowered spikerush) and *Carex limosa* (mud sedge).

Aquatic bed and Lacustrine Littoral Vegetation

Palustrine and Lacustrine aquatic bed vegetation occurs in littoral (water depth <2 meters) and limnetic (water depth >2 meters) zones of ponds and lakes in the survey area. Vegetation types correspond with water depth and may include *Potamogeton* spp. (pondweed spp.), *Utricularia* spp. (bladderwort spp.), and *Sparganium* spp. (burreed spp.). *Nuphar polysepalum* (yellow pond-lily) is frequently present as a monoculture in deep littoral zones.

Moss-Lichen Vegetation

Palustrine moss-lichen wetlands are defined as areas where mosses and lichens cover surface substrates and vascular plants make up less than 30% cover (Cowardin *et al.* 1979). Moss species are frequently present in the vegetation types discussed previously as peatlands, but vascular species are prominent. Moss-lichen wetlands as defined by Cowardin *et al.* (1979) are present as small microsites in the survey area. They are usually mapped by the NWI as inclusions with other map units due to the resolution at which the maps were developed.

RARE FLORA

Eighteen vascular and two nonvascular plant species of concern are known to occur in association with wetlands or riparian habitat within the survey area (Table 5). The rare species include disjunct species (*Ribes wolfii* and *Triantha occidentalis* spp. *brevistyla*), and species at the periphery of their range (*Salix farriae*). The remaining species have a widespread distribution but are restricted to specialized wetland or riparian habitat. Additional information on the taxonomy, habitat, and distribution of these species is available in Appendix G.

Table 5. Plant species of special concern in the survey area, conservation rank, and Idaho Native Plant Society (INPS) category.

Scientific Name	Common Name	Rank		INPS Category ^a
<i>Astragalus leptaleus</i>	park milkvetch	G4	S3	M
<i>Astragalus paysonii</i>	Payson's milkvetch	G3	S3	GP3
<i>Botrychium lanceolatum</i> var. <i>lanceolatum</i>	lance-leaved moonwort	G5T4	S3	S
<i>Botrychium simplex</i>	least moonwort	G5	S2	2
<i>Carex buxbaumii</i>	Buxbaum's sedge	G5	S3	M
<i>Carex flava</i>	yellow sedge	G5	S3	M
<i>Carex livida</i>	pale sedge	G5	S2	S
<i>Cicuta bulbifera</i>	bulb-bearing waterhemlock	G5	S2	S
<i>Drosera intermedia</i>	spoon-leaved sundew	G5	S1	1
<i>Epilobium palustre</i>	swamp willow-weed	G5	S3	M
<i>Epipactis gigantea</i>	giant helleborine	G3G4	S3	2
<i>Helodium blandowii</i>	Blandow's helodium	G5	S2	S
<i>Primula incana</i>	Jones' primrose	G4G5	S1	1
<i>Rhynchospora alba</i>	white beakrush	G5	S2	1
<i>Ribes wolfii</i>	Wolf's currant	G4	S2	M
<i>Salix farriarum</i>	Farr's willow	G4	S1	2
<i>Scheuchzeria palustris</i>	pod grass	G5	S2	2
<i>Schistostega pennata</i>	Schistostega moss	G3G5	S1	S
<i>Schoenoplectus subterminalis</i>	water clubrush	G4G5	S3	S
<i>Triantha occidentalis</i> spp. <i>brevistyla</i>	short style tofieldia	G5T4	S1	1

^a GP2=Global Priority 2, GP3=Global Priority 3, 1=State Priority 1, 2=State Priority 2, S=Sensitive, M=Monitor, R=Review. Definitions of INPS categories are available on the Idaho Conservation Data Center Homepage.

RARE ANIMALS

The survey area provides habitat for 20 terrestrial species of concern (and eight fish species of concern) that are associated with wetland and riparian areas (Table 6). Bald eagles forage on spawned out Chinook salmon during late summer in the high valleys of the Salmon River. Mountain quail are known from several areas in western Idaho and are reported to prefer tall shrublands that are near water sources (Groves *et al.* 1997). Barrow's goldeneye, common loon and bufflehead use the larger lakes and tributaries in the survey area. Three-toed woodpeckers are found in coniferous forests and occasionally in willow thickets along streams. Conifer forests with windthrow and burned areas with standing dead trees are habitat for black-backed woodpeckers. Great gray owls prefer dense forests or open woodlands and frequent open meadows for foraging.

Table 6. Wetland associated animal species of special concern in the survey area.

Species	Common Name		Rank
Fish			
<i>Acipenser transmontanus</i>	white sturgeon	?	?
<i>Oncorhynchus clarki lewisi</i>	westslope cutthroat trout	G4T3	S2
<i>Oncorhynchus mykiss</i>	steelhead (Snake River run)	G5T2T3	S2
<i>Oncorhynchus mykiss gairdneri</i>	Inland Columbia Basin redband trout	G5T4	S2S3
<i>Oncorhynchus tshawytscha</i>	chinook salmon (Snake River spring run)	G5T1	S1
<i>Oncorhynchus tshawytscha</i>	chinook salmon (Snake River summer run)	G5T1	S1
<i>Oncorhynchus nerka</i>	sockeye salmon (Snake River runs)	G5T1	S1
<i>Salvelinus confluentus</i>	bull trout	G3	S3
Amphibians			
<i>Bufo boreas</i>	western toad (northern Rocky Mountain group)	G?	S?
<i>Pseudacris triseriata maculata</i>	boreal (striped) chorus frog (not a species of special concern but see note below)	G5	S4
Birds			
<i>Aegolius funereus</i>	boreal owl	G5	S2
<i>Bucephala albeola</i>	bufflehead	G5	S3B,S3N
<i>Bucephala islandica</i>	Barrow's goldeneye	G5	S3B,S3N
<i>Falco peregrinus anatum</i>	pererine falcon	G4T3	S1B
<i>Gavia imer</i>	common loon	G5	S1B, S2N
<i>Haliaeetus leucocephalus</i>	bald eagle	G4	S3B,S4N
<i>Numenius americanus</i>	long-billed curlew	G5	S3B
<i>Oreotyx pictus</i>	mountain quail	G5	S2
<i>Otus flammeolus</i>	flammulated owl	G4	S3B
<i>Picoides arcticus</i>	black-backed woodpecker	G5	S3
<i>Picoides dorsalis</i> (<i>P. tridactylus</i>)	American three-toed woodpecker (three-toed woodpecker)	G5	S3?
<i>Sitta pygmaea</i>	pygmy nuthatch	G5	S2S3
<i>Strix nebulosa</i>	great gray owl	G5	S3
Mammals			
<i>Euderma maculatum</i>	spotted bat	G4	S2
<i>Martes pennanti</i>	fisher	G5	S1
<i>Myotis evotis</i>	long-eared myotis	G5	S3?
<i>Myotis volans</i>	long-legged myotis	G5	S3?
<i>Myotis yumanensis</i>	Yuma myotis	G5	S3?

Eight fish and one amphibian species of special concern are present in the survey area. Historic sightings of western toads are reported from throughout Custer and Valley counties. Individuals were also observed during surveys for this project. Recent genetic work indicates that populations of this species north of the Snake River may be a separate species. Western toad populations north of the Snake River appear stable (Engle and Harris 2001). An additional amphibian species is notable in the survey area as well. The boreal chorus frog is found

throughout the region. Numerous individuals (metamorphs) occurring in a pond at the Beaver Creek Fen were seen in September of 2002 to have three hind legs. It is not known what causes these abnormalities but some lines of speculation concern environmental conditions.

Five mammal species of special concern that frequent wetland and riparian habitat are known from the survey area including four species of bats that may be found in there. An Idaho study found that bat roosts were strongly correlated with the availability of water and habitats proximate to wetlands are sometimes preferred (Groves *et al.* 1997). Fishers are reported from several sites in the survey area and will utilize forested riparian habitat in the spring, summer, and fall. Information from the Idaho Vertebrate Atlas (Groves *et al.* 1997) on the status, range, and habitat of vertebrate species of concern (with the exception of fish and mollusks) is included in Appendix H.

CONSERVATION PRIORITIES FOR WETLANDS

It is widely recognized that creation of wetlands is more costly than conservation or restoration. Wetland creation projects have had minimal success and are usually limited to small portions of the landscape. Conservation, on the other hand, and the restoration of relatively intact wetland and riparian habitat accomplish resource goals efficiently by reducing labor and material costs (Stevens and Vanbianchi 1991). Large, viable wetland complexes can be the result.

The surveys identified 30 wetland sites (Table 7, Figure 5). Many of these wetlands represent relatively intact systems where actions such as livestock management, buffer creation, and public education will maintain and in some cases, improve wetland functions. Gains in wetland function can also be achieved by restoring hydrology at or adjacent to some of the identified sites.

Class I Sites

Ten sites meet the richness, rarity, condition, and viability criteria to qualify as a Class I Site. All of these sites are at the headwaters of watersheds where impacts have been minimal. Three of the sites; Bull Moose Fen, Chilcoot Peak and Mays Creek Fen, are protected within established Research Natural Areas. High elevation forested, scrub-shrub, and emergent wetlands are present in the Research Natural Areas as well as significant peatlands. Five of the Class I sites; Ditch Creek Meadows, Mud Lake, Tule Lake, Wardenhoff Meadows and Warm Lake, have been proposed to be included in Special Interest Areas. Designation as Special Interest Areas would adequately protect these Class I sites. The Poker Meadow site lies within the Frank Church-River of No Return Wilderness. Wilderness designation should be adequate to protect the high quality wet meadows and carrs found at this site. The remaining Class I site, Banner Creek Fen, currently has no formal protection. All of the Class I sites are found on lands administered by the U.S. Forest Service.

Table 7. Wetland sites in the high valleys of the Salmon River.

Wetland Site	Category	Protection ^a		Ownership ^b	Latitude	Longitude	County
		Status					
1 Banner Creek Fen	Class I	-		USFS	441853N	1151522W	Boise Custer
2 Bull Moose Fen	Class I	+		USFS	440453N	1145241W	Custer
3 Chilcoot Peak	Class I	+		USFS	444627N	1152559W	Valley
4 Ditch Creek Meadows	Class I	P		USFS	444754N	1153546W	Valley
5 Mays Creek Fen	Class I	+		USFS	440105N	1145111W	Custer
6 Mud Lake	Class I	P		USFS	443904N	1152946W	Valley
7 Poker Meadow	Class I	P		USFS	442621N	1152017W	Valley
8 Tule Lake	Class I	P		USFS	443747N	1154102W	Valley
9 Wardenhoff Meadows	Class I	P		USFS	444954N	1153322W	Valley
10 Warm Lake	Class I	P		USFS	443824N	1153936W	Valley
11 Ayers Meadow	Class II	-		USFS	442645N	1151854W	Valley
12 Bear Valley Creek Headwaters	Class II	-		USFS	441445N	1152913W	Valley
13 Bear Valley Creek-Elk Creek Floodplain	Class II	-		USFS	442508N	1152501W	Valley
14 Beaver Creek Fen	Class II	-		USFS	442459N	1150842W	Custer
15 Blind Summit Fen	Class II	-		USFS	441943N	1150542W	Custer
16 Cache Creek Lakes	Class II	+		USFS	444641N	1144128W	Lemhi
17 Corduroy Meadows	Class II	P		USFS	442750N	1152747W	Valley
18 Crooked Creek Easement	Class II	P		PRI	441403N	1150011W	Custer
19 Cub Creek Peatlands	Class II	-		USFS	441935N	1152859W	Valley
20 Elk Meadow	Class II	-		USFS	441606N	1150618W	Custer
21 Goat Creek	Class II	-		USFS	441115N	1145949W	Custer
22 Huckleberry Fen	Class II	+		USFS	440330N	1145241W	Custer
23 Mystery Lake	Class II	+		USFS	442928N	1144753W	Lemhi
24 Pole Creek	Class II	P		USFS	435446N	1144428W	Blaine
25 Redfish Lake Moraine	Class II	+		USFS	440626N	1145436W	Custer
26 Shellrock-Rainbow Lakes	Class II	P		USFS	444920N	1153510W	Valley
27 Soldier Lakes	Class II	+		USFS	443131N	1151131W	Custer

	Wetland Site	Category	Protection ^a		Latitude	Longitude	County
			Status	Ownership ^b			
28	Bruce Meadows	Reference	-	USFS	442428N	1151926W	Valley
29	Cape Horn Meadows-Dry Creek	Class II	-	USFS	442108N	1150632W	Custer
30	Tyndall Meadows	Reference	-	USFS	443409N	1153238W	Valley

^a + = Full protection (e.g., Designated Research Natural Area or Special Interest Area, Nature Conservancy Preserve, Wildlife Management Area or Refuge); P = Partial protection (e.g., Potential Research Natural or Special Interest Area recognized in the Forest Plan, partially within a Wildlife Management Area, or Privately owned with conservation easement in place); and - = Currently no protection.

^b USFS = United States Forest Service, BLM = Bureau of Land Management, IDFG = Idaho Department of Fish and Game, IDL = Idaho Department of Lands, IPR = Idaho Department of Parks and Recreation, TNC = The Nature Conservancy, and PRI = private.

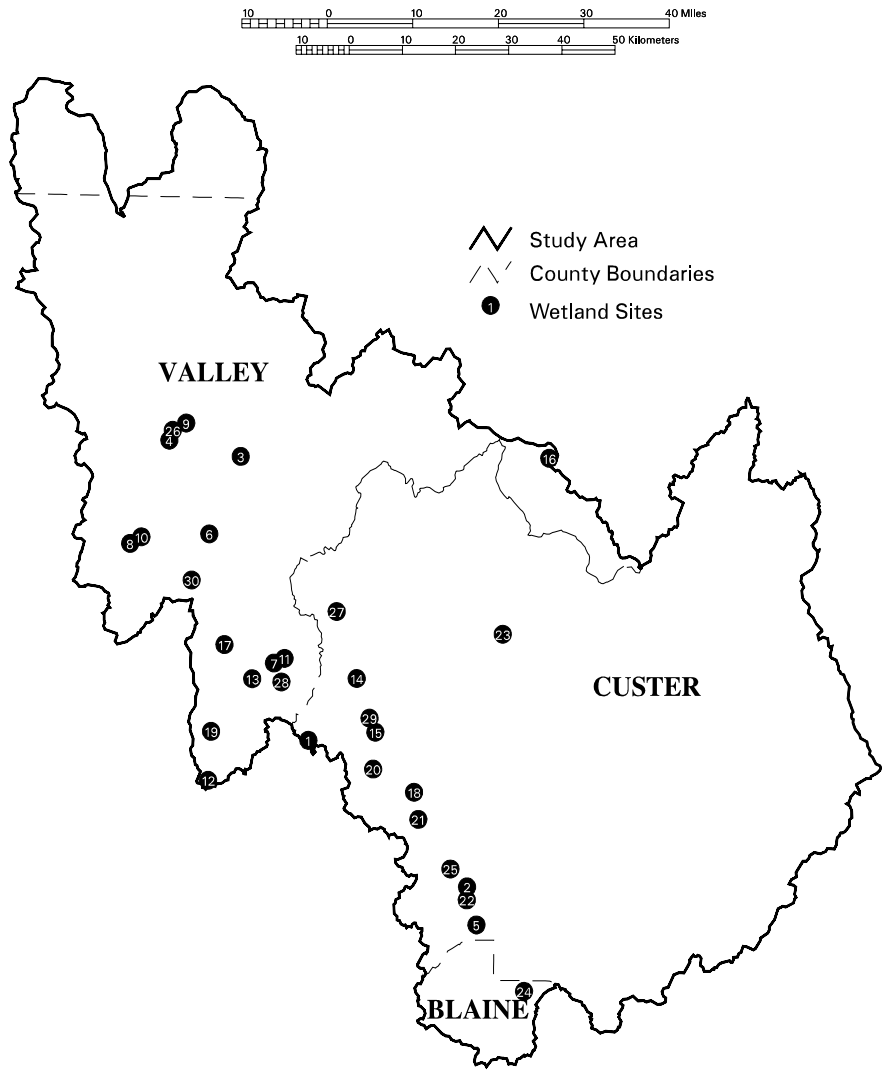


Figure 6. Location of wetland sites in the high valleys of the Salmon River.

Class II Sites

Seventeen areas meet the criteria for Class II sites. The Class II Sites include wetlands associated with larger tributaries and meadow systems, broad spring fed meadows, high elevation lakes, kettle ponds and peatlands. Five of the sites; Cache Creek Lakes, Huckleberry Fen, Mystery Lake, Redfish Lake Moraine and Soldier Lakes are protected within established Research Natural Areas. The Pole Creek site includes the Pole Creek Enclosure RNA within its boundaries although the remainder of the site is currently unprotected.

Shellrock-Rainbow Lakes has been proposed as a Special Interest Area. Designation as a Special Interest Area would adequately protect Class II sites. The Ayers Meadow and Corduroy Meadows sites lie within the Frank Church-River of No Return Wilderness. Wilderness designation should be adequate to protect the high quality wet meadows, carrs and forested wetlands found at this site. The privately owned Crooked Creek Easement site supports riparian plant communities and an extensive fen. The easement provides partial protection for the site by limiting development and livestock grazing.

The Elk Meadow site is not currently protected except by administrative designation as an “enclosure” in an active grazing allotment. The remaining Class II sites; Bear Valley Creek Headwaters, Bear Valley Creek-Elk Creek Floodplain, Beaver Creek Fen, Blind Summit Fen, Cub Creek Peatlands, and Goat Creek currently have no formal protection. All of the Class II sites except the Crooked Creek Easement are found on lands administered by the U.S. Forest Service.

The Cape Horn Meadows-Dry Creek site is representative of conditions that are found along Marsh Creek throughout the area from Blind Summit to Cape Horn. The site itself supports wet meadows and scrub-shrub wetlands adjacent to the floodplain of Marsh Creek, a stream that provides spawning and rearing habitat for Chinook salmon. Dry Creek is an example of an intermittent stream that, although it ceases to flow above ground by late summer, still contributes to the water quality and quantity of the stream into which it flows. Dense vegetation, whose establishment and persistence depend on the annual flows, shades the ground surface and helps keep groundwater temperatures lower. When the underground flow eventually enters the larger stream channel, it is likely to be cooler than if the ground surface had less vegetation or were otherwise degraded. In addition, dense vegetation contributes to the ability of the site to capture and store water from precipitation and overland flow during snowmelt. The Cape Horn Meadows-Dry Creek site is in an active sheep grazing allotment. Better control of sheep grazing at the site would help reduce damage to sensitive areas such as peatlands and rare plant populations. An old airstrip exists within the site but does not appear much used.

Livestock grazing has been eliminated on several of the sites within the last few years (i.e., Ayers Meadow, Bear Valley Creek sites, Corduroy Meadows and the Class I Poker Meadow site), however, it continues on several others. The Beaver Creek Fen site includes the fen proper and a wet meadow and riparian complex along the creek and tributaries. The site is in an active sheep grazing allotment. Part of the site has been degraded by past management activities and will probably not degrade further with continued sheep grazing, but the fen itself should be protected to prevent loss of the rare plant populations that occur there.

The biodiversity significance of Blind Summit Fen has long been recognized and although the site was recommended as a Special Interest Area a decade ago (Moseley, *etal*, 1994), it is still unprotected. Rare plants and rare plant communities occur at Blind Summit Fen and cattle grazing there continues to degrade the site and threaten its long-term viability. Pole Creek is another location where the wetland conservation site lies within an active grazing allotment. The site includes the smaller Pole Creek Exclosure RNA within its boundary. Sheep grazing that currently occurs outside the RNA fence but within the Pole Creek site is impacting stream bank stability and interfering with restoration efforts. Better control of sheep grazing at the Pole Creek site is needed to protect sensitive areas.

There are no significant impoundments on major streams in the survey area that affect the natural hydrograph. The stream systems are dynamic and channel migration and sediment deposition continually occur, creating landforms supporting forested, scrub-shrub and emergent wetlands. Maintenance of floodplain processes should be integrated into land-use plans to ensure these stream systems continue to function naturally.

Many of the streams in the survey area support wild populations of Chinook salmon. The extensive wet meadows and high quality riparian vegetation found in these sites functions to improve water quality and quantity by providing baseflow to streams and filtering sediments. Roads, trails, campgrounds and homesites, especially in or near these sites, can reduce their ability to ameliorate water quality and quantity and should be avoided if possible and carefully managed when developments do occur. Alteration of high quality wetland remnants within Class II sites should be avoided. Most of the sites can be enhanced by reducing ground disturbance, minimizing sediment and nutrient inputs, and weed control. Permanent long-term monitoring at peatlands may be worthwhile to identify subtle changes impacting water quality and/or species composition.

Reference Sites

Reference Sites are areas that represent high quality assemblages of plant associations. The Class I and Class II sites discussed previously also all contain areas that support high quality plant associations. Two additional sites identified during surveys, Bruce Meadows and Tyndall Meadows, are considered Reference Sites. Bruce Meadows is considered a Reference Site, instead of a Class II site, primarily because of degradation that has occurred there due to previous land use. There is an active airstrip adjacent to the site and the disturbed ground surface associated with it supports a mix of exotic plant species. Another area within the site appears to have been seeded with exotic grasses, perhaps in an effort to increase forage for livestock and/or “restore” areas damaged by historic livestock grazing. The livestock grazing allotment for Bruce Meadows was permanently retired in 2001 and the ecological condition of the site can be expected to improve over time.

The Tyndall Meadows site supports a mix of wetland types and although the wetter types are in good ecological condition, the drier types are in poorer condition. Tyndall Meadows has had a long history of intensive livestock use. The site appears to receive less livestock grazing now

than in the past and the ecological condition of the plant communities there is expected to improve over time. The area provides spawning habitat for Chinook salmon where Johnson Creek flows through the site.

Reference Sites can serve as comparison areas for restoration and potential sources of donor material. The current management of these areas should maintain wetland functions.

Habitat Sites

No Habitat Sites were identified in the survey area in large part because of time constraints due to the number of higher quality sites that were surveyed. Areas undoubtedly exist in the survey area that meet the criteria for Habitat Sites.

Other Sites and Priorities for Conservation

A number of wetland sites in the survey area are not summarized in this document. Other wetlands are present representing common vegetation types with important wetland functions. Regulatory protection for jurisdictional wetlands is provided by the Clean Water Act; however, wetlands that do not meet the regulatory criteria and wetlands in densely populated areas are vulnerable.

A network of wetland conservation sites should represent the diversity of habitats in an area. In the high valleys of the Salmon River survey area, the majority of the wetland and deepwater habitat acreage is in the Palustrine (83%) or Lacustrine (15%) systems (Table 3). Most of the wetland and deepwater habitat in the Palustrine system is found within high elevation meadows and riparian areas. The U.S. Forest Service manages most of the land in the survey area and natural wetlands are common. Nearly all the Riverine system wetlands in the survey area provide habitat for listed anadromous fish species and receive some protection because of management actions developed to benefit those fish species. Additional wetlands contained within the Sawtooth National Recreation Area (SNRA) receive protection beyond what would apply under Clean Water Act regulatory jurisdiction because of development restrictions that are part of the legislation that established the SNRA.

Forty percent of the Palustrine, Lacustrine and Riverine wetlands in the survey area are contained in special status management areas. Several high quality examples of rare peatlands occur within Research Natural Areas. Most of the Lacustrine system wetlands in the survey area are located around natural lakes that have not had the water level artificially raised by impoundment of the outlet. Several of these lakes are relatively large (i.e., Redfish Lake and Alturas Lake) and large, natural lakes are not common in Idaho.

Most of the vegetated wetland habitat in the study area is found in the Palustrine system and it is these wetlands that provide the majority of habitat structural diversity. Wetland acreage within special management areas reflects fairly well the actual acreage existing in the study area although additional emergent wetlands acreage in special management areas would help bring better balance between existing and protected types.

Projects that promote the conservation and maintenance of existing wetland functions should be of high priority as all wetlands are significant on a regional scale. Emphasis may be placed on those areas supporting types such as native forested, scrub-shrub or emergent habitat, which are under-protected, declining, or rare.

How This Information Can be Used

Numerous programs provide opportunities for wetlands protection and restoration on private as well as publicly owned lands. Technical and restoration assistance for privately owned wetlands is available through the USFWS Partners for Wildlife program, IDFG Habitat Improvement Program (HIP), and the NRCS Wetland Reserve Program. Projects involving multiple cooperators are generally given higher priority. The HIP also provides assistance for projects on federal lands such as fencing and restoring wetlands and riparian areas. Technical assistance and assistance to secure project funds on lands with mixed ownership may be provided by Bring Back the Natives or Intermountain Joint Ventures. Special designation such as Research Natural Area, Area of Critical Environmental Concern, or Special Interest Area is a conservation approach for ecologically significant wetlands on federal lands. Although the majority of wetlands in the survey area are in federal ownership, the long-term goal of increasing the quality and quantity of wetlands will only be accomplished through continued cooperation between private landowners, federal, state, and local agencies, and concerned citizens.

The information presented here can help identify opportunities and prioritize sites for conservation. With only limited resources available for wetland protection and conservation, projects should be carefully considered. Projects that extend out from previous projects or focus on relatively natural habitats have a high probability for success. Reference wetlands are identified that can serve as baselines for restoration projects. The information presented in the plant association descriptions can be used to set restoration goals for species and community composition. The summaries of wetland sites and plant associations can also aid in permit review by providing a regional context for wetland significance and rarity.

How To Request Additional Information

Only part of the information on wetlands in the high valleys of the Salmon River survey area has been summarized in this document. Additional data available for basin-wide or site-specific projects is housed at IDFG headquarters. This report and previous reports are available on the CDC home page at <http://fishandgame.idaho.gov/tech/CDC/>. The available data and methods of accessing the data are summarized in Table 8.

Table 8. Accessing wetlands-related data housed at Idaho Department of Fish and Game.

Data	Format	What is Available	How to Access Data
NWI	GIS	USFWS NWI maps at 1:24,000	NWI Homepage: http://wetlands.fws.gov/
Biotics	GIS	Rare plant and animal distributions. Conservation site locations. Managed area locations.	IDFG CDC Ecology Information Manager
Biotics Analog/ disk		Occurrence data for rare plant and animal species and plant associations. Location and biological significance of currently managed wetland areas. Location and biological significance of wetland conservation sites, community abstracts.	IDFG CDC Wetland Ecologist

NWI = National Wetlands Inventory, Biotics = Biodiversity Tracking and Conservation System. Geographic Information System (GIS) data is available in ArcView format.

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APPENDIX A

**IDAHO CONSERVATION DATA CENTER SITE AND COMMUNITY REPORTING
FORMS**

IDENTIFICATION AND LOCATION

SOURCECODE _____ MANUAL _____

SITENAME _____ STATE _____

MO DAY YEAR EXAMINERS

COUNTY: _____ QUADNAME: _____ QUADCODE: _____

____T/____R/ SECTION(s)
 ____T/____R/ SECTION(s)

DIRECTIONS → _____

ELEMENT OCCURRENCES

Element Name	Occ.	Plot No.	Found?	Found?	Found?	No.
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

REVISIT NEEDS → _____
 REVISIT NEEDS --> _____

SITE DESCRIPTION/DESIGN

SITE DESCRIPTION → _____

TOPOGRAPHIC BASE MAP:
 ___yes___ no 1. element locations and/or boundaries?
 ___yes___ no 2. both primary and secondary boundaries?

BOUNDARY JUSTIFICATION → _____

PROTECTION URGENCY

U1 immediate threat

U2 threat w/i 5 yrs

U3 threat but not w/i 5 yrs

U4 no threats

U5 land protected

PU COMMENTS:

MANAGEMENT URGENCY

M1 needed this year

M2 needed w/i 5 yrs (or loss)

M3 needed w/i 5 yrs (or degrade)

M4 may be needed in future

M5 none needed

MU COMMENTS:

STEWARDSHIP

LAND USE COMMENTS → _____

POTENTIAL HAZARDS → _____

EXOTIC FLORA/FAUNA COMMENTS → _____

OFF-SITE CONSIDERATIONS → _____

SITE AND ELEMENT MANAGEMENT NEEDS → _____

SKETCH MAP (e.g., show: (1) EO locations, (2) study plots, (3) natural landmarks, (4) disturbance features, such as structures, trails, logging areas, etc. Include cross section if possible. Include scale and indicate north.)

IDAHO CDC NATURAL WETLAND COMMUNITY OCCURRENCE FIELD FORM

Project Name: PLOT# EONUM: SOURCECODE
Scientific Name:
Observer(s): Survey Date: (yr-m-d)

Locational Information

Quadname: Quadcode (if known):
Surveysite Name: Site Name (if known):
County: Elevation (range if applicable):
Townrange and Section: TRS Comments:
UTM Zone: Northing: Easting:
Observed Feature: AREA: acres PLOT LENGTH: WIDTH: Conf: (Y N ?)
Directions: (driving and hiking directions)

Element Ranking Information

EORank: A B C D (Size+Condition+Landscape Context= predicted viability (e.g. big+not weedy+excellent surroundings= A"))

EORankCom:

Size: A B C D(How big is it now?)

Condition: A B C D (Quality of biotic and abiotic features/processes, stand maturity, species composition, stability of substrate, water quality, etc).

Condition - Wetland Functions:

Flood Attenuation and Storage (High, Moderate, Low):
Sediment/Shoreline Stabilization (High, Moderate, Low):
Groundwater Discharge (Yes, No):
Groundwater Recharge (Yes, No):
Dynamic Surface Water Storage (High, Moderate, Low):
Elemental Cycling (Normal, Disrupted):
Removal of Nutrients, Toxicants, and Sediments (High, Moderate, Low):
Habitat Diversity (High, Moderate, Low):
General Wildlife and Fish Habitat (High, Moderate, Low):
Production Export/Food Chain Support (High, Moderate, Low):
Uniqueness (High, Moderate, Low):
Overall Functional Integrity (At Potential, Below Potential):

Landscape Context: A B C D (Quality of biotic & abiotic factors/processes of surrounding landscape, structure, extent, condition(fragmentation, hydrologic manipulation, etc.))

Environmental Features

DL SOILS pH CONDUCTIVITY
PM LANDFORM PLOT POS SLP SHAPE ASP SLOPE %
ELEVATION EROS POTENT EROS TYPE
HORIZON ANGLE (%): N E S W IFSLP IFVAL
GROUND COVER: S+ G+ R+ L+ W+ M+ BV+ O = 100%
SPFE GROUND COVER DIST ANIMAL EVIDENCE

DISTURBANCE HISTORY (type, intensity, frequency, season)

RIPARIAN FEATURES: Channel Width Channel Entrech Surface H2O
Channel Depth Distance from H2O Valley Floor Gradient
Flood Plain Width Bed Material Wetland Type:

Management and Protection

Management Urgency: M1= immediate management need, M2= need w/in 5 years or loss, M3= need w/in 5 years or degrade, M4= future management need, M5= none needed) MgmtCom: (What management actions would help protect this occurrence?)

Protection Urgency: (P1 = protection actions needed immediately; P2 = protection actions may be needed within 5 years; P3 = Protection actions may be needed, but not within the next 5 years; P4 = no protection actions needed in future; P5 = land protection is complete) ProtCom: (Known or observed threats to occurrence)

Other Comments:

Owner (Private, USFS, BLM, etc.): OwnerCom: (special requests, permissions, circumstances)

DataSens: Y N (Does the landowner request confidentiality?) Photos: Y N (initials, roll #, frame #)

FORM III.

OCULAR PLANT SPECIES DATA

06/07/01

PLOT NO. _____ NO. SPECIES _____ PNC _____

TREES	Tot Cv _____	Mht _____		FORBS	Tot Cv _____	Mht _____	
	Tal Cv _____	Med Cv _____			Med Cv _____	Low Cv _____	
	Low Cv _____	Grd Cv _____	CC _____		Grd Cv _____		CC _____

T1 _____ / _____
 T2 _____ / _____
 T3 _____ / _____
 T4 _____ / _____
 T5 _____ / _____

F1 _____ / _____
 F2 _____ / _____
 F3 _____ / _____
 F4 _____ / _____
 F5 _____ / _____
 F6 _____ / _____
 F7 _____ / _____
 F8 _____ / _____
 F9 _____ / _____
 F10 _____ / _____
 F11 _____ / _____
 F12 _____ / _____
 F13 _____ / _____
 F14 _____ / _____
 F15 _____ / _____

SHRUBS

Tot Cv _____	Mht _____	
Tal Cv _____	Med Cv _____	
Low Cv _____	Grd Cv _____	CC _____

S1 _____ / _____
 S2 _____ / _____
 S3 _____ / _____
 S4 _____ / _____
 S5 _____ / _____
 S6 _____ / _____
 S7 _____ / _____
 S8 _____ / _____
 S9 _____ / _____
 S10 _____ / _____
 S11 _____ / _____
 S12 _____ / _____

GRAM

Tot Cv _____	Mht _____	
Med Cv _____	Low Cv _____	
Grd Cv _____		CC _____

G1 _____ / _____
 G2 _____ / _____
 G3 _____ / _____
 G4 _____ / _____
 G5 _____ / _____
 G6 _____ / _____
 G7 _____ / _____
 G8 _____ / _____
 G9 _____ / _____
 G10 _____ / _____
 G11 _____ / _____
 G12 _____ / _____

FERN Tot Cv _____ Mht _____ Med Cv _____
 Low Cv _____ Grd Cv _____
 BRYO/LICH Tot Cv _____

EO DATA: Community Description (vegetation structure e.g., canopy cover, height, density, spatial distribution, seral status, etc.)

GENERAL DESCRIPTION: (Environmental factors, water regime, adjacent vegetation, land form)

Idaho Natural Community Observation Report Form

Mail to:

**Idaho Conservation Data Center
Idaho Dept. of Fish and Game
600 S. Walnut
P.O. Box 25
Boise, ID 83702
(208) 334-3402**

For office use only

Source Code _____ Quad Code _____

Community Code _____ Occ# _____

Map Index # _____ Update Y ___ N ___

Please provide as much of the following information as you can. Attach a map (USGS 7.5 minute series preferred) showing the site's location and boundaries. If observation is based on a detailed survey, include a copy of plot data. A releve' form is available on the back of this sheet.

Scientific name: _____ Source: _____

Reporter: _____ Phone: _____

Affiliation and Address: _____

Date of Field Work: _____ County: _____

Directions: _____

Quad name: _____ T _____ R _____ 1/4 of _____ 1/4 sec _____

_____ T _____ R _____ 1/4 of _____ 1/4 sec _____

Elevation: _____ to _____ Aspect: _____ Slope (indicate % or °): _____ Stand area: _____

Owner (Private, USFS, BLM, etc.): _____

Overall Rank: A B C D Comments: _____

Size: A B C D Comments: _____

Onsite Condition: A B C D Comments: _____

Landscape Context: A B C D Comments: _____

Other Comments: _____

Management Comments: _____

Protection Comments: _____

General description of area (adjacent vegetation, substrate, soils, water regime, ecological processes): _____

Community Description/EO DATA (vegetation structure, canopy height, seral status): _____

Basis for report: Remote image _____ Binocular/Telescopic survey _____

Windshield survey _____ Brief walk-thru _____ Detailed survey _____ Other _____

Photo? _____ (Y/N) Data Sensitive? _____ (Y/N)

Continue by completing species list on the back or attaching plot survey form.

SPECIES LIST. In the space below, indicate each species cover % within the growth form categories:

<u>Trees</u>	<u>Shrubs</u>	<u>Herbs/Graminoids</u>

Is this a complete list____? or a partial species list____?

APPENDIX B.
GUIDELINES FOR ASSIGNING ELEMENT (SPECIES AND PLANT ASSOCIATION)
RANKS

Guidelines for assigning element (species and plant association) ranks. With the substitution of globally for statewide, this table can be used for global rankings.

S1	Critically imperiled statewide (typically five or fewer occurrences or less than five percent of native range currently occupied by high quality examples of type) or especially vulnerable to extirpation from the state.
S2	Imperiled statewide because of rarity (typically 6-20 occurrences or 6-25 percent of native range currently occupied by high quality occurrences of type) or especially vulnerable to extirpation from the state.
S3	Rare or uncommon statewide (typically 21-100 occurrences or 26-50 percent of native range currently occupied by high quality occurrences of type).
S4	Apparently secure statewide (many occurrences, 51-75 percent of native range currently occupied by high quality occurrences of type).
S5	Demonstrably secure statewide and essentially ineradicable under present conditions (76-100 percent of native range currently occupied by high quality examples of type).
SH	Of historical occurrence statewide, perhaps not verified in the last 20 years but suspected to still be extant.
SX	Extirpated statewide.
SE	Represents human induced community type (exotic) which has been so altered that pre-settlement condition cannot be assessed or the end result of successional processes will continue to be an altered type.
SP	Purported for state. Includes types which are formally described for adjacent states, but lack persuasive documentation (i.e., plot data) for recognition as a state type.
S#?	Rank followed by a ? indicates the assigned rank is inexact.
S?	Type not yet ranked statewide.
GQ	Synecologic status of type is unclear. Type based on classification work in a small geographical area, habitat descriptions, or field notes. Full recognition of type dependent on additional analysis.
UNK	Plant communities with ranks as UNK or state ranks blank represent types survey area whose conservation status needs to be analyzed prior to assigning a rank. This information (stand tables and community descriptions) is currently unavailable.

APPENDIX C

**SITE SUMMARIES FOR WETLANDS IN THE HIGH VALLEYS OF THE SALMON
RIVER**

BANNER CREEK FEN

Location:

Banner Creek Fen is located north of Bull Trout Lake, forming a subtle divide between the Warm Spring Creek and Banner Creek drainages. The fen is accessed via Forest Service Road 520 (Bull Trout Lake Road), which is well marked and leaving to the west of Highway 21, ca 1.5 miles north of Banner Summit. Follow Forest Service Road 520 for ca 1 mile. The area can be accessed on foot from numerous pullouts along this road.

Richness:

The wetlands at the headwaters of Banner Creek are in a broad glacial trough that includes remnant kettle ponds and permanently to semi-permanently saturated depressional and sloped emergent wetlands. These wetlands are predominantly sub-irrigated by toeslope seeps and springs. The fen forms the headwaters of Banner Creek at a subtle divide between it and Warm Spring Creek. The largest pond is in the northeast portion of the wetland complex. This pond is surrounded by a dense and wide stand of *Carex utriculata* (beaked sedge), with patchy *Carex limosa* (mud sedge) and *Menyanthes trifoliata* (buckbean) dominated areas intermixed. Shallow ponds that draw down by the end of the growing season may fill with near monocultures of *Eleocharis palustris* (common spikerush) or *Carex vesicaria* (inflated sedge), while deeper ponds support communities of *Nuphar polysepalum* (pond lily). *Carex utriculata* also rings other ponds and fills the majority of the meadows in the southern and western sections of the wetland. Patchy stands of low stature *Salix planifolia monica*/*Carex utriculata* (planeleaf willow/beaked sedge) commonly border, or are included within, these *Carex utriculata* meadows. In addition, large stands of *Salix wolfii* (Wolf's willow), with various sedges in the understory, occur in the western half of the site. Extensive and continuous areas of peatland habitat (concentrated in the center of the site) include a complex mosaic of *Scirpus cespitosus* (tufted bulrush) on broad, banded hummocks with *Eleocharis pauciflora* (few-flowered spikerush) and *Carex limosa* interspersed in wet swales. The *Scirpus cespitosus* dominated community is a very rare vegetation type that was previously only known in Idaho from the Sawtooth Valley. Within the fen, islands of conifers typically dominated by *Pinus contorta* (lodgepole pine) have an understory of *Vaccinium occidentale* (bog blueberry). The moister margins of these stands provide good habitat for the rare sedge *Carex buxbaumii* (Buxbaum's sedge). These conifer stands typically ring the fen but quickly transition to lodgepole-dominated upland communities on slopes. Other moist sites bordering the fen support willow dominated communities such as *Salix drummondiana*/*Calamagrostis canadensis* (Drummond's willow/bluejoint reedgrass) or patches dominated by *Salix commutata* (undergreen willow), *S. eastwoodiae* (Eastwood's willow), and *S. lemmonii* (Lemmon's willow) with sedge understories.

Rarity:

The fen supports one special status sedge species, *Carex buxbaumii*, and a suite of three co-occurring special status peatland plant communities, the *Carex limosa*, *Eleocharis pauciflora*, and *Scirpus cespitosus* communities. The fen supports a large diversity of characteristically peatland species including *Drosera anglica* (English sundew). *Carex livida* (pale sedge), another special status sedge is reported from nearby Bull Trout Lake based on

vegetative material. The fen also provides excellent ungulate foraging habitat and habitat for other wildlife species.

Condition:

Recreational use in the general area is high. This use is mostly confined to the south side of the road away from the wetland complex in the areas surrounding Bull Trout and Martin Lakes. The Kirkham Ridge Trail is present near the southern end of the peatland, paralleling Warm Spring Creek, but this does not impact wetland functions. The wetland complex likely gets some use from hunters, but impacts from this were not observed. Several dispersed campsites and secondary roads border the site, but motorized vehicles apparently do not enter the wetlands at this time. A yurt is placed ca 0.25 mile north of the Kirkham trail for winter use. No infestations of noxious weeds were observed. The total cover of exotic species is very low at the site.

Viability:

Surrounding area is used for wildlife watching, camping, winter cross-country skiing, hiking, hunting, and off-highway vehicle use. A road and trail are adjacent to the site.

Key Environmental Factors:

Wetlands are supported by groundwater emerging at springs and depressional areas including lakes.

Other Values:

The fen is scenic and provides recreation opportunities including wildlife watching, winter cross-country skiing, hiking, and hunting.

Conservation Intent:

This area should be established as a Research Natural Area. It is comparable in terms of plant species composition to the complex of wetlands included within the established Sawtooth Valley Peatlands RNA on the Sawtooth National Recreation Area. The wetland complex described here is much larger and has greater habitat diversity due in part to large areas of open water. No conflicts to establishing this area as a Research Natural Area were observed in spite of it being located close to a high use recreation area.

Management Needs:

The fen should be protected from any ground disturbing activities that may be proposed or occur currently including road building/drainage alteration, livestock grazing, and off-highway vehicle use. Any noxious weed infestations should be immediately controlled. Establishment as a RNA would be dependent on exclusion of livestock grazing and motor vehicles from the wetland.

Information Needs:

Nuphar polysepalum (pond lily) and *Menyanthes trifoliata* (buckbean) need to be surveyed by boat. Need to survey *Salix commutata*/*Carex scopulorum* (undergreen willow/Holm's Rocky Mountain sedge), *Salix eastwoodiae*/*C. utriculata* (Eastwood willow/bladder sedge), *Salix lemmonii*/*C. utriculata* (Lemmon's willow/bladder sedge), and *Abies*

lasiocarpa/Calamagrostis canadensis (subalpine fir/bluejoint reedgrass) communities to determine if occurrences are large enough to constitute an element occurrence record. Need to resurvey for *Carex livida* (pale sedge), which has been previously reported from the area.

Plant Association Occurrences:

<i>Carex limosa</i>	G3	S1
<i>Pinus contorta/Vaccinium occidentale</i>	G4	S2
<i>Carex utriculata</i>	G5	S4
<i>Nuphar polysepalum</i>	G5	S4
<i>Eleocharis palustris</i>	G5	S3
<i>Salix planifolia monica/Carex aquatilis-Carex utriculata</i>	G3Q	S3
<i>Eleocharis pauciflora</i>	G4	S1
<i>Scirpus cespitosus-Carex livida</i>	G1	S1
<i>Salix drummondiana/Calamagrostis canadensis</i>	G3	S2
<i>Carex vesicaria</i>	GU	S3
<i>Carex buxbaumii</i> community	G3	S1
<i>Carex luzulina</i>	GNR	S2?
<i>Hordeum brachyantherum</i>	G3	S1?
<i>Carex microptera</i>	G4	S3
<i>Deschampsia cespitosa</i>	G4	S3
<i>Salix wolfii/Deschampsia cespitosa</i>	G3	S2
<i>Carex simulata</i>	G4	S2

Rare Plant and Animal Occurrences:

<i>Gulo gulo luscus</i>	G4T4	S2
<i>Carex buxbaumii</i>	G5	S3

Author:

C. Murphy and M. Jankovsky-Jones

BULL MOOSE FEN

Location:

Bull Moose Fen is located in the Sawtooth Valley ca 7 air miles south of Stanley, Idaho. From Stanley, travel south ca 16 miles on Highway 75 to Forest Service Road 209. Travel west on Forest Service Road 209 ca 0.25 mile to the intersection of Forest Service Road 210 (Decker Flat Road) and Forest Service 315 (Hell Roaring Creek Road). Turn north and travel ca 4 miles on Decker Flat Road. Park just after the bridge that crosses Huckleberry Creek and walk up the small creek that drains Bull Moose Fen for ca 0.25 mile to reach the eastern edge of the RNA.

Richness:

Bull Moose Fen is a sloped wetland located between the moraines of Decker and Red Fish Lake creeks. Standing dead and live *Pinus contorta/Vaccinium occidentale* (lodgepole pine/blue huckleberry) are present throughout the fen. There is considerable variation in the understory species. *Vaccinium occidentale* is constant although other shrubs such as *Betula glandulosa* (bog birch), *Pentaphylloides floribunda* (shrubby cinquefoil), *Salix wolfii* (Wolf's willow), or *S. planifolia* (planeleaf willow) or graminoids including *Deschampsia cespitosa* (tufted hairgrass), *Carex utriculata* (bladder sedge), or *Calamagrostis canadensis* (bluejoint reedgrass) may be locally dominant. The southern arm of the fen has a high gradient (greater than a 5% slope). This area includes a peat terrace that is 20 to 30 feet higher than the adjacent fen and contains the source of spring fed rivulets that cascade down the face. In addition, the southern arm is more diverse and includes somewhat continuous stands of *Eleocharis pauciflora* (few-flowered spikerush) with lesser amounts of *Scirpus cespitosus* (tufted bulrush). *Carex utriculata* also creates large stands, but close inspection of most stands, reveals high cover of *Salix wolfii*, *S. planifolia*, and *Betula glandulosa*. Small patches of *Carex simulata* (short-beaked sedge) and *Deschampsia cespitosa* were also noted but considered inclusions within other communities. A small area of open water in an ancient beaver dam is present and its outlet supports a small stand of *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass). The northern arm of the fen also contains small patches of *Salix geyeriana*; but for the most part, it is dominated by *Pinus contorta/Vaccinium occidentale*.

Rarity:

Bull Moose Fen is a largely undisturbed high quality peatland complex. The spring creeks are important rearing areas for steelhead and Chinook salmon, and, in most years, provide a continual source of cool water throughout the growing season.

Condition:

Small amounts of *Poa pratensis* (Kentucky bluegrass), *Poa palustris* (fowl bluegrass), *Phleum pratense* (timothy), and *Taraxacum officinale* (common dandelion) were observed. Often the exotics were present in areas where ground was disturbed by beaver activity. The exotics do not appear to be problematic at the present time.

Viability:

Off-site considerations were not noted.

Key Environmental Factors:

The sloped wetland occurs in an area that is subirrigated by groundwater, which presumably originates as precipitation on porous glacial till upslope. The wetland sits in a small valley created by the moraines of Decker Creek and Red Fish Lake.

Other Values:

Conservation Intent:

The area is within an established Research Natural Area.

Management Needs:

Evidence of livestock use was noted just outside the southern and northern boundaries of the RNA. No sign was observed inside the RNA even though there are no real barriers to livestock entry.

Information Needs:

Plant community inventory is needed to verify element occurrences as well as surveys to identify the flora and fauna present.

Plant Association Occurrences:

<i>Pinus contorta/Vaccinium occidentale</i>	G4	S2
<i>Eleocharis pauciflora</i>	G4	S1
<i>Carex utriculata</i>	G5	S4
<i>Salix geyeriana/Calamagrostis canadensis</i>	G5	S4
<i>Salix wolfii/Carex utriculata</i>	G4	S4

Author:

M. Jankovsky-Jones

CHILCOOT PEAK

Location:

Chilcoot Peak proposed RNA is located in the Salmon River Mountains, on the divide between the Middle Fork and South Fork Salmon River drainages, about 54 miles (87.5 km) northeast of Cascade, Idaho. From Cascade, Idaho, at the intersection of State Route 55 and the Warm Lake Road, travel northwesterly on the Warm Lake Road for about 35 miles (56.7 km) to Landmark, Idaho. Take FS Road 447 and travel southeast then northeast for about 19 miles (30.8 km). At this point the road passes near the RNA's western boundary, about 1 mile (1.6 km) northwest of Chilcoot Pass. Park and walk easterly over the nearby ridge, cropping into the Chilcoot Peak Basin and the RNA. The lower elevation, northwestern portions of the RNA can be accessed by driving approximately 2 miles (3.2 km) further on FS Road 447 and following an unnamed side drainage into the RNA from where it crosses the road.

Richness:

Chilcoot Peak proposed RNA encompasses three subalpine, glaciated basins and intervening ridgeline habitats. The basins contain an unusually diverse assemblage of wetland and aquatic associations. Aquatic types include a lake, raised ponds with sphagnum, and low- to steep-gradient streams. The raised ponds are dominated by *Nuphar polysepalum*. Wetland associations are dominated by coniferous tree, shrub, and graminoid species, often occurring on sphagnum. Engelmann spruce (*Picea engelmannii*) occurs as small islands on the sphagnum mats, with Labrador tea (*Ledum glandulosum*) and western blueberry (*Vaccinium occidentale*) in the understory. Shrub communities include those dominated by Sitka alder (*Alnus sinuata*) and undergreen willow (*Salix commutata*). Graminoid associations include

water sedge (*Carex aquatilis*), beaked sedge (*Carex utriculata*), and few-flowered spike-rush (*Eleocharis pauciflora*). Dry subalpine fir (*Abies lasiocarpa*) and whitebark pine (*Pinus albicaulis*) associations dominate the uplands, with inclusions of cliff, talus, and rock outcrop habitats around Chilcoot Peak.

Rarity:

The site is within designated recovery habitat for gray wolf (*Canis lupus*). An occurrence for fisher (*Martes pennanti*), a Forest Service Region 4 Sensitive species and state Species of Special Concern, has been documented in the RNA. An occurrence for boreal owl, also a Forest Service Sensitive species and state Species of Special Concern, was documented within 2 miles of the RNA boundary.

Condition:

Chilcoot Peak is identified as a proposed RNA and is within Management Area 59 in the Boise National Forest Land and Resource Management Plan. Approximately 30% of the RNA is within the Frank Church-River of No Return Wilderness. The remainder of the RNA is within the Burnt Log Roadless Area. FS Trail 088 (Summit Trail) passes through the southern portion of the RNA near Chilcoot Pass. This trail is maintained. Forest Service road 440A is used primarily by hunters for access to the wilderness. The road is gated, but the gate is on the far side of the RNA. The portion of the site not with designated wilderness is part of the Sand Creek cattle grazing allotment. No exotic species populations have been reported for the area.

Viability:

The site is completely surrounded by Forest Service lands. The southeastern portion of the RNA occurs within the Frank Church-River of No Return Wilderness. The remainder of the RNA is bordered by Management Area 59. The area is managed for timber and range, with special attention to areas managed for anadromous fish and big game population.

Key Environmental Factors:

Other Values:

The site supports a diversity of undisturbed aquatic and wetland habitats, plus excellent representation of subalpine fir types, ranging from wet to dry sites. Watershed values of the site are high.

Conservation Intent:

RNA

Management Needs:

Firewood gathering occurs in areas to the north of the RNA. A sign along Forest Road 447 near where it passes the RNA's northwest corner could provide information concerning prohibition of firewood gathering in the RNA.

Information Needs:

Plant Association Occurrences:

<i>Pinus albicaulis</i> - <i>Abies lasiocarpa</i>	G5?	S3	
<i>Abies lasiocarpa</i> / <i>Caltha biflora</i>	G3?	S3	
<i>Abies lasiocarpa</i> / <i>Calamagrostis rubescens</i>	G4G5	SNA	
<i>Abies lasiocarpa</i> / <i>Luzula hitchcockii</i> , <i>Vaccinium scoparium</i> phase	G5	S5	
<i>Pseudotsuga menziesii</i> / <i>Carex geeyeri</i>	G4?	S4?	
<i>Abies lasiocarpa</i> / <i>Vaccinium scoparium</i>	G5	S5	
<i>Abies lasiocarpa</i> / <i>Calamagrostis canadensis</i> , <i>Calamagrostis canadensis</i> p		G5	S5
<i>Abies lasiocarpa</i> / <i>Luzula hitchcockii</i> , <i>Luzula hitchcockii</i> phase	G5	S5	
<i>Abies lasiocarpa</i> / <i>Streptopus amplexifolius</i>	G4	S4	
<i>Abies lasiocarpa</i> / <i>Menziesia ferruginea</i>	G5	S5	
<i>Abies lasiocarpa</i> / <i>Calamagrostis canadensis</i> , <i>Ligusticum canbyi</i> phase	G5	S5	
<i>Abies lasiocarpa</i> / <i>Calamagrostis canadensis</i> , <i>Ledum glandulosum</i> phase		G4	S2
<i>Abies lasiocarpa</i> / <i>Carex geeyeri</i>	G5	S5	
<i>Carex aquatilis</i>	G5	S4	
<i>Carex scopulorum</i>	G5	S3	
<i>Carex utriculata</i>	G5	S4	
<i>Eleocharis pauciflora</i>	G4	S1	
<i>Nuphar polysepalum</i>	G5	S4	
<i>Salix commutata</i> / <i>Carex scopulorum</i>	G3	S3	

Author:

J. H. Kaltenecker

DITCH CREEK MEADOWS

Location:

From Warm Lake, drive east over Warm Lake Summit to the Landmark area. Turn north on Forest Service Road 413 following Johnson Creek downstream. Drive ca 12 miles (or more) on this well maintained gravel road to the area between Coffee and Halfway creeks (just south of Halfway Station). Look for Forest Service Road 410 sign leading to west (left). Take this road to its end at a developed trailhead. It is mostly good quality but has several water bar/ruts on the last half requiring high clearance two-wheel drive or 4-wheel drive vehicle. One way to reach Ditch Creek Meadows site is to follow Road 410 to where it crosses Ditch Creek (a major drainage with outfitter campsites near crossing ca 4 miles). One can park here and walk cross-country through thick forest up Ditch Creek for ca 2 miles (a 1000-foot elevation gain). Alternatively, one can drive to the developed Rainbow Lake trailhead at the end of Forest Service Road 410 (ca 11 miles) and follow directions from Shell Rock Lake.

Richness:

Ditch Creek Meadows occupies the hanging glacial trough and rugged upper Ditch Creek watershed cirque/drainage basins. Surveys concentrated in the large subalpine meadow. This

meadow complex is approximately 1 mile long and includes several small to large ponds in the lower east end with aquatic *Nuphar polysepalum* and *Sparganium* communities and vast areas of emergent to moist *Carex utriculata* (beaked sedge) meadows. The plant species of special concern, *Carex buxbaumii* (Buxbaum's sedge), is found here. The central portion of the meadow is a mosaic of *Deschampsia cespitosa* (tufted hairgrass) and *Carex utriculata* and/or *C. aquatilis* (water sedge) meadow, with a large patch of *Eleocharis palustris* (common spikerush). This area is shallowly flooded ephemerally by spring snowmelt and moist to saturated into summer. The upper west end of the meadow is drier and dominated by a mosaic of *Deschampsia cespitosa*, *Danthonia intermedia* (timber oatgrass), and mesic forbs. This area is saturated early but dry to moist in summer. There are numerous sinuous water tracks (with *Carex* spp.) and channels (some deep, entrenched, narrow, and sand/gravel lined but dry) throughout the middle and upper meadow section. They eventually feed the narrow, entrenched, and sinuous perennial Ditch Creek, lined with natural levees of *Vaccinium occidentale/Calamagrostis canadensis* (bog blueberry/bluejoint reedgrass) and/or conifers. The low-lying meadow borders are mostly *Picea engelmannii* (Engelmann's spruce), *Abies lasiocarpa* (subalpine fir), and *Pinus contorta* (lodgepole pine)/*Vaccinium occidentale/Calamagrostis canadensis*; though *Vaccinium* drops out as you move away from the meadow and into riparian forest bottoms. The meadow lies in a large drainage basin formed by high granitic ridges, spires, and cliffs on the north, west, and south sides ranging from about 8200 to 8970 feet elevation. These slopes are unsurveyed but are typical subalpine forests on drought prone shallow granitic soils. There are shrubby avalanche tracks, dry grass/forb balds and scree slopes, *Pinus albicaulis* (whitebark pine) on ridges, and *Artemisia tridentata* var. *vaseyana* (mountain big sagebrush) patches (on south facing slopes). *Pseudotsuga menziesii* (Douglas fir) occupies southerly aspects. There are also several higher elevation wetland ponds and seeps in the upper watershed that were not surveyed. Habitat diversity is high and many ungulates use the area.

Rarity:

Carex buxbaumii, a special status plant species, is present.

Condition:

There is no current evidence of livestock grazing or any human alterations. No exotic species were noted

Viability:

Logging including post fire salvage and road building has occurred in the lower watersheds.

Key Environmental Factors:

Ditch Creek Meadows contains lower elevation subalpine wet meadow complex and riparian zones. The ungrazed wetlands are in a roadless area.

Other Values:

The area receives light recreational use, mainly hunting. Watershed stability is influenced by the extensive wetlands.

Conservation Intent:

Designation as a Special Interest Area - Botanical would be appropriate.

Management Needs:

Recreational use should be monitored and managed if necessary.

Information Needs:

Need to survey riparian zones and wetland seeps/ponds on upper elevation benches (Section 21, T17NR7E) and adjacent wet forest (Section 22).

Plant Association Occurrences:

<i>Eleocharis palustris</i>	G5	S3
<i>Nuphar polysepalum</i>	G5	S4
<i>Deschampsia cespitosa</i>	G4	S3
<i>Abies lasiocarpa/Calamagrostis canadensis</i>	G5	S3
<i>Carex aquatilis</i>	G5	S4
<i>Carex utriculata</i>	G5	S4

Author:

C. Murphy

MAYS CREEK FEN

Location:

Mays Creek Fen is located in the Sawtooth Valley between the moraines of Yellow Belly Lake and Hell Roaring Creek. From Stanley, Idaho, travel 16 miles south on State Highway 75. Travel west on Forest Service Road 209 ca 0.5 mile across the Salmon River to the intersections of Forest Service Road 210(Decker Flat Road) and 315 (Hell Roaring Creek Road). Turn west on Forest Service Road 210 for ca 1 mile to reach the northern side of the fens.

Richness:

Mays Creek Fen is located between the moraines of Yellow Belly Lake and Hell Roaring Creeks. The area includes the sloped wetlands associated with springs and the low gradient channel of Mays Creek. The fen includes tall *Salix geeyeriana* (Geyer's willow) dominated wetlands as Mays Creek enters the flat valley bottom. Semipermanently saturated mid-slopes of the wetland support a mosaic of *Scirpus cespitosus* (tufted bulrush), *Eleocharis pauciflora* (few-flowered spikerush), *Carex utriculata* (beaked sedge), *Salix planifolia* (planeleaf willow) and islands of *Pinus contorta* (lodgepole pine) with high cover of *Vaccinium occidentale* (blue huckleberry) and *Betula glandulosa* (bog birch) in the understory. Mays Creek enters a well-defined channel through well-drained wetlands dominated by *Salix wolfii* (Wolf's willow) and *Deschampsia cespitosa* (tufted hairgrass) at the lower end of the wetland

and near the eastern boundary of the RNA. Just outside this boundary, stands of *Artemisia cana* (silver sage) were also observed.

Rarity:

Mays Creek provides important rearing habitat for Chinook and steelhead salmon. The spring creeks provide a continual source of cool water throughout the growing season. The fen provides habitat for three plant species of concern including one of the known populations of *Drosera intermedia* (spoon-leaved sundew).

Condition:

No exotic species were noted which threaten the site's viability.

Viability:

Key Environmental Factors:

The sloped wetland occurs on areas that are subirrigated by springs with groundwater presumably originating as precipitation on the porous glacial till upslope. The fen occurs between the moraines of Yellow Belly Lake and Hell Roaring Creek.

Other Values:

Conservation Intent:

Mays Creek Fen is within the Sawtooth Valley Peatlands RNA boundaries.

Management Needs:

Information Needs:

Plant community inventory is needed to verify element occurrences as well as surveys to identify the flora and fauna present.

Plant Association Occurrences:

<i>Scirpus cespitosus-Carex livida</i>	G1	S1
<i>Pinus contorta/Calamagrostis canadensis</i>	G5	S5
<i>Salix planifolia monica/Carex aquatilis-Carex utriculata</i>	G3Q	S3
<i>Salix wolfii/Deschampsia cespitosa</i>	G3	S2
<i>Eleocharis pauciflora</i>	G4	S1
<i>Pinus contorta/Vaccinium occidentale</i>	G4	S2
<i>Salix geyeriana/Calamagrostis canadensis</i>	G5	S4

Rare Plant and Animal Occurrences

<i>Carex buxbaumii</i>	G5	S3
<i>Drosera intermedia</i>	G5	S1
<i>Helodium blandowii</i>	G5	S2
<i>Carex livida</i>	G5	S2
<i>Epilobium palustre</i>	G5	S3

Author:

M. Jankovsky-Jones

MUD LAKE, VALLEY COUNTY

Location:

Mud Lake is located ca 26 air miles east of Cascade, Idaho. From Warm Lake, travel east on Forest Road 22 to the intersection with Forest Road 579. Follow Forest Road 579 for ca 44 miles to the intersection with Forest Road 447. Turn right on Forest Road 447 and travel ca 3.5 miles to Mud Lake. The open water areas and meadow complexes are immediately east of the road and easily accessible.

Richness:

Mud Lake is a wetland complex in a broad glacial trough. The wetland extends for ca 1.5 miles across the low gradient valley bottom. At the southern end, a small outlet flows into Sand Creek. The wetland includes large areas of open water and emergent wetlands. Very small patches of *Salix* spp. (willows) are also present. Large areas of open water habitat with *Nuphar polysepalum* (yellow pondlily) are present in the central portion of the wetland. It is also in the central portion of the wetland where extensive Poor Fen peatlands are present. Water tracks within the Poor Fens are dominated by *Eleocharis pauciflora* (few-flowered spikerush). Areas of slightly higher ground are dominated by *Carex aquatilis* (water sedge) and *C. limosa* (mud sedge). *Carex lasiocarpa* (woollyfruit sedge) occurs in very small patches. Much of the remaining wetland is dominated by extensive stands of *Carex utriculata* (beaked sedge). Of special note are kettle ponds (sylvan pools) that are isolated from the main wetland by moraines on the southern end of the site. The kettle ponds are ca 10 to 25 meters across with some supporting open water through most of the growing season; however, most support swards of *Carex utriculata* or *C. vesicaria* (inflated sedge).

Rarity:

Mud Lake includes extensive Poor Fen habitat including the rare *Carex limosa* plant association and a population of *Scheuchzeria palustris*, a species of special concern.

Condition:

The area is currently used by hunters and anglers. Near the main campsite, areas of bare ground are present on lake margins where shore stabilizing species have been eliminated. Boards and logs have been placed on peat mat and some areas appear to have reduced plant cover due to trampling. No exotic species were noted.

Viability:

Grazing occurs in Sand Creek drainage, but Mud Lake and associated meadows appear to be fenced off.

Key Environmental Factors:

Mud Lake is in a broad glacial trough with kettle ponds on the southern end. The wetland complex has a small inlet. Most of the water is from a groundwater source. Beavers are present and active in ponds and channels.

Other Values:

Hunting, fishing, and general recreational use is moderate.

Conservation Intent:

Designation as a Special Interest Area-Botanical is appropriate.

Management Needs:

Need to continue to keep livestock out and monitor human use. Permanent monitoring needs to be set up within sensitive fen habitat to determine changes in water quality and plant species composition.

Information Needs:

Need to contact Forest Service for current management information.

Plant Association Occurrences:

<i>Carex utriculata</i>	G5	S4
<i>Carex aquatilis</i>	G5	S4
<i>Carex lasiocarpa</i>	G4	S2
<i>Eleocharis pauciflora</i>	G4	S1
<i>Juncus balticus</i>	G5	S5
<i>Nuphar polysepalum</i>	G5	S4
<i>Carex limosa</i>	G3	S1
<i>Salix wolfii/Carex aquatilis</i>	G4	S4
<i>Carex vesicaria</i>	GU	S3

Rare Plant and Animal Occurrences:

<i>Scheuchzeria palustris</i>	G5	S2
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Author:

M. Jankovsky-Jones

POKER MEADOWS

Location:

From Lowman, take Idaho Highway 21 toward Stanley. About 3 plus miles north of Banner Summit, take the road to Bear Valley (Forest Service Road 579) north for ca 9 miles to Bruce Meadows Rest Area in Bear Valley. Turn north on Dagger Falls Road (FS 568) and go ca 1.5

miles to Poker Meadows. Poker Meadows is the large wet meadow complex along Poker and Chip creeks located on the west side of the road.

Richness:

Poker Meadows was formed on granitic Quaternary glacial outwash deposits within the broad, low gradient valleys of Bear Valley Creek and Elk Creek basins. The ecologic and hydrologic systems in this broad valley are complex. Overland snowmelt runoff, sinuous perennial streams, intermittent and ephemeral drainages, vernal pool-like ponds and depressions, toeslope seeps and springs, and valley bottom upwellings all feed the wet meadows. In addition, both gravelly well-drained soils and poorly-drained loamy and peat soils occur in close proximity to each other. This mix of environmental factors combined with cold air drainage in this high elevation montane valley results in a distinctive ecological system composed of a diverse mix of both widespread and globally rare plant associations. One plant, *Erythronium grandiflorum* var. *nudipetalum* (Bear Valley fawn-lily), is endemic to the meadows in the Bear Valley region, which includes Poker Meadows.

Poker and Chip creeks enter Poker Meadows in its west half and nearly meet within a large, spring-fed wetland complex in the southwest quarter of the meadows and both leave the meadow in the south-central part of the meadow. Both creeks are intermittent streams draining low mountains to the north and eventually become narrow, deep, and sinuous perennial streams after gaining significant inflow from toeslope seeps, springs, and upwellings within Poker Meadows. Several intermittent drainages carry snowmelt runoff from the eastern half of the meadows and eventually drain into the same wetland complex as Poker Creek. All drainages cut through a low bluff as they enter the Bear Valley Creek floodplain immediately below the meadows.

Forming meadows that nearly ring the wetland complex along Poker and Chip creeks, *Danthonia intermedia* (timber oatgrass) is the most conspicuous plant in the area. Nearly the whole eastern two-thirds of Poker Meadows is comprised of a vast *D. intermedia* meadow on ephemerally moist sandy-gravelly loam with moister swales dominated by *Deschampsia cespitosa* (tufted hairgrass). A similar but narrower meadow complex occurs on the west side of Chip Creek between the *Salix wolfii* (Wolf's willow) wetlands and the forested toeslopes. Occurring on both drier soils than *D. intermedia* as well as on ephemerally moist swales adjacent to *D. cespitosa* stands, transitional meadows are co-dominated by forbs including *Aster integrifolius* (meadow aster) and *Penstemon globosus* (globe penstemon). These meadows have relatively high cover of less palatable forbs and probably represent degraded (overgrazed) *Aster integrifolius/Festuca idahoensis* (meadow aster-Idaho fescue) and/or *D. cespitosa* stands. Along ephemerally moist swales in the south-central portion of the meadow, *Juncus balticus* (Baltic rush) dominates distinct stringer communities with small patch inclusions of *Carex aquatilis* (water sedge). *Deschampsia danthonioides* (annual hairgrass), *Hordeum brachyantherum* (meadow barley), and/or *Carex* spp. (sedges) occur on gravel and sand in intermittent drainages. On well-drained soil between *J. balticus* and Bear Valley Creek floodplain, *Potentilla fruticosa* (shrubby cinquefoil) forms an open shrub canopy over a *D. intermedia* understory.

Well-drained sandy/gravelly loam along meadow margins typically supports patchy A.

integrifolius/*F. idahoensis* or *Artemisia tridentata* ssp. *vaseyana*/*Festuca idahoensis*-*Carex filifolia* (mountain big sagebrush/Idaho fescue-sheepwool sedge) stands. These stands quickly change to both burned and unburned forests dominated by *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce), and/or *Pinus contorta* (lodgepole pine). *Calamagrostis canadensis* (bluejoint reedgrass) dominates the forest understory on moist toeslope soils. Seeps within forests support patches dominated by *Carex luzulina* (woodrush sedge) or *Carex cusickii* (Cusick's sedge) with gaps dominated by low *Salix* spp. (willows) including *S. wolfii*, *S. tweedyi* (Tweedy's willow), *S. eastwoodiae* (Eastwood willow), and *S. planifolia* var. *monica* (planeleaf willow).

As Poker and Chip creeks enter Poker Meadows, seeps and springs provide ample moisture so that *S. wolfii* often with a mixed understory of *D. cespitosa*, *Carex* spp. and mesic herbs becomes dominant on terraces and adjacent moist ground. Along Poker Creek, more springs arise feeding a gently sloped fen with organic soils that are shallowly flooded all year. A mosaic of *Carex utriculata* (bladder sedge) dominated and *Carex simulata* (short-beaked sedge) dominated stands with scattered *S. planifolia* var. *monica* around the margins characterizes the fen. Several small spring channels, which are separated by low mossy hummocks, eventually consolidate into a sinuous deep channel with stable *C. utriculata* banks. Stringer stands of *S. wolfii* with a mixed *C. aquatilis* and *C. utriculata* understory borders the fen on seasonally flooded soil. A similar *S. wolfii* community forms a wide stringer along Chip Creek.

Rarity:

Several special status plant associations are present. State rare wildlife species including gray wolf and great gray owl have been observed in the area.

Condition:

With the exception of an improved gravel road along the east side, the area around Poker Meadows is mostly undeveloped. At least one dispersed campsite with a 2-track dirt access road occurs just outside the site, reflecting the primary land use in the area today. Few exotic species are present, each with low cover. *Agrostis stolonifera* (creeping bentgrass), *Poa pratensis* (Kentucky bluegrass), and *Bromus inermis* (smooth brome) were observed in mesic graminoid meadows. An *Agropyron* sp. (wheatgrass) was possibly seeded in drier meadows on soil disturbed by overgrazing or livestock bedding.

Viability:

The general Bear Valley area has a high density of roads including several improved gravel roads, pack trails, and both developed and dispersed camping areas. A maintained airstrip and day-use facility is located in Bruce Meadows. The presence of roads can influence the hydrologic patterns through ditch construction, forcing small streams through culverts, and disturbing riparian vegetation and streamflow patterns at bridge crossings. Campsites occasionally impact the drier margins of the meadows as well as stream bank vegetation; although, no campsites occur within Poker Meadows. Major placer mining operations occurred in the upper Bear Valley Creek basin. There is no private land in the lower Bear Valley Creek basin. Extensive wildfires burnt large sections of the Elk Creek and Bear Valley Creek basins during the 1980's. Except for some moist draws, the majority of the

slopes surrounding Poker Meadows to the west and north were heavily burnt. Outside the wilderness, several small-scale logging projects and post-fire salvage logging have occurred in the area.

Key Environmental Factors:

Poker Meadows consists of springs and seeps, carrs, intermittent drainages and perennial streams, an extensive wet meadow complex in a broad, high elevation montane valley with cold air drainage and glacial outwash derived soils.

Other Values:

The meadows provide exceptional forage and cover for sandhill cranes, elk, small mammals, raptors, and other wildlife species. The scenic meadows provide excellent opportunities and access for hunting, wildlife and bird watching, hiking and camping, and other forms of non-motorized recreation and solitude.

Conservation Intent:

With the exception of Forest Service Road 568 right-of-way corridor along the eastern edge of Poker Meadows, the entire site is protected within the Frank Church-River of No Return Wilderness. The livestock grazing allotments have been retired.

Management Needs:

Since cattle grazing allotments ended, there is a need to monitor the vegetation succession and riparian conditions.

Information Needs:

Specific information on the aquatic diversity within Poker and Chip creeks needs to be obtained. The upland vegetation and the spring in the northeast portion of the meadow need to be surveyed. Meadow margin communities including *Abies lasiocarpa/Calamagrostis canadensis* and *Aster integrifolius/Festuca idahoensis* need data collection.

Plant Association Occurrences:

<i>Abies lasiocarpa/Calamagrostis canadensis</i>	G5	S3
<i>Carex simulata</i>	G4	S2
<i>Carex utriculata</i>	G5	S4
<i>Deschampsia cespitosa</i>	G4	S3
<i>Juncus balticus</i>	G5	S5
<i>Potentilla fruticosa/Danthonia intermedia</i>	GNR	S3
<i>Salix wolfii/Carex utriculata</i>	G4	S4
<i>Aster integrifolius/Festuca idahoensis</i>	GNR	S3

Rare Plant and Animal Occurrences:

<i>Gulo gulo luscus</i>	G4T4	S2
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Author:

C. Murphy

TULE LAKE

Location:

Tule Lake is located ca 1 mile southwest of Warm Lake and ca 0.5 mile east of the South Fork Salmon River. Go north on Highway 55 ca 1 mile from the Cascade Ranger Station; turn east (right) on Forest Highway 22 towards Warm Lake. Travel ca 22 miles northeast on Forest Highway 22 to Forest Road 474. Turn south (right) on Forest Road 474 and travel ca 2.5 miles to the intersection with Forest Roads 470 and 427. Turn left on Forest Road 427 and travel ca 0.1 mile to the Tule Lake turnoff. Take the Tule Lake turnoff and go to the end of this road. Trail begins at the end of the road; hike ca 0.25 miles to the lake. There is a parking/camp area near the end of the road.

Richness:

Tule Lake includes a 15-acre kettle pond and associated wetlands. The wetlands surrounding Tule Lake include stands of *Carex lasiocarpa* (slender sedge), *C. aquatilis* (water sedge), *C. utriculata* (beaked sedge), *Eleocharis pauciflora* (few-flowered spikerush), and *Juncus balticus* (Baltic rush) on a wet to dry gradient. Poor fen habitat is present on the margins of the lake and on islands. Just northeast of Tule Lake an extensive area of temporarily flooded forested and emergent habitat is present. The forests are early seral stands of the *Picea engelmannii*/*Calamagrostis canadensis* (Engelmann's spruce/bluejoint reedgrass) plant association currently dominated by *Pinus ponderosa* (ponderosa pine). Emergent wetlands include vast areas of *Deschampsia cespitosa* (tufted hairgrass).

Rarity:

Tule Lake provides habitat for several plant species of special concern including *Carex buxbaumii* (Buxbaum's sedge), *Scheuchzeria palustris* (pod grass), *Carex livida* (pale sedge), and *Rhynchospora alba* (white beakrush).

Condition:

Area gets moderate recreation use. No exotics were noted.

Viability:

Local hydrology may be influenced by logging and road building activities in the watershed.

Key Environmental Factors:

The hydrology of the wetlands is groundwater driven.

Other Values:

Tule Lake is a trophy trout fishery that receives moderate recreation use.

Conservation Intent:

Designation as Special Interest Area - Botanical would be appropriate.

Management Needs:

Recreational use should be monitored and managed if necessary.

Information Needs:

No information needs were identified.

Plant Association Occurrences:

<i>Picea engelmannii/Calamagrostis canadensis</i>	G4	S4
<i>Carex utriculata</i>	G5	S4
<i>Juncus balticus</i>	G5	S5
<i>Eleocharis pauciflora</i>	G4	S1
<i>Carex lasiocarpa</i>	G4	S2
<i>Deschampsia cespitosa</i>	G4	S3

Rare Plant and Animal Occurrences:

<i>Carex livida</i>	G5	S2
<i>Rhynchospora alba</i>	G5	S2
<i>Scheuchzeria palustris</i>	G5	S2
<i>Carex buxbaumii</i>	G5	S3

Author:

M. Jankovsky-Jones

WARDENHOFF MEADOWS

Location:

To reach Wardenhoff Meadows from Warm Lake, drive east over Warm Lake Summit to the Landmark area. Turn north on Forest Service Road 413 following Johnson Creek downstream. Drive ca 12 miles (or more) on this well maintained gravel road to the area between Coffee and Halfway creeks (just south of Halfway Station). Look for Forest Service Road 410 sign leading west (left). Drive to the developed Rainbow Lake trailhead at the end of Forest Service Road 410 (ca 11 miles). Follow the Idaho Centennial Trail (093) north from the Rainbow Lake Trail (094) for ca 1.0 mile (the first 0.75 mile through thick forest, the last 0.25 mile in burned forest) as it drops to a low saddle. From this saddle, follow the drainage downhill (dropping about 500 feet in ca a mile) to Wardenhoff Meadows. Alternatively, from Forest Road 410 and the trailhead to Rainbow Lake, walk due north cross-country through forest for ca 1.0 mile, contouring at about 7550 feet to the hydrologic divide and then dropping steeply 500 feet to Wardenhoff Meadows.

Richness:

Wardenhoff Meadows are a picturesque glacial-trough valley filled with wet meadows and surrounded by a mosaic of burned and forested slopes. The defining feature is the vast wet meadow fed by springs and seeps on the upper watershed slopes. The upper quarter of the

meadow consists of patchy mixed conifers, mostly *Picea engelmannii* (Engelmann's spruce) with various amounts of *Abies lasiocarpa* (subalpine fir) and *Pinus contorta* (lodgepole pine) with a thick *Calamagrostis canadensis* (bluejoint reedgrass) understory. This open wetland forest community is found throughout the area in riparian zones and ringing the meadow. In the lower meadow, there is considerable *Vaccinium occidentale* (bog blueberry) present in the understory. The middle third of the meadow is mostly slightly drier with *Deschampsia cespitosa* (tufted hairgrass) communities occupying areas that are shallowly flooded or saturated only during snow melt runoff. On saturated soil, *Deschampsia cespitosa* grades into a mosaic with *Carex utriculata* (beaked sedge). A small *Juncus balticus* (Baltic rush) patch occurs on seepy ground. *Carex utriculata*, with *Carex aquatilis* (water sedge) inclusions, is very common in the lower half of the meadow where soils are moist to saturated all year. There are also several large patches of the low willow, *Salix planifolia* var. *monica* (planeleaf willow), occurring on wetter sites with *Carex utriculata* in the lower meadow and with *Carex scopulorum* (mountain sedge) in the upper meadow. Wardenhoff Creek is a narrow, sinuous, and entrenched stream often lined with patches of conifer, *Calamagrostis canadensis*, and *Vaccinium occidentale*. The wet meadows are ungrazed by livestock and in excellent condition. The upland forests are typical montane to subalpine habitat types dominated by *Pinus contorta* with significant *Abies lasiocarpa* and *Picea engelmannii* present on most slopes. However, the southerly facing slopes are *Pseudotsuga menziesii* (Douglas fir). In the 1990's, most of the forest on the north and south slopes was burned. These upland forest types were not surveyed. Overall, the area is excellent wildlife habitat for elk, moose, black bear (observed), spotted frogs, and songbirds.

Rarity:

The area has intact wetland plant communities.

Condition:

Recreational use, including hunting, is minimal. There is no current evidence of livestock grazing or any human alterations. A few trees have been cut down at the perimeter of burned areas. No exotic species were noted.

Viability:

Logging including post fire salvage and road building has occurred in the lower watershed.

Key Environmental Factors:

Wardenhoff Meadows consists of a low elevation, subalpine meadow complex, seeps, and riparian zones. The ungrazed wetlands occur in a roadless area.

Other Values:

The area is excellent ungulate, black bear (observed), and other wildlife habitat. Recreational use includes hunting.

Conservation Intent:

Designation as a Special Interest Area - Botanical or Wilderness Area would be appropriate.

Management Needs:

No current needs were noted.

Information Needs:

Need to survey the upland subalpine and montane forests, the riparian zones, the adjacent wet meadows to the north in Section 1, T17NR7E, and the watersheds of Caton and Wardenhoff creeks.

Plant Association Occurrences:

<i>Carex aquatilis</i>	G5	S4
<i>Carex utriculata</i>	G5	S4
<i>Abies lasiocarpa/Calamagrostis canadensis</i>	G5	S3
<i>Deschampsia cespitosa</i>	G4	S3
<i>Salix planifolia monica/Carex aquatilis-Carex utriculata</i>	G3Q	S3
<i>Salix planifolia monica/Carex scopulorum</i>	G4	S3

Author:

C. Murphy

WARM LAKE

Location:

Warm Lake is ca 26 miles east of Cascade, Idaho. Go north on Highway 55 ca 1 mile from the Cascade Ranger Station; turn east (right) on Forest Service Road 22 (Warm Lake Road) to Warm Lake. Peatlands are best developed on the southern tip of the lake. Wetlands are also present on the east side of the lake.

Richness:

Warm Lake is a large glacial lake in the South Fork Salmon River drainage in the west-central mountains of Idaho. The area is between the Salmon River Mountains to the west and the North Fork Mountains to the east. Warm Lake includes a mosaic of emergent, open water, and forested wetlands with lesser amounts of scrub-shrub wetlands. Forested wetlands are mostly dominated by *Pinus contorta/Calamagrostis canadensis* (lodgepole pine/bluejoint reedgrass). Stands of the shrub *Betula glandulosa* (bog birch) dominate scrub-shrub habitat east of Warm Lake and occur as small patches within forested wetlands. Emergent wetlands include *Nuphar polysepalum* (pond lily) in shallow water. On the south shore extensive emergent wetlands are present that include stands of *Carex lasiocarpa* (slender sedge), *Carex utriculata* (beaked sedge), and *Carex aquatilis* (water sedge). Warm Lake includes an extensive area of Poor Fen habitat. This unique habitat is characterized by high cover of *Sphagnum* spp. and sparse cover of vascular plants that are adapted to the nutrient poor organic soils. This includes the carnivorous plant *Drosera anglica* (English sundew) as well as the species of special concern *Scheuchzeria palustris* (pod grass). The Poor Fen has microtopography consisting of hummocks and swales (water tracks). The hummocks usually

support the previously mentioned *Carex* spp. and water tracks support stems of *Carex limosa* (mud sedge), and *Eleocharis pauciflora* (few-flowered spikerush).

Rarity:

An extensive Poor Fen is found on the south shore. The special status plant species *Cicuta bulbifera* (bulb-bearing waterhemlock), *Scheuchzeria palustris* (pod grass), and *Scirpus subterminalis* (water clubrush) are found here.

Condition:

The area is mostly used for recreation. Summer homes are present on the west side of the lake. On the south shore, development is limited to two summer homes near the Poor Fen and at least one boat dock has been cut into the peat mat. The area along the south shore gets occasional use by hunters and anglers. No exotics were noted that threaten wetland habitat.

Viability:

Water quality may be impacted by nutrient inputs from homes and summer camps. Sediment may also enter from roads and logging via Warm Lake Creek.

Key Environmental Factors:

Other Values:

The area is habitat for moose, black bear, geese, osprey, deer, grebes, and other waterfowl. The grebes create floating nests on the pond lilies on the southern shore.

Conservation Intent:

Establishment as a Research Natural Area is appropriate for the peatlands with a buffer on the south shore of the lake. The Research Natural Area could be within a larger Special Interest Area Botanical that includes wetlands on the east side of the lake as well as the Tule Lake area.

Management Needs:

Sediment traps in place along roads on the north shore should be maintained. Permanent monitoring of water chemistry and peatland communities should be established. Impacts to peat mats (in particular, establishment of exotic species) from boat docks should also be monitored.

Information Needs:

The drier meadows in the northwest quarter of Section 18 (T15N R7E) need to be surveyed.

Plant Association Occurrences:

<i>Nuphar polysepalum</i>	G5	S4
<i>Carex lasiocarpa</i>	G4	S2
<i>Carex aquatilis</i>	G5	S4
<i>Carex utriculata</i>	G5	S4
<i>Picea engelmannii/Calamagrostis canadensis</i>	G4	S4
<i>Juncus balticus</i>	G5	S5
<i>Betula glandulosa/Carex utriculata</i>	G4?	S3

Rare Plant and Animal Occurrences:

<i>Bufo boreas</i>	G4	S4
<i>Scheuchzeria palustris</i>	G5	S2
<i>Schoenoplectus subterminalis</i>	G4G5	S3
<i>Cicuta bulbifera</i>	G5	S2
<i>Carex buxbaumii</i>	G5	S3
<i>Haliaeetus leucocephalus</i>	G4	S3B/S4N
Author:		
M. Jankovsky-Jones		

AYERS MEADOW

Location:

From Lowman, take Idaho Highway 21 toward Stanley. At ca 3 miles north of Banner Summit, take Bear Valley Road (Forest Service Road 579) north for ca 9 miles to Bruce Meadows Rest Area in Bear Valley. Turn north on Dagger Falls Road (FSR 568) and go ca 2.5 miles to Ayers Meadow. Ayers Meadow is the large wet meadow complex along Ayers Creek, located on the east side of the road.

Richness:

Ayers Meadow is a large wet-meadow complex formed on granitic Quaternary glacial outwash deposits within the broad, low gradient valley of Bear Valley Creek basin. The ecologic and hydrologic systems in the broad valley are complex. Overland snowmelt runoff, sinuous perennial streams, intermittent and ephemeral drainages, vernal pool-like ponds and depressions, toeslope seeps and springs, and valley bottom upwellings all feed these wet meadows. In addition, both gravelly well-drained soils and poorly-drained loamy and peat soils occur in close proximity to each other. This mix of environmental factors combined with cold air drainage in these high elevation montane valleys, results in a distinctive ecological system composed of a diverse mix of both widespread and globally rare plant associations. *Erythronium grandiflorum* var. *nudipetalum* (Bear Valley fawn-lily), a plant endemic to the Bear Valley region, occurs in Ayers Meadow. The meadows provide excellent forage opportunities for a variety of wildlife and bird species including sandhill cranes, elk, and small mammals. Predators including raptors, wolverine, and reintroduced gray wolves also utilize these diverse meadows.

Ayers Meadow is mainly fed by Ayers Creek, which originates in the hills to the northwest along with a series of upwelling springs in the northwestern portion of the meadow. Numerous intermittent drainages carrying snowmelt from the west slopes of Blue Bunch Mountain and several toeslope seeps feed the eastern half of the meadow. Ayers Creek, a narrow and sinuous perennial stream, flows through drier meadow habitats along the southwestern margin of the area and drains Ayers Meadow at its south end through a gap between low hills. Small patches of *Salix lemmonii/mesic graminoid* (Lemmon's

willow/mesic grasses) association occur on terraces and banks of the creek but are rare elsewhere in the meadow. Overall, the meadow has gently undulating terrain with variable, edaphically controlled soil moisture regimes. As a result, the wettest areas do not always correspond to swales or the driest areas to hummocks. Low-lying ground in the northeastern and central portions of the meadow support extensive stands of *Salix wolfii/Deschampsia cespitosa* (Wolf's willow/tufted hairgrass), which also extend onto higher elevation toeslopes along the east-central and southeast portions of meadow where the sub-irrigation regime and soil types are probably similar. A few adjacent toeslopes that are slightly above the *S. wolfii/D. cespitosa* stands appear to have different moisture regimes and soils. These areas sometimes have more *Carex aquatilis* (water sedge) in the understory. In the central portion of the meadow, patchy *Betula glandulosa-Lonicera caerulea/Senecio pseudolaureus* (bog birch-bluefly honeysuckle/streambank butterweed) stands occur on peaty hummocks.

Extensive stands of *Salix planifolia* var. *monica/Carex aquatilis-Carex utriculata* (planeleaf willow/water sedge-bladder sedge) dominate permanently, shallowly flooded organic soils fed by upwelling springs along Ayers Creek in the northwestern portion of the meadow. Small patch inclusions dominated by either *C. utriculata* or *Carex simulata* (short-beaked sedge) occur within the open *Salix planifolia* var. *monica* stands. *Carex utriculata* is widespread but rarely the only dominant species in meadow communities. *Salix wolfii* and an understory dominated by *C. aquatilis* ring the spring-fed areas on permanently moist but not flooded soil. The *S. wolfii/C. aquatilis* stands transition into the slightly drier and more widespread *S. wolfii/D. cespitosa* association. Several small vernal and perennial ponds occur on the west side of the meadow. *Carex vesicaria* (blister sedge) forms dense swards ringing these pools.

Extensive grassy meadows form the margins of the meadow complex immediately below *Pinus contorta* (lodgepole pine) dominated forests on adjacent hill and mountain slopes. Stands of degraded *Aster integrifolius-Festuca idahoensis* (meadow aster/Idaho fescue) are common on well-drained sandy and gravelly soils along both the western and eastern upper toeslopes and drier areas in Ayers Meadow. This association is habitat for the endemic plant *E. grandiflorum* var. *nudipetalum*. Small inclusions of *Artemisia tridentata* ssp. *vaseyana* (mountain big sagebrush) and *P. contorta* are sometimes present, as well as patches apparently seeded with exotic hay grass. Down slope, along the western and southwestern part of Ayers Meadow, the toeslopes become gentler, soil moisture increases, and the topography becomes undulating. Extensive patches of *Danthonia intermedia* (timber oat) meadow quickly replace the *A. integrifolius-F. idahoensis* meadow on well-drained flats and hummocks. Between *D. intermedia* dominated areas, less well-drained soil in concave and low-lying areas rapidly becomes dominated by *D. caespitosa* and/or *S. wolfii*. In the south-central portion of the meadow, *D. caespitosa* stands grade into areas co-dominated by *Juncus balticus* (Baltic rush) and/or *C. aquatilis*.

Rarity:

Several special status plant associations are present. State rare wildlife species including gray wolf, wolverine, and great gray owl have been observed in the area.

Condition:

With the exception of an improved gravel road along the west side, the area around Ayers Meadow is mostly undeveloped. Two dispersed campsites with 2-track dirt access roads occur on the margin of the meadow, reflecting the primary land use in the area today. Several hiking/pack trails also cross the edges of the site. Very few exotic species were observed within the meadow. Patchy *Alopecurus pratensis*, an exotic hay grass, was probably seeded on soils damaged by sheep or cattle overgrazing and bedding. It is the most common exotic species, but it is not likely to invade native plant communities. *Agropyron smithii* (western wheatgrass), a cultivar of the native grass, was also possibly seeded into dry meadow communities. *Rumex crispus* (curly dock) is also present.

Viability:

The general Bear Valley area is heavily roaded with several improved gravel roads, pack trails, and both developed and dispersed camping areas. A maintained airstrip and day-use facilities occur in Bruce Meadows. Major placer mining operations occurred in upper Bear Valley Creek basin. There is no private land in lower Bear Valley Creek basin. Extensive wildfires burnt large sections of Elk Creek and Bear Valley Creek basins during the 1980's, but the slopes around Ayers Meadow are mostly unburned. Several small-scale logging projects and post-fire salvage logging have occurred in the area.

Key Environmental Factors:

Ayers Meadow consists of carrs, springs and seeps, ponds and vernal pools, intermittent drainages, headwaters of a perennial creek and an extensive wet meadow complex in a broad, high elevation montane valley with cold air drainage and glacial outwash derived soils.

Other Values:

Ayers Meadow provides exceptional forage and cover for sandhill cranes, elk, small mammals, raptors, and other wildlife species. The scenic meadows provide excellent opportunities for hunting, wildlife and bird watching, hiking, camping, and other forms of non-motorized recreation and solitude.

Conservation Intent:

With the exception of Forest Service Road 568 right-of-way corridor and the corridor around a spur road leaving FSR568 to the east to dispersed campsites on the west side of Ayers Creek, Ayers Meadow is protected within the Frank Church-River of No Return Wilderness.

Management Needs:

Monitoring of vegetation succession and riparian conditions after the elimination of cattle grazing should be conducted.

Information Needs:

The upland vegetation and Ayers Creek drainage on the west side of Forest Service Road 568 need to be surveyed. *Salix lemmonii/mesic graminoid* (Lemmon's willow/mesic grasses) stands located downstream along the creek need to be sampled. Data collection in drier meadow communities including *Aster integrifolius-Festuca idahoensis* communities is needed. Specific information on wildlife and aquatic diversity should be obtained.

Information on the aquatic diversity within Ayers Creek needs to be obtained. The exact date of grazing allotment retirement is needed.

Plant Association Occurrences:

<i>Aster integrifolius/Festuca idahoensis</i>	GNR	S3
<i>Betula glandulosa-Lonicera caerulea/Senecio pseud aureus</i>	GQ	S3
<i>Carex aquatilis</i>	G5	S4
<i>Carex vesicaria</i>	GU	S3
<i>Salix lemmonii</i>	GU	SU
<i>Salix wolfii/Carex microptera</i>	G3	S3
<i>Salix planifolia monica/Carex aquatilis-Carex utriculata</i>	G3Q	S3
<i>Salix wolfii/Deschampsia cespitosa</i>	G3	S2
<i>Salix wolfii/Carex aquatilis</i>	G4	S4
<i>Festuca idahoensis-Danthonia intermedia-Carex</i>	GNR	SNR
<i>Deschampsia cespitosa</i>	G4	S3

Rare Plant and Animal Occurrences:

<i>Helodium blandowii</i>	G5	S2
<i>Strix nebulosa</i>	G5	S3

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BEAR VALLEY CREEK HEADWATERS

Location:

From Lowman and Highway 21, take Forest Service Road 582 (Clear Creek Road) toward Bear Valley for ca 16 miles to Clear Creek Summit. Continue over the summit to the north on FS 582 for ca 0.34 mile and park. The Bear Valley Creek Headwaters peatland fens are located on both the northwest and southeast sides of the road. Additional wetlands in the site are located about 0.75 to 1.0 mile to the north on the northwest side of the road.

Richness:

Bear Valley Creek Headwaters is comprised of a series of sloped peatlands and wetlands emanating from toeslopes of a glaciated basin. The ecologic and hydrologic systems of these headwaters are complex. Although the acreage of peatlands and wetlands is not large, there is high wetland habitat heterogeneity due to rapidly changing moisture gradients. Gravelly, well drained soils, and poorly-drained loamy and peat soils occur in close proximity to each other. Mineral soil areas-influenced by alluvial deposits, overland snowmelt runoff, and colluvial deposits from uplands-border peat accumulation areas associated with scattered seeps, springs, and spring-fed streams. This mix of environmental factors combined with cold air drainage in this high elevation montane valley results in a distinctive ecological system. The

site is rich with many small stands of both widespread and special status plant associations in a mosaic. The wetlands provide excellent forage opportunities for a variety of wildlife and bird species including sandhill cranes, elk, and small mammals. Raptors, wolverine, reintroduced gray wolves, and other predators also utilize the area.

Immediately north of Clear Creek Summit, there are two areas of peat accumulation. The peat is not too thick ranging from 30 cm to at least 50 cm thick with occasional buried logs and occurs over mottled and gleyed clay loam that is underlain by 13 to 43 cm thick, light gray-tan fine sandy-clay (with chalky-crystalline, gritty feel, possibly derived from weathered Mazama ash). Under the clay layer there is gravel (possibly glacial outwash). Several springs and seeps feed the peatlands with narrow water tracks and spring creeks draining the area.

The largest peatland is a fen about 150 m long by 100 m wide located on the southwest side of the road. *Carex luzulina* (woodrush sedge) dominates the least saturated portion in the upstream end of the fen, and *C. aquatilis* (water sedge) dominates the majority of the center. Two communities of *Eleocharis pauciflora* (few-flower spikerush) occurring with and without *Sphagnum* spp. (moss) are present on slightly raised, semi-quaking, saturated peat at the margins of the lower half of the fen as well as in undulating swales within the *C. aquatilis* sward.

The other peatland is on a bench at the head of the valley on the northwest side of the road. Several patches of *E. pauciflora* bordered by *C. luzulina* are located in this valley. A large *Picea engelmannii*/*Salix eastwoodiae*-*Vaccinium occidentale*/*C. scopulorum* (Engelmann spruce/Eastwood willow-blue huckleberry/Holm's Rocky Mountain sedge) stand grading into a *S. eastwoodiae*/*Calamagrostis canadensis* (Eastwood willow/bluejoint reedgrass) community rings the uppermost spring-fed peatland on silty organic soil, which is not peat. The border with *E. pauciflora* stand is abrupt. Due to wet conditions, this habitat is apparently unproductive with conifers growing slowly. A few snags are present and only a few seedlings, but conifers are definitely established. On the lower margins of peatlands, *S. planifolia* var. *monica*/*C. scopulorum* (planeleaf willow/Holm's Rocky Mountain Sedge) occurs on wetter sites and *Salix eastwoodiae*/*Calamagrostis canadensis* occurs on drier sites. These low willow stands occur on organic silty loam adjacent to spring-fed water tracks with shallow depths to groundwater in late summer. Patches of *Deschampsia cespitosa* (tufted hairgrass) or *C. luzulina* may also be adjacent.

Areas of shallow gravelly sandy loam on toeslopes, convexities, and alluvial fans at wetland margins support *C. microptera* communities. These areas are fed by seasonally high groundwater and overland flow from snowmelt. *Carex microptera* (small wing sedge) transition into heterogeneous *C. canadensis* or *D. cespitosa* patches and eventually to *Pinus contorta* (lodgepole pine), *P. engelmannii*, and *Abies lasiocarpa* (subalpine fir) forest on the border of wetlands. The understory is dominated by *C. canadensis* with varying amounts of *Ledum glandulosum* (mountain Labrador tea), *V. occidentale*, and *C. scopulorum*. Adjacent upland forest is dominated by *P. contorta*, *A. lasiocarpa*, and *P. engelmannii* with understories dominated by *C. geyeri* (Geyer's sedge), *V. scoparium* (grouseberry), or *V. caespitosum* (dwarf huckleberry).

Rarity:

Several special status plant associations including *Abies lasiocarpa/Calamagrostis canadensis*, *Ledum glandulosum* phase, *Carex aquatilis*, *C. microptera*, *Eleocharis pauciflora*, and *Salix planifolia* var. *monica/Carex scopulorum* are present. State special status wildlife species including gray wolf and great gray owl have been observed in the Bear Valley area.

Condition:

There is a major improved gravel road going through the center of the site. Where the roadbed crosses the margins of wetlands, it is built up to improve drainage. These sites may act as dams during large overland flow events increasing sediment deposition behind the roadbed. The road may also be a sediment source. Overall, the road occurs in upland habitats as it passes through the site; and where intersected by the road, small spring creeks are channeled through culverts. *Taraxacum officinale* (common dandelion) was the only exotic species observed.

Viability:

The landscape in the upper watershed of Bear Valley Creek has had logging, patchy wildfires, road building, and old ranching settlements. Immediately downstream in Big Meadows, the valley bottom was dredged for mining of rare earth metals during the late 1950's, which resulted in major alteration of the ecologic system there.

Key Environmental Factors:

Bear Valley Creek Headwaters consists of peatlands, springs and seeps, headwaters of a major perennial stream critical for wild summer Chinook salmon spawning, and an extensive sloped wetland complex in glaciated high elevation montane valley with cold air drainage.

Other Values:

The peatlands and meadows provide excellent opportunities and access for hunting, wildlife and bird watching, hiking and camping, and other forms of non-motorized recreation and solitude. The peatlands and wetlands provide exceptional forage and cover for sandhill cranes, elk, moose, small mammals, raptors, and other wildlife species. During a visit in August 2003, several elk were observed in the wetlands.

Conservation Intent:

The peatland complex at Bear Valley Creek Headwaters could qualify as a Botanical Special Interest Area because of the presence of peatland vegetation and flora. Past logging and road construction adjacent to and within the site might prevent qualification as a Research Natural Area.

Management Needs:

Monitoring of vegetation and riparian succession after the elimination of livestock grazing should be conducted.

Information Needs:

Specific information on wildlife and aquatic diversity needs to be obtained. The wetlands to the north and the upland vegetation need to be surveyed. Information is needed about past logging activities and fire history.

Plant Association Occurrences:

<i>Carex microptera</i>	G4	S3	
<i>Salix planifolia monica/Carex scopulorum</i>	G4	S3	
<i>Eleocharis pauciflora</i>	G4	S1	
<i>Carex luzulina</i>	GNR	S2?	
<i>Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum phase</i>		G4	S2
<i>Carex aquatilis</i>	G5	S4	

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BEAR VALLEY-ELK CREEK FLOODPLAIN

Location:

From Lowman, take Idaho Highway 21 toward Stanley. After passing Banner Summit, continue on Highway 21 for ca 3+ miles to Bear Valley Road (Forest Service Road 579). Turn north on Bear Valley Road and go ca 8 miles. To access the downstream end, turn off FS 579 toward Fir Creek Campground. Stay north and go to the trailhead/pack bridge parking lot. This bridge is located ca 250 m downstream of the site's east terminus. Access to the lower half is best gained from either the bridge over Bear Valley Creek located on Dagger Falls Road (FS 568) ca 0.75 mile north of the Bruce Meadows Rest Area in Bear Valley (at the junction of FS 579 and FS 568) or from the Bear Valley Campground/picnic area. The Bear Valley Campground/picnic area is located immediately downstream of the bridge at the confluence of Bear Valley Creek and Elk Creek, ca 4.5 miles west of Bruce Meadows. To access the upper half, follow Elk Creek Road from Bear Valley Campground, up Elk Creek toward the west to Elk Creek Guard Station (ca 2 miles). The site's upper end (west terminus) is near where the Elk Creek Road crosses Elk Creek, at the confluence of Bearskin Creek and Elk Creek.

Richness:

Bear Valley Creek and lower Elk Creek are high order, low gradient, sinuous perennial streams. In the wide, high elevation montane valley bottom floodplains of these streams, there is a high diversity of landforms that support extensive wet meadows and riparian shrub communities. Except for a few areas where roads and bridges alter the floodplain, natural hydrologic processes are intact. Natural meander patterns create lateral cutbanks and point bars. These stream reaches are characterized by large amounts of granitic sandy and gravelly alluvium in the system, evidenced by stream and bank composition and numerous islands and alluvial bars below bankfull stage. Throughout most of the area, Bear Valley Creek and

lower Elk Creek are 15 to 20 m wide, at least 0.6 to 1.7 m deep with floodplain widths ranging from about 70 m to 175 m or more. These creeks would likely be classified as C5 under the Rosgen's Stream Classification System. In the Bear Valley Creek reach (lower half of the site), older and current floodplains are entrenched over 2 m deep within a broad basin filled with Quaternary glacial outwash. The glacial-outwash basin forms high benches supporting vast wet-meadow complexes (e.g., Bruce, Ayers, Poker Meadows, and others), extensive dry *Pinus contorta* (lodgepole pine) forests, or patchy *Artemisia tridentata* (big sagebrush) stands that are perched well above the floodplain. Upstream of the confluence of Elk Creek and Bear Valley Creek, the Elk Creek floodplain is confined by low mountains rather than entrenched in a glacial outwash basin.

The ecologic and hydrologic systems in these broad valleys are complex. Overland snowmelt runoff, sinuous perennial streams, numerous low-order tributary drainages (both intermittent and perennial), vernal pool-like ponds and ponds, toeslope seeps and springs, and valley bottom upwellings all feed these valley bottoms. Most floodplain soils are derived from sandy and gravelly alluvium and are well drained. However, poorly-drained loamy and peat soils occur in old filled in oxbows or cut off meanders, as well as around some springs and spring-fed tributaries. This mix of environmental factors, combined with cold air drainage in these high elevation valleys, results in a distinctive ecological system composed of a diverse mix of both widespread and globally rare plant associations. One plant, *Erythronium grandiflorum* spp. *nudipetalum* (yellow avalanche-lily), is endemic to ephemeral moist meadows in the Bear Valley region. These valley bottoms provide excellent forage opportunities for a variety of wildlife and bird species including sandhill cranes, elk, moose, beaver, and small mammals. Predators such as raptors, wolverine, and reintroduced gray wolves also utilize these diverse floodplains and meadows. Aquatic diversity is notable with numerous mussels present and a productive spawning habitat for wild summer Chinook salmon.

Within the bankfull width of stream channels, sandy point bars, side terraces, and islands are constantly disturbed by seasonal flood scouring and deposition. These landforms are colonized by *Agrostis scabra* (rough bentgrass), *Salix melanopsis* (dusky willow), and numerous early seral sandbar species. Immediately above the bankfull stage is a dynamic flood-prone zone where numerous flood-overflow channels cut through sandy deposits. Features include steep cutbanks, natural levees, and alluvial terraces ranging from bankfull stage up to about 90 cm above bankfull stage. *Carex aquatilis* (water sedge) sometimes forms narrow communities on streambanks and low terraces at the bankfull stage. It effectively stabilizes streambanks allowing for formation of overhanging banks critical for salmonid cover. *Salix drummondiana*/*Calamagrostis canadensis* (Drummond's willow/bluejoint reedgrass) is the predominant vegetation type on sandy streambanks, terraces, and islands in the flood-prone zone. Numerous stands of *Salix eastwoodiae*/*Carex aquatilis* (Eastwood willow/water sedge), and occasionally *S. lemmonii* (Lemmon's willow) occur in mosaic with *S. drummondiana* on slightly more stable, yet moist terraces having silty soil and hummocks and channels. *Calamagrostis canadensis* and, less frequently, *Phalaris arundinacea* (reed canarygrass) dominate gaps between *S. drummondiana* and *S. eastwoodiae* stands.

Numerous older floodplain landforms (which may or may not be within the frequently flooded zone), such as swales, old oxbows, cut off meanders, flood overflow channels, and pond margins, are present in the valley bottoms. The wettest of these habitats (e.g., seasonally flooded) are typically dominated by *Carex utriculata* (bladder sedge), *C. aquatilis*, *C. simulata* (short-beaked sedge), *C. vesicaria* (blister sedge), or, occasionally, *Juncus balticus* (Baltic rush). These species also dominate spring-fed tributaries emanating from toeslope positions above the floodplain, as well as upwellings in the valley bottom. Numerous *S. wolfii* (Wolf's willow) dominated communities (with understories dominated by *C. aquatilis*, *Deschampsia cespitosa* (tufted hairgrass), or *C. microptera* (small wing sedge) form on similar landforms but on less saturated soil. *Salix lemmonii/Calamagrostis canadensis*, sometimes with *C. aquatilis*, occupies slightly higher positions in mosaic with *S. wolfii*.

Forests of *Abies lasiocarpa* (*Pinus contorta*)/*Calamagrostis canadensis* (subalpine fir [lodgepole pine]/bluejoint reedgrass) are common on higher terraces and toeslopes, mostly above the active floodplain especially in the Elk Creek reach. *C. microptera* patches occur on similar transitionally moist areas between floodplains and higher terraces or upland benches. Higher terraces are dominated by *Danthonia intermedia* (timber oatgrass) with *D. cespitosa* stands in swales. The highest and driest benches and toeslopes are occupied by *Artemisia tridentata* ssp. *vaseyana/Festuca idahoensis* (mountain big sagebrush/Idaho fescue) with *Eriogonum flavum* (alpine golden buckwheat) and *Eriophyllum lanatum* (common woolly sunflower), and *P. contorta* with *F. idahoensis* or *Vaccinium* spp. (blueberry) understory.

Rarity:

There are global special status plant associations present including *Abies lasiocarpa/Calamagrostis canadensis*, *Carex aquatilis*, *C. simulata*, *C. utriculata*, *Salix drummondiana/Calamagrostis canadensis*, *S. eastwoodiae/C. aquatilis*, *S. wolfii/C. aquatilis*, *S. wolfii/Deschampsia cespitosa*. *Hierochloa odorata* (northern sweetgrass), a special status plant species, also occurs in the area. Elk Creek is one of the most important wild summer Chinook salmon spawning streams in the Middle Fork Salmon basin. This section of Bear Valley Creek also supports wild summer Chinook salmon spawning. Reintroduced gray wolves regularly utilize the area. Other state rare wildlife species including *Gulo gulo luscus* (North American wolverine), *Bucephala albeola* (bufflehead), *Strix nebulosa* (great gray owl), and *Martes pennanti* (fisher) use the Bear Valley area.

Condition:

Currently, the Bear Valley and Elk Creek areas are heavily utilized for recreation. Many canoeists, wildlife and bird watchers, campers and hikers, hunters, and other users visit the area every summer. At least two dispersed campsites, one developed campsite and one developed picnic area, occur within the site. Several hiking/pack trails also cross the edges of the site.

There is an improved gravel road going up Elk Creek. In several short sections, the road abuts the creek limiting the potential width of the floodplain. Riprap is present to protect the road near the confluence of Bear Valley and Elk Creek. Within the site, there are three bridges. At each of these bridges, the roadbed is built up like a causeway as it goes across the

floodplain. These sites may act as dams during large flood events increasing sediment deposition behind the roadbed. The streams are confined underneath bridges.

The Elk Creek Guard Station is located on the edge of the site, ca two miles west-northwest of the confluence of Bear Valley and Elk creeks. The guard station infrastructure has minimal effects on the floodplain because of its location along the road on a high bench. However, there is an active horse corral in the riparian area below the station. At least one private cabin and an Idaho Department of Fish and Game cabin also occur near the Elk Creek Guard Station, but they are located well above the valley bottom of Elk Creek. Very few exotic species are present, despite a long history of livestock grazing disturbance in the area. *Phalaris arundinacea* (reed canarygrass) is the most serious threat, but it is currently patchy. *Poa pratensis* (Kentucky bluegrass) is widespread, but always has low cover. Trace amounts of *Poa palustris* (fowl bluegrass) were also noted.

Viability:

The general Bear Valley area has a high density of roads including several improved gravel roads and pack trails. Both developed and dispersed camping areas are present. A maintained airstrip and day-use facilities occur in Bruce Meadows. The presence of roads can influence the hydrologic patterns through ditch construction, forcing small streams through culverts, and disturbing riparian vegetation and streamflow patterns at bridge crossings. Campsites occasionally impact the drier margins of the meadows as well as stream bank vegetation. Major mining operations occurred in the upper Bear Valley Creek basin in Big Meadows. There is no private land in the lower Bear Valley Creek basin. Extensive wildfires burnt large sections of the Elk Creek and Bear Valley Creek basins during the 1980's, but slope and basin forest immediately adjacent to the site are mostly unburned. Several small-scale logging projects and post-fire salvage logging have occurred in the area.

Key Environmental Factors:

The high order, low gradient perennial streams are in good ecological condition with natural floodplain processes and landforms along with springs, seeps, ponds, and vernal pools. There are extensive wet meadow and riparian shrub complexes in this broad, high elevation montane valley with cold air drainage. Alluvial depositions occur within the glacial outwash valley bottom.

Other Values:

Large numbers of elk use the Bear Valley and Elk Creek floodplains. Over 200 were observed during a visit in summer 2003. Moose also use the floodplain. As evident by erosion points and wallow holes, streambanks are occasionally trampled by ungulates. Beaver are very active in the floodplain, altering *Salix* communities and creating numerous bank tunnels. Many of these tunnels eventually collapse and create water-filled channels cut into floodplain terraces ultimately increasing habitat heterogeneity and biological diversity within the wetland community.

These scenic waterways provide excellent opportunities and access for canoeing, swimming, hunting, fishing, wildlife and bird watching, hiking, camping, and other forms of non-motorized recreation and solitude.

Conservation Intent: Special Interest Area designation would be appropriate.

Management Needs:

Monitoring of vegetation succession and riparian conditions after the elimination of cattle grazing should be conducted.

Information Needs:

The upland vegetation has not been surveyed. The aquatic diversity in Elk and Bear Valley creeks needs additional surveys. Data from moister valley bottom forest communities, such as *Abies lasiocarpa* (*Pinus contorta*)/*Calamagrostis canadensis*, is lacking. More data from communities on recent alluvial bars, such as *Salix melanopsis*/barren and *Agrostis scabra*/bar, are also needed. Additional surveys of vegetation in spring-fed sites (e.g., *Carex simulata*) and floodplain *Salix wolfii* communities are also needed.

Plant Association Occurrences:

<i>Abies lasiocarpa/Calamagrostis canadensis</i>	G5	S3
<i>Carex aquatilis</i>	G5	S4
<i>Carex simulata</i>	G4	S2
<i>Carex utriculata</i>	G5	S4
<i>Carex vesicaria</i>	GU	S3
<i>Salix drummondiana/Calamagrostis canadensis</i>	G3	S2
<i>Salix eastwoodiae/Carex aquatilis</i>	G2	S2
<i>Salix lemmonii</i>	GU	SU
<i>Salix wolfii/Carex aquatilis</i>	G4	S4
<i>Salix wolfii/Carex microptera</i>	G3	S3
<i>Salix wolfii/Deschampsia cespitosa</i>	G3	S2

Rare Plant and Animal Occurrences

<i>Gulo gulo luscus</i>	G4T4	S2
<i>Strix nebulosa</i>	G5	S3
<i>Gulo gulo luscus</i>	G4T4	S2
<i>Martes pennanti</i>	G5	S1
<i>Martes pennanti</i>	G5	S1
<i>Bucephala albeola</i>	G5	S3B,S3N

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BEAVER CREEK FEN

Location:

From Lowman, take Idaho Highway 21 toward Stanley. About 6 miles north of Banner Summit, turn north (left) onto Seafoam Area road (Forest Service Road 008). Travel northeast on Seafoam Road for ca 2 miles to Beaver Creek Campground, which is located roughly near the center of the site. Park either in the campground or in the trailhead parking area, which is across the road (north) from the campground. The fen is located ca 0.2 mile northwest of the campground. Wetland meadows occur along Beaver Creek both downstream and upstream of the campground.

Richness:

Beaver Creek Fen occurs in a broad glacial trough filled with moraine and glacial outwash deposits. The area includes the narrow floodplain of Beaver Creek, kettle ponds, a peatland, and permanently to semi-permanently saturated depressional and gently sloped wetland meadows. These wet meadows are predominantly sub-irrigated by groundwater from adjacent toeslopes rather than Beaver Creek. Lower Beaver Creek is classified as Rosgen's B and C stream types as it flows through both wet meadow and *Pinus contorta* (lodgepole pine)-dominated landscapes. It is a high order, low gradient stream in properly functioning condition representing natural conditions. Beaver Creek is important spawning habitat for Threatened wild summer chinook salmon.

The central feature of the area is a semi-quaking peatland/fen occupying what appears to be a filled-in kettle perched on a low bench above the Beaver Creek valley bottom. The peatland/fen is fed by groundwater that probably percolates through moraine and glacial outwash deposits until it hits impermeable bedrock on the toeslope bench. The area is mostly flat but has a subtle mound and depression microtopography. The fen is characterized by a complex mosaic of near-monoculture *Carex livida* (pale sedge) and *Eleocharis pauciflora* (few-flower spikerush) turfs in wet swales especially in the northeastern portion and surrounded by extensive low hummocks of thickly tufted *Scirpus cespitosus* (tufted bulrush). At the west end of the fen, the lowest and wettest spots were flooded up to 10 cm deep in mid-summer and were dominated by swards of *Carex utriculata* (bladder sedge) and/or *Carex aquatilis* (water sedge). The transition between these flooded *Carex* patches and *S. cespitosus* mounds supports the rare sedge *Carex buxbaumii* (Buxbaum's sedge). Around fen margins and present as "islands" are drier peat mounds supporting scattered *P. contorta*, *Betula glandulosa* (bog birch), *Lonicera caerulea* (bluefly honeysuckle), *Potentilla fruticosa* (shrubby cinquefoil), *Salix wolfii* (Wolf's willow), *S. planifolia* var. *monica* (planeleaf willow), and *Vaccinium occidentale* (blue huckleberry) as well as occasional *Sphagnum* (peat moss). Throughout this *Pinus contorta/Vaccinium occidentale* community and other fen communities, a mixture of characteristic peatland species occurs including *C. buxbaumii*, *C. cusickii* (Cusick's sedge), *C. echinata* (spiny star sedge), *C. oederi* (green sedge), *Eriophorum polystachion* (coldswamp cotton-grass), *Mimulus primuloides* (primrose monkeyflower), *Senecio cymbalarioides* (cleftleaf groundsel), *Spiranthes romanzoffiana* (hooded ladies'-tresses), *Swertia perennis* (felwort), and *Thalictrum alpinum* (alpine

meadow-rue). The drier eastern portion of the fen supports *Deschampsia cespitosa* (tufted hairgrass) with *Danthonia intermedia* (timber oatgrass) and a patch of *P. fruticosa* on well-drained mineral soil. The fen is surrounded by *Pinus contorta*-dominated forest that varies from a moist habitat with an understory of *Calamagrostis canadensis* (bluejoint reedgrass) to drier upland associations on low ridges and toeslopes.

There are two small kettle ponds between the peatland/fen and base of the adjacent mountain slope. The ponds have rocky and mucky bottoms and vary from shallowly flooded to dry by late summer. One pond (the "frog pond") is ringed by a dense, wide stand of *C. utriculata* with a band dominated by *Carex saxatilis* (rock sedge), a mix of tall mesic forbs, and *Pinus contorta*/*Calamagrostis canadensis* on progressively higher wetland elevations.

North-northeast of the frog pond above the road and toward Laidlow Creek is a meadow transitioning to uplands. The meadow is dominated by *Stipa* sp. (needlegrass), *Agropyron* sp. (wheatgrass), *Wyethia* sp. (mule-ears), *Carex microptera* (small wing sedge), *P. fruticosa*, *Achillea millefolium* (common yarrow), *Antennaria corymbosa* (flat-top pussytoes), and *Aster integrifolius* (meadow aster).

South of Beaver Creek road and north-northeast of the campground is an extensive but heterogeneous complex of wet meadow vegetation. The toeslope between the road and meadow supports two bands of vegetation, each about 10 m wide. The upper band is dominated by *S. planifolia* var. *monica* and *S. wolfii*, with *D. cespitosa* and more patches of *C. buxbaumii*. The lower band is drier and dominated by *D. intermedia*. East of Laidlow Creek, the meadow is somewhat rolling with conspicuous *Alopecurus pratensis* (meadow foxtail), *Carex athrostachya* (slenderbeaked sedge), and *Pedicularis groenlandica* (elephanthead lousewort). *Salix planifolia* var. *monica* dominates wet swales with *C. aquatilis* and *C. utriculata*. Water occurs on the surface up to 10 cm deep in these communities. Higher, drier areas support *A. pratensis*, *Stipa* sp., and *Senecio hydrophiloides* (tall groundsel). Toward Beaver Creek and to the west toward the campground, the meadow becomes dominated by *D. cespitosa* with stands of *D. intermedia* on better-drained soil. There are signs of degradation from livestock grazing in these drier grass communities. Downstream along Beaver Creek is a 50 by 50 m stand of *A. pratensis*, probably an area seeded in the past. Another feature of this wet meadow is a narrow and deep stream channel coming downslope from the pond or Laidlow Creek and under the road. The channel is dominated by *C. aquatilis* and *C. utriculata* with a narrow stand (up to 10 m wide) of scattered *B. glandulosa*, *S. wolfii*, and *E. pauciflora* along the channel banks. Near moist *Pinus contorta*/*Calamagrostis canadensis* forest, at the meadow edge, there are dense, but small (less than 50 square m) stands of *Carex luzulina* (woodrush sedge) and *D. cespitosa*. Additional patches of *C. buxbaumii* occur in this habitat.

Rarity:

The fen supports large populations of two rare sedge species, *Carex buxbaumii* and *Carex livida* as well as several special status peatland plant communities including *Carex livida*, *Carex saxatilis*, *Eleocharis pauciflora*, *Pinus contorta*/*Vaccinium occidentale*, and *Scirpus cespitosus*. There is a large diversity of characteristic peatland species.

This section of Beaver Creek supports Listed Threatened wild summer Chinook salmon spawning. The ponds above the peatland supported hundreds of *Pseudacris triseriata* (striped/boreal chorus frog) metamorphs during a September 2002 visit. Two individuals caught had three hind legs and several more were seen (they don't hop as well as normal individuals and stood out in a moving mass of froglets). *Pseudacris* tadpoles were also seen in the pond and adults were observed in the peatland.

Condition:

Sheep grazing occurs in the general area, but use within the peatland is minimal. However, the ecologic condition of the large Beaver Creek wet meadow upstream of the campground has been disturbed by livestock over the years. The exotic hay grass, *Alopecurus pratensis*, has been seeded in the past presumably to increase forage and cover on areas previously damaged by excessive livestock grazing.

Recreational use in the general area is high. An improved gravel road bisects the site and forms much of the boundary. Except for one large bridge crossing, this road has minimal effects on the Beaver Creek floodplain because of its location on higher benches and toeslopes above wetland and riparian areas. Most recreation use is confined south of the road away from the peatland and wet meadow in the area within and around a developed campground. There is a pack trail and trailhead parking area adjacent to the peatland. Several old dispersed campsites and secondary roads also border the site. Due to their close proximity to roads and the campground, the peatland and wet meadows are highly susceptible to illegal motorized vehicle travel. In the wet meadow north of the campground, there is a large stand (50 by 50 m) of *Alopecurus pratensis*, an exotic hay grass probably seeded in the past. No infestations of noxious weeds were observed. The total cover of exotic species in the peatland is very low.

Viability:

A developed and heavily used campground occurs immediately adjacent to but outside the site boundaries. An improved gravel road bounds the site, while several old spur two-track roads leading to dispersed campsites occur in the watershed. A pack trail and trailhead parking area occur immediately west of the peatland at the edge of the site. A Boy Scout camp occurs about one mile southeast of the site near Cape Horn Lakes. Several large wildfires have burned in the Beaver Creek watershed during the last ten years including a lightning ignited fire in July 2003. The forest immediately surrounding the wetlands has not burned recently; however, tree mortality from mountain pine beetles is continuing in the area. It is unknown how many past logging projects including post-fire salvage and mountain pine beetle treatments have occurred in the Beaver Creek watershed. Portions of the Beaver Creek watershed, especially at higher elevations, are protected within the Frank Church-River of No Return Wilderness.

Key Environmental Factors:

Beaver Creek Fen consists of a peatland/fen with a low gradient perennial stream in very good ecological condition with natural floodplain processes and landforms, springs, ponds, and wet meadow and riparian vegetation. This peatland/fen occurs in a broad, high elevation montane valley with cold air drainage and glacial outwash derived soils.

Other Values:

The fen and wet meadows provide excellent wildlife habitat. Large numbers of elk use the Beaver Creek area and moose also use the floodplain and fen. Reintroduced gray wolves regularly utilize the area. Western terrestrial garter snakes were also observed. The peatland/fen, wet meadows, and Beaver Creek are scenic and provide opportunities for hunting, fishing, wildlife and bird watching, hiking, camping, winter cross-country skiing, and other forms of non-motorized recreation and solitude.

Conservation Intent:

The peatland area of the site could be protected as a special management area and excluded from livestock grazing and motorized vehicle travel. It is comparable in terms of plant species and community composition to the complex of peatlands included within the established Sawtooth Valley Peatlands Research Natural Area on the Sawtooth National Recreational Area and the proposed special management area at Blind Summit fen.

Management Needs:

The site should be periodically monitored for changes in recreation, livestock grazing, off highway vehicle use, and other activities to see if they are disturbing the ecological condition of the peatland and wet meadows.

Information Needs:

The aquatic diversity in springs, ponds, and streams needs to be surveyed. Need to sample plots in the wetland meadows, riparian habitats, and peatland vegetation that were noted in the field. The upland vegetation needs to be surveyed. The wet meadow along Beaver Creek located downstream of the campground needs to be surveyed.

Plant Association Occurrences:

<i>Pinus contorta/Calamagrostis canadensis</i>	G5	S5
<i>Pinus contorta/Vaccinium occidentale</i>	G4	S2
<i>Salix planifolia monica/Carex aquatilis-Carex utriculata</i>	G3Q	S3
<i>Salix wolfii/Deschampsia cespitosa</i>	G3	S2
<i>Betula glandulosa/Carex utriculata</i>	G4?	S3
<i>Potentilla fruticosa/Danthonia intermedia</i>	GNR	S3
<i>Carex aquatilis</i>	G5	S4
<i>Carex livida</i>	GQ	S2
<i>Carex luzulina</i>	GNR	S2?
<i>Carex utriculata</i>	G5	S4
<i>Deschampsia cespitosa</i>	G4	S3
<i>Eleocharis pauciflora</i>	G4	S1
<i>Scirpus cespitosus-Carex livida</i>	G1	S1

Author:

E. Bottum

BLIND SUMMIT FEN

Location:

Blind Summit Fen occupies a nearly imperceptible watershed divide between Marsh Creek and Valley Creek about 10 km northwest of Stanley, Idaho. From Stanley, drive north on State Highway 21 to Forest Road 203 at Trap Creek Narrows. Turn right on Forest Road 203, which parallels the east edge of the site for about 2.5 km.

Richness:

Blind Summit Fen contains the largest continuous expanse of peat in the Sawtooth Valley. The site lies at the headwaters of Marsh and Valley creeks, two sinuous perennial streams that flow through low gradient valleys. The area is known as Blind Summit because of the nearly imperceptible hydrologic divide that occurs between the Middle Fork of the Salmon and the Main Salmon River drainages. This watershed divide forms the boundary between the Sawtooth National Recreation Area and the Salmon-Challis National Forest.

The water that surfaces in this extensive wetland probably originates in the moraine and glacial outwash features southwest of the fen. The groundwater moves down a northeastern gradient through glacial till until it encounters impermeable bedrock and surfaces. The quaking mat of Blind Summit Fen is sub-irrigated by numerous springs that parallel the granitic bedrock slopes at the northeastern edge. Both gravelly well-drained soils and poorly-drained loamy and peat soils occur in close proximity to each other. A mix of environmental factors, combined with cold air drainage in a high elevation montane valley, results in a distinctive ecological system composed of a diverse mix of both widespread and globally rare plant associations. The area is about 1.8 miles long and up to 0.7 mile wide.

Peatlands supporting *Pinus contorta* (lodgepole pine), *Salix wolfii* (Wolf's willow), *Betula glandulosa* (bog birch), and *Calamagrostis canadensis* (bluejoint reedgrass) with *Carex livida* (pale sedge) and *Eleocharis pauciflora* (few-flower spikerush) are found at the south end of the site between Highway 21 and Road 203. Trap Creek enters this area and joins with several springs that emerge within the site before its confluence with Meadow Creek, a tributary of Valley Creek, just outside the site boundary. A mosaic of *P. contorta*/*C. canadensis* and *S. wolfii*/*C. canadensis* is found along Trap Creek along with *Salix lemmonii*/Mesic Graminoid (Lemmon's willow/mesic graminoid) and *Potentilla fruticosa*/*Danthonia intermedia* (shrubby cinquefoil/timber oatgrass). Other communities found in the southern end of the site include *S. wolfii* with several *Carex* spp. (sedges) and *Deschampsia cespitosa* (tufted hairgrass), *S. planifolia* var. *monica*-*S. wolfii* (planeleaf willow-Wolf's willow) with *C. livida*, *D. cespitosa*-*D. intermedia*-*C. canadensis*, and other sedges and graminoids. *Deschampsia cespitosa*, *Carex* spp., and *E. pauciflora* along with *Juncus balticus* (Baltic rush) occur as a mosaic in wetter areas.

Nearer the middle of the site is an extensive peatland supporting *E. pauciflora* and *C. livida* turf and to a lesser extent *Scirpus cespitosus* (tufted bulrush) and *Carex buxbaumii* (Buxbaum's sedge). A majority of the turf is quaking; i.e., it is floating on water or muck.

Grounded *Carex simulata* (short-beaked sedge) and *S. wolfii/Carex utriculata* (Wolf's sedge/bladder sedge) communities cover small areas, and *D. cespitosa* and *P. contorta/Vaccinium occidentale* (lodgepole pine/blue huckleberry) occur at the periphery. To the north and east are *S. wolfii* and *Salix planifolia* var. *monica* along with *C. utriculata*, other *Carex* spp. and *J. balticus*.

Rarity:

Several special status plant associations are present. The fen supports large populations of two rare sedge species, *Carex buxbaumii* and *Carex livida*, as well as special status peatland plant communities (e.g., *Carex livida*, *Eleocharis pauciflora*, *Pinus contorta/Vaccinium occidentale*, and *Scirpus cespitosus*). There is a large diversity of characteristic peatland species. The site lies at the headwaters of Marsh and Valley Creeks both of which support rearing and spawning Listed Threatened fish species.

Condition:

Blind Summit Fen is in an active livestock grazing allotment. The meadow areas surrounding the fen have several exotic plant species, each with low cover. *Alopecurus pratensis* (meadow foxtail), *Poa pratensis*, and *Taraxacum officinale* (common dandelion) were observed in the mesic graminoid meadows. *Poa pratensis* is widespread but dominant in only a few localized areas. Few exotic species are present in the fen and peatland areas.

Viability:

The general Sawtooth Valley area has a high density of roads and trails with many improved gravel roads, pack trails, and both developed and dispersed camping areas. The presence of roads around sites can influence hydrologic patterns through drainage ditch construction, culverts, and disturbance of riparian vegetation and stream-flow patterns at bridge crossings. Roads can also serve as sources of increased sediment and avenues for dispersal of invasive exotic plants. There is private land scattered throughout the Sawtooth Valley; although, there are some land use restrictions associated with National Recreation Area status. Those land use restrictions do not apply on the Salmon-Challis National Forest. Several small-scale salvage and forest health logging projects have occurred in the area. Mountain pine beetles currently feeding in lodgepole pine stands around the Sawtooth Valley could cause widespread tree die-off and increased short-term potential for wildfires. Wildfires should not negatively impact the Blind Summit Fen site and could, in fact, be beneficial to the long-term persistence of the plant communities found at the site. Gold mining has taken place nearby in Valley Creek where there are two patented claims.

Key Environmental Factors:

Blind Summit Fen consists of fens, springs, and seeps. This extensive peatland and wet meadow complex occurs in a broad, high elevation montane valley with cold air drainage and glacial outwash derived soils.

Other Values:

The meadows provide exceptional forage and cover for sandhill cranes, elk, small mammals, raptors, and other wildlife species. The scenic meadow provides excellent opportunities and

access for hunting, wildlife and bird watching, hiking and other forms of non-motorized recreation.

Conservation Intent:

Blind Summit Fen was recommended as a Special Interest Area ten years ago but has not been officially proposed. Designation as a Special Interest Area is appropriate and would adequately protect the wetland features. The area is mostly within the Salmon-Challis National Forest and the remainder is within the Sawtooth National Recreation Area.

Management Needs:

Livestock grazing is negatively impacting the site and requires better management. Recreational use of the site and adjacent areas should be managed to avoid unnecessary negative impacts to vegetation and soils. The vigor of meadow associations may be enhanced by occasional prescribed fire.

Information Needs:

Specific information on wildlife diversity should be obtained. Information on the aquatic diversity within Marsh, Meadow and Trap Creeks needs to be obtained. The status of mining claims that may be associated with the site, if they exist, needs to be determined.

Plant Association Occurrences:

<i>Scirpus cespitosus-Carex livida</i>	G1	S1
<i>Betula glandulosa/Carex utriculata</i>	G4?	S3
<i>Carex livida</i>	GQ	S2

Rare Plant and Animal Occurrences:

<i>Strix nebulosa</i>	G5	S3
<i>Carex livida</i>	G5	S2
<i>Carex buxbaumii</i>	G5	S3

Author:

E. Bottum

CACHE CREEK LAKES

Location:

Cache Creek Lakes RNA is located on the north side of Sleeping Deer Mountain in the Salmon River Mountains, about 42 miles (68 km) northwest of Challis, Idaho, by road and trail. From Challis, travel northwest on Twin Peaks Road which becomes FS Road 086 at the Forest boundary. Continue on this road to the end, a distance of approximately 39 miles (63

km). FS Trail 103 leaves from the end of the road and runs along east side of the RNA after about 2 miles (3.2 km).

Richness:

Cache Creek Lakes RNA encompasses a high-elevation cirque in the Salmon River Mountains, containing a diversity of aquatic and terrestrial habitats on volcanic substrate. Elevations in the RNA range from about 7500 feet (2273 m) where the boundary crosses Cache Creek to 9881 feet (2994 m) on the peak of Sleeping Deer Mountain. Aquatic habitats include several lakes and ponds and low- to steep-gradient streams. These aquatic communities are bordered by several wetland associations. Much of the upland is dominated by subalpine fir (*Abies lasiocarpa*) and whitebark pine (*Pinus albicaulis*) forests, although cliffs, talus and rock outcrops cover large areas, especially around the summit of Sleeping Deer Mountain. The area also contains habitat for bighorn sheep (*Ovis canadensis*).

Rarity:

The RNA supports a variety of aquatic and terrestrial habitat types on soils derived from volcanic rock. The site occurs within designated recovery habitat for gray wolf.

Condition:

Cache Creek Lakes is listed as a Special Management Area in the Challis National Forest Land and Resource Management Plan (1987) for its values as an RNA. Recreational use of the area occurs primarily along FS Trail 103. The boundaries of the RNA were drawn to exclude areas that receive regular use.

Viability:

Cache Creek Lakes is entirely surrounded by Forest Service lands within Management Area 1 – the Frank Church-River of No Return Wilderness. The area is managed to protect wilderness attributes.

Key Environmental Factors:

Other Values:

A herd of bighorn sheep occupy the basin.

Conservation Intent:

RNA

Management Needs:

Information Needs:

Information should be gathered to assess impacts of the fire. More information is needed on the significant features of the area.

Plant Association Occurrences:

Abies lasiocarpa/Vaccinium scoparium, Pinus albicaulis phase

G5

S5

<i>Abies lasiocarpa/Carex geyeri, Carex geyeri phase</i>	G5	S5	
<i>Abies lasiocarpa/Juniperus communis</i>	G5	SNA	
<i>Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum phase</i>		G4	S2
<i>Pinus albicaulis-Abies lasiocarpa</i>	G5?	S3	

Author:

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CORDUROY MEADOWS

Location:

From Lowman, take Idaho Highway 21 toward Stanley. Just over 3.0 miles north of Banner Summit, take the road to Bear Valley (Forest Service Road 579) north and west for ca 14.0 miles to the Corduroy Meadows trailhead. The trailhead is located on a short spur road leading north from Forest Service Road 579 ca 1.0 mile west of Elk Creek Ranger Station. Park at the trailhead and hike 1.6 miles on the Corduroy Meadows trail to the site boundary. The site is a large wet meadow complex that extends southwest, north and west.

Richness:

Corduroy Meadows is a large wet-meadow complex comprised of Corduroy Meadows, Elk Meadows, Crane Meadows, and others formed on granitic Quaternary glacial outwash deposits within the broad, low gradient valleys of the Elk Creek basin. The ecologic and hydrologic systems in these broad valleys are complex. Overland snowmelt runoff, sinuous perennial streams, intermittent and ephemeral drainages, vernal pool-like ponds and depressions, toeslope seeps and springs, and valley bottom upwellings all feed these wet meadows. In addition, both gravelly well-drained soils and poorly-drained loamy and peat soils occur in close proximity to each other. This mix of environmental factors combined with cold air drainage in these high elevation montane valleys results in a distinctive ecological system composed of a diverse mix of both widespread and globally rare plant associations. *Erythronium grandiflorum* spp. *nudipetalum* (Bear Valley fawn-lily), a special status plant species, is endemic to these meadows in the Bear Valley region. These meadows provide excellent forage opportunities for a variety of wildlife and bird species including sandhill cranes, elk, and small mammals. Raptors, wolverines, reintroduced gray wolves, and other predators also utilize these diverse meadows.

Most of Corduroy Meadows lies in a broad low-gradient valley drained by Elk Creek. Tributary streams drain low mountains to the north, east and west. Elk Creek and many of its major tributaries, such as Porter Creek, are deep, sinuous perennial streams. Porter Creek is a perennial stream that becomes narrow, deep, and sinuous after gaining significant inflow from toeslope seeps, springs, and upwellings within Crane Meadows. Several intermittent drainages carry snowmelt runoff from the north, east, and west and eventually drain into Elk Creek or its tributaries. Elk Creek flows through a narrow valley for about a mile as it leaves the site at the lower (south) end.

Danthonia intermedia (timber oatgrass), which is a conspicuous plant at the site, occurs as small patches to dominating large meadows on ephemerally moist sandy-gravelly loam. Moister swales are dominated by *Deschampsia cespitosa* (tufted hairgrass). Transitional meadows are co-dominated by forbs such as *Aster integrifolius* (meadow aster) and occur on both drier soils than *D. intermedia* as well as on ephemerally moist swales adjacent to *D. cespitosa* stands. These meadows have relatively high cover of less palatable forbs and probably represent degraded (overgrazed) *Aster integrifolius-Festuca idahoensis* (meadow aster-Idaho fescue) and/or *D. cespitosa* stands. Occasional small patches of open canopy *Potentilla fruticosa* are found over a *D. intermedia* understory. A scattering of vernal pool-like depressions and ephemerally moist flats support *Navarretia* spp. (pincushionplant), *Veronica peregrina* (neckweed), annual *Polygonum* spp. (knotweed), *Muhlenbergia filiformis* (pullup muhly), and *D. cespitosa*.

Juncus balticus (Baltic rush) occurs in well-defined patches and forms a complex mosaic in seasonally saturated meadows (dry by summer) and ephemerally moist swales blending with *Carex aquatilis* (water sedge) stands or small patches of *Carex simulata* (short-beaked sedge) and *C. utriculata* (bladder sedge) in wetter soil. *Deschampsia cespitosa* dominates slightly drier soil. Soils are generally organic-rich loams with a thick duff surface layer. These graminoid-dominated mosaics may also blend with stands of *Salix wolfii* (Wolf's willow) and *S. planifolia* var. *monica* (planeleaf willow).

A mosaic of willow types occupies the valley bottom in a 50-100m wide band that follows the creek floodplain meander belt. Water tracks occur throughout the band resulting from both spring channels and flood overflow channels. *Salix eastwoodiae/C. aquatilis* (Eastwood willow/water sedge) stands are dominant with extensive patches of *S. wolfii/C. aquatilis* and sometimes with *C. utriculata*. *Salix planifolia* var. *monica/C. aquatilis-C. utriculata* occurs on the wettest sites in the meadows. *Carex aquatilis* stands occur on channel banks with *S. drummondiana/Calamagrostis canadensis* (Drummond's willow/bluejoint reedgrass) occupying slightly drier terraces within the flood-prone zone. Along the East Fork of Elk Creek, *S. drummondiana/C. canadensis* dominates areas flooded by beaver dams. *Betula glandulosa* (bog birch) stands occur near banks of some spring channels.

Well-drained sandy/gravelly loam soils along meadow margins and on low rises typically support patchy *A. integrifolius-F. idahoensis* stands. These stands quickly change to both burned and unburned forests dominated by *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce), and/or *P. contorta*. *Calamagrostis canadensis* dominates the forest understory on moist toeslope soils. *Abies lasiocarpa/C. canadensis* dominates low lying gently sloping areas above the borders of *C. canadensis* or *D. cespitosa* meadows where the sandy loam soil is ephemerally moist but not seasonally flooded. In areas that have high ground water level during runoff or surface flow during snowmelt, *C. canadensis* forms dense to open stands. *Deschampsia cespitosa* may also be widespread along with tall forbs such as *Senecio hydrophyloides* (water ragwort), *Camassia quamash* (small camas), *Dodecatheon jeffryi* (Sierra shootingstar) and *A. integrifolius*. Shrubs and trees occur on the margins of these areas with no sign of tree invasion. *Salix wolfii* wetlands may also occur between these meadow complexes and the forested toeslopes.

Numerous areas around meadow margins contain sloped seeps with *P. contorta*, *B. glandulosa*, *S. eastwoodiae*, and *Carex* spp. including *C. scopulorum* (Holms Rocky Mountain sedge). Some of these sloped seeps support *Betula glandulosa*-*Lonicera caerulea*/*Senecio pseud aureus* (bog birch-bluefly honeysuckle/streambank butterweed) on peaty mounds (examples of this type are also found on flat terrain). *Salix wolfii* is found on similar physiographic positions that are not peaty and is often mixed with *Salix planifolia* var. *monica*.

A patterned fen occurs in a small meadow west of the confluence of the West and East Forks of Elk Creek. This area has peat soils that are shallowly flooded all year. The fen is characterized by scattered *S. planifolia* var. *monica* with an understory mosaic of *C. utriculata* and *C. simulata*. *Eleocharis pauciflora* (few-flower spikerush) dominates wet swales between linear hummocks supporting *Sphagnum* and *S. planifolia* var. *monica*/*C. utriculata*.

Rarity:

Several special status plant associations are present. State rare wildlife species including *Canis lupus* (gray wolf) have been observed at the site. Listed threatened fish species spawn in Elk Creek within the site.

Condition:

Despite many years of livestock grazing, intact native plant communities still dominate the meadows. However, a few areas were damaged by excessive livestock grazing, as evidenced by the increased level of less palatable forbs in stands of *Deschampsia cespitosa*, *Danthonia intermedia*, and drier *Aster integrifolius*-*Festuca idahoensis* meadow communities. In general, the ecological conditions in the site appear to be improving after just a few years of rest. Only a few exotic species are present, each with low cover. *Festuca pratensis* (meadow ryegrass), *Poa pratensis* (Kentucky bluegrass), and *Taraxacum officinale* (common dandelion) were observed in mesic graminoid meadows.

Viability:

The general Elk Creek area has several improved gravel roads, pack trails, and both developed and dispersed camping areas in the lower watershed. There is a U. S. Forest Service guard station, an Idaho Department of Fish and Game cabin, and a private cabin in the lower Elk Creek basin. Extensive wildfires burnt large sections of the Elk Creek and Bear Valley Creek basins during the 1980's. Slopes east and south of Corduroy Meadows were heavily burnt. Outside the wilderness, several small-scale logging projects and post-fire salvage logging have occurred. All roads, campsites, and developments are downstream of the site and have no direct impact on site integrity.

Key Environmental Factors:

Corduroy Meadows is an extensive wet meadow complex of springs and seeps, fens, and intermittent drainages and perennial streams located in a broad, high elevation montane valley with cold air drainage, and glacial outwash derived soils.

Other Values:

These scenic meadows provide excellent opportunities and access for hunting, wildlife and bird watching, hiking and camping, and other forms of non-motorized recreation and solitude. The meadows provide exceptional forage and cover for sandhill cranes, elk, small mammals, raptors, and other wildlife species.

Conservation Intent:

The entire site is protected within the Frank Church-River of No Return Wilderness. The livestock grazing allotments have been retired.

Management Needs:

Specific information on wildlife and aquatic diversity should be obtained. Information on the aquatic diversity within Elk and Porter Creeks needs to be obtained. Vernal pool-like ponds need data collection. Crane Meadow and the meadow on West Fork Elk Creek should be surveyed. The upland vegetation and the headwaters of the West Fork, North Fork and East Forks of Elk Creek needs to be surveyed.

Information Needs:

The retirement of the grazing allotments in 2000 and 2001 provides an excellent opportunity for monitoring vegetation succession and riparian conditions after the elimination of over a century of livestock grazing.

Plant Association Occurrences:

<i>Abies lasiocarpa/Calamagrostis canadensis</i>	G5	S3
<i>Salix drummondiana/Calamagrostis canadensis</i>	G3	S2
<i>Salix eastwoodiae/Carex aquatilis</i>	G2	S2
<i>Salix planifolia monica/Carex aquatilis-Carex utriculata</i>	G3Q	S3
<i>Salix wolfii/Carex aquatilis</i>	G4	S4
<i>Betula glandulosa-Lonicera caerulea/Senecio pseud aureus</i>	GQ	S3
<i>Aster integrifolius/Festuca idahoensis</i>	GNR	S3
<i>Calamagrostis canadensis</i>	G4	S4
<i>Carex aquatilis</i>	G5	S4
<i>Deschampsia cespitosa/Caltha leptosepala</i>	G4	S2
<i>Eleocharis pauciflora</i>	G4	S1
<i>Juncus balticus</i>	G5	S5

Rare Plant and Animal Occurrences:

<i>Helodium blandowii</i>	G5	S2
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Author:

E. Bottum

CROOKED CREEK EASEMENT

Location:

From Stanley proceed three miles northwest on Highway 21 to the entrance of the Crooked Creek subdivision on the southwest side of the Highway. Turn left on the entrance road to the subdivision; the site lies on the right hand side of the road. The site also can be reached by turning left off Highway 21 about two and one half miles outside of Stanley on to the Iron Creek Road. Take the first right off the Iron Creek Road and follow the dirt road across the Forest Service property around the west side of the Crooked Creek subdivision to the southern boundary of the site.

Richness:

Crooked Creek site consists of a flat, high elevation, wet meadow situated at the base of the Sawtooth Mountains in Custer County, Idaho. Crooked Creek, a small meandering, freestone stream, bisects the meadow. Two special status plant communities, *Pinus contorta-Vaccinium occidentalis*, and a sphagnum bog (currently referred to as valley peatland floating mat), occur along Crooked Creek and on the wet portions of the south end of the site. Much of the remaining acreage in the site is mesic meadow that has been grazed in the past. There is some sign of old fencing present on the south end of the site, and a number of drainage ditches were constructed on the site ten to fifteen years ago.

Rarity:

Two special status plant communities exist within the site: *Pinus contorta-Vaccinium occidentalis* (G4/S2), and a sphagnum bog (G3/S1) (currently classified as valley peatland floating mat).

Condition:

Because the site borders National Forest land and is located within the boundaries of the Sawtooth National Recreation Area, it has received some passive recreational use from hikers, mountain bikers, skiers and fisherman. Also, minimal ORV and snow machine use has impacted the site in the past. Some exotic vegetation has been identified on the meadow portion of the site where grazing was permitted in the past.

Viability:

Key Environmental Factors:

Other Values:

Conservation Intent:

The Nature Conservancy will enter into agreement with private landowners in order to protect the threatened riparian communities. Any legal interest that the Conservancy obtains in property at the site may be transferred to the U.S. Forest Service at some time in the future. The Forest Service is charged with the responsibility of managing the Sawtooth National Recreation Area in which the site is located.

Management Needs:

An overall management plan with particular emphasis paid to fencing needs to be developed for the site to ensure the viability of the riparian communities.

Information Needs:

Additional inventory work needs to be done on the northern portion of the site to determine the exact location and protection needs of the significant riparian communities.

Plant Association Occurrences:

<i>Pinus contorta/Vaccinium occidentale</i>	G4	S2
Valley peatland Floating Mat	G3	S1

Author:

L. Williams

CUB CREEK PEATLAND

Location:

From Lowman and Highway 21, take Clear Creek Road (Forest Service Road 582) toward Bear Valley for ca 16 miles to Clear Creek Summit. Continue ca 5 miles going through Big Meadows to the main junction with Forest Service Road 563, which goes north to Bearskin Creek and Elk Creek. Take Forest Service Road 563 north, cross the bridge over Bear Valley Creek, and go ca 0.5 mile to Cub Creek and park. The main cluster of peatlands occurs about 0.5 to 0.75 mile upstream on both north and south sides of Cub Creek. Additional wetlands in the site are located in the meadow of lower Cub Creek, immediately to the east-northeast.

Richness:

Cub Creek Peatlands is a sloped peatland complex formed on glaciated benches in the upper Bear Valley Creek basin. The ecologic and hydrologic systems in this peatland are diverse. Although the acreage of the peatland complex is not large, there is high wetland habitat heterogeneity due to rapidly changing moisture gradients when gravelly well-drained soils and poorly-drained loamy and peat soils occur in close proximity to each other. Mineral soil areas-influenced by alluvial deposits from Cub Creek, overland snowmelt runoff, and colluvial deposits from uplands-border peat accumulation areas associated with scattered seeps, springs, and spring-fed streams. Wildfires have also heavily influenced drier forests bordering the peatland complex. This mix of environmental factors combined with cold air drainage in the high elevation montane valleys results in a distinctive ecological system.

The area is rich with many small stands of both widespread and globally rare plant associations in a tight mosaic. *Erythronium grandiflorum* var. *nudipetalum* (yellow avalanche-lily) is endemic to margins of meadows in the Bear Valley region. Potential habitat occurs along the meadows of lower Cub Creek, near the confluence with Bear Valley

Creek. The meadows and wetlands in the site provide excellent forage opportunities for a variety of wildlife and bird species including sandhill cranes, elk, and small mammals. Raptors, wolverine, reintroduced gray wolves, and other predators also utilize wetlands in the area.

At least four small areas (each 0.3 to 0.5 ac) of peat accumulation are present above the floodplain of Cub Creek on toeslope benches at the base of a steep granitic slope. Most, but not all, of these areas are slightly raised (convex-shaped). The nature of these peat accumulations varies depending on the amount of site moisture. Springs and seeps feed the peatlands with several narrow water tracks and spring creeks draining the area. Semi-quaking peat is located on benches in association with springs. On slightly drier areas, the peat was anchored and varied from saturated to moist at the surface. Peat thickness varied from 35 to 55 cm and the peat ranged from 5.4 to 6.1 pH. The peat was underlain by a 13 to 15 cm thick, light gray-tan fine sandy-clay layer. This layer had a chalky-crystalline gritty feel (possibly derived from weathered Mazama ash?).

Several small stands of *Salix commutata*/*Carex scopulorum* (undergreen willow/Holm's Rocky Mountain sedge) occur on saturated peat at the western-most, highest margins of the peatland complex. This habitat was hummocked and terraced due to the presence of old buried logs. These stands graded into *Picea engelmannii*/*S. eastwoodiae*-*Vaccinium occidentale*/*C. scopulorum* (Engelmann spruce/Eastwood willow-blue huckleberry/Holm's Rocky Mountain sedge) communities on adjacent slightly drier peat soils or burnt forest. Two very wet, semi-quaking and slightly raised peat areas were dominated by *Eleocharis pauciflora* (few-flower spikerush) with open communities of *Salix planifolia* var. *monica*/*Carex aquatilis* (planeleaf willow/water sedge) on margins, and a thick layer of non-sphagnum mosses. Varying amounts of *Carex simulata* (short-beaked sedge) and *C. utriculata* (bladder sedge) were intermixed. Numerous small spring-fed creek channels and water tracks cut through these stands. Downslope from these spring-fed areas, a mosaic of *S. eastwoodiae*/*C. scopulorum* and *P. engelmannii*/*S. eastwoodiae*-*V. occidentale*/*C. scopulorum* stands occupied peat accumulations on the margins of spring creek channels. Small stands of *Pinus contorta*/*S. wolfii*-*V. occidentale* (lodgepole pine/Wolf's willow) and *Betula glandulosa* (bog birch) with *S. wolfii*, *V. occidentale*, *E. pauciflora*, and *Sphagnum* spp., were present further downslope, but these were too small to form distinct communities.

Non-peat wetlands were immediately adjacent on mineral soils including on streambanks and areas flooded during snowmelt runoff. Elevated margins of peatlands, seasonally wet slopes, floodplains (including along Cub Creek), and lower meadow openings were dominated by *S. eastwoodiae* and/or *S. wolfii* with *C. scopulorum*, *Deschampsia cespitosa* (tufted hairgrass), or *Calamagrostis canadensis* (bluejoint reedgrass) dominated understories. Unburned *P. contorta*/*C. canadensis* stands with scattered *Abies lasiocarpa* (subalpine fir) reproduction form narrow to wide stands on low-lying ground with seasonally high groundwater but above floodplains of small channels. Soils were 50 cm of mineral sandy clay loam mixed with coarser colluvium and overlying what appeared to be fine sandy-clay (weathered Mazama ash?). Several small *Carex microptera* (small wing sedge)-dominated patches occurred in moist forest gaps, while nearby open meadows had small patches of *D. cespitosa* and *Danthonia intermedia* (timber oatgrass) present. Unlike wetter conifer stands that were

spared from fires, nearly all of the surrounding *P. contorta*, *A. lasiocarpa*, and *P. engelmannii* forests have burned within the last 20 years. *Carex geyeri* (Geyer's sedge) and *V. scoparium* (grouseberry) currently dominate the understory of regenerating *P. contorta* forest.

Rarity:

Several special status plant communities are present. State special status wildlife species including gray wolf and great gray owl have been observed.

Condition:

An improved gravel road from Bear Valley Creek to Bearskin Creek cuts through the middle of the site. Cub Creek flows through a maintained culvert under the road. It does not appear that the road is significantly impacting groundwater hydrology at this spot, since Cub Creek collects all spring-fed creek drainage upslope. At least two dispersed campsites were present within the site. One was old and no longer accessible because of the washout of an old 2-track. The other campsite, which is adjacent to the road where Cub Creek crosses, was active. *Taraxacum officinale* (common dandelion) was the only exotic species observed.

Viability:

The main impacts are from the maintained gravel road and past clearcut logging in the watershed. Immediately upstream in Big Meadows the Bear Valley Creek valley bottom was dredged for mining of rare earth metals during the late 1950's. This resulted in major alteration of the ecologic system there.

Key Environmental Factors:

Cub Creek Peatlands is an extensive sloped wetland complex of peatlands, springs and seeps, and perennial streams located in glaciated high elevation montane valley with cold air drainage, and wildfire regeneration.

Other Values:

These peatlands and meadows provide excellent opportunities and access for hunting, wildlife and bird watching, hiking and camping, and other forms of non-motorized recreation and solitude. During a visit in July 2003, several elk cow-calf pairs were observed on the site.

Conservation Intent:

The area is most likely managed for non-motorized recreation. Livestock grazing has ended during the last several years. This peatland complex could qualify as a Special Botanical Interest Area because of the presence of peatland vegetation and flora. Past logging and road building immediately adjacent might prevent qualification as a Research Natural Area.

Management Needs:

Monitoring of vegetation and riparian succession after the elimination of livestock grazing should be conducted.

Information Needs:

Specific information on the aquatic diversity within Cub Creek and the spring creeks needs to be obtained. Information on wildlife should be obtained. The lower meadows and the upland vegetation need to be surveyed. Information about logging and fire history is needed.

Plant Association Occurrences:

<i>Eleocharis pauciflora</i>	G4	S1
<i>Pinus contorta/Calamagrostis canadensis</i>	G5	S5
<i>Salix commutata/Carex scopulorum</i>	G3	S3
<i>Salix eastwoodiae/Carex aquatilis</i>	G2	S2
<i>Salix wolfii/Calamagrostis canadensis</i>	G3	S3
<i>Salix wolfii/Deschampsia cespitosa</i>	G3	S2

Author:

C. Murphy

ELK MEADOW

Location:

From Stanley, take Idaho Highway 21 north for ca 8.1 miles to the junction with Forest Service Road 614. Turn west (left) on Forest Service Road 614 and travel ca 1.5 miles to the Elk Meadow trailhead. Park at the trailhead and hike either of two trails leading to Elk Meadow. The site is a large wet meadow complex that extends southwest, west, and north.

Richness:

Elk Meadow is a large wet meadow complex occupying a glacial-trough valley on the lower northeast flank of the Sawtooth Mountains. Granitic Quaternary glacial outwash deposits fill the valley and Elk Creek flows through the site as a deep, sinuous perennial stream. Overland snowmelt runoff, sinuous perennial streams, intermittent and ephemeral drainages, toeslope seeps and springs, and valley bottom upwellings all feed the wet meadow. In addition, both gravelly well-drained soils and poorly-drained loamy and peat soils occur in close proximity to each other. This mix of environmental factors combined with cold air drainage in a high elevation montane valley results in a distinctive ecological system composed of a diverse mix of both widespread and globally rare plant associations. Elk Meadow provides excellent forage opportunities for a variety of wildlife and bird species including sandhill cranes, elk, moose and small mammals. Raptors, wolverine, reintroduced gray wolves, and other predators also utilize the diverse meadow.

Elk Meadow lies in a broad low-gradient valley drained by Elk Creek. Elk Creek enters the site from the southwest and flows ca 2.75 miles northeast through the meadow to a short reach of forested canyon where it leaves the site. A perennial tributary stream enters Elk Creek from the southeast near the center of the site and two intermittent streams that carry

snowmelt runoff from the east and west enter the site nearer the north end the meadow. There is significant inflow to the site from spring creeks that enter Elk Creek at several places along with water from numerous toeslope seeps, springs, and upwellings within the meadow.

Upland glacial moraine slopes bordering the site support conifer forests dominated by *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce), and *Pinus contorta* (lodgepole pine) with understories dominated by *Vaccinium caespitosum* (dwarf huckleberry), *V. scoparium* (grouseberry), and *Carex geyeri* (Geyer's sedge). Moist toeslopes below the forest support stands of *Deschampsia cespitosa* (tufted hairgrass), *Danthonia intermedia* (timber oatgrass) and mixed stands of mesic graminoids and forbs including *Hordeum brachyantherum* (meadow barley), *Alopecurus pratensis* (an exotic hay grass), *Koeleria cristata* (prairie Junegrass), *Senecio hydrophiloides* (tall groundsel), *Penstemon globosus* (globe penstemon) and *Fragaria virginiana* (Virginia strawberry). Some of these areas have relatively high cover of less palatable forbs and probably represent communities degraded by historic excessive livestock grazing.

On the lower side slopes of the valley surrounding the site, there are several moist swales and small glacial kettle-like depressions. These swales and depressions support a heterogeneous mix of lush mesic forbs and graminoids. One such swale is dominated by *C. microptera* (small wing sedge) mixed with *C. aquatilis* (water sedge), *C. jonesii* (Jones' sedge), *S. hydrophyloides*, *Delphinium* spp. (larkspur), *Aster foliaceus* (alpine leafybract aster), and trace amounts of *Poa pratensis* (Kentucky bluegrass), *Rumex crispus* (denseflowered dock), and *Taraxacum officinale* (common dandelion) indicating possible disturbance from historical livestock grazing. Another kettle-like depression supported an open mix of *P. engelmannii* and *P. contorta* with a shrubby understory of *Salix barclayi* (Barclay's willow), *Ledum glandulosum* (mountain Labrador tea), and other *Salix* spp. with *V. scopulorum* (grouseberry), *Calamagrostis canadensis* (bluejoint reedgrass), and *Caltha leptosepala* (white marsh marigold) dominating the herbaceous layer.

Wetlands extend ca 50-100 m upslope from the meadow into the conifer forest in several areas. On the northwest side of the meadow, one wetland supports *A. lasiocarpa*-*P. contorta*/*C. canadensis*, *S. wolfii* (Wolf's willow), *S. planifolia* var. *monica* (planeleaf willow), *Vaccinium occidentale* (blue huckleberry), *Betula glandulosa* (bog birch), *C. aquatilis* and *C. canadensis* stands. The substrate is a mix of quaking peat and loamy soils with numerous water tracks draining the area. Small to large patches of *C. aquatilis*, *E. pauciflora* (few-flow spikerush), and *C. utriculata* (bladder sedge) occur near the meadow.

Along the southwest edge of Elk Meadow is an extensive area of peatland and sloping carrs, which support stands of *S. wolfii*, *S. lemmonii* (Lemmon's willow), *S. planifolia* var. *monica* and *V. occidentale* along with patches of *C. aquatilis*, *Eleocharis pauciflora* (few-flower spikerush) and *Sphagnum* spp. The ground surface quakes and numerous narrow water tracks, some of which are elevated above the peat surface on natural dike-like hummocks, drain the area. *Betula glandulosa* stands occur near the banks of some spring channels. Inclusions of perched patches of *E. pauciflora* and *C. utriculata* occur at the forest edge. Fingers of *P. contorta* saplings extend into the meadow interspersed with stringers of *C. aquatilis* and *C. utriculata*. Drier areas adjacent to these peatlands and carrs transition to *D.*

cespitosa stands. *Juncus balticus* (Baltic rush) also occurs as well-defined patches blending with *C. aquatilis* patches in wetter soil. Soils are generally organic-rich loams with a thick duff surface layer. These mosaics may also blend with stands of *S. wolfii* and *S. planifolia* var. *monica*.

In the lower part of the site, water draining from the northwest feeds numerous sloping, convex peatlands that merge with meadow vegetation. These fan-shaped, 50 by 75 m areas of peatland support extensive mixed communities of *C. utriculata* and *E. pauciflora* with stands of *C. aquatilis* along water tracks. These communities extend onto the valley floor where the wettest sites support large expanses of *C. utriculata* along with large patches of *E. pauciflora* and a few scattered *S. eastwoodiae* patches. A pond located in the center of one large patch of *C. utriculata* contains *Nuphar polysepalum* (Rocky Mountain pond-lily). Extensive peatland also occurs along the northern side of Elk Meadow (in the southeastern most corner of Section 18, T 11N, R 12E) in association with a series of springs emanating from toeslopes. Some of these peatlands have been extremely degraded, apparently as the result of trampling by either livestock or elk.

The uppermost (southwest) portion of the valley floor south of Elk Creek is dominated by extensive stands of *Salix* spp. and patches of *D. cespitosa* and *D. intermedia* on fingers of higher ground. At the lowest elevation are *S. wolfii* and *S. planifolia* var. *monica* stands which occur between graminoid dominated wetlands. Stringers of *S. lemmonii*/*C. canadensis* occur along larger water tracks closer to the forest edge and along Elk Creek nearer the center of the meadow.

The southwestern section of the meadow on the north side of Elk Creek is dominated by *Salix* spp. including stands of *S. wolfii*, and *S. planifolia* var. *monica* with *S. drummondiana*/*C. canadensis* (Drummond's willow/bluejoint reedgrass) stands occupying slightly drier terraces. Wetter areas support patches of *C. aquatilis* and *C. utriculata*. An extensive stand of *D. intermedia* also occurs in this area on ephemeral moist sandy-gravelly loam soils. Adjacent slightly wetter areas are dominated by dense stands of *P. globosus* with smaller amounts of *D. cespitosa*, *D. intermedia*, *Senecio hydrophyloides* (tall groundsel) and inclusions of *C. aquatilis* in small wet depressions. *Penstemon globosus* dominated areas probably represent *D. cespitosa* stands degraded by excessive livestock grazing. Along ephemeral moist swales, *J. balticus* dominates with small patch inclusions of *C. aquatilis*.

Toward the center of the site the valley bottom supports *S. wolfii*/*C. utriculata* and *S. wolfii*/*C. aquatilis* with patches of *S. planifolia* var. *monica*, *C. utriculata*, *C. aquatilis*, *J. balticus*, *D. cespitosa*, and a few small patches of *C. simulata* short-beaked sedge) and *Carex atherodes* (awned sedge).

Rarity:

Several special status plant associations are present. State rare wildlife species including *Canis lupus* (gray wolf), *Lynx canadensis* (Canada lynx) and *Strix nebulosa* (great gray owl) have been observed at the site. Listed Threatened fish species including *Oncorhynchus mykiss* (steelhead), *O. tshawytscha* (Chinook salmon), and *Salvelinus confluentus* (bull trout) rear in Elk Creek within the site.

Condition:

Despite many years of livestock grazing, intact native plant communities still dominate the meadow; although some areas were damaged by excessive livestock grazing as evidenced by the increased cover of less palatable forbs and some areas of sloughing stream banks. The meadow was being grazed by cattle at that time the management plan for the livestock grazing allotment that includes Elk Meadow was revised in 1993. Managers, recognizing that livestock grazing had had an adverse impact on other resource values in the meadow, recommended the site be rested from grazing for 5-10 years. The meadow has not been grazed since 1994 and is currently managed as an enclosure from the rest of the allotment. As of 2003, managers and holders of permits have concluded that fencing costs to protect streams and wetlands associated with managing livestock in the meadow exceed the value of forage. In general, ecological conditions at the site appear to be improving after just a few years of rest. Few exotic species are present, each with low cover. *Poa pratensis* (Kentucky bluegrass), *Taraxacum officinale* (common dandelion) and *Rumex crispus* (curly dock) were observed in mesic graminoid meadows.

Viability:

The general Sawtooth Valley area has a high density of roads and trails with many improved gravel roads, pack trails, and both developed and dispersed camping areas. With the exception of trails, developments occur downstream of the site. The presence of trails within and around the site can influence hydrologic patterns through drainage ditch construction, culverts, and disturbing riparian vegetation and stream-flow patterns at crossings. Trails can also serve as sources of increased sediment and avenues for dispersal of invasive exotic plants. There is private land scattered throughout the Sawtooth Valley although there are some land use restrictions associated with National Recreation Area status. Several small-scale salvage and forest health logging projects have occurred in the area. Mountain pine beetles currently feeding in lodgepole pine stands around the Sawtooth Valley could cause widespread tree die-off and increase short-term potential for wildfires. Wildfires should not negatively impact Elk Meadow proper and in fact, could be beneficial to the long-term persistence of the plant communities found at the site.

Key Environmental Factors:

Elk Meadow is an extensive wet meadow complex of springs, seeps and fens, intermittent drainages, and perennial streams in a broad, high elevation montane valley with cold air drainage and glacial outwash derived soils.

Other Values:

Scenic meadows like Elk Meadow provide excellent opportunities and access for hunting, fishing, wildlife and bird watching, hiking and camping, and other forms of non-motorized recreation and solitude. The meadows provide exceptional forage and cover for sandhill cranes, elk, moose, beaver, small mammals, raptors, and other wildlife species. There is extensive bank dwelling beaver sign at the southwest end of the meadow and a beaver dam complex just downstream from the site.

Conservation Intent:

Designation as a Special Interest Area is appropriate. The entire site is within the Sawtooth National Recreation Area.

Management Needs:

The exclusion of livestock since 1994 provides an excellent opportunity for monitoring vegetation succession and riparian conditions after the cessation of over a century of livestock grazing.

Information Needs:

Specific information on wildlife and aquatic diversity should be obtained. Information on the aquatic diversity within Elk Creek needs to be obtained. The upland vegetation surrounding the site needs to be surveyed.

Plant Association Occurrences:

<i>Abies lasiocarpa/Calamagrostis canadensis</i>	G5	S3
<i>Abies lasiocarpa/Vaccinium caespitosum</i>	G5	S3
<i>Abies lasiocarpa/Vaccinium scoparium</i>	G5	S5
<i>Abies lasiocarpa/Carex geyeri</i>	G5	S5
<i>Betula glandulosa/Carex utriculata</i>	G4?	S3
<i>Salix eastwoodiae/Carex aquatilis</i>	G2	S2
<i>Salix drummondiana/Calamagrostis canadensis</i>	G3	S2
<i>Salix drummondiana/Carex utriculata</i>	G3	S3
<i>Salix lemmonii</i>	GU	SU
<i>Salix planifolia monica/Carex aquatilis-Carex utriculata</i>	G3Q	S3
<i>Salix wolfii/Carex aquatilis</i>	G4	S4
<i>Salix wolfii/Carex utriculata</i>	G4	S4
<i>Salix wolfii/Deschampsia cespitosa</i>	G3	S2
<i>Calamagrostis canadensis</i>	G4	S4
<i>Carex aquatilis</i>	G5	S4
<i>Carex microptera</i>	G4	S3
<i>Carex scopulorum</i>	G5	S3
<i>Carex simulata</i>	G4	S2
<i>Carex utriculata</i>	G5	S4
<i>Deschampsia cespitosa</i>	G4	S3
<i>Eleocharis pauciflora</i>	G4	S1
<i>Juncus balticus</i>	G5	S5
<i>Nuphar polysepalum</i>	G5	S4

Rare Plant and Animal Occurrences:

<i>Lynx canadensis</i>	G5	S1
<i>Polystichum kruckebergii</i>	G4	S2
<i>Botrychium simplex</i>	G5	S2
<i>Gulo gulo luscus</i>	G4T4	S2

Author:

E. Bottum

GOAT CREEK

Location:

The site is located SW of Stanley and encompasses a tributary valley of Sawtooth Valley, at the foot of the Sawtooth Mountains. The site may be accessed by trail from Iron Creek Road (FS Road 619).

Richness:

Goat Creek is located on the northeast toe slope of the Sawtooth Mountains. The site is representative of low gradient glaciofluvial environments characteristic of glaciated mountains of the Idaho Batholith ecoregional section. The site provides a relatively rare, pristine example of a naturally leached stream. Forested plant associations range from *Pseudotsuga menziesii/Calamagrostis rubescens* on relatively warm, dry ridgespur habitats to *Abies lasiocarpa/Vaccinium caespitosum* on cool, moist valley bottom habitats. A moderately-sized wet sedge meadow occurs in the valley bottom in association with low gradient meanders of Goat Creek. A mosaic of sedge dominated plant associations is present. Riparian shrub communities occur in small, patchy stands adjacent Goat Creek. A beaver-maintained wetland system occurs within the upper portion of the valley. Evidence of elk use abounds throughout the area.

Rarity:

Several special status plant species and plant communities are present.

Condition:

No exotic species were observed.

Viability:

The site is adjacent to the Sawtooth Wilderness and within the Sawtooth NRA. Private land is within close proximity to the site.

Key Environmental Factors:

Other Values:

Conservation Intent:

Goat Creek has been recommended as a Reference Area or Research Natural Area.

Management Needs:

The site is closed to domestic livestock grazing. However, livestock use of the site needs to be monitored as some stray cows are entering the area. Recreational use of the site also needs to be monitored.

Information Needs:

Inventory work needs to be conducted in the northwest portion of the meadow.

Plant Association Occurrences:

<i>Pseudotsuga menziesii/Calamagrostis rubescens, Calamagrostis rubesce</i>	G5	S3
<i>Deschampsia cespitosa</i>	G4	S3
<i>Abies lasiocarpa/Vaccinium scoparium, Vaccinium scoparium phase</i>	G5	S5
<i>Betula glandulosa/Carex utriculata</i>	G4?	S3
<i>Pseudotsuga menziesii/Carex geyeri, Carex geyeri phase</i>	G5	S5
<i>Carex buxbaumii community</i>	G3	S1
<i>Pinus contorta/Vaccinium occidentale</i>	G4	S2
<i>Abies lasiocarpa/Calamagrostis rubescens</i>	G4G5	SNA
<i>Abies lasiocarpa/Vaccinium caespitosum</i>	G5	S3
<i>Carex aquatilis</i>	G5	S4
<i>Potentilla fruticosa/Deschampsia cespitosa</i>	G4	S3
<i>Abies lasiocarpa/Calamagrostis canadensis, Vaccinium caespitosum pha</i>	G5	S5
<i>Carex utriculata</i>	G5	S4
<i>Abies lasiocarpa/Vaccinium scoparium, Calamagrostis rubescens phase</i>	G5	S5

Rare Plant and Animal Occurrences:

<i>Carex buxbaumii</i>	G5	S3
<i>Carex livida</i>	G5	S2

Author:

J. M. Anger

HUCKLEBERRY CREEK FEN

Location:

Huckleberry Creek Fen is located ca 9 air miles south of Stanley, Idaho, on the west side of Decker Flat. From Stanley, travel ca 16 miles south on Highway 75 to Forest Service Road 209. Turn west on Forest Service Road 209 for ca 0.25 mile across the Salmon River to the intersections of Forest Service Road 210 (Decker Flat Road) and Forest Service Road 315 (Hell Roaring Creek). Travel ca 2 miles north on Forest Service Road 210. A road heads due west, that can be traveled, until it ends at a fence corner. Walk from the fence corner ca 0.5 mile to the RNA.

Richness:

Huckleberry Creek Fen is a sloped wetland between the moraines of Hell Roaring and Decker creeks. The fen is a very complex mosaic of community types that extend over short distances. The most widespread community is *Pinus contorta/Vaccinium occidentale*

(lodgepole pine/blue huckleberry). Small microsites (up to 10 x 10 meters) support near monocultures of *Carex utriculata* (bladder sedge), *Eleocharis pauciflora* (few-flowered spikerush), *Carex livida* (pale sedge), *Scirpus cespitosus* (tufted bulrush), and *Betula glandulosa* (bog birch). These small stands are created as inclusion within the *Pinus contorta/Vaccinium occidentale* plant community.

Rarity:

The fen provides habitat for several peatland species of concern including *Carex livida*, *C. buxbaumii* (Buxbaum's sedge), and *Drosera intermedia* (spoon-leaved sundew). The spring creeks are important rearing areas for steelhead and Chinook salmon. The creeks provide a continual source of cool water throughout the growing season in most years.

Condition:

Exotics, which threaten site quality, were not observed.

Viability:

Key Environmental Factors:

The sloped wetland occurs in an area subirrigated by groundwater, which presumably originates as precipitation on porous glacial till upslope. The wetland sits in a small valley created by the moraines of Decker and Hell Roaring creeks. Huckleberry Creek originates above the peatland and transverses the area. It should be noted that Huckleberry Creek is a spring creek and not driven by melt of high elevation snow pack.

Other Values:

Conservation Intent:

The area is an established RNA. Private land is adjacent with high quality wetlands that could be targeted for acquisition or easement.

Management Needs:

Decker Flat is grazed and livestock had entered the RNA in 2001 and previous years. Impacts include compacted trails, pugging in emergent habitat, and removal of aboveground biomass. The effect on the fen includes loss of vegetative cover in trails, creation of hummocky topography, increase run-off rather than storage of water, and possibly changes in water quality from nutrient inputs (fecal material), and alteration of filtering functions. A fence needs to be constructed to prevent livestock use. As of 2002, no fence has been constructed. However, protective and interpretive signs, about the RNA, and a perimeter fence should be installed.

Information Needs:

Plant community inventory is needed to verify element occurrences as well as surveys to identify the flora and fauna present. Fish inventories are also needed.

Plant Association Occurrences:

Pinus contorta/Vaccinium occidentale

G4

S2

Rare Plant and Animal Occurrences

<i>Carex livida</i>	G5	S2	
<i>Drosera intermedia</i>		G5	S1
<i>Carex buxbaumii</i>		G5	S3

Author:

M. Jankovsky-Jones

MYSTERY LAKE

Location:

Mystery Lake is located in the Salmon River Mountains, at the head of the Loon Creek drainage, about 28 air miles (45 km) west of Challis, Idaho. | From Stanley, Idaho, travel west on State Route 75 along the Salmon River to Sunbeam, Idaho. At Sunbeam take FS Road 013 north along the Yankee Fork for about 9.5 miles (15.3 km) to the junction with FS Road 172, just past the Bonanza Guard Station. Travel north on FS Road 172 up Jordan Creek, over Loon Creek Summit, and down the West Fork Mayfield Creek to the mouth of Mystery Creek, a distance of about 15 miles (24 km). Access to the RNA is by hiking a trail up the Mystery Creek drainage. The first lake is just inside the RNA boundary.

Richness:

Mystery Lake RNA encompasses a glaciated basin at the head of Mystery Creek. The basin includes several lakes varying greatly in both size and productivity. Elevations range from 8560 feet (2594 m) where Mystery Creek leaves the RNA to 10,329 feet (3130 m) on the summit of The General. The area is geologically complex, being underlain by Idaho Batholith granitics and close to the contact with the Custer Graben. Numerous volcanic dikes of tertiary age have cut the granitic bedrock. A large rock glacier occurs below the headwall of The General and is moving into Mystery Lake. The site lies in the relatively arid, central portion of the Salmon River Mountains. As a result, the subalpine fir (*Abies lasiocarpa*) and whitebark pine (*Pinus albicaulis*) communities in the area represent the xeric end of their respective habitat type series. Considerable cliff and talus habitat occurs at upper elevations in the area. Above the subalpine fir and whitebark pine krummholz at upper timberline on The General, there is a small alpine zone dominated by plants adapted to talus and scree.

Rarity:

The site occurs within designated recovery habitat for gray wolf, an endangered species.

Condition:

Mystery Lake is listed as a Special Management Area in the Challis National Forest Land and Resource Management Plan (1987) for its values as an RNA. The lowest lake in the area contains fish and receives some recreational use by fishermen.

Viability:

Mystery Lake is entirely surrounded by Forest Service lands within Management Area 1 - the Frank Church-River of No Return Wilderness. The area is managed to protect wilderness attributes.

Key Environmental Factors:

Other Values:

Conservation Intent:

RNA

Management Needs:

Information Needs:

Plant Association Occurrences:

<i>Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum phase</i>	G4	S2
<i>Pinus albicaulis-Abies lasiocarpa</i>	G5?	S3
<i>Abies lasiocarpa/Carex geyeri, Carex geyeri phase</i>	G5	S5
<i>Abies lasiocarpa/Vaccinium scoparium, Pinus albicaulis phase</i>	G5	S5
<i>Abies lasiocarpa/Vaccinium scoparium, Vaccinium scoparium phase</i>	G5	S5
<i>Abies lasiocarpa/Juniperus communis</i>	G5	SNA

Author:

A. H. Pitner

POLE CREEK MEADOWS

Location:

From the junction of State Routes 21 and 75 in Stanley, Idaho, travel southeast on Route 75 for ca 24.0 miles to the intersection with Pole Creek Road (Forest Service Road 194). Turn east onto Pole Creek Road and travel for ca 3.0 miles to the historic Pole Creek Guard Station. The site is located along Pole Creek for ca 1.4 miles up and downstream from the guard station.

Richness:

Pole Creek includes the Pole Creek Exclosure Research Natural Area (RNA) and additional wetland areas up and downstream along Pole Creek. The confluence of Pole and Rainbow creeks is within the site. The site also includes several vernal pool-like kettle ponds and depressions, toeslope seeps and springs, and valley bottom upwellings that feed areas of wet

meadow and peatland. Both gravelly well-drained soils and poorly-drained loamy and peat soils occur in close proximity to each other. These wetlands provide excellent forage opportunities for a variety of wildlife and bird species, including sandhill cranes, elk, beaver and small mammals. Raptors, wolverines, reintroduced gray wolves, and other predators also utilize these diverse wetlands.

Pole Creek, a tributary to the Salmon River near its headwaters, originates in the Boulder Mountains and is a sinuous perennial stream that flows through a wide, low gradient valley on the east side of the Sawtooth Valley. It has cut a relatively wide floodplain through undulating, well-drained, granitic Quaternary glacial outwash deposits. Pole Creek is entrenched as it enters the site from the northeast.

The highest terraces along the creeks support *Artemisia tridentata* var. *vaseyana*/*Festuca idahoensis* (mountain big sagebrush/Idaho fescue) and occasional *Pinus contorta* (lodgepole pine) stands. The vegetation grades into *Aster integrifolius*/*Festuca idahoensis* (mountain aster/Idaho fescue) meadow on gravelly soil with patchy *A. cana* (silver sagebrush), *Juncus balticus* (Baltic rush) stands, and extensive stands of *Carex praeegracilis* (clustered field sedge) and *Alopecurus pratensis* (an introduced hay grass). Narrow stringers of *Salix boothii* (Booth willow) and *S. lemmonii* (Lemmon's willow) with mesic graminoid understories follow the creek floodplain. The drier areas of the meadow have been disturbed by both historic and recent livestock grazing.

The southeastern portion of the upper section supports large stands of *Salix* spp. co-dominated by *S. lemmonii* and *S. boothii* with patchy *S. geeyeriana* (Geyer willow) and *S. wolfii* (Wolf's willow). The willows form a canopy over a mixed understory of extensive *J. balticus* with smaller amounts of *Deschampsia cespitosa* (tufted hairgrass), *C. microptera* (small wing sedge), *Calamagrostis canadensis* (bluejoint reedgrass) and *A. pratensis*. This area also supports *C. utriculata* (bladder sedge) as scattered inclusions and on the margins of beaver ponds and along spring channels. Wetter low-lying areas are occupied by *S. lemmonii*/*C. utriculata* in wide bands around beaver ponds with inclusions of *S. wolfii* and *S. boothii* on higher ground. An extensive complex of beaver dams has backed up water into *S. boothii*/*C. utriculata* stands and raised the water table enough to promote establishment of *Betula glandulosa* (bog birch) and *C. cusickii* (Cusick's sedge). *Betula glandulosa* also occurs in small patches on creek banks.

Nearer the center of the site but still upstream from the RNA enclosure is a mosaic of *D. cespitosa*, *Potentilla fruticosa*/*Danthonia intermedia* (shrubby cinquefoil/timber oatgrass), *J. balticus*, *C. praeegracilis*-*Muhlenbergia richardsonis* (clustered field sedge-mat muhly) and other types situated among a network of hummocks, small springs with peat buildup and many small water tracks. Another distinct complex of undulating mounds, swales and vernal pools supports small stands of *C. aquatilis* (water sedge), *Eleocharis pauciflora* (few-flower spikerush), *D. cespitosa* and *J. balticus*. This area appears to be in relatively good ecological condition although there are areas dominated by *Poa pratensis* (Kentucky bluegrass).

The Pole Creek Enclosure RNA proper supports occurrences of *Abies lasiocarpa*/*C. canadensis* (subalpine fire/bluejoint reedgrass), *S. boothii*/mesic graminoid, *S. wolfii*/*C.*

utriculata, *C. utriculata*, *P. fruticosa*/*D. intermedia*, and *A. tridentata* var. *vaseyana*. Below the RNA enclosure, the valley bottom supports *A. cana*/*F. idahoensis* on drier clay-loam soils while *P. fruticosa*/*D. cespitosa*-*D. intermedia* is found on seasonally subirrigated areas. The *A. cana*/*F. idahoensis* community has been degraded by historic excessive livestock grazing and is now dominated by less palatable forbs and has a low cover of *P. pratensis* and other exotic species. *Carex praegracilis* now dominates many degraded *D. cespitosa* sites, probably as a result of historic excessive livestock grazing. *Salix wolfii*-*B. glandulosa* is found on adjacent wetter soils up and down the creek.

During the August 2002 survey, a large but currently unoccupied beaver dam complex below the enclosure raised water levels enough to cause some dieback of the *S. boothii*/mesic graminoid association. The raised water level has promoted expansion of *C. lanuginosa* (woolly sedge), *A. cana* and *P. fruticosa*.

Upwellings of ground water in the lower section of the site have allowed the development of numerous micro fens or small pockets of peatland scattered in mosaic with *S. wolfii*-*B. glandulosa*/*C. utriculata* and *C. cusickii*. This mosaic occurs in small patches to stringers along the creek surrounded by drier areas of *A. cana*, *P. fruticosa*, *J. balticus*, *Swertia perennis* (felwort) and *S. wolfii*.

Near Pole Creek Road in the northwestern section of the site, springs emanating from sloped peatlands support stands of *B. glandulosa*/*C. utriculata*, *C. simulata* (short-beaked sedge), *E. palustris* (creeping spikerush), and patches of *C. cusickii*. *Carex aquatilis* occurs in some water tracks, and scattered patches of *S. brachycarpa* (short fruit willow), *S. wolfii* and *B. glandulosa* occur on the wet margins of water tracks and peat. One of these peatland springs has 40-75 cm of peat with gravel in the water tracks. Sheep have disturbed the peatlands and water tracks. Although the area would appear to provide excellent habitat for *C. livida* (pale sedge), *C. buxbaumii* (Buxbaum's sedge), and *Drosera* spp. (sundew), they were not found during our survey. The area, which is further upslope and between the springs and the road, supports *S. wolfii* and *S. brachycarpa* on slightly elevated peat mounds as well as *B. glandulosa*, *C. cusickii*, and *P. fruticosa* and then transitions to uplands dominated by *A. cana* and *A. tridentata* var. *vaseyana*.

Rarity:

Several special status plant associations are present. State rare wildlife species, including *Canis lupus* (gray wolf), have been observed at the site. Listed Threatened fish species rear in Pole Creek. An active beaver dam complex further enhances the site's biodiversity value.

Condition:

Pole Creek Enclosure RNA was originally a fenced horse pasture for the historic ranger station and was therefore more or less protected from the extensive sheep and cattle grazing outside the pasture. The integrity of the fence has been problematic over the last several years and is still in need of completion and regular maintenance. Part of the enclosure has been used for cattle grazing experiments. A gravel road and well-maintained trail provide access to the historic ranger station and additional two-track roads and off-highway vehicle trails are common in the area. Pole Creek is part of an active livestock grazing allotment.

An effort has been made to restore a portion of Pole Creek to repair sloughing banks and other damage caused by historic excessive livestock grazing. Several boulder drop structures have been installed to control downcutting and the banks are beginning to show some sign of improvement. *Poa pratensis* is still common along the banks; however, its relatively shallow root system does not do an adequate job of stabilizing the soil. Sedges are starting to become established in the restored area and should help stabilize banks in the future if livestock grazing is controlled. Few exotic species are present with low cover. *Alopecurus pratensis*, *Poa pratensis*, and *Taraxacum officinale* (common dandelion) were observed in mesic graminoid meadows. *Poa pratensis* is widespread but dominant in only a few localized areas. The area around an old corral (demolished) in the upper end of the site is dominated by weedy exotics and species that increase with excessive grazing pressure. Common exotic species present around the old corral site include *Alopecurus pratensis*, *Agropyron repens* (quackgrass), *Urtica dioica* (stinging nettle), *Thlaspi arvensis* (field pennycress), *Bromus inermis* (smooth brome), and *Poa pratensis*.

Viability:

The general Sawtooth Valley area has a high density of roads and trails with many improved gravel roads, pack trails, and both developed and dispersed camping areas. The presence of roads can influence hydrologic patterns through drainage ditch construction, culverts, and disturbing riparian vegetation and stream-flow patterns at bridge crossings. Roads can also serve as sources of increased sediment and avenues for dispersal of invasive exotic plants. Campsites occasionally impact the drier margins of meadows as well as stream bank vegetation. There is private land scattered throughout the Sawtooth Valley although there are some land use restrictions associated with National Recreation Area status. Several small-scale salvage and forest health logging projects have occurred in the area. Mountain pine beetles currently feeding in lodgepole pine stands around the Sawtooth Valley could cause widespread tree die-off and increased short-term potential for wildfires. Wildfires should not negatively impact the Pole Creek site and may be beneficial to the long-term persistence of the plant communities found at the site.

Key Environmental Factors:

Pole Creek is an extensive wet meadow complex of springs, seeps, carrs, fens, and perennial streams in a broad, high elevation montane valley with cold air drainage and glacial outwash derived soils.

Other Values:

The scenic meadow provides excellent opportunities and access for hunting, wildlife and bird watching, hiking and camping, and other forms of non-motorized recreation. In addition, the meadows provide exceptional forage and cover for sandhill cranes, elk, small mammals, raptors, and other wildlife species. A historic ranger station is located within the site along with associated interpretive signs, footpaths, a bridge and restroom facilities. Pole Creek Exclosure RNA could provide a better example of grazed versus ungrazed riparian and upland habitats if fencing was completed and maintained.

Conservation Intent:

Pole Creek is within the Sawtooth National Recreation Area and encompasses Pole Creek Exclosure RNA. Designation of the portion of the site outside the RNA as a Special Interest Area is appropriate.

Management Needs:

Livestock grazing and off-highway vehicle use are negatively impacting the site and both require better management. Recreational use of the site and adjacent areas should be managed to avoid unnecessary negative impacts to vegetation and soils. The old corral site is a source of exotic species that should be carefully monitored and treated if necessary.

Information Needs:

Specific information on wildlife diversity should be obtained. *Euderma maculatum* (spotted bat) have been found in several central Idaho locations with similar habitat. Information on the aquatic diversity within Pole Creek needs to be obtained. Vernal pools in the area need to be surveyed.

Plant Association Occurrences:

<i>Salix wolfii/Carex utriculata</i>	G4	S4
<i>Artemisia tridentata vaseyana/Festuca idahoensis</i>	G5	S4
<i>Salix boothii/Carex utriculata</i>	G4	S4
<i>Carex utriculata</i>	G5	S4
<i>Abies lasiocarpa/Calamagrostis rubescens</i>	G4G5	SNA
<i>Potentilla fruticosa/Danthonia intermedia</i>	GNR	S3
<i>Artemisia tridentata vaseyana/Agropyron spicatum</i>	G5	S4
<i>Abies lasiocarpa/Calamagrostis canadensis</i>	G5	S3
<i>Salix lemmonii</i>	GU	SU
<i>Salix boothii/Mesic Graminoids</i>	G3?	S3?
<i>Artemisia tridentata vaseyana/Festuca idahoensis</i>	G5	S4
<i>Artemisia tridentata vaseyana/Agropyron spicatum</i>	G5	S4
<i>Juncus balticus</i>	G5	S5
<i>Carex aquatilis</i>	G5	S4
<i>Aster integrifolius/Festuca idahoensis</i>	GNR	S3
<i>Salix wolfii/Mesic Forbs</i>	G3	S2
<i>Betula glandulosa-Lonicera caerulea/Senecio pseud aureus</i>	GQ	S3
<i>Artemisia cana/Festuca idahoensis</i>	G3	S2
<i>Deschampsia cespitosa</i>	G4	S3
<i>Carex cusickii</i>	GQ	S3

Author:

E. Bottum

REDFISH LAKE MORAINE

Location:

Redfish Lake Moraine RNA is located on the east side of Redfish Lake in the Sawtooth Valley, ca 8.5 miles (13.8 km) south of Stanley, Idaho. | From Stanley, at the junction of State Routes 21 and 75, turn south onto State Route 75 and travel for ca 4.2 miles (6.8 km) to the intersection with Forest Service (FS) Road 214 (to Redfish Lake). Turn southwest (right) onto FS Road 214. Follow the road to the east side of the lake. Look for trailhead (FS Trail 045). Follow the trail southward for ca 1 mile (1.6 km) to the northern boundary of the RNA. The RNA can also be reached by following the shoreline southward from the boat ramp on the eastern shore for ca 1 mile (1.6 km) to the northwest corner of the RNA.

Richness:

Redfish Lake Moraine RNA encompasses a section of the large lateral moraine on the east side of Redfish Lake, and three different ages of glacial deposits occur in the area. The youngest covers the steep inner slope of the moraine and the two older deposits cover the relatively gentle outer slope. Elevations range from 6,547 feet (1984 m) along the western boundary on the shore of Redfish Lake to 7,520 feet (2279 m) on the ridgeline above the lake. Much of the area has *Pinus contorta* (lodgepole pine) in various stages of succession, *Pseudotsuga menziesii* (Douglas- fir), or *Abies lasiocarpa* (subalpine fir) series habitat types. On the flat benches of the outer slope of the moraine, *Pinus contorta* occurs in stands where the older age class is being replaced by a younger age class. It is difficult to tell whether the stand will eventually be *Pseudotsuga menziesii* or *Abies lasiocarpa* climax. Several communities are restricted to a narrow zone along Redfish Lake shoreline. They communities are affected either by cold air drainage or a high water table. The *Abies lasiocarpa/Vaccinium scoparium* (grouse whortleberry) habitat type falls in the former category, while several communities fall into the latter, including *Abies lasiocarpa/Menziesia ferruginea* (menziesia), *Abies lasiocarpa/Ledum glandulosum* (Labrador-tea), *Alnus sinuata* (Sitka alder) plant associations. There is also a community that occurs below the mean high water line of the lake.

Rarity:

Redfish Lake is the spawning site for the endangered *Oncorhynchus nerka* (sockeye salmon), and it supports *Salvelinus confluentus* (bull trout), a listed threatened species. In 1993, a *Falco peregrinus* (peregrine falcon) pair was documented nesting on cliffs west of the lake. The raptors could potentially use the RNA for foraging or other activities.

Condition:

The site is allocated to Mangement Area 4A-12 lands in the Sawtooth Land and Resource Management Plan. A trail traverses the RNA, but recreational use is light and impacts are minimal. In 2000, a large volume of foot traffic impacted the lakeshores adjacent to and within the RNA. This resulted in soil compaction, loss of groundcover, firewood scavenging, a loss of woody forest debris, and multiple undesigned trails converging along the lakeshore. Small cold springs, creeks, and steep trails were also impacted by foot traffic. Recreational uses in the area include hiking, hunting, fishing, horseback riding and/or other riding/pack

stock use, and mountain biking. No exotic species were specifically noted during the 2000 survey, but this may change with increased use of horses and other recreational livestock.

Viability:

The site is surrounded by Forest Service lands and within Management Area 4A-13 lands. These lands are managed to provide for dispersed and developed recreation activities in areas conveniently accessed by automobile and other recreational vehicles. In 2000, a large improved campground, with paved access, was reported in close proximity of the RNA's northern boundary.

Key Environmental Factors:

Other Values:

The site includes an excellent example of glaciation processes and contrast in glacial tills.

Conservation Intent:

RNA

Management Needs:

RNA boundaries need to be marked and accompanied by some type of interpretative signs that would explain RNA purposes and goals to the public. A frequent monitoring schedule needs to be established in order to maintain RNA integrity. This will help identify any increasing or inappropriate levels of use in a timely manner. The lakeshore, both within and adjacent to the RNA, needs to be surveyed to determine if any restoration closures are warranted. There are trails in need of repair to prevent erosion, down cutting, and the formation of gullies, and trail signs need to be repaired. There is also a need to eliminate motorized vehicle access on the east boundary of the RNA.

Information Needs:

Plant inventory data was taken in the following plant association types: *Abies lasiocarpa/Calamagrostis rubescens* (pinegrass), *Pseudotsuga menziesii/Carex geyeri* (elk sedge)-*Carex geyeri*, *Pseudotsuga menziesii/Vaccinium caespitosum*, *Abies lasiocarpa/Calamagrostis canadensis-Vaccinium caespitosum*, and *Pseudotsuga menziesii/Calamagrostis rubescens*. However, more plant community inventory is needed to verify element occurrences along with inventory surveys to identify the flora and fauna present. Additional data information and comparisons to fire frequency or successional patterns within the habitats represented in the RNA might be useful for management activities.

Plant Association Occurrences:

<i>Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum phase</i>	G4	S2
<i>Abies lasiocarpa/Calamagrostis rubescens</i>	G4G5	SNA
<i>Abies lasiocarpa/Vaccinium scoparium, Calamagrostis rubescens phase</i>	G5	S5
<i>Pseudotsuga menziesii/Calamagrostis rubescens</i>	G5	S4?
<i>Alnus sinuata</i>	G2Q	SNA
<i>Abies lasiocarpa/Menziesia ferruginea, Menziesia ferruginea phase</i>	G5	S5

<i>Abies lasiocarpa/Calamagrostis canadensis,</i>		
<i>Vaccinium caespitosum phase</i>	G5	S5
<i>Abies lasiocarpa/Carex geyeri</i>	G5	S5
<i>Pinus contorta/Carex geyeri</i>	G4?	S4
<i>Pseudotsuga menziesii/Carex geyeri, Carex geyeri phase</i>	G5	S5
<i>Pseudotsuga menziesii/Vaccinium caespitosum</i>	G5	S2

Author:

A. H. Pitner, E. Bottum (10-28-2004)

SHELL ROCK - RAINBOW LAKES

Location:

To reach Shell Rock - Rainbow Lakes from Warm Lake, drive east over Warm Lake Summit to the Landmark area. Turn north on Forest Service Road 413 following Johnson Creek downstream. Drive ca 12 miles (or more) on this well maintained gravel road to the area between Coffee and Halfway Creek (just south of Halfway Station). Look for Forest Service Road 410 sign leading to west (left). Take this road to its end at the Rainbow Lake trailhead at the end of Forest Service Road 410 (ca 11 miles). The road is mostly good quality but has several water bar/ruts on the last half requiring a high clearance two-wheel drive or 4-wheel drive vehicle. From the trailhead at the end of the road, follow Forest Service Trail 094 toward Rainbow Lake. The first 0.3 mile follows an old logging road through fire salvage logged area. At ca 0.3 mile, look for a major trail, marked by the Rainbow Lake trail sign and will head up hill to the northwest. Follow this maintained trail (marked "Ditch Creek" trail on quad map). After ca 1.0 mile of hiking on this trail (the first half through fire salvage logged area), you will approach a low saddle. You have now entered the Shell Rock-Rainbow Lakes area. Look for an unmarked trail heading into the forest to the west before the saddle. This is the trail to Shell Rock Lake. If you continue straight, you will reach Rainbow Lake. It will be ca 250 yards to the junction with the Idaho Centennial Trail (Forest Trail 093), ca 0.3 mile further to a beautiful pond and wet meadow (look for moose), and another 250 yards to a large degraded campsite at Rainbow Lake. To reach the Shell Rock Lake wetland benches, take the trail (less often maintained) going west and follow it as it steeply climbs onto a bench to the north of Shell Rock Peak. The trail to Shell Rock Lake can be difficult to follow because it occasionally disappears in grassy openings and wet meadows. There are also a few elk and hunter trails (flagged but do not follow) leading off trail. Go slowly, and search for the main trail--it always reappears. Once you reach the bench (ca 0.3 mile), the next 1.0 mile of the trail will trend southwest on this gently sloping bench while paralleling, and occasionally crossing, wetland meadows and grassy areas between conifer clusters. At ca 0.3 mile from the Rainbow Lake trail junction, the trail reaches a low saddle immediately to the west of Shell Rock Peak. Though you cannot see Shell Rock Lake through the thick lodgepole pine forest, you are getting close. Follow the main trail as it descends steeply to the

south into Shell Rock Lake basin. It will drop through a small wet meadow in 0.25 mile and travel another third of a mile to reach the lake (a total of ca 3.3 miles from the trailhead).

Richness:

Shell Rock - Rainbow Lakes consists of two subalpine lakes and several drainages located within glacial peaks, cirques, and benches. Shell Rock Lake is in a cirque basin though Rainbow Lake is not. The area includes three distinct drainage basins: the Shell Rock Lake basin and immediate outlet to Ditch Creek; seeps, wet forest and meadows, and ephemeral streams feeding a major north fork of Ditch Creek on the north side of Shell Rock Peak; and Rainbow Lake, its inlet pond and immediate outlet to Caton Creek. The Shell Rock Lake and bench drainages, separated from each other by a low saddle, are ringed by high granitic ridges and broad peaks including Log Mountain at 9179 feet forming a horseshoe facing east around the isolated Shell Rock Peak. Rainbow Lake drainage is separated from the north fork of Ditch Creek by a low saddle. The wetlands are a defining feature of the area and include aquatic *Nuphar polysepalum* (pond lily) at Rainbow Lake and its inlet pond and *Sparganium* (burreed) at both lakes, large areas of *Carex* (sedge) meadow that are flooded to ephemerally wet, and patches of *Deschampsia cespitosa* (tufted hairgrass) and mixed mesic forbs occur on slightly drier ground. Swards of *Carex utriculata* (beaked sedge) occur in the inlet pond and the perimeter of Rainbow Lake and on the shorelines of Shell Rock Lake in areas that are flooded up to about 30 cm in the summer or merely saturated. *Carex aquatilis* (water sedge) patches are also common in these areas but of less extent. *Carex scopulorum* (mountain sedge) communities are also common around the lakes, seeps, springs, and late lying snow beds throughout the benches on wet soil. On slightly elevated landforms that are ephemerally saturated to flooded, there are occasional patches of *Carex luzulina* (woodrush sedge). These mesic graminoid meadows and patches are usually bordered by mixed aged conifers including *Picea engelmannii* (Engelmann's spruce), *Abies lasiocarpa* (subalpine fir), and *Pinus contorta* (lodgepole pine) as well as *Calamagrostis canadensis* (bluejoint reedgrass), often with significant *Ledum glandulosum* (Western Labrador tea) cover in the understory with *Phyllodoce empetriformis* (pink mountainheath). These conifer communities are also common in riparian zones and broad drainage bottoms (e.g. bench between Shell Rock and Rainbow Lakes). The surrounding upland forest is nearly all mid to late seral *Pinus contorta* dominated with patches of *Picea engelmannii* and *Abies lasiocarpa* invasion. *Pinus albicaulis* (whitebark pine) can be found on high ridges. A small area of burned forest is found near Rainbow Lake's outlet. The upland herbaceous scree slopes, shrubby talus slopes, well-drained granitic gravel soil ridges, and rocky benches have a high diversity of upland community types typical of the Salmon River Mountains. These upland communities, as well as several small, high elevation wetland benches and seeps, were not surveyed. Elk and moose were observed at the site and a black bear was observed nearby. Rainbow Lake receives moderate recreation use, especially anglers, hunters, and day hikers (Shell Rock receives less use). Shell Rock Lake is in a very scenic basin.

Rarity:

The area has intact wetland plant communities.

Condition:

Recreational uses in the area include hunting, fishing, and hiking with dispersed campsites and trails. There is no current evidence of livestock grazing. Trees have been cut down at the perimeter of burned areas and around campsites. No exotic species were noted, but there is a potential for invasion along trails and campsites.

Viability:

Logging including post fire salvage and road building has occurred in the lower watersheds.

Key Environmental Factors:

Shell Rock - Rainbows Lakes have intact subalpine lakes, wetland meadows, seeps, riparian zones with ungrazed wetlands in a roadless area.

Other Values:

The area is excellent moose, elk, and other wildlife habitat. Recreational use includes hunting, fishing, and hiking.

Conservation Intent:

Designation as a Special Interest Area - Botanical or wilderness area would be appropriate.

Management Needs:

Recreational use should be monitored and managed if necessary to prevent degradation of the wetlands. Better trails and camp placement around wetlands are needed.

Information Needs:

Need to survey the highest elevation wetland benches and seeps, the upland subalpine forest and mountain slope/ ridge communities, and the riparian zones.

Plant Association Occurrences:

<i>Nuphar polysepalum</i>	G5	S4
<i>Deschampsia cespitosa</i>	G4	S3
<i>Abies lasiocarpa/Calamagrostis canadensis</i>	G5	S3
<i>Carex scopulorum</i>	G5	S3
<i>Carex utriculata</i>	G5	S4
<i>Carex aquatilis</i>	G5	S4

Author:

C. Murphy

SOLDIER LAKES

Location:

Soldier Lakes RNA is located 25 air miles (42 km) northwest of Stanley, Idaho, at the head of Soldier Creek, a tributary to the Middle Fork Salmon River. Access to Soldier Lakes RNA is from State Route 21, 18 miles (29 km) northwest of Stanley, Idaho. Take FS Road 008 north for approximately 20 miles (33 km) to the end of the road at Josephus Lake Campground. The RNA is approximately 4 miles (7 km) by FS Trail 013 west from the campground. The RNA is up the steep slope to the south from where the trail approaches the first Soldier Lake. One of the lakes within the RNA is less than 0.25 mile up the slope.

Richness:

Soldier Lakes RNA contains two ponds and two lakes connected by moderate to steep gradient streams in high elevation cirque basins of granitic rock. One lake supports brook trout (*Salvelinus fontinalis*); the other does not support fish. The cirque basins in which the lakes are located are sparsely forested with mature subalpine fir (*Abies lasiocarpa*), lodgepole pine (*Pinus contorta*), Engelmann spruce (*Picea engelmannii*), and whitebark pine (*Pinus monticola*). A considerable portion of these basins consists of rocky, treeless headwalls and talus slopes. Elevations in the RNA range from 7900 feet (2408 m) along the northern boundary to 9147 feet (2788 m) at the highest point on the ridge above the upper basin.

Rarity:

The site contains a diversity of aquatic habitats. The area is within designated recovery habitat for gray wolf.

Condition:

Soldier Lakes RNA is listed as a Special Management Area in the in the Challis National Forest Land Resource Management Plan (1987) for its values as an RNA. The RNA receives minimal recreational use.

Viability:

The site is entirely surrounded by Forest Service lands within Management Area 1, the Frank Church-River of No Return Wilderness. This area is managed to protect wilderness attributes.

Key Environmental Factors:

Other Values:

The site has high watershed values.

Conservation Intent:

The site has been protected by designation as a Forest Service Research Natural Area.

Management Needs:

Information Needs:

Plant Association Occurrences:

<i>Abies lasiocarpa/Luzula hitchcockii</i>	G5	S5	
<i>Abies lasiocarpa/Vaccinium scoparium</i>	G5	S5	
<i>Abies lasiocarpa/Juniperus communis</i>	G5	SNA	
<i>Pinus albicaulis-Abies lasiocarpa</i>	G5?	S3	
<i>Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum phase</i>		G4	S2
<i>Abies lasiocarpa/Carex geyeri</i>	G5	S5	

Author:

J. H. Kaltenecker

BRUCE MEADOWS

Location:

From Lowman, take Idaho Highway 21 toward Stanley. About 3+ miles north of Banner Summit, take the road to Bear Valley (Forest Service Road 579) north for about 8.5 miles to Bruce Meadows in Bear Valley. The meadow is signed and has an airstrip and day-use facilities for airstrip users.

Richness:

Bruce Meadows formed on granitic Quaternary glacial outwash deposits within a broad, low gradient valley of the Bear Valley Creek and Elk Creek basins. The ecologic and hydrologic systems in this broad valley are complex. Overland snowmelt runoff, sinuous perennial streams, intermittent and ephemeral drainages, vernal pool-like ponds and depressions, toeslope seeps and springs, and valley bottom upwellings all feed the wet meadows. In addition, both gravelly well-drained soils and poorly-drained loamy and peat soils occur in close proximity to each other. This mix of environmental factors combined with cold air drainage in these high elevation montane valleys results in a distinctive ecological system composed of a diverse mix of both widespread and globally rare plant associations. One plant, *Erythronium grandiflorum* var. *nudipetalum* (yellow avalanche-lily), is endemic to the meadows in the Bear Valley region.

Bruce Meadows is fed by a series of north trending intermittent drainages that carry snowmelt runoff, toeslope seeps, and spring-fed perennial streams. These drainages are usually well separated from each other by low ridges of supporting drier meadows resulting in a subtle undulating pattern and a mosaic of saturated wetlands, ephemerally moist soil, and drier soil. *Carex aquatilis* (water sedge) dominates the wettest swales in the meadow including areas saturated into the fall and occurs as numerous small but distinct patches of up to 1 to 2 acres scattered throughout the meadow on seeps and along small spring-fed creeks. Often adjacent to *C. aquatilis*, *Deschampsia cespitosa* (tufted hairgrass) dominates relatively small but distinct patches in swales that are moist to saturated in the summer and borrow pits where soil was removed to construct the airstrip. Some *D. cespitosa* stands do grade into

stands co-dominated by *Juncus balticus* (Baltic rush) or *Carex utriculata* (bladder sedge) on wetter sites and stands dominated by *Salix wolfii* (Wolf's willow) or *Potentilla fruticosa* (shrubby cinquefoil) shrubs on slightly drier sites. *Potentilla fruticosa*/*D. cespitosa* stands occasionally with *Pinus contorta* (lodgepole pine) inclusions are drier and rarely support *Salix wolfii* (Wolf's willow). *Salix wolfii* forms extensive but highly variable stands on toeslopes with water tracks and along spring-fed creeks. The understory of *S. wolfii* stands reflects soil moisture conditions. For example, *Calamagrostis canadensis* (bluejoint reedgrass) is occasionally abundant on drier toeslope sites and surrounded by *Abies lasiocarpa*/*Calamagrostis canadensis* (subalpine fir/bluejoint reedgrass) forest with scattered *Betula glandulosa* (bog birch). Often *D. cespitosa* occurs with *Carex* spp. (sedges) and in transitional areas and dominates *S. wolfii* stands. Mixed with *Salix planifolia* var. *monica* (planeleaf willow) and *C. utriculata*, *C. aquatilis* forms the understory in a large wetland in the southeast portion of the meadow.

In areas with slightly drier and sandier soil, *S. wolfii* or *D. cespitosa* stands rapidly change to dominance by *Danthonia intermedia* (timber oatgrass) or *Aster integrifolius*/*Festuca idahoensis* (meadow aster/Idaho fescue). Adjacent to the *D. intermedia* meadow along the western portion of the site, *Potentilla fruticosa*/*Danthonia intermedia* (shrubby cinquefoil/timber oatgrass) shrubland is extensive on coarse gravelly loam soils probably derived from alluvial deposits originating from adjacent Wyoming Creek. On well-drained sandy loam on toeslopes and low ridges in the center of the meadow, degraded stands of *A. integrifolius*/*F. idahoensis* are extensive. Most likely due to past overgrazing by sheep and cattle, both *A. integrifolius* and *F. idahoensis* are irregularly distributed varying from locally dense to nearly absent and replaced by seeded perennial grasses. Around Cold Creek and near the historic cabin and pasture site near the airstrip, *Agropyron smithii* (western wheatgrass) and *Alopecurus pratensis* (meadow foxtail) were probably seeded. In other areas, *Stipa columbiana* (Columbia needlegrass) has colonized disturbed soils. In general, the vegetation around the airstrip, access road, and old cabin and pasture is altered. Ditching of spring-fed creeks and draining and/or filling of some wetlands has occurred to keep water off of the airstrip.

Rarity:

Several special status plant associations are present. State rare wildlife species including gray wolf and great gray owl have been observed at the area.

Condition:

These scenic meadows provide excellent opportunities and access for hunting, wildlife and bird watching, hiking and camping, and other forms of non-motorized recreation and solitude.

There are trace amounts of *Bromus inermis* (smooth brome) present, with seeded *Agropyron smithii* patches in vicinity of airstrip. *Alopecurus pratensis* patches were seeded in drier meadows on soil disturbed by overgrazing or livestock bedding. In general, few exotic species are present, each with low cover.

Viability:

The general Bear Valley area is heavily roaded with several improved gravel roads, pack trails, and both developed and dispersed camping areas. A maintained airstrip and day-use facilities occurs in Bruce Meadows. Campsites occasionally impact the drier margins of the meadows, as well as stream bank vegetation. Major placer mining operations occurred in upper Bear Valley Creek basin. There is no private land in lower Bear Valley Creek basin. Extensive wildfires burnt large sections of the Elk Creek and Bear Valley Creek basins during the 1980's, but the slopes around Bruce Meadows are mostly unburned. Several small-scale logging projects and post-fire salvage logging have occurred in the area.

Key Environmental Factors:

Bruce Meadows consists of springs and seeps, ponds and vernal pools, intermittent drainages and perennial creeks and an extensive wet meadow complex in a broad, high elevation montane valley with cold air drainage and glacial outwash derived soils.

Other Values:

Bruce Meadows provides exceptional forage and cover for sandhill cranes, elk, small mammals, raptors, and other wildlife species. These scenic meadows provide excellent opportunities and access for hunting, wildlife and bird watching, hiking and camping, and other forms of non-motorized recreation and solitude.

Conservation Intent:

The area is managed for non-motorized recreation use. Designation as a Special Interest Area is appropriate.

Management Needs:

Since cattle grazing allotments ended, there is a need to monitor the vegetation succession and riparian conditions.

Information Needs:

Specific information on wildlife and aquatic diversity needs to be obtained. Upland vegetation and meadow margin vegetation including *Abies lasiocarpa*, *Pinus contorta*/*Calamagrostis canadensis* and *Salix wolfii*/*Calamagrostis canadensis* communities need to be surveyed. Data from *Carex aquatilis* and *Danthonia intermedia* meadow communities need to be obtained and data from *Salix lemmonii* stands along outlet creeks are also lacking.

Plant Association Occurrences:

<i>Abies lasiocarpa</i> / <i>Calamagrostis canadensis</i>	G5	S3
<i>Aster integrifolius</i> / <i>Festuca idahoensis</i>	GNR	S3
<i>Carex aquatilis</i>	G5	S4
<i>Deschampsia cespitosa</i>	G4	S3
<i>Potentilla fruticosa</i> / <i>Danthonia intermedia</i>	GNR	S3
<i>Potentilla fruticosa</i> / <i>Deschampsia cespitosa</i>	G4	S3
<i>Salix lemmonii</i>	GU	SU
<i>Salix wolfii</i> / <i>Calamagrostis canadensis</i>	G3	S3
<i>Salix wolfii</i> / <i>Carex aquatilis</i>	G4	S4

Rare Plant and Animal Occurrences:

<i>Gulo gulo luscus</i>	G4T4	S2
<i>Strix nebulosa</i>	G5	S3

Author:

C. Murphy

CAPE HORN MEADOWS-DRY CREEK

Location:

From Lowman, take Idaho Highway 21 toward Stanley. About 6 miles north of Banner Summit, turn north (left) toward the Seafoam Area (Forest Service Roads 008 and 203 begin here). Travel southeast on Road 203 for ca 7 miles to where the road crosses Dry Creek (near a junction with the 2-track Dry Creek Road). Dry Creek crossing is near the middle of the site. The site is located in the meadow west of the road.

Richness:

Cape Horn Meadows-Dry Creek occurs in a broad glacial trough filled with moraine and glacial outwash deposits. The area is adjacent to the Marsh Creek floodplain and consists largely of a mosaic of permanently to semi-permanently saturated depressional and gently sloped meadow wetlands that are shallowly flooded early in the growing season. These wetlands are also sub-irrigated by groundwater from adjacent toeslopes and from the flow of Dry Creek. Although Dry Creek is an intermittent stream that has surface flows only during annual snowmelt or unusual precipitation events, its sub-surface flow helps support the diverse mix of shrub and graminoid dominated communities found at the site. Areas of peatlands also occur within the site, often associated with springs on toeslopes where groundwater surfaces and in swales with high groundwater. In some of these peatlands, *Sphagnum* sp. (moss) forms peaty hummocks over somewhat quaking ground in stands of *Betula glandulosa*-*Lonicera caerulea*/*Senecio pseud aureus* (bog birch-bluefly honeysuckle/streambank butterweed), *Carex utriculata* (bladder sedge), *Salix planifolia* var. *monica* (planeleaf willow) and *Vaccinium occidentale* (blue huckleberry). Swales and water tracks between hummocks support *Carex simulata* (short-beaked sedge), *C. aquatilis* (water sedge) and *Carex livida* (pale sedge). There are a few vernal pool-like areas in the meadows, mainly with mixed *Carex* spp. (sedges) in the bottoms of pools.

Rarity:

The wet meadow supports a large population of the rare sedge species, *Carex livida* (pale sedge). There are also several special status plant communities including *Abies lasiocarpa*/*Calamagrostis canadensis* (subalpine fir/bluejoint reedgrass), *Carex livida*, *Carex simulata* (short-beaked sedge), *Pinus contorta*/*Vaccinium occidentale* (lodgepole pine/blue huckleberry), and *Salix drummondiana*/*Calamagrostis canadensis* (Drummond's

willow/bluejoint reedgrass). The adjacent section of Marsh Creek provides spawning and rearing habitat for the listed threatened wild summer Chinook salmon.

Condition:

Historic livestock grazing over the past century had reduced the ecological condition of the meadow. The gravel road on the eastern boundary of the site has been used for many years to access a U.S. Forest Service facility and private ranches. Recreational use of the area is high and dispersed campsites are common. A sparse lodgepole pine stand included within the site and adjacent to the gravel road appears to have been used as a shepherd camp historically and recently. Due to the close proximity of roads and dispersed campgrounds, the peatland and wet meadows are highly susceptible to illegal motorized vehicle travel. Very few exotic species were noted in the wet meadow. *Poa pratensis* (Kentucky bluegrass) was found occasionally but did not form large patches or dominate the understory of stands. The total cover of exotic species in the peatland is very low.

Viability:

An improved gravel road forms the eastern boundary of the site and several old spur two-track roads lead to dispersed campsites that occur in the watershed. Large wildfires have burned in the surrounding area during the last ten years. The forest immediately adjacent to the wetlands has not burned recently; however, tree mortality from mountain pine beetles is continuing in the area. It is unknown how many past logging projects including post-fire salvage and mountain pine beetle treatments have occurred in the area.

Key Environmental Factors:

Cape Horn Meadows-Dry Creek consists of springs, seeps, carrs, peatland, low gradient intermittent and perennial streams in good ecological condition, and an extensive wet meadow complex in a broad, high elevation montane valley with cold air drainage and glacial outwash derived soils.

Other Values:

The wet meadow and peatland provide excellent wildlife habitat. Large numbers of elk use the area as well as reintroduced gray wolves. Sandhill cranes are common and breed there. The wet meadow and peatland are very scenic and also provide opportunities for hunting, fishing, wildlife and bird watching, hiking, camping, winter cross-country skiing, and other forms of non-motorized recreation and solitude.

Conservation Intent:

Protection of the site by designation as a Special Interest Area – Botanical would be appropriate.

Management Needs:

The site should be periodically monitored for changes in recreation, livestock grazing, off-highway vehicle use, and other activities to determine if they are impacting the ecological condition of the peatland and wet meadows.

Information Needs:

An aquatic diversity survey in Marsh Creek is needed. The plots of wetland meadow and peatland vegetation that were noted in the field during the 2002 survey need to be sampled. The upland vegetation needs to be surveyed. The site boundaries could be expanded both upstream and further downstream in the Marsh Creek drainage.

Plant Association Occurrences:

<i>Carex utriculata</i>	G5	S4
<i>Deschampsia cespitosa</i>	G4	S3
<i>Betula glandulosa-Lonicera caerulea/Senecio pseud aureus</i>	GQ	S3
<i>Abies lasiocarpa/Calamagrostis canadensis</i>	G5	S3
<i>Pinus contorta/Vaccinium occidentale</i>	G4	S2
<i>Salix drummondiana/Calamagrostis canadensis</i>	G3	S2
<i>Salix lemmonii</i>	GU	SU
<i>Salix wolfii/Carex utriculata</i>	G4	S4
<i>Artemisia ludoviciana</i>	G3	S2
<i>Carex aquatilis</i>	G5	S4
<i>Carex livida</i>	GQ	S2
<i>Carex simulata</i>	G4	S2
<i>Festuca idahoensis-Danthonia intermedia-Carex</i>	GNR	SNR

Author:

E. Bottum

TYNDALL MEADOWS

Location:

From the ranger station in Cascade, go north on Highway 55 ca 1 mile. Turn east on Forest Service Road 22 (Warm Lake Road) to Warm Lake. Continue past Warm Lake, over Warm Lake Summit, toward Landmark. At the turn to Landmark and lower Johnson Creek, turn right (east) on Forest Service Road 579 and go slightly less than 0.5 mile to Johnson Creek at which point Forest Service Road 579 turns south. To reach Swamp Creek, the lower part of the site, continue on Forest Service Road 579 (toward Deadwood Summit) for ca 6 miles passing Pen Basin. To reach the middle of Tyndall Meadows, continue ca another 3 miles south. Go ca another 2 miles to reach Deadwood Summit, the upper part of the site.

Richness:

Tyndall Meadows is a five-mile long wet-meadow complex occupying a glacial trough at the headwaters of Johnson Creek. The ecologic and hydrologic systems in this broad, low gradient valley are complex. Overland snowmelt runoff, perennial streams, wet swales and pools, toeslope seeps and springs, and valley bottom upwellings all feed these wet meadows. In addition, both gravelly well-drained soils and poorly-drained loamy and peat soils occur in close proximity to each other. This mix of environmental factors combined with cold air drainage in this high elevation montane valley results in a distinctive ecological system

composed of a diverse mix of both widespread and globally rare plant associations. These meadows provide excellent forage opportunities for a variety of wildlife and bird species including sandhill cranes, elk, and small mammals. Raptors, wolverine, reintroduced gray wolves, and other predators also utilize these types of diverse meadows.

Johnson Creek is relatively narrow, deep, and sinuous as it meanders through Tyndall Meadows. The meadow supports emergent wetlands dominated by grasses or sedges and shrublands dominated by willows. Areas that are highest above the water table, such as seasonally-wet toeslopes and alluvial fans with mostly well-drained mineral soils, support a rich mix of forbs and graminoids including stands dominated by *Carex microptera* (small wing sedge) and *Deschampsia cespitosa* (tufted hairgrass) on moister sites. Shrublands dominated by *Salix wolfii* (Wolf's willow), *S. eastwoodiae* (Eastwood willow), or *S. planifolia* var. *monica* (planeleaf willow) are scattered in the wet meadow complex. In the center of the site, *S. planifolia* var. *monica*/*Carex aquatilis*-*Carex utriculata* (planeleaf willow/water sedge-bladder sedge) communities dominate alluvial overbank deposits and natural levees along Johnson Creek. Numerous seeps and springs emanate from toeslopes especially on the northwest toeslope at the center of the site. These springs, snowmelt runoff, and groundwater feed the wet meadows in the valley bottom. *Eleocharis pauciflora* (few-flower spikerush) forms large stands on gently sloped to nearly flat bottoms of the valley on sites of high groundwater and saturated histosol soils (almost 50 cm of peat-like soil with silt and clay intermixed). The organic soil is underlain by yellowish-gray fine sandy-clay with a chalky-crystalline, gritty feel (possibly derived from weathered Mazama ash). Adjacent more deeply flooded swales and areas that are shallowly flooded all year support large acreage swards of *C. utriculata* and *Carex aquatilis*. *Carex vesicaria* (blister sedge) is also present in similar habitats. *Eleocharis pauciflora* and *Carex* spp. also follow water tracks draining toeslope springs. Toeslope springs support areas of shallow peat accumulation over silty-clay loam and underlain by yellowish-gray fine sandy-clay. The vegetation is heterogeneous but characterized by a mosaic of intergrading *Betula glandulosa*/*Salix eastwoodiae*-*Vaccinium occidentale*/*Carex scopulorum* (bog birch/Eastwood willow-blue huckleberry/Holm's Rocky Mountain sedge), *B. glandulosa*-*Lonicera caerulea*/*Senecio pseud aureus* (bog birch-bluefly honeysuckle/streambank butterweed), and *S. eastwoodiae*/*C. scopulorum* communities. There are also scattered islands of *Pinus contorta* (lodgepole pine) and *Picea engelmannii* (Engelmann spruce) on hummocks and stand margins. Sites are subirrigated with soil very moist throughout the growing season. Conifer growth appears very slow. A small wetland that supports a *Carex* sward is located along the road at Deadwood Summit. A variety of upland forest types occupy the slopes of ridges forming the upper watershed of Johnson Creek.

A fen/wet meadow complex occurs along lower Swamp Creek, just upstream of its confluence with Johnson Creek at the far northeast end of the site. A natural levee has formed along Swamp Creek that separates an area of thin peat accumulation on the southeast section of the wetland from a wet meadow with mineral soils on the northwest section. The southeast section supports a vegetation mosaic characteristic of fens even though the peat layer, which overlies peaty muck soil, is only ca 10 cm thick. *Carex lasiocarpa* (slender sedge) forms a large sward on wet peat with smaller patches dominated by *C. buxbaumii* (Buxbaum's sedge) or *E. pauciflora* at the margin on less wet peat. The northwest section of

the wetland supports a large *C. utriculata* sward. *Carex utriculata* also rings a small, shallow pond in the center of the fen/wet meadow complex. *Sparganium angustifolium* (narrowleaf bur-reed) and *Isoetes* sp. (quillwort) dominate the bottom of the pond. The moist toeslopes on the south and east sides of the wetland are dominated by open stands of *P. contorta/V. occidentale* with *B. glandulosa* well represented.

Rarity:

The Tyndall Meadows area is spawning habitat for wild summer chinook salmon. Several special status plant associations are present. *Carex stramineiformis* (Mt. Shasta sedge), a special status plant species, is present. State special status wildlife species including *Gulo gulo luscus* (North American wolverine), *Canis lupus* (gray wolf), *Aegolius funereus* (boreal owl), and *Strix nebulosa* (great gray owl) have been observed in the area. The meadows provide exceptional forage and cover for sandhill cranes, elk, small mammals, raptors, and other wildlife species.

Condition:

There is an improved gravel road going through the site. In a few areas, the roadbed crosses the margins of wetlands and is elevated with drainage ditches on the sides to decrease flooding. These sites may act as dams during large overland flow events increasing sediment deposition behind the roadbed. Small spring creeks go under roads through culverts. Groundwater flow is also altered. The road may also be a sediment source. However, the road mainly occurs on the southwest toeslope of the glacial trough valley traversing the zone between mesic and upland habitats. There are also dispersed campsites within the site at the margin of the meadow reflecting the primary land use in the area today. Two old 2-track roads traverse parts of the site that may have provided access to old mining or logging sites, but they don't appear to be used very much or are closed to vehicles. There is one hiking/pack trail crossing the lower half of the site.

Before livestock grazing ended, these productive meadows were regularly utilized for both cattle and sheep grazing. Most likely due to past overgrazing by sheep and cattle, drier meadow habitats are in the poorest ecological condition with decreased amounts of native grasses and sedges. These areas support forbs including *Antennaria* spp. (pussytoes), *Potentilla* spp. (cinquefoil) that persisted with grazing. Several old pasture fence lines are present but no longer maintained. Despite many years of livestock grazing, intact native plant communities still dominate the meadows and ecological conditions appear to be improving after just a few years of rest. Channel banks are well vegetated with sedges and are stable. Stream structures have been placed in Johnson Creek to reduce stream velocity and restore past damage (the overall impact on the hydrologic system is not known). There are many regenerating willows, but willow stands toward the north end of the meadow had been defoliated by insects during a visit in summer 2000.

Viability:

Tyndall Ridge, the ridgeline forming the eastern edge of the site, has a mosaic burn of unknown age. Pen Basin, the next meadow complex located a few miles to the north, was also a major livestock grazing area. There is a developed campground and airstrip in Pen Basin.

Key Environmental Factors:

Tyndall Meadows is composed of peatlands and sloped wetlands, springs and seeps, headwaters of major perennial stream critical for wild summer chinook salmon spawning, and an extensive wet meadow complex in a broad, high elevation glacial trough valley with cold air drainage.

Other Values:

These scenic meadows provide excellent opportunities and access for hunting, fishing, wildlife and bird watching, hiking and camping, and other forms of non-motorized recreation and solitude.

Conservation Intent:

The area is most likely managed for non-motorized recreation. Livestock grazing has apparently ended during the last several years. This wet meadow complex is ecologically important especially for wild summer Chinook salmon spawning. Designation as a Special Interest Area would be appropriate.

Management Needs:

Monitoring of vegetation succession and riparian conditions after the elimination of cattle grazing should be conducted.

Information Needs:

Much of the riparian/wetland survey work in Tyndall Meadows occurred over twenty years ago when Mutz and Queiroz (1983) classified the riparian/wetland vegetation of upper Johnson Creek, South Fork Salmon, and upper Deadwood River areas and needs to be resurveyed. Upland vegetation also needs to be surveyed. The aquatic diversity of upper Johnson Creek needs additional surveying as well.

Plant Association Occurrences:

<i>Carex buxbaumii</i> community	G3	S1
<i>Carex lasiocarpa</i>	G4	S2
<i>Pinus contorta/Vaccinium occidentale</i>	G4	S2
<i>Alnus incana/Cornus sericea</i>	G3G4	S3
<i>Betula glandulosa-Lonicera caerulea/Senecio pseud aureus</i>	GQ	S3
<i>Carex aquatilis</i>	G5	S4
<i>Carex luzulina</i>	GNR	S2?
<i>Carex microptera</i>	G4	S3
<i>Carex scopulorum</i>	G5	S3
<i>Carex utriculata</i>	G5	S4
<i>Carex vesicaria</i>	GU	S3
<i>Calamagrostis canadensis</i>	G4	S4
<i>Deschampsia cespitosa</i>	G4	S3
<i>Eleocharis pauciflora</i>	G4	S1
<i>Salix eastwoodiae/Carex scopulorum</i>	G2	S2
<i>Salix planifolia monica/Carex aquatilis-Carex utriculata</i>	G3Q	S3
<i>Salix wolfii/Carex aquatilis</i>	G4	S4

Rare Plant and Animal Occurrences:

Aegolius funereus

G5

S2

Gulo gulo luscus

G4T4

S2

Carex stramineiformis

G5

S2

Author:

C. Murphy

APPENDIX D

**ACRES OF WETLAND AND DEEPWATER HABITAT FOR DIGITIZED MAPS BY
HYDROLOGIC UNIT**

Wetland and deepwater habitat for digitized maps within Hydrologic Unit 17060201 (Upper Salmon River).

Cowardin Type	Frequency	Acres	Percent
L1UBH	417	4,075.06	15.24
L2UBH	10	13.00	0.05
L2USC	31	28.59	0.11
PABF	7	4.26	0.02
PABFb	5	3.37	0.01
PABFh	2	0.36	0.00
PABG	1	0.34	0.00
PABH	29	19.43	0.07
PABHb	30	8.09	0.03
PEM/SSC	2	40.92	0.15
PEMA	306	1,194.42	4.47
PEMB	1913	2,457.54	9.19
PEMBb	1	0.09	0.00
PEMC	1543	11,645.64	43.55
PEMCb	5	20.25	0.08
PEMCh	1	0.67	0.00
PEMCx	1	0.16	0.00
PEMF	83	105.12	0.39
PEMFb	2	1.03	0.00
PEMFx	1	0.28	0.00
PEMH	2	5.44	0.02
PFOA	234	1,017.70	3.81
PFOB	468	1,635.54	6.12
PFOC	188	836.51	3.13
PSSA	71	141.77	0.53
PSSB	291	550.63	2.06
PSSC	614	2,007.66	7.51
PSSCb	3	33.02	0.12
PUBF	48	14.53	0.05
PUBFb	15	4.16	0.02
PUBFh	2	0.31	0.00
PUBGx	1	0.48	0.00
PUBH	269	222.31	0.83
PUBHb	6	3.52	0.01
PUBHh	16	11.42	0.04
PUBHx	5	1.58	0.01

PUBKrx	2	6.09	0.02
PUBKx	6	13.82	0.05

Hydrologic Unit 17060201 (continued)

Cowardin Type	Frequency	Acres	Percent
PUSA	1	0.93	0.00
PUSC	35	19.15	0.07
PUSCh	7	1.44	0.01
R3UBH	85	422.51	1.58
R3USA	7	8.14	0.03
R3USC	177	160.83	0.60
R4SBC	1	1.33	0.00
TOTAL	6,944.00	26,739.46	100.00

Wetland and deepwater habitat for digitized maps within Hydrologic Unit 17060205 (Upper Middle Fork Salmon River).

Cowardin Type	Frequency	Acres	Percent
L1UBH	180	506.85	9.48
L2USC	8	11.69	0.22
PABF	2	0.49	0.01
PABH	12	4.73	0.09
PEMA	20	419.63	7.85
PEMB	793	932.21	17.44
PEMC	244	2,177.72	40.75
PEMF	18	27.69	0.52
PEMH	1	0.82	0.02
PFOA	14	50.16	0.94
PFOB	214	723.88	13.55
PFOC	37	203.76	3.81
PSSB	37	26.91	0.50
PSSC	39	79.79	1.49
PUBF	11	3.83	0.07
PUBH	35	14.18	0.27
PUBHb	2	0.29	0.01
PUSA	1	2.22	0.04
PUSC	26	13.18	0.25

R3UBH	5	102.28	1.91
R3USC	65	41.89	0.78
TOTAL	1764	5,344.20	100.00

Wetland and deepwater habitat for digitized maps within Hydrologic Unit 17060208 (South Fork Salmon River).

Cowardin Type	Frequency	Acres	Percent
L1ABH	1	7.91	0.27
L1UBH	14	407.67	13.81
L2ABH	2	29.82	1.01
PABF	2	7.02	0.24
PEMB	203	421.59	14.28
PEMC	91	469.13	15.89
PEMF	20	37.38	1.27
PFOA	1	1.37	0.05
PFOB	137	783.96	26.55
PFOC	42	391.32	13.25
PSSB	227	238.55	8.08
PSSC	14	127.72	4.33
PUBF	5	7.25	0.25
PUBH	6	8.76	0.30
PUBHb	4	1.47	0.05
PUBHh	1	0.51	0.02
PUSC	1	0.99	0.03
R3UB1H	2	1.38	0.05
R3UBH	1	0.97	0.03
R3US1C	2	0.42	0.01
R3USC	18	7.57	0.26
TOTAL	794	2,952.77	100.00

APPENDIX E

**KEY TO WETLAND AND RIPARIAN PLANT ASSOCIATIONS IN THE HIGH
VALLEYS OF THE SALMON RIVER**

Instructions for use of this key

Locate a sample plot which represents the stand as a whole. Avoid ecotones between communities and microsites that represent small scale disturbances. Recommended plot size for forested and scrub-shrub communities is 250 m² (25 x 10), and emergent communities 100 m² (10 x 10).

While in the plot, identify the community type by following the key. In sites that have been heavily impacted by anthropogenic factors (such as grazing), search for remnants of native vegetation. The cover values in the key may be reduced for disturbed sites.

Record canopy cover for all species in the plot. Validate the key by comparing plot data with written descriptions (included for high ranking plant communities in Appendix F) and stand tables to check for the presence of constant and characteristic species (Tuhy 1981, Tuhy and Jensen 1982, Mutz and Queiroz 1983, Youngblood et al. 1985, Padgett et al. 1989, Cooper 1995, Hansen et al. 1995, Crowe 2004).

The community types are from sites sampled by CDC and a summary of agency surveys in the west-central valleys of Idaho. This work encompasses wide variation in environmental factors affecting the distribution of wetland community types. However, the key may not contain all wetland community types in the basin.

KEY TO LIFEFORM GROUPS

- 1a. Conifers including *Abies lasiocarpa*, *Picea engelmannii*, *Pinus contorta* or *Pseudotsuga menziesii* dominate the overstory with at least 25% cover either individually or collectively.....Go to **Needle-leaved Forest Types Key**
- 1b. Not as above.....Go to 2
 - 2a. *Populus trichocarpa* present with at least 15% cover and not representing a sere to a conifer dominated site
.....Go to **Broad-leaved Deciduous Forest Types Key**
 - 2b. Trees absent or if present with less than 15% cover and restricted to microsites.....Go to 3
- 3a. Shrubs present with at least 10% canopy cover.....Go to **Scrub-shrub Types Key**
- 3b. Not as above.....Go to 4
 - 4a. Shrubs and trees contributing minor amounts to composition or restricted to microsites; herbaceous species growing in less than 1 meter of water with a combined cover of at least 15% or emergent herbaceous species with at least

- 5% cover.....Go to **Emergent Types Key**
- 4b. Not as above.....Go to 5
- 5a. Emergent species growing in water 1 meter or more in depth
.....Go to **Aquatic Bed Types Key**
- 5b. Not as above.....**Unclassified or Undocumented Types**

KEY TO NEEDLE-LEAVED EVERGREEN FOREST TYPES

- 1a. *Abies lasiocarpa* or *Picea engelmannii* with at least 25% cover and successfully reproducing. Stands dominated by *Pinus contorta* are also included here
.....Go to 2
- 1b. *Pinus contorta* or *Pseudotsuga menziesii* dominate the overstory.....Go to 10
 - 2a. *Pinus engelmannii* with at least 5% cover.....Go to 3
 - 2b. Not as above.....Go to 5
- 3a. *Vaccinium uliginosum* (*V. occidentale*) with at least 5% cover
.....*Picea engelmannii/Vaccinium uliginosum*
- 3b. Not as above.....Go to 4
- 4a. *Calamagrostis canadensis* with at least 25% cover
.....*Picea engelmannii/Calamagrostis canadensis*
- 4b. Not as above.....Go to 14
- 5a. *Caltha biflora* with at least 25% cover.....*Abies lasiocarpa/Caltha biflora*
- 5b. Not as above.....Go to 6
- 6a. *Calamagrostis canadensis* with at least 25% cover
.....*Abies lasiocarpa/Calamagrostis canadensis*
- 6b. Not as above.....Go to 7
- 7a. *Senecio triangularis* and *Saxifraga odontoloma* have a combined cover of at least 5% and are usually abundant
.....*Abies lasiocarpa/Senecio triangularis – Saxifraga odontoloma*

- 7b. Not as above.....Go to 8
- 8a. *Streptopus amplexifolius*, *Aconitum columbianum* or *Mertensia* spp. with at least 10% cover
.....*Abies lasiocarpa*/*Streptopus amplexifolius*
- 8b. Not as above.....Go to 9
- 9a. *Menziesia ferruginea* with at least 5% cover
.....*Abies lasiocarpa*/*Menziesia ferruginea*
- 9b. Not as above.....Go to 14
- 10a. *Pinus contorta* the dominant tree.....Go to 11
- 10b. *Pseudotsuga menziesii* with at least 25% cover and successfully reproducing
.....Go to 13
- 11a. *Vaccinium uliginosum* (*V. occidentale*) with at least 1% cover
.....*Pinus contorta*/*Vaccinium uliginosum*
- 11b. Not as above.....Go to 12
- 12a. *Calamagrostis canadensis* with at least 5% cover
.....*Pinus contorta*/*Calamagrostis canadensis*
- 12b. Not as above.....Go to 14
- 13a. *Cornus sericea* alone or in combination with willows, *Equisetum arvense* or *Actea rubra* with at least 10% cover
.....*Pseudotsuga menziesii*/*Cornus sericea*
- 13b. Not as above.....Go to 14
- 14a. Site with wetland characteristics including hydric soils, hydrophytic vegetation or wetland hydrology.....Go to 15
- 14b. Site without wetland characteristics.....**Upland Site**
- 15a. Overstory and understory dominated by native plant species
.....**Unclassified or Undocumented Palustrine Needle-leaved Evergreen Forest Community**
- 15b. Overstory or understory dominated by exotic plant species
.....**Human Induced Palustrine Needle-leaved Forest**

KEY TO BROAD-LEAVED DECIDUOUS FOREST TYPES

- 1a. *Populus trichocarpa* with at least 15% cover.....Go to 2
- 1b. Not as above.....Go to 4
 - 2a. *Cornus sericea* with at least 25% cover
.....*Populus trichocarpa/Cornus sericea*
 - 2b. Not as above.....Go to 3
- 3a. Community occurs on recently deposited alluvial bar or island with seedlings and saplings dominating the site.....*Populus trichocarpa/Alluvial Bar*
- 3b. Not as above.....Go to 4
 - 4a. Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.....Go to 5
 - 4b. Site without wetland characteristics.....**Upland Site**
- 5a. Overstory and understory dominated by native plant species
.....**Unclassified or Undocumented Palustrine Broad-leaved Deciduous Forest**
- 5b. Overstory or understory dominated by exotic plant species
.....**Human Induced Palustrine Broad-leaved Deciduous Forest**

KEY TO SCRUB-SHRUB TYPES

- 1a. Willows with at least 25% cover.....Go to 2
- 1b. Willows absent or with less than 25% cover
.....**Mixed Scrub-shrub Dominated Community Type**
 - 2a. Tall willow species including *Salix boothii*, *S. drummondiana*, *S. geyeriana* or *S. lemmonii* alone or in combination with at least 25% cover
.....**Tall Willow Community Types**

- 2b. Short willow species including *Salix arctica*, *S. brachycarpa*, *S. commutata*, *S. eastwoodiae*, *S. melanopsis*, *S. nivialis*, *S. planifolia* var. *monica* or *S. wolfii* with at least 25% cover
**Short Willow Community Types**

KEY TO MIXED SCRUB-SHRUB TYPES

- 1a. Low shrubs including *Artemisia cana*, *Betula glandulosa* or *Potentilla fruticosa* alone or in combination with at least 15% cover. Tall shrubs absent or with less than 5% cover.....Go to 2
- 1b. Tall shrubs including *Alnus incana*, *A. sinuata*, *Cornus sericea* or *Crataegus douglasii* are dominant.....Go to 8
- 2a. *Betula glandulosa* or *Potentilla fruticosa* with at least 10% cover.....Go to 3
- 2b. Not as above.....Go to 13
- 3a. *Betula glandulosa* dominates shrub layer.....Go to 4
- 3b. Not as above.....Go to 6
- 4a. *Carex utriculata* and/or *C. aquatilis* with at least 25% cover
***Betula glandulosa/Carex utriculata***
- 4b. Not as above.....Go to 5
- 5a. *Lonicera caerulea* and/or *Senecio pseud aureus* with at least 1% cover
***Betula glandulosa – Lonicera caerulea/Senecio pseud aureus***
- 5b. Not as above.....Go to 13
- 6a. *Deschampsia cespitosa* and/or *Polygonum bistortoides* with at least 5% cover
***Potentilla fruticosa/Deschampsia cespitosa***
- 6b. Not as above.....Go to 7
- 7a. *Danthonia intermedia* dominant, *Deschampsia cespitosa* with less than 5% cover
***Potentilla fruticosa/Danthonia intermedia***
- 7b. Not as above.....Go to 13
- 8a. *Alnus sinuata* the dominant shrub with at least 10% cover. Communities typically occur at higher, subalpine elevations.....Go to 9

- 8b. Not as above.....Go to 10
- 9a. Herbaceous layer depauperate; *Claytonia (Montia) cordifolia* with at least 5% cover
.....*Alnus sinuata/ Claytonia (Montia) cordifolia*
- 9b. Not as above.....Go to 13
- 10a. *Alnus incana* the dominant shrub with at least 10% cover; *Cornus sericea* with
at least 5% cover
.....*Alnus incana/Cornus sericea*
- 10b. Not as above.....Go to 11
- 11a. *Cornus sericea* with at least 25% cover.....*Cornus sericea*
- 11b. Not as above.....Go to 12
- 12a. *Crataegus douglasii* with at least 25% cover.....*Crataegus douglasii*
- 12b. Not as above.....Go to 13
- 13a. Site with wetland characteristics including hydric soils, hydrophytic vegetation, or
wetland hydrology.....Go to 14
- 13b. Site without wetland characteristics.....**Upland Site**
- 14a. Overstory and understory dominated by native plant species
.....**Unclassified or Undocumented Palustrine scrub-shrub community
type**
- 14b. Overstory or understory dominated by exotic plant species
.....**Human induced Palustrine scrub-shrub
vegetation**

KEY TO TALL WILLOW COMMUNITY TYPES

- 1a. *Salix boothii* the dominant willow, alone or in combination with *S. geyeriana* or *S.
drummondiana*, with at least 25% cover.....Go to 2
- 1b. Not as above.....Go to 4
- 2a. *Carex utriculata* with at least 25% cover.....*Salix boothii/Carex utriculata*

- 2b. Not as above.....Go to 3
- 3a. Mesic graminoid species including *Carex lanuginosa*, *Glyceria striata* or *Juncus balticus* alone or in combination with at least 35% cover
.....***Salix boothii/Mesic Graminoid***
- 3b. Not as above.....Go to 13
- 4a. *Salix drummondiana* the dominant willow with at least 30% cover.....Go to 5
- 4b. Not as above.....Go to 7
- 5a. *Carex utriculata* with at least 25% cover.....***Salix drummondiana/Carex utriculata***
- 5b. Not as above.....Go to 6
- 6a. *Calamagrostis canadensis* with at least 25% cover
.....***Salix drummondiana/Calamagrostis canadensis***
- 6b. Not as above.....Go to 13
- 7a. *Salix geyeriana* the dominant willow contributing up to 25% cover to the somewhat open shrub layer (*Salix boothii* absent or present in minor amounts)
.....Go to 8
- 7b. Not as above.....Go to 11
- 8a. *Carex utriculata* with at least 25% cover.....***Salix geyeriana/Carex utriculata***
- 8b. Not as above.....Go to 9
- 9a. *Calamagrostis canadensis* with at least 10% cover
.....***Salix geyeriana/Calmagrostis canadensis***
- 9b. Not as above.....Go to 10
- 10a. Mesic graminoid species including *Carex lanuginosa*, *C. microptera*, *C. praegracilis*, *Juncus balticus* or *Poa pratensis* typically present in varying amounts.....***Salix geyeriana/Mesic Graminoid***
- 10b. Not as above.....Go to 13
- 11a. *Salix lemmonii* with at least 25% cover or the dominant willow.....Go to 12
- 11b. Not as above.....Go to 13

- 12a. *Calamagrostis canadensis* with at least 25% cover or the dominant graminoid
.....*Salix lemmonii/Calamagrostis canadensis*
- 12b. Understory not as above.....*Salix lemmonii*
- 13a. Overstory and understory dominated by native plant species.....Go to 14
- 13b. Site without wetland characteristics.....**Upland Site**
- 14a. Overstory and understory dominated by native plant species
.....**Unclassified or Undocumented Palustrine Scrub-shrub Community
Type**
- 14b. 14b. Overstory or understory dominated by exotic plant species
.....**Human Induced Palustrine Scrub-shrub
Vegetation**

KEY TO SHORT WILLOW TYPES

- 1a. *Salix melanopsis* the dominant willow. Herbaceous ground cover is mostly bare
ground or alluvium (sand, cobbles, etc.)
.....*Salix melanopsis/Alluvial Bar*
- 1b. Not as above.....Go to 2
- 2a. *Salix planifolia* var. *monica* with at least 25% cover.....Go to 3
- 2b. Not as above.....Go to 6
- 3a. *Carex utriculata* alone or in combination with other sedge species with at least 25%
cover.....*Salix planifolia* var. *monica/Carex utriculata*
- 3b. Not as above.....Go to 4
- 4a. *Carex aquatilis* the dominant understory species with at least 25% cover
.....*Salix planifolia* var. *monica/Carex aquatilis*
- 4b. Not as above.....Go to 5
- 5a. *Carex scopulorum* the dominant understory species with at least 25% cover
.....*Salix planifolia* var. *monica/Carex scopulorum*
- 5b. Not as above.....Go to 19
- 6a. *Salix wolfii* the dominant willow with at least 15% cover.....Go to 7

- 6b. Not as above.....Go to 13
- 7a. *Swertia perennis* present; *Carex aquatilis* and *Pedicularis groenlandica* usually present; surface usually mossy
.....*Salix wolfii*/*Swertia perennis* – *Pedicularis groenlandica*
- 7b. Not as above.....Go to 8
- 8a. *Carex aquatilis* with at least 25% cover or *Pedicularis groenlandica* at least codominant.....*Salix wolfii*/*Carex aquatilis*
- 8b. Not as above.....Go to 9
- 9a. *Carex utriculata* with at least 25% cover.....*Salix wolfii*/*Carex utriculata*
- 9b. Not as above.....Go to 10
- 10a. *Carex microptera* the dominant sedge.....*Salix wolfii*/*Carex microptera*
- 10b. Not as above.....Go to 11
- 11a. *Deschampsia cespitosa* present. *Carex aquatilis*, *C. utriculata*, *C. vesicaria*, individually or in combination with less than 5% cover
.....*Salix wolfii*/*Deschampsia cespitosa*
- 11b. Not as above.....Go to 12
- 12a. Tall *Mertensia* spp., *Smilacina stellata* and/or other mesic forbs with at least 25% cover, together or individually, or the dominant under growth
.....*Salix wolfii*/*Mesic Forb*
- 12b. Not as above.....Go to 19
- 13a. *Salix commutata* with at least 25% cover.....Go to 14
- 13b. Not as above.....Go to 15
- 14a. *Carex scopulorum* with at least 25% cover
.....*Salix commutata*/*Carex scopulorum*
- 14b. Not as above.....**Depauperate or Undefined *Salix commutata* Type**
- 15a. *Salix eastwoodiae* with at least 25% cover.....Go to 16
- 15b. Not as above.....Go to 19

- 16a. *Carex aquatilis* the dominant understory species
.....*Salix eastwoodiae/Carex aquatilis*
- 16b. Not as above.....Go to 17
- 17a. *Carex utriculata* the dominant understory species
.....*Salix eastwoodiae/Carex utriculata*
- 17b. Not as above.....Go to 18
- 18a. *Calamagrostis canadensis* with at least 25% cover
.....*Salix eastwoodiae/Calamagrostis canadensis*
- 18b. Not as above.....Go to 19
- 19a. Site with wetland characteristics including hydric soils, hydrophytic vegetation, or
wetland hydrology.....Go to 20
- 19b. Site without wetland characteristics.....**Upland Site**
- 20a. Overstory and understory dominated by native plant species
.....**Unclassified or Undocumented Palustrine Scrub-shrub Community
Type**
- 20b. Overstory or understory dominated by exotic plant species
.....**Human Induced Palustrine Scrub-shrub Vegetation**

KEY TO EMERGENT VEGETATION TYPES

- 1a. *Carex* species dominant.....**Sedge Emergent Vegetation Types Key**
- 1b. Grass or forb species dominant or not as above
.....**Non-sedge Emergent Vegetation Types Key**

KEY TO SEDGE EMERGENT VEGETATION TYPES

- 1a. *Carex livida* with at least 25% cover.....*Carex livida*
- 1b. Not as above.....Go to 2

- 2a. *Carex limosa* with at least 20% cover.....***Carex limosa***
- 2b. Not as above.....Go to 3
- 3a. *Carex scopulorum* with at least 25% or the dominant graminoid.....***Carex scopulorum***
- 3b. Not as above.....Go to 4
- 4a. *Carex praegracilis* with at least 25% cover or the dominant graminoid
.....***Carex praegracilis***
- 4b. Not as above.....Go to 5
- 5a. *Carex luzulina* with at least 25% or the dominant graminoid.....***Carex luzulina***
- 5b. Not as above.....Go to 6
- 6a. *Carex aquatilis* with at least 25% or the dominant graminoid....***Carex aquatilis***
- 6b. Not as above.....Go to 7
- 7a. *Carex cusickii* with at least 25% cover or the dominant graminoid.....***Carex cusickii***
- 7b. Not as above.....Go to 8
- 8a. *Carex microptera* with at least 25 % cover or the dominant graminoid
.....***Carex microptera***
- 8b. Not as above.....Go to 9
- 9a. *Carex utriculata* with at least 25% cover or the dominant graminoid...***Carex utriculata***
- 9b. Not as above.....Go to 10
- 10a. *Carex lasiocarpa* with at least 25% cover or the dominant graminoid
.....***Carex lasiocarpa***
- 10b. Not as above.....Go to 11
- 11a. *Carex buxbaumii* with at least 25% cover or the dominant graminoid
.....***Carex buxbaumii***
- 11b. Not as above.....Go to 12
- 12a. *Carex vesicaria* with at least 25% cover or the dominant graminoid
.....***Carex vesicaria***

- 12b. Not as above.....Go to 13
- 13a. *Carex saxatalis* with at least 25% cover or the dominant graminoid.....***Carex saxatalis***
- 13b. Not as above.....Go to 14
- 14a. *Carex simulata* with at least 25% cover or the dominant graminoid
.....***Carex simulata***
- 14b. Not as above.....Go to 15
- 15a. *Carex nebrascensis* with at least 25% cover or the dominant graminoid
.....***Carex nebrascensis***
- 15b. Not as above.....Go to 16
- 16a. Site with wetland characteristics including hydric soils, hydrophytic vegetation,
or wetland hydrology.....Go to 17
- 16b. Site without wetland characteristics.....**Upland Site**
- 17a. Community dominated by native plant species
.....**Unclassified or Undocumented Palustrine Emergent Vegetation Type**
- 17b. Native species replaced or nearly replaced by exotic plant species
.....**Human Induced Palustrine Emergent Vegetation**

KEY TO NON-SEDGE EMERGENT VEGETATION TYPES

- 1a. Graminoids dominant.....Go to 2
- 1b. Forbs dominant.....Go to 15
- 2a. *Agrostis scabra* present on alluvial bar.....***Agrostis scabra/Alluvial Bar***
- 2b. Not as above.....Go to 3
- 3a. *Danthonia intermedia* with at least 25% cover.....***Danthonia intermedia***
- 3b. Not as above.....Go to 4
- 4a. *Calamagrostis canadensis* with at least 25% cover
.....***Calamagrostis canadensis***

- 4b. Not as above.....Go to 5
- 5a. *Deschampsia cespitosa* with at least 25% cover.....***Deschampsia cespitosa***
- 5b. Not as above.....Go to 6
- 6a. *Phalaris arundinacea* with at least 25% cover or the dominant species
.....***Phalaris arundinacea***
- 6b. Not as above.....Go to 7
- 7a. *Hordeum brachyantherum* with at least 25% cover or the dominant species
.....***Hordeum brachyantherum***
- 7b. Not as above.....Go to 8
- 8a. *Trichophorum caespitosum* (*Scirpus caespitosus*) with at least 5% cover or the
dominant species..... Go to 9
- 8b. Not as above.....Go to 10
- 9a. *Carex livida* present with at least 1% cover...***Trichophorum caespitosum/Carex livida***
- 9b. Not as above.....***Trichophorum caespitosum***
- 10a. *Eriophorum angustifolium* (*E. polystachion*) with at least 25% cover or the
dominant species.....***Eriophorum angustifolium***
- 10b. Not as above.....Go to 11
- 11a. *Elocharis palustris* with at least 25% cover or the dominant species
.....***Elocharis palustris***
- 11b. Not as above.....Go to 12
- 12a. *Eleocharis pauciflora* with at least 25% cover or the dominant species
.....Go to 13
- 12b. Not as above.....Go to 14
- 13a. *Sphagnum* sp. present.....***Eleocharis pauciflora/Sphagnum***
- 13b. Not as above.....***Eleocharis pauciflora***
- 14a. *Juncus balticus* with at least 25% cover or the dominant species
.....***Juncus balticus***

- 14b. Not as above.....Go to 18
- 15a. *Typha latifolia* with at least 50% cover.....***Typha latifolia***
- 15b. Not as above.....Go to 16
- 16a. *Aster integrifolius* and/or *Festuca idahoensis* alone or in combination with at least 1% cover.....***Aster integrifolius/Festuca idahoensis***
- 16b. Not as above.....Go to 17
- 17a. *Artemisia ludoviciana* with at least 25% cover.....***Artemisia ludoviciana***
- 17b. Not as above.....Go to 18
- 18a. Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.....Go to 19
- 18b. Site without wetland characteristics.....**Upland Site**
- 19a. Community dominated by native plant species
.....**Unclassified or Undocumented Palustrine Emergent Community Type**
- 19b. Native species replaced or nearly replaced by exotic plant species
.....**Human Induced Palustrine Emergent Vegetation**

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APPENDIX F

**CHARACTERIZATION ABSTRACTS FOR HIGH RANKING PLANT ASSOCIATIONS
IN THE SURVEY AREA**

Populus trichocarpa/Cornus sericea

Black cottonwood/Red-osier dogwood

RANGE

This association has been documented from Washington south to northern California and eastward to Idaho and all of Montana west of the Continental Divide, as well as central Montana. In Montana alone it occurs over a broad elevation range of 610-2,010 m (2,000-6,600 feet) where *Populus balsamifera ssp. trichocarpa* is the dominant cottonwood at elevations considered relatively low- to mid-gradient; in Idaho it ranges to 2,135 m (7,000 feet) (NatureServe Explorer 2001).

ENVIRONMENT

Populus is a pioneering species that requires moist, barren, newly deposited alluvium exposed to full sunlight for regeneration. This plant association occupies alluvial terraces of major rivers and streams, point bars, side bars, mid-channel bars, delta bars, an occasional lake or pond margin, and even creeps onto foot slopes and lower subirrigated slopes of hilly or mountainous terrain. Many of these sites are flooded in the spring and dry deeply by summer's end; capillary action keeps upper portions of soil profile moist. Other sites are merely subirrigated (NatureServe Explorer 2001).

SOILS

Soil textures vary from loam to coarse sand, and are generally well drained with a low available water holding capacity. These sites are often flooded in the spring with water tables lowering to 3 or more feet below the soil surface at the end of summer; upper soil profiles remain moist due to capillary action. Coarse textured soils, moderate stream gradients, and high coarse fragment contents throughout the soil profile provide an environment that produces a

rapid movement of highly aerated groundwater. Redox concentrations (mottles) are common as evidence of a fluctuating water table (Kovalchik 1993; Hansen et al. 1995).

VEGETATION COMPOSITION

The *Populus trichocarpa/Cornus sericea* plant association is characterized by an overstory dominated by *Populus trichocarpa* (25-85% cover) with *Populus angustifolia* and *Populus balsamifera* sometimes occurring as subordinates in the eastern portion of the range and *Betula papyrifera* and *Populus tremuloides* occurring as subordinates in the western portion of the range. The dense shrub layer is diverse and dominated by *Cornus sericea* (20-90% cover), *Amelanchier alnifolia*, *Symphoricarpos* spp., *Alnus incana*, *Rosa* spp., and *Salix* spp. *Maianthemum stellatum*, *Galium triflorum*, *Solidago Canadensis*, and *Equisetum* spp. are often present along with graminoids, none of which have high constancy.

ADJACENT COMMUNITIES

Adjacent wetter communities may be dominated by *Salix exigua*, *S. lasiandra*, *S. drummondiana*, *S. geyeriana*, *Carex utriculata*, *C. buxbaumii*, or a variety of *Alnus incana* or *Typha latifolia* dominated plant associations. Adjacent drier communities may be dominated by *Populus trichocarpa* types, or habitat types from the *Pseudotsuga menziesii*, *Pinus ponderosa*, *Thuja plicata*, and *Juniperus scopulorum* series (Hansen et al. 1995; Kovalchik 1993; Boggs et al. 1990).

MANAGEMENT CONSIDERATIONS

Because of its close proximity to streams and rivers and the flat topography, recreational developments and transportation corridors are common within

this type; care must be taken when locating structures in the floodplain to avoid damage by floods or loss. Management should emphasize the importance of the understory shrub layer in streambank stabilization; a buffer strip of the *Populus trichocarpa* dominated plant associations should be maintained adjacent to rivers and streams. Under certain conditions, fire may be used as a tool to extend the life span or rehabilitate a stand (Hansen et al. 1995; Boggs et al. 1990).

SUCCESSIONAL DYNAMICS

The erosional and depositional pattern of a river helps maintain diversity of plant communities on the floodplain. The distribution of communities depends on the way the river meanders. In turn, the rate of meandering determines the seral stage of the communities. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop (Hansen et al. 1995; Boggs et al. 1990). In the absence of fluvial disturbance, succession continues to a variety of conifer dominated habitat types such as *Pinus ponderosa*, *Pseudotsuga menziesii*, *Abies grandis*, *Picea*, *Thuja plicata*, *Tsuga heterophylla*, *Abies lasiocarpa*, or *Juniperus scopulorum*, or types dominated by sagebrush. If conifers are absent, shrubs and herbaceous species that formed the former undergrowth may persist. Stands in moister regions are successional to habitat types from the *Populus tremuloides*, *Thuja plicata* series, and the *Picea/Cornus sericea* habitat types. In other instances, this plant association may be successional to the *Salix geyeriana/Calamagrostis canadensis* habitat type or the *Salix lutea/ Calamagrostis canadensis* habitat type, depending upon elevation. If disturbance is severe enough,

all shrubs can be eliminated and the understory will be converted to a herbaceous one dominated by species such as *Poa pratensis*, *Phleum pratensis*, *Bromus inermis*, and *Centaurea maculosa* (Hansen et al. 1995).

WILDLIFE FUNCTIONS

This plant association provides valuable cover, shade, and food for a variety of species. Big game use may be high, depending upon the time of year. The spreading crown of *Populus trichocarpa* provides nesting sites for *Haliaeetus leucocephalus* (bald eagles), *Pandion haliaetus* (osprey), and *Ardea herodias* (great blue heron). Woodpeckers, great horned owls, wood ducks, and raccoons nest in trunk cavities. Beaver use both the cottonwood and dogwood vegetation for food and building material. Understory species provide food and cover for a variety of waterfowl, small birds, and mammals. The streamside location of this plant association is very important in providing thermal cover, debris recruitment, and streambank stability for fish habitat (Hansen et al. 1995).

CLASSIFICATION COMMENTS

There is considerable variability in defining this community at both the alliance (based on tree species composition) and association levels (based on undergrowth species). Some authors taking a habitat type approach have considered any stands with conifers represented (even in the seedling/ sapling size classes) to be members of the alliance (series in habitat type idiom) of the most shade-tolerant conifer represented on site and not the alliance of the *Populus balsamifera* ssp. *trichocarpa*, or other deciduous trees dominant on the site. It is also a highly debatable point as to whether stands containing *Populus balsamifera* ssp.

trichocarpa and *Populus tremuloides* should be allocated to the *Populus tremuloides* Forest Alliance (A.274) regardless of its cover value (as some authors have advocated) when in fact *Populus balsamifera* ssp. *trichocarpa* generally has a narrower ecological amplitude and better serves as a diagnostic species. Another troubling observation is that more than half of the identified stands have less than 60% tree canopy cover, which means that a significant portion of this association qualifies physiognomically as woodland, rather than as forest as currently classified. There are strongly discordant criteria as to how much *Cornus sericea* cover should be represented (ranging from 1-25%) for a stand to be considered a member of this association (NatureServe Explorer 2001).

AUTHOR/DATE(UPDATE)

Linda Williams/1995-08-07(2002-02-21)

Alnus incana/Cornus sericea

Mountain alder/Red-osier dogwood

RANGE

Stands occur in Utah (Padgett et al. 1989), Nevada (Manning and Padgett 1995), Oregon (Crowe and Clausnitzer 1997), and Idaho (Jankovsky-Jones 1996; 1997a; 1997b; 1997c).

ENVIRONMENT

This plant association occurs immediately adjacent to streams that are subject to seasonal fluvial scouring and deposition. Surface topography is typically undulating and slopes are often 2% or less. Valley bottoms are narrow to moderately wide (Padgett et al. 1989). Elevations range from below 3,000 to nearly 8,000 feet.

SOILS

Soils form by fluvial deposition and scouring and generally have more than 35% coarse fragments at least in the subsurface horizons. Estimated available water-holding capacity ranged from low to moderate. Water tables are closely related to the height of the community above the water level of adjacent streams. Soils have been classified as Aquic Cryofluvents, Typic Udifluvents, Mollic Xerofluvents, and Typic and Aquaic Cryoborolls (Padgett et al. 1989).

VEGETATION COMPOSITION

Alnus incana dominates the tall shrub overstory of this community. *Betula occidentalis* may occasionally be present as co-dominant. *Cornus sericea* forms a dense shrub layer with *Salix lutea*, *S. lasiolepis*, *Philadelphus lewisii*, *Crataegus douglasii*, and *Rosa woodsii*. The herbaceous layer is usually sparse, with no species occurring in high abundance (Padgett et al. 1989).

ADJACENT COMMUNITIES

Because of the wide elevational range of this type, adjacent upland communities range from sagebrush-steppe to coniferous woodland and forest types.

MANAGEMENT CONSIDERATIONS

Because of their rooting structure, the dominant shrub species are capable of holding coarse textured streambank materials in place and can act as filters for upland water and soil movement into channel systems. Livestock grazing is limited because of dense undergrowth (Padgett et al. 1989).

SUCCESSIONAL DYNAMICS

This early seral type occurs adjacent to streams and is frequently subjected to seasonal flooding, scouring, and deposition. It appears to be long-lived; succession to

other types is probably slow. At lower elevations, this plant association is replaced by the *Betula occidentalis/Cornus sericea* plant association and in some areas these two communities grade into one another with both *Alnus incana* and *Betula occidentalis* present in the overstory. *Alnus incana*, *Cornus sericea*, and *Betula occidentalis* are well adapted to growing immediately adjacent to streams. They appear to withstand periodic flooding and seem to require the more aerated ground water that flows through the coarse-textured subsurface soils with which they are commonly associated (Padgett et al. 1989; Manning and Padgett 1995).

WILDLIFE FUNCTIONS

The low tree/shrub layers provide structural diversity for birds and other animals, while providing shade to the adjacent streams (Padgett et al. 1989).

CLASSIFICATION COMMENTS

Information on classification comments is not available.

AUTHOR/DATE(UPDATE)

Robert K. Moseley/1997-12-31()

Betula glandulosa/Carex utriculata

Bog birch/Bladder sedge

RANGE

Betula glandulosa/Carex utriculata is a minor type at mid- elevations in western Montana (Hansen et al. 1995), and throughout Idaho (Moseley et al. 1991; Bursik and Moseley 1995).

ENVIRONMENT

This plant associaton occurs adjacent to beaver ponds, lakes, or marshes, and on seeps, swales and wet alluvial terraces

adjacent to low gradient meandering streams (Hansen et al. 1995). Stands of this association frequently occur where seeps or springs emerge and stands may be semi-permanently saturated.

SOILS

Soils are commonly flooded until mid summer, and are saturated year-round on wetter sites. Redox concentrations are present in some mineral soils; redox depletions (gleyed soil) occur rarely. Organic matter accumulations of moss or sedge peat may form floating, quaking mats as this type encroaches onto open water. Drier extremes have shallow organic horizons overlying deeper mineral soil (Hansen et al. 1995).

VEGETATION COMPOSITION

Betula glandulosa contributes an average of 35% to the overstory. Minor amounts of *Potentilla fruticosa* and *Salix* species are usually present. The canopy cover provided by the various shrubs is sparse to moderate, but the herbaceous layer cover is high. Associated shrubs include *Rhamnus alnifolia* (northern Idaho) and various willows. Understory species composition is dependent on water levels. The wettest sites support *Carex utriculata* and *C. aquatilis*. *Geum macrophyllum* and the graminoids *Poa pratensis* and *Agrostis stolonifera* are often present in drier microsites and/or disturbed sites (Hansen et al. 1995). Similar associations include *Betula glandulosa/Carex scopulorum* (Johnston 1987), and *Betula glandulosa/Mesic forb-Mesic graminoid* (Kittel et al. 1999). The *Betula glandulosa/Mesic forb-Mesic graminoid* association contains some of the same associated species, but is not similar enough to be considered synonymous.

ADJACENT COMMUNITIES

Adjacent wetter sites may be dominated by *Salix drummondiana*, *S. geeyeriana*, *Carex utriculata* or *C. buxbaumii* associations. Drier wetland sites may be dominated by *Poa pratensis*, *Populus trichocarpa*, and *Potentilla fruticosa*. At higher elevations, adjacent wetland forests are often dominated by *Picea engelmannii* or *Abies lasiocarpa*. Adjacent uplands support habitat types from the *Abies lasiocarpa*, *Pseudotsuga menziesii*, and *Pinus ponderosa* series, depending on elevation and aspect (Hansen et al. 1995).

MANAGEMENT CONSIDERATIONS

The diagnostic shrub species of this association is poor to fair browse for most classes of livestock (USDA Forest Service 2002). Repeated browsing of shrubs can reduce vigor and result in eventual elimination. It is often reported that livestock will avoid sites supporting *Betula glandulosa* due to unstable substrates. However, livestock and livestock use has been observed in stands where human access was difficult (Jankovsky-Jones 2001). Saturated soils are highly susceptible to soil compaction and streambank sloughing when used by livestock and heavy machinery. Grazing, primitive trail use, and other soil compacting activities makes sites susceptible to surface erosion. Overuse may result in reduced vigor or eventual elimination of shrubs and contribute to a shift in species composition to exotics and increasers such as *Poa pratensis*, *Phalaris arundinacea*, and *Juncus balticus*. Sites supporting this association burn infrequently due to saturated conditions. Nonetheless, *Betula glandulosa* and understory sedges will readily resprout after fire. It is reported that *Betula glandulosa* is of limited use for restoration as it is not easily transplanted (USDA Forest Service 2002).

SUCCESSIONAL DYNAMICS

The *Betula glandulosa/Carex utriculata* plant association represents a stable, late seral vegetation type. Grazing may decrease the vigor of bog birch and increase the presence of species tolerant of grazing including *Agrostis stolonifera*, *Poa pratensis*, *Poa palustris*, and *Juncus balticus*.

WILDLIFE FUNCTIONS

Betula glandulosa is a food source for moose, elk, mule deer, caribou, and hares. The catkins, buds, and seeds of *Betula glandulosa* are eaten by sharp-tailed grouse, spruce grouse, ruffed grouse, redpolls, pine siskin, chickadees, and kinglets. Stands also may provide cover for small birds and mammals. Use for cover by larger animals may be limited due to the short stature of the diagnostic shrub (USDA Forest Service 2002). This association may function to stabilize channel banks (frequently creating overhanging banks) and provide shade creating quality fish habitat.

CLASSIFICATION COMMENTS

The *Betula glandulosa/Carex utriculata* plant association was first described by Hansen et al. (1995). Several closely related plant associations have been described in the western United States including the *Betula glandulosa/Carex simulata* and *Betula glandulosa/Carex lasiocarpa* plant associations from Idaho, and the *Betula glandulosa/Mesic forb-Mesic graminoid* (Kittel et al. 1999) and *Betula glandulosa/Carex scopulorum* plant associations from Colorado (Johnston et al. 1987). Stands dominated by *Betula glandulosa* are common throughout the Rocky Mountain region (Windell et al. 1986).

AUTHOR/DATE(UPDATE)

Linda Williams/1995-09-05(2002-02-25)

Cornus sericea

Red-osier dogwood

RANGE

This is a widespread type known from Washington, Oregon, Idaho, Nevada, and Montana.

ENVIRONMENT

This type is typically adjacent to stream and river channels, but it can occupy a diversity of landforms. It may appear as dense linear bands on alluvial benches in narrow canyons or broad thickets on islands and floodplains of major streams and rivers. Most occurrences have evidence of annual or near-annual flooding (Manning and Padgett 1995; Hall and Hansen 1997).

SOILS

Soils of this association are classified as Inceptisols, Entisols, or Mollisols. Where sites are located outside of the active floodplain, a litter/duff layer 2 inches or more thick may accumulate. Surface horizons are comprised of a wide range of alluvial materials with textures ranging from silty clays to sandy loams. These layers may be relatively shallow or as deep as 5 feet. Underlying layers are typically coarse sands, gravels, and cobbles that facilitate the movement of aerated groundwater through the subsurface layers which may be important for the longevity of stands. Water availability ranges from high, where this type occupies floodplains immediately adjacent to active channels, to low on upper, remote floodplain sites. Mottled and gleyed soils may occur (Manning and Padgett 1995; Hall and Hansen 1997; Crowe and Clausnitzer 1997).

VEGETATION COMPOSITION

Cornus sericea forms a dense, closed canopy, often excluding understory shrub and herbaceous species. *Cornus sericea* is usually the only species with high cover values. Associated species vary with geography and elevation, but constant shrubs include *Rosa woodsii*, *Ribes hudsonianum*, *Acer glabrum*, *Salix exigua*, *S. lutea*, and *Clematis ligusticifolia*. Because of its wide range, a great diversity of herbaceous species are associated with this association, usually in low cover (Manning and Padgett 1995; Hansen et al. 1995; Hall and Hansen 1997; Crowe and Clausnitzer 1997).

ADJACENT COMMUNITIES

Because of the wide geographic range for this type, associations of adjacent uplands can be coniferous forest, aspen, sagebrush-steppe, and pinyon-juniper types.

MANAGEMENT CONSIDERATIONS

The herbaceous biomass varies widely and is largely dependent on the density of the dogwood canopy (Crowe and Clausnitzer 1997). Ratings for red-osier dogwood palatability for livestock range from low (Manning and Padgett 1995; Crowe and Clausnitzer 1997) to "ice cream" (Hansen et al. 1995; Hall and Hansen 1997), but the stands are often so dense that they limit grazing in many cases. This community functions in a variety of ways to promote stream health. Red-osier dogwood forms dense root networks that stabilize streambanks against lateral cutting and erosion, provides cover in the form of overhanging branches and banks, and shades channels, effectively moderating extreme summer temperature fluctuations (Hall and Hansen 1997). Dogwood sprouts vigorously after a fire and germination of its seed-bank

is stimulated by fire (Crowe and Clausnitzer 1997).

SUCCESSIONAL DYNAMICS

This is considered an early seral association, typically colonizing sites adjacent to streams. The herbaceous cover is often sparse, probably due to the dense overstory canopy and regular flooding, scouring, and deposition. The latter factor is probably responsible for maintaining this as a persistent plant association on the landscape. The presence of tall shrubs or trees in some stands may represent succession toward *Alnus incana*, *Populus trichocarpa*, *P. tremuloides*, *P. angustifolia*, *Picea engelmannii*, *Pseudotsuga menziesii*, or other associations.

WILDLIFE FUNCTIONS

Red-osier dogwood provides food and cover for mule deer, moose, elk, mountain goats, cottontail rabbits, snowshoe hares, and many birds. The fruits are an important black bear food and are also eaten by songbirds, grouse, quail, partridge, cutthroat trout, ducks, crows, mice, and other mammals. The young stems and bark are eaten by deer mice, meadow voles, and other small rodents. Red-osier dogwood often grows in dense thickets because of its layering ability. These thickets provide good mule deer fawning and rearing areas and nesting habitat for many songbirds (Hansen et al. 1995; Crowe and Clausnitzer 1997).

CLASSIFICATION COMMENTS

Stands of *Cornus sericea* have been sampled in Washington, Oregon, Idaho, Nevada, and Montana. *Cornus sericea* is the dominant species in several associations and several classifications have treated stands as a *Cornus sericea* dominance type. The *Cornus sericea* association described here lacks structural diversity of the other types

and understory species with high constancy or fidelity are lacking. This association seems most closely related to the *Cornus sericea*/*Galium triflorum* association described from Utah and eastern Idaho (Youngblood et al. 1985; Padgett et al. 1989).

AUTHOR/DATE(UPDATE)

Robert K. Moseley/1998-01-02(2001-01-15)

Salix eastwoodiae*/*Carex aquatilis

Eastwood willow/*Water sedge*

RANGE

The association is known to occur in Idaho in the Salmon River Mountains and in Wyoming in the Wind River Mountains, on the Bear Tooth Plateau, and in the Absaroka Mountains.

ENVIRONMENT

Stands occur at upper elevations in narrow to wide valleys in both open meadows, at the inlets to lakes, and as openings in forested wetlands along higher gradient channels. Along channels, stands may occur in oxbows or at the mouths of tributaries (Mutz and Querioz 1983; Walford et al. 1997).

SOILS

Soils are fine to coarse loams and silty clay loams. Sites are seasonally saturated and often dry at the surface late in the growing season (Mutz and Querioz 1983; Walford et al. 1997).

VEGETATION COMPOSITION

Shrublands dominated by *Salix eastwoodiae* occur in subalpine habitats above 2,800 meters in the northern Rocky Mountains. *Salix eastwoodiae* dominates a low to medium height (one to two meter) shrub

layer with lesser amounts of *Salix planifolia* and *Lonicera caerulea*. *Carex aquatilis* is always present and other herbaceous species including the graminoids *Carex rostrata*, *C. norvegica*, *C. microptera* and mesic forbs may sometimes be present. The shrublands create broad open meadow/willow mosaics and may occur at the mouths of tributaries and in oxbows associated with forested riparian habitat. Soils are saturated at or near the surface through mid-summer. In broad valley bottoms, the ground may be hummocky and cut with many channels (Mutz and Querioz 1983; Walford et al. 1997).

ADJACENT COMMUNITIES

Information on adjacent communities is not available.

MANAGEMENT CONSIDERATIONS

The roots of the willow species and associated sedges provide stability to soils and channel banks. Stands sampled in Idaho were reported to be grazed by livestock by late summer and destruction of vegetation cover may accelerate erosion. Information on the utility of this willow species for revegetating sites is unknown.

SUCCESSIONAL DYNAMICS

Stands are considered late seral and stable and will persist as long as water levels are maintained and soil compacting activities are avoided.

WILDLIFE FUNCTIONS

Salix eastwoodiae is not highly palatable though elk and mule deer may make moderate use due to the ease of accessing willows (Elzinga and Rosentreter 2001).

CLASSIFICATION COMMENTS

This plant association was originally described by Mutz and Querioz (1983) in

the South Fork Salmon drainage of central Idaho as the *Salix eastwoodiae/ Carex aquatilis-Carex utriculata* plant association. This included both stands where *Carex aquatilis* and/or *Carex utriculata* were dominant in the understory. Two associations are recognized based on Mutz and Querioz's (1983) data; *Salix eastwoodiae/Carex aquatilis* and *Salix eastwoodiae/ Carex utriculata*. This association was also described in northwestern Wyoming by Walford et al. (1997). Youngblood et al. (1985) reported stands of *Salix eastwoodiae* in the Teton Range with a forb understory. Apparently *Salix eastwoodiae* was considered synonymous with *Salix commutata* by Tuhy and Jensen (1982) and their *Salix commutata* stands may have included stands dominated by *Salix eastwoodiae*.

SIMILAR COMMUNITIES

This plant association is similar to other high elevation willow dominated associations including those dominated by *Salix wolfii* and *S. planifolia* and these species may co-occur to form mixed stands. In fact, *Salix eastwoodiae* is difficult to identify and can be confused with *Salix wolfii*, *S. commutata*, and *S. boothii* (Brunsfield and Johnson 1985). For management purposes, associations dominated by willows are often lumped and diagnostic species are not identified. However, for the purpose of biodiversity conservation, it is worthwhile to have a classification that recognizes *Salix* species diversity.

AUTHOR/DATE(UPDATE)

Mabel Jankovsky-Jones/2002-03-05()

Salix geyeriana/Carex utriculata

Geyer's willow/Bladder sedge

RANGE

This is a common and widespread type in the Intermountain and Rocky Mountain areas. It is distributed from the eastern Sierra Nevada (Manning and Padgett 1995) and central Oregon (Kovalchick 1987) on the west, across northeastern Oregon (Crowe and Clausnitzer 1997), Idaho (Tuhy 1981; Tuhy and Jensen 1982; Mutz and Queiroz 1983; Youngblood et al. 1985; Jankovsky-Jones 1996; Hall and Hansen 1997), Nevada (Manning and Padgett 1995), and northern Utah (Padgett et al. 1989) to Colorado (Kittel and Lederer 1993; Kettler and McMullen 1996), Wyoming (Norton et al. 1981; Chadde et al. 1988; Walford et al. 1997), and Montana (Hansen et al. 1995).

ENVIRONMENT

Throughout its distribution, this association occurs in mountains and high valleys at elevations ranging from 4,300 to 9,000 feet. This type is most common on broad, level floodplains, but does occur in narrow bands along smaller streams in open, U-shaped valleys. Valley bottom gradients are usually low. Surface microtopography is often hummocky as a result of the irregular buildup of organic material. Hydrology of these sites is usually maintained through subirrigation and soil moisture is maintained at or near the surface in most cases. These sites may or may not be annually flooded during high water in the spring and early summer.

SOILS

This association occurs on a range of soil types that are typically wet, cold, and organic or have organic surface horizons. They are generally classified as Mollisols and Histisols. Organic surface horizons,

often extending to a depth of 18 inches or more, are riddled with fibrous root and plant material. Soil textures are categorized as fine, generally silts and clays. Deeper alluvial mineral deposits are comprised of coarse and fine sands and gravels. The soils are usually mottled (Hall and Hansen 1997).

VEGETATION COMPOSITION

Salix geyeriana dominates the open overstory and characteristically appears in large, often widely-spaced clumps. *S. geyeriana* can be as much as 3 m tall. A diversity of other shrubs may be present, but usually in low amounts. Some of these subordinate shrubs include *Betula glandulosa*, *S. boothii*, *S. drummondiana*, *Ribes inerme*, *Lonicera involucrata*, *Potentilla fruticosa*, and *Alnus incana*. The lower shrubs of this group often occur at the base of *S. geyeriana*. *Carex utriculata* clearly dominates the understory. Other sedges and grasses, such as *C. aquatilis*, *C. interior*, and *Calamagrostis canadensis*, may be present but they have low cover. Forb species are sparse, but *Geum macrophyllum* appears to be the most constant species across the range of this type.

ADJACENT COMMUNITIES

Adjacent upland and riparian associations vary considerably across the wide range of this type. Upland types include sagebrush-steppe, aspen, and coniferous forest. Adjacent riparian associations are even more diverse and too numerous to mention here, but mostly include other willow types and those dominated by graminoids.

MANAGEMENT CONSIDERATIONS

The wet organic soils can be strongly impacted by livestock and heavy machinery, but the dense roots and rhizomes of *Carex utriculata* bind the soils and stabilize the

site. Loss of the shallow water table, through soil damage and/or stream incision will initially shift undergrowth composition towards drier graminoids and forbs. Willow regeneration will be limited and the mature individuals will eventually become decadent. *C. utriculata* provides a very high level of streambank stabilization.

SUCCESSIONAL DYNAMICS

The *Salix geyeriana*/*Carex utriculata* association is the wettest of all *S. geyeriana* types. Prolonged, intense utilization by livestock and wild ungulates may shift the site potential to a drier grazing disclimax, characterized by more open stands with exotic grasses, such as *Poa pratensis* and *Agrostis stolonifera*, dominating the understory. Beavers may exert a significant influence on sites as well. Active dams maintain high water tables needed to support this type. However, sustained removal of willows by beavers may reduce the site to a *Carex utriculata* association. When beaver abandon a site, the dams eventually deteriorate and the water table may drop, shifting the site potential to the *S. geyeriana*/*Calamagrostis canadensis* type (Hall and Hansen 1997).

WILDLIFE FUNCTIONS

A diversity of wildlife species, ranging from small mammals to rodents and songbirds, use this type for food, cover, and nesting. Moose and beaver, in particular, are important in this association. Beaver may provide a vital role in the maintenance of this association in many places by maintaining high water tables (Hall and Hansen 1997).

CLASSIFICATION COMMENTS

This association has been quantitatively defined and described by at least 12 studies throughout the Intermountain region and

Rocky Mountains. All these classifications have used the old name, *Carex rostrata*, which is now known to be strictly boreal. This name is now superseded by *C. utriculata* (Reznicek 1987). Because of the wide geographic distribution, different studies have taken different approaches to its classification, with some taking a rather narrow approach and others taking a much broader view of this type. Most of the variability revolves around the treatment of *Salix boothii*, *S. drummondiana*, and *C. aquatilis*. *S. geyeriana* and *S. boothii* have been treated differently in different classifications. For example, Hansen et al. (1995) in Montana include in their *S. geyeriana* types those stands with all combinations of *S. geyeriana* and *S. boothii*, citing similarities between the two species in the environments they occupy and in management issues. On the other hand, Padgett et al. (1989) place stands with at least 25% cover of *S. boothii* into their *S. boothii* associations, even if the stands have greater cover of the taller *S. geyeriana*, arguing that that much *S. boothii* cover significantly alters the structure of the vegetation. Some studies have taken an even broader approach by lumping stands dominated by *S. geyeriana* and *S. drummondiana*, as well as *S. boothii*, *S. lemmonii*, *S. bebbiana*, *S. wolfii* and/or *Betula glandulosa*, into a generic *Salix/Carex utriculata* type (e.g., Tuhy and Jensen 1982; Kovalchik 1987; Crowe and Clausnitzer 1997). Studies have also taken varying approaches to the amount of *Carex aquatilis* in this association. Some studies (e.g., Youngblood et al. 1985; Mutz and Queiroz 1983; Hall and Hansen 1997) take the broad view by defining a *S. geyeriana*/*C. utriculata* type with either *C. utriculata* or *C. aquatilis* as the herbaceous dominant. A narrower approach has been taken by others (e.g., Padgett et al. 1989; Kittel and Lederer 1993; Walford et al. 1997), where *C.*

utriculata is the sole herbaceous dominant and *C. aquatilis*-dominated sites would be a different association. The association described here is a narrow one, that is *S. boothii*-dominated sites are treated as different associations (sensu Padgett et al. 1989; Walford et al. 1997; and others) and *C. aquatilis*-dominated understory similarly defines a separate type (sensu Padgett et al. 1989 and others).

AUTHOR/DATE(UPDATE)

Robert K. Moseley/1998-12-04()

***Salix geyeriana*/Mesic graminoid**

Geyer's willow/Mesic graminoid

RANGE

Salix geyeriana/Mesic graminoid is a widely distributed major type. In southeastern Idaho, it is known from observations and plots in the Aspen, Preuss, Caribou, and Bear River Ranges and Grays Lake National Wildlife Refuge (Padgett et al. 1989; Jankovsky-Jones 1997b). It is also known from eastern Idaho in the vicinity of Henrys Lake, the Yellowstone Highlands, and the upper Teton River basin (Jankovsky-Jones 1996). In central Idaho, it is found in the Pioneer/White Knob Mountains (Jankovsky-Jones 1999b). Walford et al. (1997) sampled *S. geyeriana*/Mesic graminoid in or near the Absaroka, Bighorn, and Wind River Mountains of northwest Wyoming. The association is also known in the Wasatch Mountains and the high south-central plateaus of Utah (Padgett et al. 1989). Manning and Padgett (1995) described the association in the eastern Sierra Nevada Mountains and surrounding areas of California and Nevada. It is also found in the Santa Rosa Range of north Nevada (Manning and Padgett 1995) and the Toiyabe and Monitor Ranges of central

Nevada (Weixelman et al. 1996). In addition, Evenden (1989) described a *Salix geyeriana*/Mesic graminoid-forb association in the Trout Creek Mountains of southeastern Oregon and Hansen et al. (1995) described a broader *S. geyeriana* association in Montana. Both of these associations may encompass some stands of *S. geyeriana*/Mesic graminoid.

ENVIRONMENT

Stands of the *Salix geyeriana*/Mesic graminoid plant association are often found in wide valleys and basins filled with Quaternary alluvium or morainal outwash, such as alpine cirques and U-shaped troughs, but is also located in narrow valleys (Padgett et al. 1989; Manning and Padgett 1995; Weixelman et al. 1996; Walford et al. 1997). The association is on seasonally saturated sites such as flat, gently sloping, or hummocky streambanks, terraces (about 60 cm above bankfull channel), benches, floodplains (which it may fill), moist meadows, and, occasionally, gravel bars. It is usually adjacent to meadow seeps and springs or streams which seasonally flood (Padgett et al. 1989; Manning and Padgett 1995; Weixelman et al. 1996; Walford et al. 1997). However, it is sometimes in old floodplains now abandoned due to lateral stream migration. Typical associated streams vary from moderate gradient, narrow and meandering to low gradient braided rivers, but are often Rosgen B or C types (Manning and Padgett 1995; Walford et al. 1997).

SOILS

Soils are cold and moist with organic horizons, usually categorized as silt loams, silty clay loams, or clay loams with moderate to high water holding capacity (Padgett et al. 1989; Manning and Padgett 1995). However, coarse loamy, loamy

skeletal, and more recent sandy alluvium soils are sometimes present, but rarely with more than 35% coarse fragments (Weixelman et al. 1996; Walford et al. 1997). Soils are most often classified as Cryaquolls (Typic) and Cryoborolls (Typic and Pachic), and Cryofluvents (Typic), but Borosaprists, Borofibrists, Haplaquolls, and Haploborolls are also observed (Padgett et al. 1989; Manning and Padgett 1995; Weixelman et al. 1996; Walford et al. 1997). Soils often have redoximorphic features (usually mottling) within 50 cm of the surface since the water table usually ranges from the surface to 76 cm deep (occasionally deeper). Due to slow decomposition and high production of these sites, litter/duff cover is high (up to 66%).

VEGETATION COMPOSITION

The *Salix geyeriana*/Mesic graminoid association is characterized by an open canopy of clumped *S. geyeriana*. *S. boothii* is occasionally mixed with *S. geyeriana*, but is usually shorter and has less than 20% cover. Scattered around the bases of these willows are lower shrubs, including *Ribes inerme*, *R. aureum*, *Rosa woodsii*, *Pentaphylloides floribunda*, *S. lemmonii*, and *S. wolfii* (Padgett et al. 1989; Manning and Padgett 1995; Weixelman et al. 1996; Walford et al. 1997). The herbaceous understory is dominated by a diverse mix of mesic graminoid species which varies in composition depending on the amount of grazing disturbance. *Poa pratensis* is ubiquitous in all stands, however, with cover ranging from less than 8% in higher quality stands (Manning and Padgett 1995; Weixelman et al. 1996; Walford et al. 1997) to 44% in disturbed stands (Padgett et al. 1989). In mid or late-seral stands, the most common graminoids are *Carex lanuginosa*, *Deschampsia cespitosa*, *C. microptera*, and occasionally *C. nebrascensis* (Manning and Padgett 1995; Weixelman et al. 1996;

Walford et al. 1997). Other graminoids in less disturbed stands, occasionally with moderate cover and constancy, include *Calamagrostis canadensis*, *Carex aquatilis*, *C. simulata*, *C. subnigricans*, *C. utriculata*, *Glyceria* spp. (e.g. *G. striata*), *Elymus trachycaulus*, and others. In addition to *Poa pratensis*, stands that have been disturbed by grazing may have high cover of exotic grasses such as *Agrostis stolonifera*, *Bromus inermis*, *Phalaris arundinacea*, *Phleum pratense*, and *Poa palustris* (Padgett et al. 1989; Jankovsky-Jones 1996 and 1997). The cover of mesic forbs is less than that of graminoids. The most common species are often indicative of some disturbance. Forb species include: *Taraxacum officinale* (up to 17% cover and 86% constancy), *Achillea millefolium*, *Trifolium* spp., *Thalictrum* spp., *Potentilla gracilis*, *Geum macrophyllum*, *Smilacina stellata*, and *Iris missouriensis* (Padgett et al. 1989; Manning and Padgett 1995; Weixelman et al. 1996; Walford et al. 1997). The *Salix geyeriana*/Mesic graminoid plant association is a broad association which may encompass *S. geyeriana*/*Poa pratensis* and other *S. geyeriana* associations with no clearly dominant understory graminoid species. When ecological conditions are good, it has higher cover and constancy of *Calamagrostis canadensis*, *Carex aquatilis*, *C. lanuginosa*, *C. utriculata*, and *Deschampsia cespitosa*, possibly causing confusion with *S. geyeriana* associations named for dominance of any one of these species (Mutz and Queiroz 1983; Youngblood et al. 1985; Padgett et al. 1989). Stands of this association may result from grazing disturbance which creates a mixed understory of both increased and late-seral graminoid species. As a result, the association resembles other *S. geyeriana* associations from which it may have originated such as: *S. geyeriana*/*Calamagrostis canadensis*, *S.*

geyeriana/Carex aquatilis, *S. geyeriana/C. rostrata*, and *S. geyeriana/Deschampsia cespitosa* (Mutz and Queiroz 1983; Youngblood et al. 1985; Padgett et al. 1989; Hansen et al. 1995; Manning and Padgett 1995; Hall and Hansen 1997; Walford et al. 1997). Other similar associations, include those dominated by a mix of *Salix* spp. (often *S. boothii* and *S. drummondiana*) with dominance by mesic graminoids and high cover and constancy of *S. geyeriana*. The broad *S. geyeriana* association of Hansen et al. (1995) is similarly characterized by greater cover of mesic graminoids than that of mesic forbs. In contrast, Hall and Hansen (1997) described a broad *S. geyeriana* type and Evenden (1989) described a *S. geyeriana*/Mesic graminoid-forb association, which both represent overgrazed, degraded associations with similar amounts of both understory mesic graminoids and forbs. In addition many *S. boothii* (and sometimes *S. drummondiana*) associations (e.g. *S. boothii*/Mesic graminoid), with very similar mesic graminoid dominated understories and sub-dominance by *S. geyeriana*, resemble the aforementioned *S. geyeriana* associations (Mutz and Queiroz 1983; Youngblood et al. 1985; Padgett et al. 1989; Walford et al. 1997).

ADJACENT COMMUNITIES

Wetter associations adjacent to stands of *Salix geyeriana*/Mesic graminoid include associations in springs or seeps dominated by *Carex aquatilis*, *C. utriculata*, or *C. nebrascensis* (Manning and Padgett 1995; Weixelman et al. 1996). Adjacent riparian associations with similar moisture regimes are *S. wolfii/Deschampsia cespitosa*, *S. boothii*/Mesic graminoid, various other *Salix* types (e.g. those dominated by *S. exigua*, *S. lemmonii*, or *S. planifolia*), *Iris missouriensis*, or *Deschampsia cespitosa* (Manning and Padgett 1995; Walford et al.

1997). Neighboring on slightly drier floodplains are *Populus tremuloides/Symphoricarpos albus*, *Poa pratensis* meadow, and *Artemisia cana* stands (Padgett et al. 1989; Weixelman et al. 1996). Adjacent to the comparable, but broader, *Salix geyeriana* association type in Montana were *S. geyeriana/Carex rostrata* and *S. geyeriana/Calamagrostis canadensis* on wetter sites and *Populus tremuloides/Cornus stolonifera*, *Pentaphylloides floribunda/Deschampsia cespitosa*, and *Juncus balticus* associations on drier sites (Hansen et al. 1995). Uplands adjacent to *Salix geyeriana*/Mesic graminoid are dominated by *Picea* spp., *Pinus contorta*, *P. jeffreyi* (Sierra Nevada Mountains), *Populus tremuloides*, and *Artemisia tridentata* var. *vaseyana* steppe (Padgett et al. 1989; Manning and Padgett 1995).

MANAGEMENT CONSIDERATIONS

The high cover of grasses and sedges makes *Salix geyeriana*/Mesic graminoid highly productive for livestock forage. In addition, this association has many corridors between willow clumps which allow for livestock access (Padgett et al. 1989; Hansen et al. 1995; Walford et al. 1997). These attributes make *S. geyeriana*/Mesic graminoid susceptible to overgrazing and conversion of the understory from native species to exotic grasses. Overgrazing of *S. geyeriana* causes lost vigor, decreased stand density, and eventual elimination. After overgrazing, *S. geyeriana* stands regain vigor if rested for at least 3 to 6 years (Kovalchik 1987; Hansen et al. 1995; Crowe and Clausnitzer 1997). However, the mesic graminoid understory will become dominated by *Poa pratensis* or other weedy species which increase with grazing (Padgett et al. 1989; Manning and Padgett 1995; Weixelman et al. 1996; Walford et al. 1997). *P. pratensis* is palatable, moderately productive, and

tolerant of heavy grazing (Kovalchik 1987). Livestock grazing, as well as human developments (e.g. roads, recreation sites, etc.), may compact the wet Mollisol soils of *S. geyeriana*/Mesic graminoid and are not usually compatible. When the association converts to *P. pratensis* dominance, streambank stability decreases and cattle trampling causes bank sloughing, creek overwidening, and water table alterations (Kovalchik 1987; Padgett et al. 1989; Manning and Padgett 1995; Hansen et al. 1995). The *Carex* sod mats characteristic of a high quality understory have excellent soil stabilizing ability. In contrast, *P. pratensis* roots are poor soil binders. *S. geyeriana* will sprout vigorously after fire, especially in wetter stands after quick, hot fires. Thus, prescribed burning is effective in rejuvenating old clumps (Hansen et al. 1995). *P. pratensis* and other graminoids resprout better after cooler fires (Hansen et al. 1995; Kovalchik 1987). *S. geyeriana*, though more difficult to root than *S. boothii* or *S. drummondiana*, is valuable for revegetation of streambanks. It has high value for stabilizing streambanks, trapping debris, creating pools, and reducing erosional energy (Hansen et al. 1995). Reestablishment of willows may help raise the water table and allow reinvasion by native species such as *Carex lanuginosa* (Kovalchik 1987).

SUCCESSIONAL DYNAMICS

While *Salix geyeriana*/Mesic graminoid does exist in less disturbed, late-seral states (with an understory of *Carex lanuginosa*, *Calamagrostis canadensis*, *Deschampsia cespitosa*, *Carex microptera*, *C. nebrascensis*, and other native species), it more often reflects disturbance by livestock grazing (Padgett et al. 1989; Manning and Padgett 1995; Weixelman et al. 1996; Walford et al. 1997). Similarly, understory shrub and forb composition may be the

result of grazing disturbance (e.g. some species, such as *Achillea millefolium*, *Rosa woodsii*, and *Taraxacum officinale* increase under grazing while others decrease) (Weixelman et al. 1996; Hall and Hansen 1997). Thus, it is hypothesized that under persistent, heavy livestock grazing the association will move toward *Salix geyeriana*/*Poa pratensis*, *S. geyeriana*/*P. palustris*, *S. geyeriana*/Mesic graminoid-forb, or *S. geyeriana*/Mesic forb (Youngblood et al. 1985; Evenden 1989; Padgett et al. 1989; Walford et al. 1997). Overgrazing may directly or indirectly eliminate *S. geyeriana*, such as by decreasing its vigor or altering hydrologic conditions (Hall and Hansen 1997). The resulting associations may be drier types such as *P. pratensis* meadows, mesic graminoid or forb meadows, conifer types, or *Populus tremuloides* associations. The association may naturally form on frequently flooded gravelbars, streambanks, or springs with bare sand and gravel substrates necessary for willow establishment (Weixelman et al. 1996; Walford et al. 1997). Alternatively, *Salix geyeriana*/Mesic graminoid possibly originated from *S. geyeriana*/*Calamagrostis canadensis*, *S. geyeriana*/*Carex aquatilis*, *S. geyeriana*/*C. rostrata*, or *S. geyeriana*/*Deschampsia cespitosa* associations which have been disturbed by grazing and subsequently invaded by various mesic graminoid species (Mutz and Queiroz 1983; Youngblood et al. 1985; Padgett et al. 1989; Hansen et al. 1995; Manning and Padgett 1995; Hall and Hansen 1997; Walford et al. 1997).

WILDLIFE FUNCTIONS

The *Salix geyeriana*/Mesic graminoid association provides good cover, bedding ground, and forage for wildlife such as beaver, deer, moose, small mammals, and elk (especially in the winter) (Hansen et al.

1995; Walford et al. 1997). *S. geyeriana* has moderate to high value as ungulate and beaver forage and is apparently more palatable than *S. boothii* (Manning and Padgett 1995; Crowe and Clausnitzer 1997). Songbirds, upland gamebirds, and other birds use this association for nesting and foraging (Crowe and Clausnitzer 1997; Hall and Hansen 1997). The dense root network of *S. geyeriana* and understory *Carex* spp. stabilizes streambanks, allowing streambank undercutting which creates excellent fish habitat (Hansen et al. 1995; Hall and Hansen 1997). Beaver ponds, often associated with *S. geyeriana* associations, also provide excellent fish and waterfowl habitat.

CLASSIFICATION COMMENTS

Salix geyeriana/Mesic graminoid is an extensively sampled association. It has been sampled throughout Idaho (Padgett et al. 1989; Jankovsky-Jones 1996, 1997), northwestern Wyoming (Walford et al. 1997), Utah (Padgett et al. 1989), northern and central Nevada (Manning and Padgett 1995; Weixelman et al. 1996), and southeastern Oregon (Evenden 1989). Hansen et al. (1995) sampled 71 plots of a broader *S. geyeriana* type in Montana which likely includes some stands of *S. geyeriana*/Mesic graminoid.

AUTHOR/DATE(UPDATE)

Chris Murphy/1999-03-01(2002-03-05)

***Salix drummondiana*/Calamagrostis canadensis**

Drummond's willow/Bluejoint reedgrass

RANGE

This plant association has been described from throughout the west including Colorado, Montana, Idaho, and Washington.

ENVIRONMENT

Elevation ranges from 2,320 to 8,200 feet. The association occurs on low gradient slopes adjacent to beaver ponds, lakes, marshes, rivers and streams, or on toeslopes below upland sites. This association is relatively dry compared to other willow plant association (Kovalchik 1993). Water levels range from at the surface to 100 cm below the surface during the growing season.

SOILS

Soils are coarse to fragmented loams or grass peat over deep, erosive, moderately fine-textured alluvium (Kovalchik 1993; Tuhy and Jensen 1982). Hansen et al. (1995) notes soil textures range from silt to clay loam; mottling and gleyed soils are common.

VEGETATION COMPOSITION

Salix drummondiana dominates the tall shrub layer (25-60% cover). *S. geyeriana*, *S. boothii* and *S. monticola* are sometimes present in lesser amounts than the dominant shrub. *Lonicera involucrata*, *Ribes* spp., *Alnus incana*, and *Potentilla fruticosa* are usually present with up to 15% cover individually. In Colorado, *S. planifolia* var. *planifolia* is also reported as an associate. *Calamagrostis canadensis* contributes at least 5% and up to 60% cover to the understory. Other species with high constancy include *Carex microptera*, *C. utriculata*, *C. aquatilis*, *Deschampsia cespitosa*, *Aster foliaceus*, and *Fragaria virginiana*. In Idaho, this plant association represents the driest sites supporting stands of *S. drummondiana*. Other similar stands of vegetation on moister sites may have understories dominated by *C. utriculata* or *C. aquatilis*. Other tall willow species including *S. boothii* and *S. geyeriana* form similar vegetation stands and may co-occur

with *S. drummondiana*. Hansen et al. (1995) reports that in Montana, stands of *S. drummondiana* typically occur at higher elevations. In eastern Idaho, stands dominated by both *S. boothii* and *S. drummondiana* have been included in *S. boothii* types (Youngblood et al. 1985; Padgett et al. 1989). From a biodiversity conservation standpoint, it is important to separate to recognize both *S. drummondiana* and *S. boothii* associations. Where dominance is unclear, stands should be treated as *S. boothii* associations.

ADJACENT COMMUNITIES

Adjacent wetter sites may support *Salix drummondiana*/*Carex utriculata*, *Carex utriculata*, *C. aquatilis*, or *C. scirpoidea* var. *pseudoscirpoidea* types, or open water. Drier sites may support *Salix* dominated types with a *Poa pratensis* or *Juncus balticus* understory, or *Potentilla fruticosa*, *Alnus incana*, or conifer dominated types (Hansen et al. 1995; Kovalchik 1993).

MANAGEMENT CONSIDERATIONS

The vigor of *Salix* spp. in these communities appears directly related to streambank stability and rate of sedimentation into stream systems (Tuhy and Jensen 1982). Sustained grazing decreases the vigor, reproductive success, and competitive ability of *Calamagrostis canadensis* and *Deschampsia cespitosa*. To maintain vigor and prevent damage to soils and vegetation, grazing should be deferred until soils dry; proper levels of grazing should range from light to moderate. Overuse by livestock will result in reduced vigor of willow species present, illustrated by uneven stem age distribution, highlining, clubbing, or dead clumps. With continued overuse, willows may be eventually eliminated from the site (Hansen et al. 1995).

SUCCESSIONAL DYNAMICS

Grazing pressure will cause a decrease in *Calamagrostis canadensis* and *Deschampsia cespitosa*, with a corresponding increase in either introduced or less desirable species such as *Ribes setosum*, *Urtica dioica*, and *Equisetum arvense*. Abundance of *Calamagrostis canadensis* suggests that communities may be seral stages of *Abies lasiocarpa*/*Calamagrostis canadensis* habitat type. The development of a conifer overstory tends to reduce and eventually eliminate the shade intolerant *Salix* species without affecting the herbaceous layer (Tuhy and Jensen 1982; Hansen et al. 1995).

WILDLIFE FUNCTIONS

Stands of willow are important habitat for songbirds including vireos, warblers, and sparrows. The dense stands of vegetation and overhanging branches provide protective cover, nesting, and foraging habitat for waterfowl. Moose and elk will consume large amounts of the diagnostic willow and in some locations it is reported that plants do not grow higher than a couple meters due to overbrowsing (U.S.D.A. Forest Service 2002). Where this and related associations occur along streams, they provide shade and woody debris which are important for salmonid habitat.

CLASSIFICATION COMMENTS

The *Salix drummondiana* plant association has been quantitatively described based on plot data from Idaho (Tuhy and Jensen 1982), Colorado (Kittel et al. 1999), Montana (Hansen et al. 1995), and Washington (Kovalchik 1993). This association is synonymous with the following types: Tuhy's (1981) *S. drummondiana*/*Ribes lacustre*/*Thalictrum occidentale*; Mutz's (1983) *S. drummondiana*-*S. boothii*/*Calamagrostis canadensis*; and Baker's (1989) *S.*

drummondiana-*S. monticola*/*Calamagrostis canadensis*-*Carex rostrata*.

AUTHOR/DATE(UPDATE)

Linda Williams/1996-06-13(2002-03-01)

Salix drummondiana*/*Carex utriculata

Drummond's willow/*Bladder sedge*

RANGE

The *Salix drummondiana*/*Carex utriculata* community type is known from Montana, Idaho, Washington, and probably eastern Wyoming. In Idaho, it is known from throughout the mountains of eastern Idaho (Hall and Hansen 1997), the Yellowstone Highlands (Jankovsky-Jones 1996), the Centennial Mountains (Mutz and Queiroz 1983; Jankovsky-Jones 1996), the Sawtooth Valley (Mutz and Queiroz 1983; Moseley et al. 1994), the Secesh River area (Moseley 1996), the North Fork St. Joe River area (Jankovsky-Jones 1999a), and the Priest River area (Jankovsky-Jones 1997b; Jankovsky-Jones 1999a). It is common in northwestern Montana but a minor type in mid to high elevations of southern Montana (Hansen et al. 1995). The community is at moderate elevations throughout northeastern Washington and lower elevations on the eastside of the Cascade crest (Kovalchik 1993).

ENVIRONMENT

The *Salix drummondiana*/*Carex utriculata* community type is found from 700 to 1,025 m elevation in north Idaho, northeastern Washington, and northwest Montana (Kovalchik 1993; Hansen et al. 1995; Jankovsky-Jones 1999a). Elevations in central Idaho average around 1,900 m (Moseley et al. 1994; Moseley 1996) while in southwestern Montana and eastern Idaho, it is found as high as 2,400 m (Hansen et al.

1995; Jankovsky-Jones 1996; Hall and Hansen 1997). The community is found in narrow to wide valleys on alluvial terraces adjacent to streams of low or moderate gradients (Mutz and Queiroz 1983; Hansen et al. 1995; Hall and Hansen 1997). These streams are often moderately entrenched, Rosgen C types (Kovalchik 1993). It is equally common adjacent to poorly drained or impounded areas such as beaver ponds, peatlands, lakes, marshes, seeps, springs, and road crossings (Kovalchik 1993; Moseley et al. 1994; Hansen et al. 1995). Though on mostly flat ground, the microtopography is characterized by channels and hummocks (Mutz and Queiroz 1983). As with landform settings, soils vary from Entisols and Histosols to Mollisols. Soils adjacent to moderate gradient streams are often poorly developed, coarse textured, and sandy with high gravel and cobble content. These soils allow the water necessary to support *Carex utriculata* to easily pass through (Hansen et al. 1995). In wider valleys, clay and silt-loam or organic soils are more common. Gleying and mottling are often present, typical of a spring/summer surface water table followed by the water table dropping to 100 cm below the surface by late summer (Kovalchik 1993). Organic loam and sedge peat soils, with high available water content, are up to 1 m deep and classified as Cumulic Cryaquolls and Terric, Hemic, Sapric, and Fibric Histosols (Mutz and Queiroz 1983; Kovalchik 1993). A 5 cm surface litter/duff layer may be present. The soils of this community are held together by sod mats formed by *Carex* species and willow cover which effectively stabilize stream banks (Hansen et al. 1995).

SOILS

Information on soils is not available.

VEGETATION COMPOSITION

The *Salix drummondiana*/*Carex utriculata* community type is variable, often having mixed *Salix* and *Carex* species present. *S. drummondiana* is usually dominant with 30 to 55% cover and 70 to 100% constancy (Kovalchik 1993; Hansen et al. 1995; Jankovsky-Jones 1999a). Other tall willow species, such as *S. geyeriana*, *S. boothii*, *S. sitchensis*, *S. lasiandra*, *S. bebbiana*, and *S. pseudomonticola*, usually have less than 40% cover and less than 30% constancy. While these species form a tall shrub canopy (to 4 m), shorter species, such as *S. farriae* or *S. planifolia*, can be prominent in the understory (Mutz and Queiroz 1983; Kovalchik 1993; Hansen et al. 1995). Where *Salix* species have been reduced by beaver or overgrazing, *Betula glandulosa* (10 to 15% cover), *Spiraea douglasii*, or *Ribes* species may be important (Hansen et al. 1995). *Picea engelmannii*, *Abies lasiocarpa*, and *Alnus incana* are also occasionally present. The herbaceous layer is dominated by *Carex utriculata* (10 to 39% cover, about 80% constancy) and *C. aquatilis* (less than 34% cover, less than 80% constancy) with *C. vesicaria* also common. Other associated *Carex*, having low cover and constancy, include *C. lanuginosa*, *C. lasiocarpa*, *C. lenticularis*, and *C. nebrascensis*. Other common graminoid species, with low constancy but occasionally moderate cover (less than 40%), are *Calamagrostis canadensis*, *Phalaris arundinacea*, *Scirpus microcarpus*, *Glyceria* species, and *Juncus* species (Mutz and Queiroz 1983; Kovalchik 1993; Hansen et al. 1995; Jankovsky-Jones 1996; Jankovsky-Jones 1999a). Due to the dense *Salix* and *Carex* species cover, overall forb cover is low and mainly around shrub bases. Widespread species are *Epilobium ciliatum*, *Geum macrophyllum*, and *Equisetum arvense*. Less common species (but

occasionally with higher cover) include *Saxifraga arguta*, *Galium* species, *Petasites sagittatus*, and *Aster modestus* (Mutz and Queiroz 1983; Kovalchik 1993; Hansen et al. 1995; Jankovsky-Jones 1996; Jankovsky-Jones 1999a). Moss cover is often high. The edaphic and hydrologic situations which allow *Carex utriculata* dominance also promote many different *Salix* species. However, dominance by any one *Salix* species is the result of factors such as elevation or grazing (Hall and Hansen 1997). Tall willow communities similar to *Salix drummondiana*/*Carex utriculata* (often with high cover and constancy of *S. drummondiana*) include *S. drummondiana*-*S. boothii*/*C. rostrata*-*C. aquatilis*, *S. boothii*/*C. rostrata*, *S. geyeriana*/*C. rostrata*, and *S. lutea*/*C. rostrata* (Mutz and Queiroz 1983; Youngblood et al. 1985; Padgett et al. 1989; Hansen et al. 1995; Hall and Hansen 1997; Walford et al. 1997). Short willow species may dominate at higher elevations. *S. drummondiana* is sometimes present in short willow communities such as: *S. candida*/*C. utriculata*; *S. farriae*/*C. utriculata*; and *S. wolfii*/*C. rostrata* (Youngblood et al. 1985; Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Walford et al. 1997). Other *Carex* species may be more common than *C. utriculata* in similar communities due to variations in seral status or other factors. These include *S. boothii*/*C. aquatilis*, *S. geyeriana*/*C. aquatilis*, and *S. drummondiana*/*C. scopulorum* var. *prionophylla* (Youngblood et al. 1985; Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Hall and Hansen 1997).

ADJACENT COMMUNITIES

Communities adjacent to *Salix drummondiana*/*Carex utriculata* include other *S. drummondiana* types with slightly drier moisture regimes. Examples are *S. drummondiana*/*Calamagrostis canadensis*,

S. drummondiana/*Carex scopulorum* var. *prionophylla*, and *S. drummondiana*/*Poa pratensis* (Mutz and Queiroz 1983; Hansen et al. 1988; Kovalchik 1993; Hansen et al. 1995). Other adjacent communities with similar moisture levels are *S. geyeriana*/*C. rostrata*, *S. boothii*/*C. rostrata*, *S. farriae*/*C. scopulorum* var. *prionophylla*, and *S. wolfii* communities (Mutz and Queiroz 1983; Kovalchik 1993; Hall and Hansen 1997; Walford et al. 1997). Slightly drier adjacent communities include *Alnus incana*/*Calamagrostis canadensis*, *Alnus incana*/*Carex utriculata*, *Potentilla fruticosa*/*Deschampsia cespitosa*, and *Deschampsia cespitosa* communities. Wetter adjacent communities are herbaceous types (*Carex utriculata*, *C. aquatilis*, or *C. lasiocarpa* dominated) and *S. farriae*/*C. utriculata* (Kovalchik 1993; Hansen et al. 1995). Adjacent uplands are *Abies lasiocarpa*, *Pseudotsuga menziesii*, *Picea engelmannii*, or *Pinus ponderosa* habitat types (Hansen et al. 1988; Hansen et al. 1995).

MANAGEMENT CONSIDERATIONS

Salix drummondiana/*Carex utriculata* can be a productive community but will decrease if soils are damaged or hydrologic conditions change. For example, recreation trails, road building, agriculture (including draining with ditches), and livestock grazing easily damage organic soils through compaction and reduction of water holding capacity (Mutz and Queiroz 1983; Moseley et al. 1994; Hansen et al. 1995). These activities also cause streambank sloughing as well as premature soil drying, the loss of vegetative protection, and eventual loss of the community. Fortunately, thick shrub cover and excessive wetness limits activities in this community. Livestock forage value varies with season and historic use, but both *Salix drummondiana* and *Carex utriculata* are fair to good forage in the spring (Hansen

et al. 1988; Hansen et al. 1995).

Overgrazing of willows decreases their vigor and eliminates them from the site allowing graminoid cover to increase. This occurs with late summer and fall grazing which reduces willow regrowth and allows sedges, with their underground root reserves, to later proliferate. Thus, long rest periods are needed to maintain the community (Hansen et al. 1995). Beaver are also important in maintaining necessary hydrologic conditions and should not be removed if possible. Prescribed fire effectively rejuvenates dead clumps because *Salix drummondiana* sprouts vigorously after fire (quick, hot fires are preferred over slow, cool burns). Fires also increase *Carex rostrata* but only if ungrazed before and after the fire (Hansen et al. 1995). Both *S. drummondiana* and *C. rostrata* (and *C. aquatilis* and *C. vesicaria*) are excellent for re-vegetation over the long-term and provide good erosion control (Hansen et al. 1995).

SUCCESSIONAL DYNAMICS

The successional origin of *Salix drummondiana*/*Carex utriculata* is not well known. Both *S. drummondiana* and *C. utriculata* can be colonizers of fresh, mineral alluvium (Hansen et al. 1995; Walford et al. 1997). Thus, when alluvium is exposed, such as post-flood silt deposits around willow roots or after a beaver dam breaks, these species may invade. Alternately, *C. utriculata* might invade on silt deposited in open beaver ponds, then allowing later *Salix* invasion as the site dries (Mutz and Queiroz 1983). Another hypothesis, taken from the similar *S. boothii*/*C. utriculata* type, is that a *Salix* community existed before the beaver dam. The beaver dam was built, flooding the *Salix* but not eliminating it, subsequent siltation allowed *C. utriculata* to invade, and *Salix* rejuvenated later (Youngblood et al. 1985; Padgett et al. 1989). Whatever the origin,

stability of the *S. drummondiana*/*C. utriculata* community is indicated by a thick accumulation of organic matter (Kovalchik 1993). Disturbance by livestock or beaver will reduce *S. drummondiana* cover and allow graminoids, especially introduced species, to increase (Mutz and Queiroz 1983). If willows are reduced too much, beaver will leave in search of food and fail to maintain dams washed out by storms. The water table will then lower as the stream downcuts and the community will change toward a drier *S. drummondiana*/*Calamagrostis canadensis* or *Abies lasiocarpa* type (Hansen et al. 1988; Hansen et al. 1995).

WILDLIFE FUNCTIONS

In the winter, *Salix drummondiana* shoots are heavily browsed by moose. Throughout the year, *S. drummondiana* is utilized by beaver and provides fair forage for elk and deer. Songbirds also utilize *Salix* species habitat for feeding and nesting. In addition to *Salix* root masses, the dense *Carex rostrata* and *C. aquatilis* sod overhangs undercut banks creating prime fish habitat (Hansen et al. 1988; Hansen et al. 1995; Hall and Hansen 1997; Walford et al. 1997).

CLASSIFICATION COMMENTS

Earlier studies lumped this community within broader *Salix/Carex rostrata* [syn. *Carex utriculata*], *S. drummondiana*-*S. boothii*/*C. rostrata*-*C. aquatilis*, and *Salix/C. rostrata*-*C. aquatilis* communities (Tuhy and Jensen 1982; Mutz and Queiroz 1983; Walford et al. 1997). Likewise, in eastern Idaho, western Wyoming, and Utah, it may have been kept within the *S. boothii*/*C. rostrata* or *S. geyeriana*/*C. rostrata* community types (Youngblood et al. 1985; Padgett et al. 1989). These communities often have high cover and constancy of *S. drummondiana* (to the level of co-

dominance) making lumping of types seem logical (Hansen et al. 1995; Hall and Hansen 1997). *S. drummondiana* communities, with their mixed *Salix* species composition, may be transitional to other community types (Kovalchik 1993). In addition, *S. sitchensis* is easily confused with *S. drummondiana* (with which it may hybridize). *S. sitchensis* sometimes co-dominates stands making community identification difficult (Jankovsky-Jones 1999a).

AUTHOR/DATE(UPDATE)

Chris Murphy/1998-11-25()

***Salix lemmonii*/Bench**

Lemmon's willow/Bench

RANGE

The *Salix lemmonii*/Bench plant association is known mainly from the northern Great Basin. It is especially common in the northeastern Sierra Nevada Mountains of California but also in the Santa Rosa and Jarbidge Mountains of Nevada (Manning and Padgett 1995). In Idaho it has been sampled in only one watershed, the Upper North Fork Owyhee River in the Owyhee Mountains (Jankovsky-Jones et al. 2001). *Salix lemmonii* is reported from the Stanley Basin in central Idaho (Brunsfeld and Johnson 1985), but plant associations dominated by this species have not been described. A similar plant association, *Salix lemmonii*-*Rosa woodsii*/*Artemisia douglasiana*, is found in eastern Oregon (Oregon Natural Heritage Program 1999).

ENVIRONMENT

The *Salix lemmonii*/Bench plant association is found as low as 6,140 feet elevation in the Owyhee Mountains to as high as 9,360 feet in the Great Basin (where the average elevation of occurrence is 7,630 feet)

(Manning and Padgett 1995). It is known from a variety of fluvial settings and soils. The plant association occupies low alluvial terraces, bars, and benches adjacent to intermittent or perennial streams (Manning and Padgett 1995). It is also found in abandoned channels of perennial streams (Manning and Padgett 1995) as well as in intermittent stream channels (Jankovsky-Jones et al. 2001). Site may or may not be flooded annually. Stream types include narrow intermittent streams in rocky canyons (e.g., North Fork Owyhee River), steep mountain streams, and low-gradient streams in wide montane valleys. Valley gradients are typically low (Manning and Padgett 1995). The *Salix lemmonii*-*Rosa woodsii*/*Artemisia douglasiana* plant association of eastern Oregon is also found on stream terraces but is at much lower elevations (2,760 to 5,660 feet) (Oregon Natural Heritage Program 1999).

SOILS

Soils are often well drained and coarse-textured (large amounts of cobble, gravel, and sand present) but are sometimes clayey (Manning and Padgett 1995).

VEGETATION COMPOSITION

Salix lemmonii/Bench plant association is characterized by very high cover of *Salix lemmonii* (typically with around 60% to 80%) with low cover of understory shrubs (usually *Ribes inerme*, *Rosa woodsii*, and *Symphoricarpos oreophilus*) around willow bases (Manning and Padgett 1995; Jankovsky-Jones et al. 2001). *Salix boothii*, *Alnus incana*, and *S. geyerana* are occasionally intermixed with *S. lemmonii* (Manning and Padgett 1995). The herbaceous understory has high diversity of species with low cover. However, it lacks clear dominance by specific species or suites of species. The most important commonly

associated graminoids are *Poa pratensis*, *Juncus oreophyllus*, *Carex microptera*, and *Agrostis* spp. (e.g., *A. exarata*, *A. scabra*, *A. stolonifera*) (Manning and Padgett 1995; Jankovsky-Jones et al. 2001). The most important forbs are *Solidago* spp., *Achillea millefolium*, *Heracleum lanatum*, *Aster ascendens*, and *Thalictrum fendleri*. Other commonly associated species, with even less cover, include *Scenecio* spp., *Potentilla gracilis*, *Veratrum californicum*, *Castilleja miniata*, *Artemisia ludoviciana*, and *Perideridia* spp. (Manning and Padgett 1995; Jankovsky-Jones et al. 2001).

ADJACENT COMMUNITIES

A wide variety of riparian communities are adjacent to *Salix lemmonii*/Bench plant associations. These communities may be tree-dominated *Populus tremuloides* or *Alnus incana* types or willow-dominated (e.g., *S. eastwoodiae*, *S. boothii*, and *S. exigua*) (Manning and Padgett 1995; Jankovsky-Jones et al. 2001). Adjacent herbaceous-dominated riparian associations include *Artemisia ludoviciana*, *Carex utriculata*, and *C. scopulorum* (Manning and Padgett 1995). Adjacent upland communities are dominated by *Pinus contorta*, *P. monticola*, *Cercocarpus ledifolius*, *Artemisia tridentata* ssp. *Vaseyana*, and *Juniper occidentalis*.

MANAGEMENT CONSIDERATIONS

Salix lemmonii is more palatable for sheep than cattle, however, cattle use may be significant due to riparian settings (USDA Forest Service 2002). Though livestock movement can be impeded by the dense willow thickets, many *S. lemmonii* stands show evidence of overuse by cattle (e.g., decreased willow vigor, “high-lining,” “clubbing,” and dead clumps) (Manning and Padgett 1995; USDA Forest Service 2002). The coarse and well-drained soils of the *S.*

lemmonii/Bench plant association are less susceptible to compactions by livestock or vehicles than wetter, fine-textured soils (Manning and Padgett 1995). *S. lemmonii* can re-sprout from its root crown after all but the most severe, slow-burning fires which kill subsurface roots (USDA Forest Service 2002). Even though a quick, hot burn may rejuvenate *S. lemmonii*, it may take two years to re-sprout and many more years to become resistant to browsing damage. *S. lemmonii* cuttings or root clumps can be used for effective revegetation of streambanks (USDA Forest Service 2002).

SUCCESSIONAL DYNAMICS

Salix lemmonii is an early seral species reproducing by seed and root or stem fragments on favorable alluvial soils (e.g., well-drained gravelly or sandy soils) (Brunsfeld and Johnson 1985; USDA Forest Service 2002). The *S. lemmonii*/Bench plant association may have in the past, or may in the future, support denser herbaceous understories dominated by tall forbs, mesic graminoids, or mesic forbs (Manning and Padgett 1995). For example, as stream channel migration, downcutting, and alluvium deposition occurs, surface moisture of benches may decrease. As a result, herbaceous undergrowth will become sparser and composition will shift toward species preferring drier, better-drained soils (Manning and Padgett 1995). The *Salix lemmonii*/Bench plant association is apparently a stable community on such sites.

WILDLIFE FUNCTIONS

Salix lemmonii provides browse for deer and elk. Like other willows, it is a preferred food for beaver and moose and good habitat cover for songbirds, mammals, and salmonids (USDA Forest Service 2002).

CLASSIFICATION COMMENTS

The classification of the *Salix lemmonii*/Bench plant association is based on 10 plots from Nevada and adjacent California (Manning and Padgett 1995) and 2 plots from the North Fork Owyhee River in the Owyhee Mountains of Idaho (Jankovsky-Jones et al. 2001). Communities dominated by *S. lemmonii* are relatively common throughout eastern Oregon (Kovalchik 1987; Evenden 1989; Oregon Natural Heritage Program 1999), and northern and western Nevada (Manning and Padgett 1995) but are usually separated by diagnostic understory mesic graminoid and forb species. In contrast, the understory of the *S. lemmonii*/Bench plant association is noticeably sparse. The understory lacks any obvious or consistent dominant species or suite of species. The classification of *S. lemmonii* communities is complicated by the common inclusion of other sub-dominant *Salix* spp. (especially *S. boothii*, and *S. geyeriana*) (Kovalchik 1987; Manning and Padgett 1995). In addition, *S. lemmonii* and *S. geyeriana* can hybridize in the field, making identification difficult (Brunsfeld and Johnson 1985). The most similar plant association to *S. lemmonii*/Bench is the *S. lemmonii-Rosa woodsii/Artemisia douglasiana* plant association from eastern Oregon (Oregon Natural Heritage Program 1999). This community and *S. lemmonii*/Bench share a mixture of understory forbs and graminoids with low cover commonly found on drier riparian sites (e.g., alluvial benches with *Poa pratensis*, *Artemisia* spp., *Aster* spp.) (Manning and Padgett 1995; Murphy 1999). Further sampling may indicate the need for combining these two plant associations or, alternatively, better refine the *S. lemmonii*/Bench plant association. Other *S. lemmonii* plant associations, especially *S. lemmonii*/Mesic graminoid, *S.*

lemmonii/Mesic forb, and *S. lemmonii*/Tall forb, are closely related to *S. lemmonii*/Bench and may form on moister benches or as a later seral state (Evenden 1989; Manning and Padgett 1995). Communities classified as *S. geieriana*-*S. lemmonii* and *S. boothii*-*S. lemmonii* types are also similar (Kovalchik 1987; Reid et al. 2000).

AUTHOR/DATE(UPDATE)

Christopher J. Murphry/2002-12-11()

Salix planifolia* /*Carex aquatilis*-*Carex rostrata

Tea-leaf willow/Leafy tussock sedge-Swollen Sedge

RANGE

Salix planifolia/*Carex aquatilis*-*Carex rostrata* has been sampled in the Centennial Mountains, the South Fork Salmon River, Bear Valley, and Stanley Basin of Idaho (Mutz and Queiroz 1983). It is also known from the northeast shore of Henrys Lake, the Lemhi Mountains, and the Lemhi River basin of Idaho (Jankovsky-Jones 1999a). Very similar and more common *S. planifolia*/*C. aquatilis* and broader *S. planifolia* communities are located in the Pioneer Mountains of Idaho; the mountains of central and southwestern Montana (Hansen et al. 1995); the Beartooth and Wind River Mountains of northwestern Wyoming and Colorado (Youngblood et al. 1985; Walford et al. 1997); the Uinta Mountains and central Utah plateau (Padgett et al. 1989); and Alaska (Viereck et al. 1992). The synonymous community *S. farriae*/*C. utriculata* is known from the Cascade Mountains (on the east side of the crest) (Kovalchik 1993) and the headwaters of the West Fork of the Pahsimeroi River in the Lost River Mountains of Idaho

(Jankovsky- Jones 1999a). Mattson (1984) described a *S. phyllicifolia* phase of *S. wolfii*/*C. aquatilis* (which can be considered synonymous with *S. planifolia*/*C. aquatilis*) in Yellowstone National Park, Wyoming.

ENVIRONMENT

Salix planifolia/*Carex aquatilis*-*Carex rostrata* (including the ecologically similar communities *S. planifolia*/*C. aquatilis* (Padgett et al. 1989; Hansen et al. 1995; Walford et al. 1997); *S. wolfii*/*C. aquatilis*, *C. rostrata* and *S. phyllicifolia* phases (Mattson 1984); *S. farriae*/*C. utriculata* (Kovalchik 1993); and the broader *S. planifolia* community type (Youngblood et al. 1985)) is in the wettest of any low-willow community sites. It is found in subalpine to alpine areas with flat to gently sloping, broad U-shaped valley bottoms, basins, cirques, and gentle alluvial toeslopes (Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Jankovsky-Jones 1999a). The community is associated with poorly drained meadows or floodplains, often next to lakes, banks of narrow and meandering streams, abandoned meanders, broadly sloping seeps, and springs. These habitats usually have subirrigated organic soils, occasionally with enough peat to qualify as rich fens, which experience permanent saturation and shallow flooding in the spring and early summer (Mutz and Queiroz 1983; Mattson 1984; Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Walford et al. 1997; Jankovsky-Jones 1999a). The microtopography is sometimes characterized by freeze-thaw hummocks and tussocks, with standing water or rivulets in inter-mound depressions and quaking saturated ground. Elevations range from below 1,890 m in Washington (*Salix farriae* community of Kovalchik (1993) to between 1,750 m and 2,700 m in Montana and Idaho's Centennial Mountains (Youngblood et al. 1985; Hansen et al. 1995). In

Yellowstone National Park, western Wyoming, and Idaho's east-central mountains elevations range from 2,060 m to over 2,840 m (Mattson 1984; Walford et al. 1997; Jankovsky-Jones 1999a), while in Utah they are between 2,745 and 3,355 m (Padgett et al. 1989). The organic soils are acidic (4.4 to 6.3 pH) with a surface layer of organic matter, such as sedge or moss peat, ranging from 20 to 110 cm in thickness. Though soils are often shallow, the organic layer usually overlies sand, silt, or clay loams which, in turn, are over sand and gravel moraine or floodplain deposits (Mutz and Queiroz 1983; Mattson 1984; Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Walford et al. 1997). Mineral soils are mottled or gleyed near their upper boundary with the organic horizon. Soils are most commonly Mollisols (Histic and Typic Cryaquolls) but Histosols (Typic or Terric Cryofibrists, Borofibrists, Borohemists, Borosaprists) and Inceptisols (Histic Cryaquepts) are also well represented (Mutz and Queiroz 1983; Mattson 1984; Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Walford et al. 1997). The water table is usually at the surface (but occasionally drops to 64 cm deep), though water is not stagnant.

SOILS

Information on soils is not available.

VEGETATION COMPOSITION

Salix planifolia/*Carex aquatilis*-*Carex rostrata* (including *S. planifolia*/*C. aquatilis* (Padgett et al. 1989; Hansen et al. 1995; Walford et al. 1997); *S. wolfii*/*C. aquatilis*, *C. rostrata* and *S. phyllifolia* phases (Mattson 1984); *S. farriae*/*C. utriculata* (Kovalchik 1993); and the broader *S. planifolia* community type (Youngblood et al. 1985) is dominated by *S. planifolia*. *S.*

planifolia forms a low shrub layer 30 to 100 cm in height (averaging 40 to 70 cm tall) with up to 36% cover and 45 to 93% constancy (Mutz and Queiroz 1983; Mattson 1984; Kovalchik 1993; Hansen et al. 1995; Jankovsky-Jones 1999a). *S. wolfii* is a commonly associated shrub (usually less than 25% cover but co-dominant in Yellowstone National Park) along with *Betula glandulosa* (up to 33% cover and 40% constancy) and *Pentaphylloides floribunda* [syn. *Potentilla fruticosa*] (less than 25% cover) (Mutz and Queiroz 1983; Mattson 1984; Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Jankovsky-Jones 1999a). Several other shrub species, mainly low *Salix* species, are usually present, occasionally with moderate cover and/or constancy. They include *S. pseudomonticola*, *S. farriae* (co-dominant in eastern Washington), *S. candida*, *S. boothii*, *S. eastwoodiae*, *S. commutata*, *Alnus incana*, and *Spiraea douglasii*. The herbaceous layer is dominated by *Carex* species, usually *C. aquatilis* (with 13 to 40% cover and at least 74% constancy), or *C. utriculata* (with 15 to 50% cover and at least 59% constancy), or an equal combination of these two species (Mutz and Queiroz 1983; Mattson 1984; Youngblood et al. 1985; Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Jankovsky-Jones 1999a). Both *C. aquatilis* and *C. utriculata* are usually present, though not always. Other *Carex* species are usually common but individual cover and constancy is highly variable from trace to 33%. Common species include *C. nebrascensis*, *C. simulata*, *C. canescens*, *C. aurea*, *C. aperta*, and *C. scopulorum*. In addition, *Deschampsia cespitosa* is common (with low cover) and *Calamagrostis canadensis*, *Phleum alpinum*, *Juncus balticus*, and *Luzula parviflora* are also sometimes present (usually with low cover and constancy) (Mutz and Queiroz 1983; Mattson 1984; Youngblood et al. 1985;

Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Jankovsky-Jones 1999a). Forb cover is much less than graminoid species; diversity can be relatively low. The most commonly encountered species are *Pedicularis groenlandica* (low cover and moderate constancy) followed by *Senecio* (*S. cymbalaria*, *S. sphaerocephalus*, *S. integerrimus*, and *S. triangularis* with up to 10% cover), *Aster* (*A. occidentalis* and *A. foliaceus*), *Epilobium*, *Galium* (*G. bifolium*, *G. trifidum*), *Potentilla*, *Viola*, *Gentiana*, and *Erigeron* species. Moss cover can be thick and continuous or associated with hummocks (30 to 60% cover) (Mattson 1984; Padgett et al. 1989; Kovalchik 1993; Jankovsky-Jones 1999a). Scattered conifers, such as *Picea engelmannii* and *Pinus contorta*, may also be found on hummocks.

ADJACENT COMMUNITIES

Wetter communities adjacent to *Salix planifolia*/*Carex aquatilis*-*Carex rostrata* include open water, *C. saxatilis* stands, or *C. rostrata* meadows (Mutz and Queiroz 1983; Jankovsky-Jones 1999a). The change to slightly drier adjacent communities is more abrupt. These communities include *Deschampsia cespitosa*, *C. simulata*, or *Juncus balticus* meadows, and *Salix wolfii*/*C. rostrata*, *S. wolfii*/*Swertia perennis*-*Pedicularis groenlandica*, other *Salix* species stands, or stands of *Pentaphylloides floribunda*. Neighboring uplands are talus, with interspersed *Pinus contorta* and *P. flexilis*, and *P. contorta* forest (Mutz and Queiroz 1983; Jankovsky-Jones 1999a). In addition to the aforementioned communities, adjacent wetter communities to the ecologically similar *S. planifolia*/*C. aquatilis*, *S. wolfii*/*C. aquatilis* (*C. rostrata* and *S. phyllifolia* phases), and *S. farriae*/*C. utriculata* communities include *C. aquatilis*, *Eleocharis pauciflora*, *C. lasiocarpa*, and

Eriophorum polystachion. On similarly moist, or slightly drier sites, adjacent communities include *S. boothii*/Mesic graminoid, *Calamagrostis canadensis* meadows, *S. farriae*/*Carex scopulorum*, *S. drummondiana*/*C. scopulorum*, and *S. geyeriana*/*Calamagrostis canadensis*. Even drier neighboring sites support *Picea engelmannii*/*Carex scopulorum*, *Abies lasiocarpa*/*Trollis laxus*, *Ledum glandulosum*, and *Abies lasiocarpa*/*Calamagrostis canadensis* (Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Walford et al. 1997). Other associated uplands include *Artemisia tridentata* steppe (Mattson 1984) and *Abies lasiocarpa* or *Picea engelmannii* forests.

MANAGEMENT CONSIDERATIONS

The high water table and fragile organic soils make most management activities incompatible with perpetuation of the *Salix planifolia*/*Carex aquatilis*-*Carex rostrata* community. Though not commonly grazed by livestock, *C. aquatilis* and *C. rostrata* are of variable value as forage and production can be moderate (Hansen et al. 1995). However, livestock grazing is not recommended on saturated organic soils. In the rare chance that soils sufficiently dry by fall, late season grazing may be possible. However, late grazing can potentially damage *Salix* which needs late season regrowth. Off-road vehicles, livestock, and recreationists easily damage organic soils, crushing fibers and causing deep ruts. Thus, roads and trails should be on neighboring upland soils (Hansen et al. 1995). The dense roots of *S. planifolia* and sod mats of *C. rostrata* and *C. aquatilis* are excellent streambank stabilizers. Root wads also filter out sediments, build banks, and reduce flood erosional energy (Hansen et al. 1995). Water diversion, caused by road construction or trails, removal of beaver and their dams, or other hydrologic alterations

will cause the water table to drop. Sites supporting the community will dry and organic layers will begin to decompose, increasing soil erosion possibilities (Mutz and Queiroz 1983). The construction of rock checkdams can raise water tables, helping restore the hydrologic regime (Hansen et al. 1995). In addition, *S. planifolia* is valuable for revegetation. Fire is rare in these wet sites and, while *S. planifolia* may resprout after fire, the effects of fire are not well known. *S. planifolia* communities are good for wildlife viewing and fishing, though excessive human use can damage soils, create trails, and cause streambank sloughing and erosion (Mutz and Queiroz 1983; Hansen et al. 1995).

SUCCESSIONAL DYNAMICS

Due to the long-term accumulation of peat, *Salix planifolia/Carex aquatilis-Carex rostrata* (and related *S. planifolia/C. aquatilis*) is apparently a stable community. Though little is known about *S. planifolia* community succession, it is probably similar to *S. wolfii/C. aquatilis* which forms over time on organic soils where *C. aquatilis* has replaced *C. rostrata* (Youngblood et al. 1985). *C. rostrata* colonizes old beaver ponds that have filled with silt and clay and eventually *Salix* species establish on higher points where surface water is less. *C. rostrata* and *C. aquatilis* have a similar moisture regime, but *C. rostrata* appears to be more pioneering and tolerant of deeper water than *C. aquatilis* (Padgett et al. 1989). Thus, if hydrologic conditions slightly change, then *C. aquatilis* may be able to replace *C. rostrata*. Alternatively, *C. aquatilis* more often establishes on sites where floods deposit sediment and moving water keeps the root zone aerobic (versus anaerobic, which *C. rostrata* better tolerates) (Mutz and Queiroz 1983). It is possible that *S. planifolia* may invade suitable habitat in a *C. aquatilis* community (instead of a *C.*

rostrata community) and the presence of *C. rostrata* is due to microtopographical or soil variation at a site. Beaver are important in maintaining high water tables necessary for *S. planifolia/C. aquatilis-C. rostrata* perpetuation. If beaver leave a site or the hydrology is otherwise altered, stream channels may downcut, lowering the water table and allowing invasion by species less tolerant of saturated conditions (Padgett et al. 1989; Hansen et al. 1995; Walford et al. 1997; Jankovsky-Jones 1999a). Such species include *S. wolfii* or other *Salix* species, *Pentaphylloides floribunda*, *Deschampsia cespitosa*, *Poa pratensis*, *Juncus balticus*, *Trifolium* species, and various mesic forbs. Succession would be a slow process, however, since organic matter decomposes very slowly during the short growing seasons. If the site becomes even drier, *Picea engelmannii* or *Pinus contorta* communities may form (Youngblood et al. 1985).

WILDLIFE FUNCTIONS

Salix planifolia communities are valuable for wildlife, especially as winter forage. Beaver, elk, and moose use of *S. planifolia* is moderate to heavy, though few wildlife trails are observed (Padgett et al. 1989; Hansen et al. 1995; Walford et al. 1997). If shrubs are exposed, moose and other ungulates will browse the shrub to the level of the snowpack. Birds, such as common snipe and common yellowthroat, also use *S. planifolia* habitat (Youngblood et al. 1985). The understory of *S. planifolia/Carex aquatilis-Carex rostrata* is also important. For example, *C. aquatilis* seeds are eaten by waterfowl which also use *Carex* stands for cover. Ungulates graze *C. aquatilis* moderately. The roots of *S. planifolia* and associated *Carex* sod create stable, overhanging streambanks which are excellent fish habitat (Hansen et al. 1995).

CLASSIFICATION COMMENTS

Salix planifolia var. *monica*/*Carex aquatilis*-*Carex rostrata* [syn. *C. utriculata*] is a broadly defined community encompassing variation in understory species throughout its range. The understory can be dominated by either *Carex* species, but *C. aquatilis* dominates most often. With further sampling, this community could potentially be split into *S. planifolia*/*C. rostrata* (currently not described) and *Salix planifolia*/*C. aquatilis* (described or recognized by Padgett et al. 1989; Hansen et al. 1995; Walford et al. 1997; Jankovsky-Jones 1999a). Alternatively, the similarity of *S. planifolia*/*C. aquatilis* with *S. planifolia*/*C. aquatilis*-*C. rostrata* could warrant lumping as one community named for the broader two-sedge type. Though *C. rostrata* and *C. aquatilis* have different ecological requirements, the presence of both could be a function of microtopographic or soil variation at a site (Mutz and Queiroz 1983). Youngblood et al. (1985) described a broad *S. planifolia* community type which is similar to *S. wolfii*/*C. rostrata* in soils and species composition. Though *S. wolfii* communities do not always have high cover or constancy of *S. planifolia*, they are sometimes considered synonymous with *S. planifolia* communities. For example, in Yellowstone National Park, Wyoming, the *C. rostrata* and *S. phyllicifolia* [syn. *S. planifolia*] phases of *S. wolfii*/*C. aquatilis* are very similar to *S. planifolia*/*C. aquatilis*-*C. rostrata* in that both *Salix* species are co-dominant (Mattson 1984). The phases of this community are considered synonymous with *S. planifolia*/*C. aquatilis* by Walford et al. (1997). Kovalchik's (1993) *S. farriae*/*C. utriculata* is also considered synonymous with *S. planifolia*/*C. aquatilis*-*C. rostrata* due to co-dominance by *S. planifolia* and the moderate

amount of *C. aquatilis* (Jankovsky-Jones 1999a).

SIMILAR COMMUNITIES

Salix planifolia var. *monica*/*Carex aquatilis*-*Carex rostrata* is structurally and sometimes compositionally similar to other low willow communities. These communities include: *S. eastwoodiae*/*C. aquatilis* (also sometimes with *C. rostrata* as in Mutz and Queiroz [1983]); *S. candida*/*C. rostrata*; *S. planifolia*/*C. scopulorum*; *S. farriae*/*C. utriculata*; *S. commutata* communities; *S. wolfii*/*C. aquatilis*; and *S. wolfii*/*C. rostrata*, which all can have *S. planifolia* well represented and a mix of *C. aquatilis* and *C. rostrata* in the understory (Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Walford et al. 1997). In Yellowstone National Park, *S. wolfii*/*C. aquatilis* can have *C. rostrata* and *S. phyllicifolia* phases which are very similar to *S. planifolia*/*C. aquatilis*-*C. rostrata*, having co-dominance by *Salix* species (Mattson 1984). Also similar in structure and species composition, though occupying slightly drier sites, are *S. planifolia*/*Deschampsia cespitosa* and *S. wolfii*/*Swertia perennis*-*Pedicularis groenlandica* (Mutz and Queiroz 1983; Padgett et al. 1989). Cold-site tall-willow communities, such as *S. drummondiana*/*C. rostrata* and *S. geyeriana*/*C. aquatilis* or *C. rostrata*, may also have abundant *S. planifolia* in the understory, as well as other herbaceous species common to *S. planifolia* communities (Padgett et al. 1989; Hansen et al. 1995). *S. planifolia* var. *planifolia* communities are structurally taller and found at lower elevations than *S. planifolia* var. *monica* types, and thus, have different species composition (Hansen et al. 1995). In Alaska, *S. planifolia* ssp. *pulchra*/*C. aquatilis* is structurally similar but has other associated *Salix* and *Carex* species uncommon or not found in the lower 48 states (Viereck et al. 1992).

AUTHOR/DATE(UPDATE)

Chris Murphy/1999-02-02()

Salix wolfii/Deschampsia cespitosa

Wolf's willow/Tufted hairgrass shrubland

RANGE

This is a minor plant association in Utah, Wyoming, Idaho, and Montana.

ENVIRONMENT

The *Salix wolfii/Deschampsia cespitosa* plant association typically occurs in meadows, on lower toeslopes, and on benches or terraces associated with broad valley bottoms (Padgett et al. 1989; Youngblood et al. 1985).

SOILS

Soils range from coarse to fine loams. Hansen et al. (1995) reported soil depths from 20 to 40 cm overlying gravel or cobble. Water tables range from at the surface up to 1 meter below the surface. Distinct or prominent mottles are present within 40 cm of the soil surface. Available water holding capacity is from moderate to high.

VEGETATION COMPOSITION

Salix wolfii has an average of 30-40% cover. *Potentilla fruticosa* is usually present with 10% cover. *Deschampsia cespitosa* is the diagnostic graminoid with up to 10% cover. Other graminoids include *Juncus balticus*, *Danthonia intermedia*, *Phleum alpinum*, *Poa pratensis*, *Agrostis scabra*, and *Bromus inermis*. *Potentilla gracilis*, *Senecio integerrimus*, and *Fragaria virginiana* are usually present.

ADJACENT COMMUNITIES

Adjacent wetland associations include *Salix wolfii* with an understory dominated by

Carex aquatilis or *C. utriculata* or openings dominated by monocultures of sedge species. Drier wetland associations dominated by *Artemisia cana*, *Potentilla fruticosa*, or *Deschampsia cespitosa*. Uplands are typically dominated by conifers, *Populus tremuloides*, or *Artemisia tridentata* (Youngblood et al. 1985; Padgett et al. 1989; Hansen et al. 1995).

MANAGEMENT CONSIDERATIONS

The *Salix wolfii/Deschampsia cespitosa* plant association represents one of the driest of the *S. wolfii* associations. The dense understory may impede livestock use, but communities may be susceptible to grazing pressure due to accessibility. The occurrence of increasers such as *Juncus balticus*, *Poa pratensis*, and *Taraxacum officinale* and low vigor of the diagnostic willow are indicative of disturbance. The exclusion of grazing or the use of wetland and riparian pastures is recommended to minimize impacts from grazing (Youngblood et al. 1985; Padgett et al. 1989; Hansen et al. 1995). The response of *S. wolfii* to fire is unknown. Prescribed burns may be a method to rejuvenate decadent clumps. Quick, hot fires would result in more sprouts than slower fires. *Deschampsia cespitosa* is resistant to damage by fire. Root crowns are rarely damaged by fires. However, repeated burning favors rhizomatous species such as *Poa pratensis*. After burning, livestock grazing should be excluded for at least 2 to 3 years (Hansen et al. 1995). Beaver frequently play a role in the maintenance of the hydrology associated with sites dominated by *S. wolfii*. Removal of beaver from these systems should be evaluated closely. In areas where streams are downcut, the use of rock checkdams may aid in rehabilitation of areas impacted by a lowered water table. Rooting of cuttings of *S. wolfii* is erratic. Cuttings should first be

rooted and nursery grown to ensure survival. Best results are obtained from cuttings taken in the spring from dormant two- and four-year old wood. Cuttings 30-50 cm long and greater than 1 cm produce the best results (Hansen et al. 1995).

SUCCESSIONAL DYNAMICS

The presence of *Deschampsia cespitosa* is indicative of sites where little or no grazing has occurred. Under careful management, this association may provide forage for livestock, however too much pressure will result in the proliferation of increasers such as *Juncus balticus*, *Poa pratensis* and forb species. Browsing may reduce the vigor of or eliminate *Salix wolfii* (Youngblood et al. 1985; Padgett et al. 1989; Hansen et al. 1995).

WILDLIFE FUNCTIONS

Cover value and browse potential are low to moderate due to the short stature of *Salix wolfii*. Wolf's willow is not as palatable as other willow species. Elk may make moderate summer use of both *Deschampsia cespitosa* and *Juncus balticus* (Hansen et al. 1995).

CLASSIFICATION COMMENTS

Classification of this association is based on 7 stands in Utah and Southeastern Idaho, an unknown number of stands in eastern Idaho and western Wyoming, and 20 stands in Montana.

SIMILAR COMMUNITIES

This plant association is similar to other mid to high elevation willow dominated associations including those dominated by *Salix eastwoodiae* and *S. planifolia* and these species may co-occur to form mixed stands. The diagnostic species *S. wolfii* is fairly easy to identify, but can be confused with *S. eastwoodiae* (Brunsfeld and Johnson

1985). Difficulties in classification may also occur when stands are disturbed and the diagnostic understory species (*Deschampsia cespitosa*) is only present with low cover and stands are dominated by exotic grasses.

AUTHOR/DATE(UPDATE)

Mabel Jankovsky-Jones/1997-03-04

Artemisia ludoviciana

Prairie sage, Louisiana sagewort

RANGE

The *Artemisia ludoviciana* plant association is known only from eastern Washington and adjacent Idaho, eastern Oregon, and southern Idaho. It is widespread in the Columbia Basin of Washington, sampled in Lincoln and Adams counties and observed throughout dry-land areas (Crawford 2000). It is also known from the Columbia Basin of eastern Oregon and the foothills of the Blue Mountains (Crawford 2000; Oregon Natural Heritage Program 1999). The plant association is found at low elevations on the lower Clearwater River of Idaho (Lichthardt 1992) and at moderate elevations in Owyhee county of southwest Idaho (Moseley 1998; Moseley 1999; Murphy 2000). Though generally found in ephemeral or intermittently wet drainages, the type is also found in a vernal pool in Fremont county of southeastern Idaho (Jankovsky-Jones 1995). *Artemisia ludoviciana* is a common pioneer species expected in ephemeral or intermittently moist, but well-drained, habitats throughout the region.

ENVIRONMENT

The *Artemisia ludoviciana* plant association usually occurs on ephemeral or intermittently moist, but well-drained, coarse-textured substrates. It is known from 840 feet elevation on the Clearwater River

in Idaho (Lichthardt 1992) and averages 1,657 feet elevation in eastern Washington (Crawford 2000). In contrast, the type is found between 4,350 and 6,000 feet in eastern Oregon and southern Idaho (Jankovsky-Jones 1995; Moseley 1998; Moseley 1999; Murphy 2000; Oregon Natural Heritage Program 1999). The community usually occupies alluvial terraces or rocky, sandy, and gravelly bottoms of ephemeral streams, intermittent drainages, and overflow channels of perennial streams (Moseley 1998; Moseley 1999; Murphy 2000; Crawford 2000). Sites may or may not flood annually, though most surfaces appear frequently scoured by flooding. Flooding regimes vary from intense annual flooding to intermittent flooding by heavy rain or snowmelt (Moseley 1998; Moseley 1999; Murphy 2000; Crawford 2000). Stream channels are from 2 to 15 m wide with gradients from 0 to 25%. Stream channels are orders 1, 2, and 3 and Rosgen types C3, F3, and G3 (intermittent) and D3 (perennial) with varying degrees of entrenchment (Moseley 1998; Moseley 1999; Crawford 2000; Oregon Natural Heritage Program 1999).

SOILS

Soils are coarse and well-drained sands and gravels filling spaces between cobbles and stones (Moseley 1998; Moseley 1999; Murphy 2000; Crawford 2000).

VEGETATION COMPOSITION

This community is characterized by the dominance of 30 to 50 cm tall *Artemisia ludoviciana* with cover ranging from about 10% to 80% (usually 40% or less) (Crawford 2000; Jankovsky-Jones 1995; Moseley 1998; Moseley 1999; Murphy 2000; Oregon Natural Heritage Program 1999). Shrubs such as *Artemisia cana*, *Salix* spp., and *Rosa woodsii* are occasionally

present with trace cover (Murphy 2000). The associated understory species are quite variable throughout the range of the association but graminoids are most common. Rangewide, *Muhlenbergia richardsonis*, *Eleocharis palustris*, *Agrostis* spp. (e.g., *A. stolonifera*, *A. interrupta*), *Juncus balticus*, *Poa* spp. (e.g., *P. compressa*, *P. secunda*), *Agropyron* spp. (e.g., *A. repens*, *A. smithii*, *A. caninum*), and *Bromus tectorum* are occasionally present with cover averaging trace to 15% (Crawford 2000; Jankovsky-Jones 1995; Moseley 1998; Moseley 1999; Murphy 2000; Oregon Natural Heritage Program 1999). *Hordeum brachyantherum* and *Polypogon monspeliensis* are only important in the Owyhee region (Moseley 1998; Murphy 2000) while *Distichlis spicata* is only important in eastern Washington (Crawford 2000). Few forb species are prominent, though in eastern Washington, *Lomatium columbianum* and *L. macrocarpum* are occasionally important. *Achillea millefolium*, *Haplopappus* spp. (e.g., *H. hirtus*, *H. uniflorus* var. *howellii*), annual *Polygonum* spp., *Iva axillaris*, *Rumex* spp., and *Grindelia squarrosa* are also sometimes associated with low cover. Overall, vegetation cover is mostly open with cover and composition varying both yearly and throughout the growing season (Crawford 2000).

ADJACENT COMMUNITIES

Plant associations adjacent to stands of *Artemisia ludoviciana* within ephemeral or intermittent stream channels include *Muhlenbergia richardsonis* and *Salix exigua*/barren (Moseley 1998; Murphy 2000). Surrounding riparian vegetation may include *Artemisia cana* and *Artemisia tridentata* var. *tridentata*/*Elymus cinereus* associations while uplands are usually dominated by *Artemisia tridentata* var. *wyomingensis* or *Juniperus occidentalis*

(Moseley 1998; Moseley 1999; Murphy 2000).

MANAGEMENT CONSIDERATIONS

The palatability and forage value of *Artemisia ludoviciana* for livestock is poor to fair (USDA 2002). Due to the overall lack of forage and rocky substrate, livestock grazing is not usually a significant influence on the *A. ludoviciana* community. The *A. ludoviciana* community type is probably maintained by periodic disturbances such as flooding and easily re-sprouts from rhizomes or colonizes bare soil with its wind-dispersed seeds after fire (USDA 2002). *A. ludoviciana* is easily established, fast growing, and persistent on disturbed sites providing excellent soil cover and stabilization (USDA 2002). It is useful for riparian restoration. *A. ludoviciana* is also used by Native Americans for ceremonial, purification, medicinal, and other purposes (USDA 2002).

SUCCESSIONAL DYNAMICS

Artemisia ludoviciana is a common, pioneering rhizomatous suffruticose species tolerant of drought (USDA 2002). In addition, it is fast growing and easily established. The *A. ludoviciana* association is probably maintained by periodic disturbances such as flash-floods or short-term flooding of coarse soils. *A. ludoviciana* is top-killed by fire but easily re-sprouts from rhizomes and colonizes bare soil with its small, wind-dispersed seeds (USDA 2002). Other successional information is not known.

WILDLIFE FUNCTIONS

Though seasonally important, especially for mule deer, *Artemisia ludoviciana* has poor to fair palatability for most wildlife and birds and provides little habitat or cover (USDA 2002).

CLASSIFICATION COMMENTS

The *Artemisia ludoviciana* community type is known only from eastern Washington and adjacent Idaho, eastern Oregon, and southern Idaho. It is widespread in the Columbia Basin of Washington, with at least 5 plots sampled (Crawford 2000). It is also known from the Columbia Basin of eastern Oregon (2 plots sampled; Oregon Natural Heritage Program, 1999) and a very similar type (*Artemisia ludoviciana*/*Galium aparine*) is known from the foothills of the Blue Mountains (3 plots sampled) (Crawford 2000). The community is also described from a plot on the lower Clearwater River of Idaho (Lichthardt 1992). It has also been sampled in Owyhee County in southwest Idaho (e.g., 3 plots near the South Fork Owyhee River on the 45 Ranch Allotment; 1 plot in the Owyhee Mountains; and sampled without plot data on the Owyhee Plateau near Grasmere (Moseley, 1998; Moseley 1999; Murphy 2000). The type was also observed (no plot data) in a vernal pool in Fremont county of southeastern Idaho (Jankovsky-Jones 1995). This association is based on the clear dominance of *Artemisia ludoviciana*. Associated species composition varies greatly and cover of these species is usually very low.

SIMILAR COMMUNITIES

Artemisia ludoviciana is a distinct association in well-drained, ephemerally or intermittently moist drainages (or rarely, vernal pools) (Moseley 1998). The most similar association is the *A. ludoviciana*/*Galium aparine* plant association known from the Blue Mountain foothills. It is distinguished by the presence of *Philadelphus lewisii* and *Galium aparine* and lack of *Agropyron repens* (Crawford 2000). Though not formally described, a structurally similar *A. lindleyana* dominance

type has been observed on cobble bars and banks (restricted to areas below the high water line) of the Columbia River, lower Snake River, and lower Salmon River.

AUTHOR/DATE(UPDATE)

Chris Murphy/2000-12-06()

Carex lasiocarpa

Slender sedge

RANGE

The *Carex lasiocarpa* plant association is distributed globally throughout the northern hemisphere; in the western United States, it is a minor type in eastern Washington, the Uinta Mountains of Utah, north of the Snake River in Idaho (except for one large occurrence known from Grays Lake in southeast Idaho), throughout much of Montana, and in central Yellowstone National Park.

ENVIRONMENT

Stands of *Carex lasiocarpa* are associated with pond and lake margins, kettle ponds, or headwater basins. The hydrology favors accumulation of sedge and moss peat. Stands sometimes occur as floating or quaking mats.

SOILS

Soils are deep peats composed of sedges and/or mosses. Groundwater or fluid peat subsoils may become trapped beneath the fine-textured organic soils that are held together by the rhizomes of the diagnostic species to create a floating or quaking mat. Mats may also extend from the edges of ponds and lakes into open water. The pH of the organic soils are moderately acid to neutral and stands are not found on saline or alkaline sites (Elzinga 1998).

VEGETATION COMPOSITION

Carex lasiocarpa dominates stands with 30-80% cover. Stands usually form continuous, dense swards of the diagnostic species. Occasionally, the stands may form on vegetative hummocks (0.5 or less in diameter) that are surrounded by open water. Associated species occasionally present with low cover include *C. aquatilis*, *C. buxbaumii*, *C. canescens*, *C. utriculata*, *Calamagrostis stricta*, *Deschampsia cespitosa*, *Juncus balticus*, *Menyanthes trifoliata*, *Potentilla palustris*, and *Triglochin maritimum*. The rhizomes of *Carex lasiocarpa* create a dense mat that is important for bank stabilization. The dense vegetation also captures sediment run-off and is important for maintaining water quality. This species recovers quickly on disturbed sites due to its spreading rhizomes and may have some potential for revegetating sites at mid to upper elevations. This may be best achieved by transplanting rhizomes as it is not known if seed is commercially available or the rate of success of using wild collected seeds (Elzinga 1998). This is a distinctive association that is easily recognized by continuous, near monocultures of the diagnostic sedge over large areas (often over 1 acre). Crowe and Clausnitzer (1997) indicate that the dense root masses of *Carex lasiocarpa* prevent other species from becoming abundant.

ADJACENT COMMUNITIES

Adjacent stands of vegetation may include *Sphagnum* dominated poor fens or stands of *Eleocharis pauciflora*, *Carex limosa*, *C. utriculata* or *C. aquatilis*. Shrublands dominated by *Salix* spp., *Betula glandulosa*, or *Artemisia cana* may also be present in the wetland. Drier sites may be dominated by stands of *Deschampsia cespitosa* or *Juncus balticus* (Hansen et al. 1995).

MANAGEMENT CONSIDERATIONS

Drought years may make stands accessible to both domestic and wild grazing animals which could cause rutted and hummocky soils on margins. These sites are generally so wet as to preclude most types of recreational uses except fishing. Trailing by fisherman and placement of boards, logs, and/or pallets can cause localized changes which may impact species composition and hydrology. Heavy disturbance such as from ORV use should be avoided because the organic soils are slow to recover from mechanical damage. High water tables make burning difficult, but fire can be used on sites adjacent to floodplains; dominant sedges of this association are resistant to damage by fire except where hot fires penetrate the peat soil.

SUCCESSIONAL DYNAMICS

Stands are considered to be stable and late seral as long as site hydrology is maintained. Moderate disturbance will increase *Carex aquatilis*, *Juncus balticus* and associated forbs. Severe disturbance (resulting in dewatering) may lower the water table and cause the site to be dominated by *Poa pratensis*, *P. palustris*, *Potentilla anserina*, or *Agrostis stolonifera*.

WILDLIFE FUNCTIONS

Otters, beaver, sandhill cranes, and waterfowl use stands of *Carex lasiocarpa* for bedding, nesting cover, and foraging areas. Seeds may be eaten by waterfowl and small mammals. Stands can be important foraging areas for raptors. Deer and elk use stands for fawning and calving (Hansen et al. 1995). The root mats of *Carex lasiocarpa* create overhanging banks that are important for fish habitat.

CLASSIFICATION COMMENTS

Hansen et al. (1995) included all combinations of *Carex lanuginosa*, *C. lasiocarpa*, and *C. buxbaumii* in the *C. lasiocarpa* habitat type. There may be some similarities between sites supporting *C. lanuginosa*, *C. lasiocarpa*, and *C. buxbaumii* plant associations. However, *C. lanuginosa* stands typically occur on mineral soils in seasonally saturated floodplains along run-off dominated stream channels or headwater basins while *C. lasiocarpa* and *C. buxbaumii* occur on deep peat soils in association with semi-permanently saturated spring-fed or groundwater driven wetlands. From a biodiversity conservation standpoint, the 3 associations should be recognized as distinct types. This association is distinguished from others by the dense, near monocultures of *C. lasiocarpa*. Scattered stems of *C. lasiocarpa* may occur over a *Sphagnum* lawn. The associations where vascular plants are sparse are treated as poor fens, a distinct type in Idaho.

AUTHOR/DATE(UPDATE)

Linda Williams/1995-07-11(2002-01-31)

Carex limosa

Mud sedge

RANGE

The *Carex limosa* plant association occurs at mid to high elevations in boreal regions of the Northern Hemisphere; in the western United States it is a minor type in the Uinta Mountains of Utah, north of the Snake River in Idaho, throughout much of Montana, and in central Yellowstone National Park.

ENVIRONMENT

Stands of *Carex limosa* are found in some of the wettest sites in fens that have formed in glacial kettles, on pond margins, along low

gradient lake inlets or outlets, in ancient abandoned oxbows, and in association with springs in broad valleys.

SOILS

Soils are poorly drained with the saturated conditions resulting in slow decomposition and favoring accumulation of organic matter (Hansen et al. 1995). Soils are usually acidic (pH 4.8-5.2). *Carex limosa* is strongly rhizomatous and when combined with mosses, maintains the fibric nature of the organic sedge and moss peat soils (Padgett et al. 1989). Where springs surface within stands of this plant association, the soils are bottomless, unconsolidated mucks (dark, well decomposed peat typically high in ash content).

VEGETATION COMPOSITION

The *Carex limosa* plant association inhabits fens at mid to high elevations. *C. limosa* has 50% or greater cover. Several species that are adapted to nutrient poor conditions including *Drosera rotundifolia*, *Eriophorum sheuchzeri*, *E. chamissonis*, *Menyanthes trifoliata*, and *Scirpus cespitosus* are sometimes present. In addition *Carex aquatilis*, *C. rostrata*, and *Potentilla palustris* may be present. A dense layer of moss that includes *Sphagnum* spp. may occur in stands.

ADJACENT COMMUNITIES

Adjacent wetter sites include the *Eleocharis pauciflora* plant association or open water. Adjacent drier sites may be dominated by the *Carex utriculata*, *C. aquatilis*, *C. lasiocarpa*, or the *Scirpus acutus* plant associations. Stands of shrubs including *Betula glandulosa*, *Potentilla fruticosa*, *Salix* spp. may also be present. Slightly elevated conifer islands dominated by *Pinus contorta* may also be present in the wetlands.

MANAGEMENT CONSIDERATIONS

Due to saturated soils with water levels either above or near the soil surface throughout the growing season, the sites are generally minimally impacted. Drought years may make stands accessible to both domestic and wild grazing animals which could cause rutted and hummocky soils on margins. However, sites in the Long Valley of west-central Idaho were heavily grazed and livestock may have been displaced into stands due to the amount of deadfall in adjacent forested stands. These sites are generally so wet as to preclude most types of recreational uses except fishing. Trailing by fisherman and placement of boards, logs, and/or pallets can cause localized changes which may impact species composition and hydrology. Heavy disturbance such as from ORV use should be avoided because the organic soils are slow to recover from mechanical damage. High water tables make burning difficult, but fire can be used on sites adjacent to floodplains; dominant sedges of this community type are resistant to damage by fire except where hot fires penetrate the peat soil (Hansen et al. 1995). *Carex limosa* may have potential for use in revegetating wet meadow sites and margins of ponds and lake shores. Seed is commercially available, but plants may be best established using transplants on small projects (Elzinga 1998).

SUCCESSIONAL DYNAMICS

Carex limosa is considered a stable, long-lived plant association, however, dewatering and subsequent decomposition of organic soils may result in a shift in species composition due to invasion by exotic species or an increase in species adapted to slightly drier sites such as *Carex aquatilis* (Padgett et al. 1989).

WILDLIFE FUNCTIONS

Waterfowl and sandhill cranes may use this plant association for foraging and nesting. Aquatic mammals including otters and beavers may make use of the rhizomes and seeds as a food source (Elzinga 1998).

CLASSIFICATION COMMENTS

The *Carex limosa* plant association has been characterized in numerous studies in the Great Lakes Region, in Canada, northern Europe, and northern Asia (Mattson 1984). It appears closely related to the *C. aquatilis* plant association with which it is commonly associated (Padgett et al. 1989). Hansen et al. (1995) indicates that *C. limosa* has indicator priority over *C. lasiocarpa*, but not *C. aquatilis* or *C. utriculata*. Mattson's (1984) *C. limosa* series and phases described for the central portion of Yellowstone National Park are included in this broader association.

AUTHOR/DATE(UPDATE)

Linda Williams/1995-07-10(2002-01-29)

Carex nebrascensis

Nebraska sedge

RANGE

The *Carex nebrascensis* plant association has been documented in every western State, with the possible exception of New Mexico and Washington (Manning and Padgett 1995; Anderson et al. 1998).

ENVIRONMENT

This association typically occurs at low to mid elevations in the mountains, ca 3,300 to 9,200 feet depending on latitude. It most often occurs in meadows and on broad alluvial terraces with fine-textured soils, but also around seeps. Although stands can occur near streams and rivers, the high water

tables found in this type appear to result from lateral subirrigation rather than fluvial flooding. Valley bottom widths can range from very narrow to very broad (typically moderate to broad) and gradients can range from very low to very high (typically low). It also occurs along a wide variety of Rosgen stream classes (Youngblood et al. 1985; Padgett et al. 1989; Hansen et al. 1995; Manning and Padgett 1995; Crowe and Clausnitzer 1997).

SOILS

The *Carex nebrascensis* association is mostly associated with deep, fine-textured mineral soils (Mollisols, Andisols, Entisols, and Inceptisols). It rarely occurs on organic substrates (Histisols). Water tables are typically at or near the surface, at least in the early growing season, occasionally dropping to more than 1 m. Estimated available water holding capacity is moderate to high (Youngblood et al. 1985; Padgett et al. 1989; Hansen et al. 1995; Crowe and Clausnitzer 1997).

VEGETATION COMPOSITION

Stands of the *Carex nebrascensis* plant association are generally small and widely scattered on the landscape. *C. nebrascensis* clearly dominates the vegetation, with generally minor amounts of other graminoids, including *Glyceria striata*, *Deschampsia cespitosa*, *Juncus balticus*, *Calamagrostis neglecta*, and *Poa pratensis*, among many others. Forb species present in the association are highly variable and typically sparse (Youngblood et al. 1985; Padgett et al. 1989; Hansen et al. 1995; Manning and Padgett 1995; Crowe and Clausnitzer 1997; Hall and Hansen 1997). Other associations for which *Carex nebrascensis* is a community dominant or co-dominant include the *C. nebrascensis*-*C. microptera* community possibly occurring in

California, Nevada, Oregon, and Washington, the *C. nebrascensis-Catabrosa aquatica* community from Colorado, and the *Deschampsia cespitosa-C. nebrascensis* community from Colorado and Wyoming (Bourgeron and Engelking 1994; Anderson et al. 1998).

ADJACENT COMMUNITIES

Because of the wide elevational and geographical distribution, adjacent upland associations can range from sagebrush-steppe at the lower elevations to a diversity of montane and subalpine coniferous forest types. Adjacent riparian associations are equally diverse and include coniferous forest, deciduous forest, tall shrub, low shrub, and herbaceous associations.

MANAGEMENT CONSIDERATIONS

Carex nebrascensis, although an increaser in some associations, is very palatable to livestock and an excellent soil binder in wet meadows. Several studies suggest that management of this association should allow for regrowth at the end of the grazing season to replenish carbohydrate reserves for winter respiration and early spring growth. The typically wet, fine-textured soils are susceptible to compaction and hummocking by excessive livestock use particularly if the sod layer is broken and hummocks are present. Grazing value ratings are high for elk, cattle and horses, and medium for sheep and deer. The erosion control potential rating is high. It is valuable for streambank stabilization because of its strong rhizomes and dense roots (Manning and Padgett 1995).

SUCCESSIONAL DYNAMICS

Some studies consider all stands of the *Carex nebrascensis* association to be a grazing disclimax (e.g., Hansen et al 1995; Crowe and Clausnitzer 1997; Hall and

Hansen 1997), while others consider it to be the potential natural community in some cases (e.g., Youngblood et al. 1985; Padgett et al. 1989; Manning and Padgett 1995). These latter studies apparently sampled stands that they considered to have received little or no grazing pressure. *Carex nebrascensis* is strongly rhizomatous and robust, outcompeting other species that occupy similar sites, such as *Deschampsia cespitosa*. The dominance of *C. nebrascensis* may represent disturbance conditions because it can persist under heavy grazing. Under high quality conditions, however, increaser species (e.g., *Juncus balticus*, *Poa pratensis*, *Aster* spp., and/or *Trifolium* spp.) are either absent or present with low cover. While *Deschampsia cespitosa* may have once co-dominated some sites, the strongly rhizomatous habit of *C. nebrascensis* has likely facilitated its continued dominance. Once *C. nebrascensis* dominates a site, it should be considered the potential natural community for these sites (Manning and Padgett 1995).

WILDLIFE FUNCTIONS

Carex nebrascensis is palatable to elk and provides food and cover for waterfowl (Hansen et al. 1995).

CLASSIFICATION COMMENTS

Classification of this association is based on many plots from many studies in Oregon, Nevada, Idaho, California, Montana, Wyoming, Utah, and Colorado, at least.

AUTHOR/DATE(UPDATE)

Robert K. Moseley/1998-12-08

Parex praegracilis

Clustered field sedge

RANGE

The *Carex praegracilis* plant association is reported from Idaho, Oregon, Colorado, Wyoming, Montana, and California.

ENVIRONMENT

The *Carex praegracilis* plant association is found on a variety of landforms ranging from subirrigated moist meadows to floodplains of large rivers. The association is typically found at middle to lower elevations.

SOILS

Soils are deep and range from heavy clays to sandy clay loams with mottling and may be alkaline (Kittel et al. 1999). Soils are saturated early in the growing season and surface dry by mid-summer.

VEGETATION COMPOSITION

Carex praegracilis is the dominant graminoid on high quality sites with continuous (90 percent) cover in some locations. Other species that may be present include *C. nebrascensis*, *Eleocharis palustris*, *Juncus balticus*, *Potentilla palustris*, and *Elymus triticoides*. On alkaline sites *Distichlis spicata* and *Muhlenbergia asperifolia* may be present. This plant association is similar to other mesic graminoid associations in the seasonally and temporarily flooded alliances.

ADJACENT COMMUNITIES

Stands of *Carex praegracilis* typically occupy a complex mosaic made up of patches of *Typha latifolia*, *Scirpus* spp., *Carex nebrascensis*, *Agropyron smithii*, *Elymus triticoides*, *Juncus balticus*, and *Potentilla fruticosa*.

MANAGEMENT CONSIDERATIONS

Carex praegracilis is rated as highly palatable to cattle and moderately palatable to sheep and horses. Meadows are often used as irrigated hay pasture and cows are reported to get a good gain on *C. praegracilis* hay. The rhizomatous habit of *C. praegracilis* allows it to persist with annual haying and grazing. Stands are susceptible to compaction if disturbed in early spring or summer. Heavy use can decrease stand area and allow other species to become dominant. This species is useful for revegetation and can be planted from commercially available seed or from transplants (Elzinga and Rosentreter 1999).

SUCCESSIONAL DYNAMICS

Little is known about the successional pattern of *Carex praegracilis* dominated areas.

WILDLIFE FUNCTIONS

Carex praegracilis is considered good forage for elk and is valued as winter forage. It will function as a streambank stabilizer and stabilize overhanging banks for fish habitat (Elzinga and Rosentreter 1999). Meadows supporting *C. praegracilis* provide nesting habitat for wrens, rails, and other birds.

CLASSIFICATION COMMENTS

The *Carex praegracilis* plant association is classified based on a limited number of quantitative vegetation plots sampled in Colorado (2 plots), Oregon (3 plots), and Idaho (1 plot) (Crowe and Clausnitzer 1997; Moseley 1998; Kittel et al. 1999). This association is typically found at lower elevations where much of the land is in private ownership and only limited sampling has occurred. Some stands do support near monocultures of the diagnostic species. However, hydrologic fluctuations (both

natural and human caused) and ground disturbance seem to favor more diverse stands with a mix of mesic graminoids including *Carex praegracilis*, *C. nebrascensis*, *Juncus balticus*, *Eleocharis palustris*, *Agropyron smithii*, and *Elymus triticoides*. Mixed graminoid stands are difficult to classify especially when no species shows clear dominance.

AUTHOR/DATE(UPDATE)

Mabel Jankovsy-Jones/2000-11-17(2001-01-04)

Carex simulata

Short-beaked sedge

RANGE

The *Carex simulata* association is a minor, although widespread, type which occurs in the montane valleys throughout southern and south-central Idaho; the Wyoming Range and the Yellowstone Volcanic Plateau of northwestern Wyoming (Youngblood 1985), the Uinta Mountains and the Wasatch Plateau of Utah (Padgett et al. 1989), the mountains of Montana (Hansen et al. 1995), the Rio Grande and Closed Basins of Colorado (Kittel et al. 1999), and is scattered throughout central Oregon (Kovalchik 1987).

ENVIRONMENT

Stands are located in wet depressions such as broad meadows, toeslope seeps or gentle slopes below seeps, flat alluvial terraces adjacent to streams, and swales formed by abandoned channels.

SOILS

Soils of the *Carex simulata* plant association commonly have organic matter accumulation 30-120 cm thick (Brichta 1987). Padgett et al. (1989) noted that

although the degree of organic matter decomposition is variable, communities within his study area were most often associated with organic soils rather than highly decomposed mineral soils. Kovalchik (1987) describes soils of this association as organic loam and sedge peats. This type may also be found on poorly drained, fine-textured, mineral soils (Hansen et al. 1995) or fine loams and clays with organic surface horizons of thick (cumulic) mollic epipedons (Youngblood et al. 1985).

VEGETATION COMPOSITION

Carex simulata dominates stands with up to 85% cover. *C. simulata* may not always be the dominant species, but it is an indicator for this association. Moss cover is typically high. Low species diversity, with *C. aquatilis*, *C. utriculata*, *Deschampsia cespitosa* and *Juncus balticus* being the only associates with high constancy, is characteristic. The shrubs *Potentilla fruticosa*, *Salix wolfii* and *S. brachycarpa* are sometimes present. The most common forbs include *Pedicularis groenlandica* and *Swertia perennis*.

ADJACENT COMMUNITIES

Wetter sites are dominated by *Scirpus acutus*, open water (Hansen et al. 1995), *Carex utriculata* or *C. aquatilis* (Padgett et al. 1989). Stands of *Potentilla fruticosa/Deschampsia cespitosa* are common on drier sites (Hansen et al. 1995), while uplands may be dominated by *Pinus contorta*, *Picea engelmannii*, *Populus tremuloides*, shrub-steppe, or dry grasslands (Padgett et al. 1989).

MANAGEMENT CONSIDERATIONS

Carex simulata appears able to withstand moderate grazing pressures, though impacts on soils may include hummocking and pitting if stands are used when sites are wet

(Padgett et al. 1989). Hummocked meadows will continue to support *C. simulata* if water table levels are maintained (Elzinga and Rosentreter 1999). Stands are generally too wet to burn except in the fall. Recovery from resprouting rhizomes is rapid unless the soil surface becomes dry, organic soils become flammable, and fire penetrates the soil destroying sedge rhizomes (Kovalchik 1987). Transplanted rhizomes can be used for restoration of riparian and wetland habitat. Seed, while less effective, may also be used (Elzinga and Rosentreter 1999).

SUCCESSIONAL DYNAMICS

The strongly rhizomatous *Carex simulata* appears to form a dense, stable association (Padgett et al. 1989). Continually high water tables limit the successful establishment of most other species. Due to the season-long high water table, the sites are often inaccessible and minimally disturbed (Hansen et al. 1995). Most reproduction is via spread by rhizomes; seed is produced, but germination rates are low (Elzinga and Rosentreter 1999)

WILDLIFE FUNCTIONS

The dense stands created by *Carex simulata* provides cover for waterfowl and small mammals. Where stands vegetate stream channels, they provide good bank stability and may create overhanging banks for fish (Elzinga and Rosentreter 1999). This type may provide early spring forage for deer when adjacent uplands are still covered by snow (Kovalchik 1987).

CLASSIFICATION COMMENTS

The *Carex simulata* plant association has been well described and documented from Idaho (Tuhy and Jensen 1982), Utah (Youngblood et al. 1985; Padgett et al. 1989), Montana (Hansen et al. 1989),

Oregon (Kovalchik 1987), Colorado (Kittel et al. 1999) and California (Nachlinger 1985).

AUTHOR/DATE(UPDATE)

Linda Williams/1995-08-06(2001-01-04)

Carex utriculata

Bladder sedge

RANGE

This plant association occurs in Oregon (Kovalchik 1987), Nevada (Manning and Padgett 1995), Utah (Padgett et al. 1989), Idaho, Wyoming (Youngblood et al. 1985; Jones and Walford 1995), Montana (Hansen et al. 1995), and Colorado (Kittel et al. 1999).

ENVIRONMENT

This association is widespread at moderate to high elevations in the mountains and rarely found in low-elevation valleys or on volcanic plains. It occurs in a wide variety of landscape settings, such as in narrow to broad valley bottoms on meadows, seeps, stream terraces and is commonly associated with ponds and sloughs that have silted in. It can occur in standing water or on sites that become relatively dry during the latter part of the growing season. Valley bottom gradients are low (Padgett et al. 1989; Hall and Hansen 1997).

SOILS

Soils are classified as Histisols, Mollisols, and Inceptisols, and Entisols. Mineral soils are generally very organic-matter rich and often have an incipient histic epipedon forming at the surface. These soils may eventually become Histisols. Most of the mineral soils are fine-textured and have high water holding capacity. The soils are saturated to the surface well into the summer

and the water table is usually within 2 feet of the surface late into the growing season (Crowe and Clausnitzer 1997; and others).

VEGETATION COMPOSITION

Carex utriculata typically exhibits monospecific dominance in this association, with dense cover. *C. nebraskensis*, *C. simulata*, *C. aquatilis*, and/or *Juncus balticus* may be present but are usually not abundant in this species-poor association. Litter often accumulates and few species can establish on these organic, permanently saturated or inundated soils. This is why willows are rarely present (Hansen et al. 1995; Manning and Padgett 1995; Crowe and Clausnitzer 1997). This sedge species was previously thought to be *C. rostrata*, which was included in many plant association throughout the west. We now know this species as *C. utriculata*.

ADJACENT COMMUNITIES

Because of the wide elevational and geographical distribution, adjacent upland associations can range from sagebrush-steppe at the lower elevations (rare) to a diversity of montane and subalpine coniferous forest types.

MANAGEMENT CONSIDERATIONS

Though *Carex utriculata* produces large amounts of herbage every year, it apparently is relatively unpalatable to livestock, especially as it matures. It is a coarse sedge with high amounts of silica in its leaf cells. The dense network of rhizomes and roots provides excellent streambank stabilization and frequently forms the overhanging banks associated with good fish habitat. These banks may slump if subjected to heavy grazing or trampling (Hansen et al. 1995). This is a good species for restoration by using transplanted rhizomes or

commercially available or collected seed (Elzinga and Rosentreter 1999).

SUCCESSIONAL DYNAMICS

Carex utriculata is a widespread species that occupies mineral or organic soils with seasonably high water tables. This association typically colonizes recently formed ponds and/or sites in or adjacent to low-gradient stream channels. It has been observed that *C. utriculata* has higher cover on sites that are seasonally flooded; continually inundated sites had decreased shoot density. It can colonize permanently flooded sites, often doing so from the outer edge. As soil and litter build up, these sites are more conducive to increased *C. utriculata* dominance. This species is relatively long-lived and maintains dominance with high soil moisture; associations are at potential for these sites. As soil moisture decreases, other species such as *C. nebraskensis*, *C. simulata*, or *Deschampsia cespitosa* may replace *C. utriculata* (Manning and Padgett 1995).

WILDLIFE FUNCTIONS

This association performs a vital role in maintaining water quality and aquatic health in headwater streams. Past beaver activity is often evident in this plant association, and *Carex utriculata* is one of the species likely to pioneer newly-flooded beaver ponds. Palatability appears to be lower than for other sedges such as *C. nebraskensis* or *C. aquatilis* (Padgett et al. 1989). Rhizomes and sprouts are important food for muskrats and are occasionally eaten by waterfowl (Elzinga and Rosentreter 1999). *C. utriculata* provides valuable breeding and feeding grounds for waterfowl and snipe. Common yellowthroats, red-winged blackbirds, song sparrows, and tree swallows are commonly associated with this association (Crowe and Clausnitzer 1997).

CLASSIFICATION COMMENTS

Carex rostrata plant associations have been described in Oregon (Kovalchik 1987), Nevada (Manning and Padgett 1995), Utah (Padgett et al. 1989), Montana (Hansen et al. 1995), Idaho, Wyoming (Youngblood et al. 1985) and Colorado (Kittel et al. 1999). This sedge forms near monocultures and the plant association is easily identified. Identification can, however, be complicated as sedges including *C. vesicaria*, *C. atherodes*, and *C. aquatilis* have similar growth form and occupy similar habitat.

AUTHOR/DATE(UPDATE)

Robert K. Moseley/1998-01-02(2001-01-04)

Carex vesicaria

Inflated sedge

RANGE

Carex vesicaria is a major community type with a widespread range. It is known from the following areas: central and northeastern Oregon (Kovalchik 1987; Crowe and Clausnitzer 1997); Yellowstone National Park and elsewhere in western Wyoming (Mattson 1984; Youngblood et al. 1985); Uinta Mountains of Utah (Padgett et al. 1989); most of Montana (Hansen et al. 1988); the Henrys Fork basin of eastern Idaho (Youngblood et al. 1985; Jankovsky-Jones 1996) and northern Idaho (Jankovsky-Jones 1997b; Jankovsky-Jones 1999a); both sides of the Cascade Mountains in Washington (Mattson 1984; Crowe and Clausnitzer 1997); and the eastside of the Sierra Nevada along the California-Nevada border (Manning and Padgett 1995). The *C. vesicaria* community is probably circumboreal in distribution (Mattson 1984).

ENVIRONMENT

The *Carex vesicaria* community occurs in very low gradient and wide wet meadows, floodplains, basins, and forest openings. It is found from as low as 650 to 750 m in northern Idaho (Jankovsky-Jones 1997b and 1999a); up to 1,830 m in eastern Oregon and northern Idaho (Kovalchik 1987; Crowe and Clausnitzer 1997; Jankovsky-Jones 1997b); and from 1,800 to 2,560 m in the Sierra Nevada Mountains, western Wyoming, and eastern Idaho (Mattson 1984; Manning and Padgett 1995; Jankovsky-Jones 1996). The *C. vesicaria* community is most commonly found in swales, fens, glacially formed kettle ponds or potholes, silted-in beaver ponds or ponds with blown-out dams, and other closed drainage concavities (Mattson 1984; Manning and Padgett 1995; Crowe and Clausnitzer 1997; Jankovsky-Jones 1999a). It is also found on poorly drained shorelines of ponds, lakes, reservoirs, springs, overflow channels, and streamside alluvial terraces which are flooded in the spring and have standing water through most of the summer growing season (Youngblood et al. 1985; Kovalchik 1987; Hansen et al. 1988; Padgett et al. 1989; Jankovsky-Jones 1996; Crowe and Clausnitzer 1997; Jankovsky-Jones 1997b; Jankovsky-Jones 1999a). The spring and early summer water depth varies from 12 to over 50 cm (occasionally less, especially during drought) but drops by late summer or fall in most years (Mattson 1984; Youngblood et al. 1985; Kovalchik 1987; Jankovsky-Jones 1999a). After a site dries, the water table drops below the surface over 30 cm, though the soil usually remains moist all year (Mattson 1984; Kovalchik 1987). This moisture flux creates pronounced mottling and gleying of deeper mineral soil. Soils are usually deep, fine-textured mineral or organic silty-loams with high organic matter accumulation and water holding capacity. Classification groups include:

Typic Cryaquents or Cryaquepts, Cryic Fragiaquepts, Cryoborolls, Cryaquolls Terric Borosaprists, or Histic Cryaquolls (Kovalchik 1987; Hansen et al. 1988; Manning and Padgett 1995; Crowe and Clausnitzer 1997). Occasionally, soils are either coarser alluvium (e.g. sandy loam) or peat.

SOILS

Information on soils is not available.

VEGETATION COMPOSITION

Species diversity is relatively low in the *Carex vesicaria* community. *C. vesicaria* is clearly dominant, forming dense stands 35 to 60 cm tall, with 40 to 80% cover and 100% constancy (Mattson 1984; Kovalchik 1987; Crowe and Clausnitzer 1997; Jankovsky-Jones 1999a). Shrub or tree species are rarely present with negligible cover. The importance of other associated species varies due to the moisture characteristics (e.g. permanently flooded versus seasonally flooded) of each *C. vesicaria* stand (Mattson 1984). For example, the wettest phase of the *C. vesicaria* community, where standing water is over 30 cm in the spring, has low diversity and is composed of mainly *C. vesicaria* with low cover of other species such as *C. utriculata* (Mattson 1984; Kovalchik 1987). Sites with less spring standing water, which may dry only in the fall, have higher cover of *C. aquatilis* (less than 7% cover and 23% constancy) with low cover of *Deschampsia cespitosa*, *Calamagrostis canadensis*, and *Galium* species (Mattson 1984; Crowe and Clausnitzer 1997). Other species associated with *Carex vesicaria* on sites with long periods of standing water include: *Eleocharis palustris* (less than 18% cover and 45% constancy), *Juncus balticus* (less than 8% cover and 42% constancy), *Glyceria borealis*, *Sparganium* species (e.g.

S. emersum, *S. eurycarpum*), *Equisetum fluviatile*, *Zizania aquatica*, *Carex atherodes*, *Polygonum* species, *Phalaris arundinacea*, and *Utricularia* species (Mattson 1984; Kovalchik 1987; Hansen et al. 1988; Crowe and Clausnitzer 1997; Jankovsky-Jones 1998). Better drained sites, which are flooded in spring but dry in summer, are co-dominated by *Deschampsia cespitosa* (less than 12% cover and 75% constancy) or *Aster foliaceus* (less than 12% cover and 23% constancy) (Mattson 1984; Kovalchik 1987; Crowe and Clausnitzer 1997). Other species commonly associated with *Carex vesicaria* in these stands include *C. nebrascensis* (less than 31% cover and 42% constancy), *C. aquatilis*, *Epilobium watsonii*, *Antennaria corymbosa*, *Galium* species, *Camassia quamash*, *Mentha arvensis*, *Senecio* species, and others (Mattson 1984; Kovalchik 1987; Hansen et al. 1988; Crowe and Clausnitzer 1997; Jankovsky-Jones 1999a). Due to long periods of flooding, the cover of mosses, lichens, and liverworts is low. In contrast, the ground is either bare or deep litter (forming a sedge peat layer). The *Carex vesicaria* community type is most similar to the *C. utriculata* community, though, some similarities to the *C. aquatilis* community also exist. For example, *C. vesicaria* has moderate to high cover in some *C. aquatilis* and *C. utriculata* communities, sometimes being co-dominant with those and other *Carex* species (Kovalchik 1987; Kovalchik 1993; Hansen et al. 1995; Hall and Hansen 1997; Crowe and Clausnitzer 1997). When *C. vesicaria* stands are located in deeper, standing water they are very similar to the *C. atherodes* community (Youngblood et al. 1985; Padgett et al. 1989). Other communities, which also form nearly pure stands, occupy similar (or wetter) wetland habitats and include: *Phalaris arundinacea*, *Glyceria* species, *Polygonum* species, *Sparganium emersum*, *Alopecurus aequalis*,

or *Utricularia* species (Mattson 1984; Kovalchik 1987; Hansen et al. 1988). In contrast, when water tables are at the surface or below, communities, such as *Carex rostrata*, *Eleocharis palustris*, or *Deschampsia cespitosa*, become more common than *C. vesicaria* (Youngblood et al. 1985; Hansen et al. 1988; Padgett et al. 1989; Crowe and Clausnitzer 1997).

ADJACENT COMMUNITIES

On sites with long periods of standing water, adjacent wetland communities are nearly pure stands of semi-aquatic, often floating leaved, plants. These communities include: *Alopecurus aequalis-Ranunculus flammula*, *Carex atherodes*, *Glyceria* species, *Polygonum* species, *Sparganium* species, and *Utricularia* species (Mattson 1984; Kovalchik 1987; Hansen et al. 1988).

Where water levels drop in late summer, adjacent wetter communities may form on the shoreline below *Carex vesicaria*, such as stands of *Eleocharis bella* and *Equisetum arvense* (Crowe and Clausnitzer 1997).

Adjacent communities on sites which dry in late summer, with a similar moisture regime as *Carex vesicaria* (or slightly drier) include *C. utriculata*, *Phalaris arundinacea*, *Eleocharis palustris*, *C. aquatilis*, *Juncus nevadensis*, *C. lasiocarpa*, and *Deschampsia cespitosa* (Mattson 1984; Kovalchik 1987; Hansen et al. 1988; Crowe and Clausnitzer 1997; Jankovsky-Jones 1999a).

Neighboring communities on drier mineral soil include *Salix* species types (e.g. *Salix/Poa pratensis*), *Populus tremuloides/Elymus glaucus*, *Alnus* species, *Poa pratensis*, *Deschampsia cespitosa-Antennaria corymbosa*, *Carex aquatilis-Deschampsia cespitosa*, *Phleum alpinum-Carex aquatilis*, *Vaccinium occidentale/Calamagrostis canadensis*, and *Calamagrostis canadensis* (Mattson 1984; Kovalchik 1987; Hansen et al. 1988; Jankovsky-Jones 1999a). Adjacent dry

terraces and uplands are dominated by *Artemisia tridentata/Poa cusickii* and conifers such as *Pinus contorta*, *Picea engelmannii*, and *Abies lasiocarpa* (Mattson 1984; Kovalchik 1987; Crowe and Clausnitzer 1997).

MANAGEMENT CONSIDERATIONS

The semi-permanently flooded *Carex vesicaria* stands are not usually grazed or impacted by recreation and other uses. However, if wetlands are drained or filled, or the hydrology otherwise altered (such as removal of beaver and their dams), the community will disappear (Hansen et al. 1995). Livestock usually avoid extremely wet organic soils, but on sites which dry by late summer, grazing of *C. vesicaria* can occur (Kovalchik 1987; Crowe and Clausnitzer 1997). *C. vesicaria* is moderately to highly palatable and can be important in late summer when other forage is less available. It is more palatable than *C. utriculata* and may be selected for (Hansen et al. 1995; Hall and Hansen 1997). However, grazing on organic soils should only occur if the site is completely dry. Though the dense sod of *C. vesicaria* resists grazing and trampling damage (Hansen et al. 1988), overuse will damage soils, reduce *C. vesicaria* cover, and promote dominance by other mesic graminoids and grazing tolerant forbs (Kovalchik 1987; Crowe and Clausnitzer 1997). Associated species, such as *Deschampsia cespitosa*, will also decrease under heavy grazing and less palatable species, such as *Juncus balticus* will increase (Hansen et al. 1995; Hall and Hansen 1997). Eventually the community may convert to *C. nebrascensis* or exotic species such as *Phalaris arundinacea*. However, if the community is in mid-seral condition and rested for at least 30 days, *C. vesicaria* will recolonize damaged areas (Kovalchik 1987; Hansen et al. 1995; Hall and Hansen 1997). The community should

not be grazed too low so that the vegetation cannot function as a sediment filter. *C. vesicaria* is effective in reducing erosion and stabilizing streambanks due to its sod forming rhizomes. It is also of high value for wetland revegetation (Hansen et al. 1995; Hall and Hansen 1997). The *C. vesicaria* community will burn only in late summer or fall when dry. Fire will reduce litter and increase productivity for several years. However, if peat soils are dry enough, they will burn hot and kill *C. vesicaria* rhizomes (Kovalchik 1987; Crowe and Clausnitzer 1997).

SUCCESSIONAL DYNAMICS

Little is known about the successional dynamics of the *Carex vesicaria* community. The origins of the community are not clear but it forms on sites with long periods of standing water which *Salix* or other *Carex* species do not tolerate. It is a stable, long-lived community as indicated by deep peat formation on some sites (Kovalchik 1987; Hansen et al. 1988). Thus, it is doubtful that succession to other *Carex* species, willow/sedge, or other shrub or forest communities will occur unless the hydrologic conditions which promote *C. vesicaria* are altered. For example, if the ponding is eliminated and the water table is lowered by fluvial changes, wetland draining, removal of beaver and their dams, or filling of wetlands with sediment, the soils will dry promoting *C. utriculata*, *Salix* species, or (with more drying) mesic forbs and graminoids (Youngblood et al. 1985; Kovalchik 1987; Hansen et al. 1995). If drier phases of *C. vesicaria* are overgrazed, the community may move toward dominance by mesic forbs, *C. nebrascensis*, *Poa pratensis*, *Phalaris arundinacea*, *Phleum pratense*, or other graminoids (Kovalchik 1987; Crowe and Clausnitzer 1997).

WILDLIFE FUNCTIONS

The *Carex vesicaria* community is commonly browsed by elk and moose, especially in mid or late summer, whose hooves deeply churn the soil (Mattson 1984; Kovalchik 1987; Hansen et al. 1995; Jankovsky-Jones 1999a). Grizzly bear also forage for roots in this community (Mattson 1984). Depending on water levels, *C. vesicaria* stands are important feeding and nesting areas for waterfowl, small mammals, and other birds (Kovalchik 1987; Crowe and Clausnitzer 1997). *C. vesicaria* root mats form a thick sod which stabilizes undercut streambanks and creates deep, narrow channels with overhanging cover for fish (Kovalchik 1987; Hansen et al. 1988).

CLASSIFICATION COMMENTS

The *Carex vesicaria* community type is sometimes included within the *C. utriculata* [syn. *C. rostrata*] community (Kovalchik 1993; Hansen et al. 1995; Hall and Hansen 1997). Reasons for lumping are that *C. rostrata* and *C. vesicaria* are sometimes difficult to distinguish, may form mixed stands, share similar ecological requirements, and stands of each may form a complex mosaic of small patches (Kovalchik 1993; Hansen et al. 1995; Manning and Padgett 1995; Crowe and Clausnitzer 1997; Hall and Hansen 1997). More often, however, the two communities are easily distinguished by their monospecific stands. Mattson (1984) subdivided the *C. vesicaria* community into phases based on co-dominance by other species: *Aster foliaceus*, *Deschampsia cespitosa*, and *C. aquatilis*. Other classifications have not recognized these phases or have lumped them with other community types. Due to the large depth of standing water sometimes associated with the *C. vesicaria* community, it has been termed a "wetland" type (instead of a

"riparian" type) by some and not described (Youngblood et al. 1985; Padgett et al. 1989).

AUTHOR/DATE(UPDATE)

Chris Murphy/1998-01-19()

Eleocharis palustris

Common spikerush

RANGE

Eleocharis palustris is a common type in California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming, and Saskatchewan. Essentially it has been documented from every western state except Arizona and New Mexico (Bourgeron and Engelking 1994; Anderson et al. 1998).

ENVIRONMENT

The *Eleocharis palustris* plant association is found at low to moderate elevations, generally in wide, low gradient valleys of all shapes. Sites are wet basins, floodplains, meadows, gravel bars, and lake edges. It is typically in sites that are prone to yearly flooding or persistent surface water. Where streams are present, they are Rosgen's C and E stream types. Elevations range from 2,200 to at least 8,700 feet, depending on latitude (Hansen et al. 1995; Manning and Padgett 1995; Crowe and Clausnitzer 1997; Hall and Hansen 1997).

SOILS

Soils of this plant association are classified as Mollisols, Entisols, Histisols, and Inceptisols. Textures are variable, ranging from sites that are very coarse-fragment rich to others that are deep and fine-textured. The surface is usually rich in organic matter and the litter accumulation may blend into rich, black organic muck soils. The fine-

textured upper horizons often arise from alluvial deposition. Sands, gravels, and cobbles usually constitute the main body of deeper subsurface materials (Manning and Padgett 1995; Crowe and Clausnitzer 1997; Hall and Hansen 1997).

VEGETATION COMPOSITION

Eleocharis palustris is an aggressive, rhizomatous species that nearly excludes all other species from establishing any significant cover. Common associates in high quality sites include *Alopecurus aequalis*, *Mentha arvensis*, *Rumex crispus*, *Eleocharis acicularis*, *Carex utriculata*, *Glyceria* spp., and *Phalaris arundinacea*. On some sites, aquatic species such as *Hippuris vulgaris*, *Utricularia vulgaris*, and *Potamogeton natans*, have high cover. In some cases, the *Eleocharis palustris* may be confused with *E. rostellata*, especially if the stolons of *E. rostellata* are not present or not obvious. Be sure of the plant's true identity. A misidentification will result in the wrong community type and the sites on which they occur are very different ecologically.

ADJACENT COMMUNITIES

Due to the wide geographic distribution of this type, adjacent upland communities are varied, including shrub-steppe, woodland, and coniferous forest types. Adjacent riparian communities may be dominated by an equally varied assortment of types including deciduous forest, tall shrub, low shrub, and herbaceous communities.

MANAGEMENT CONSIDERATIONS

Seasonally wet conditions and low palatability of *Eleocharis palustris* limit the grazing value of this type for livestock, even during drought years when upland forage dries early and dies back (Kovalchik 1987). Sites occupied by this type are typically inundated or at least saturated for much of

the year so as to preclude most development. Trampling damage and soil churning occurs readily with livestock use and may result in a shift toward more disturbance tolerant species such as *Hordeum jubatum*, *Carex nebrascensis*, and *Juncus balticus* (Hall and Hansen 1997).

SUCCESSIONAL DYNAMICS

Padgett et al. (1989) suggest that *Eleocharis palustris* can represent an early seral species on ponds and streambanks where water is at or above the ground surface. As siltation occurs over time, other communities, such as *Carex rostrata*, may replace it. However, due to the continual saturated conditions and dense growth of *E. palustris*, once formed, stands appear difficult to displace and may persist as climax vegetation. If water levels rise, *Scirpus* spp. and *Typha latifolia* may be able to supplant *E. palustris*. Hansen et al. (1995) have observed that disturbance can drastically shift the vegetative composition of this type toward increaser or invader species such as *Hordeum jubatum*.

WILDLIFE FUNCTIONS

Broad zones of this type along streams, rivers, lakes, and reservoirs provide valuable feeding and nesting areas for waterfowl. *Eleocharis palustris* and associated plants are a valuable source of food and cover for waterfowl. Wild ungulates seldom browse this habitat type due to its low palatability (Hall and Hansen 1997).

CLASSIFICATION COMMENTS

The *Eleocharis palustris* plant association is widespread and has been described in numerous classifications throughout the United States. In Idaho, two plant associations dominated by *E. palustris* are recognized. The one described here represents stands that occur along streams,

rivers, and lakeshores. An *E. palustris* vernal pool association is also recognized that occurs in vernal lake beds that dry completely by the end of the growing season. In some cases, *E. palustris* may be confused with *E. rostellata*, especially if the stolons of *E. rostellata* are not present or not obvious. Be sure of the plant's true identity. A misidentification will result in the wrong community type and the sites on which they occur are very different ecologically.

AUTHOR/DATE(UPDATE)

Robert K. Moseley/1998-12-08(2001-10-01)

Juncus balticus

Baltic rush

RANGE

The *Juncus balticus* plant association has been documented from every state in the western United States, with the exception of Arizona (Bourgeron and Engelking 1994; Manning and Padgett 1995; Anderson et al. 1998).

ENVIRONMENT

The elevational range occupied by stands of *Juncus balticus* is as wide as the geographic range, ranging from 3,000 feet in Montana to over 10,000 feet farther south.

Throughout its range, it occurs near seeps, in meadows, and on alluvial terraces. Where streams are present, the Rosgen reach types have been identified as B3, B4, C3, C4, C6, E4, E6, and F4. Surface topography is usually level or sometimes undulating or hummocky. Valley bottom characteristics are equally diverse, with widths ranging from very narrow to very broad and gradients from low to high (Padgett et al. 1989; Hansen et al. 1995; Manning and Padgett 1995; Crowe and Clausnitzer 1997).

SOILS

This plant association typically occurs on fine-textured surface soils. Textures range from silt to sandy-loam. The water table ranges from the surface to ca 50 cm below the surface, occasionally falling below 1 m by the end of the summer. Estimated available water-holding capacity ranges from low to high. Horizon A soils have been classified as Mollisols, Inceptisols, and Histisols. Soil reaction ranges from neutral to mildly alkaline, pH 7.0 to 8.0 (Padgett et al. 1989; Hansen et al. 1995; Manning and Padgett 1995; Crowe and Clausnitzer 1997).

VEGETATION COMPOSITION

Baltic rush dominates stands with canopy cover generally over 50%, usually higher. Cover by other graminoids is usually low, although *Poa pratensis* appears to be a common associate over the range of this type. There is a wide diversity of other graminoids and forbs, both native and exotic, that occur with low cover in *Juncus balticus* stands throughout its range (Padgett et al. 1989; Hansen et al. 1995; Manning and Padgett 1995; Crowe and Clausnitzer 1997; Walford et al. 1997).

ADJACENT COMMUNITIES

As would be expected with an association distributed over the western United States and having at least a 6,000-foot elevational range, the adjacent upland and riparian associations are diverse. Upland associations range from steppe and shrub-steppe at the lower elevations to alpine associations at the higher.

MANAGEMENT CONSIDERATIONS

Grazing value ratings for *Juncus balticus* are moderate for cattle and low (except in the spring when rated medium) for sheep, horses, mule deer, and elk. *J. balticus* has vigorous rhizomes and a wide ecological

amplitude. It is an excellent streambank stabilizer with dense fibrous roots that not only bind horizontally in the soil, but grow to a greater depth than other rhizomatous graminoids. It has high erosion control potential. Because of its tenacious nature and relatively low palatability to livestock, this species is very important as a soil binder and streambank stabilizer. Planting *J. balticus* plugs in the flood plain of an incised but aggrading stream will enhance bank building by binding soils and trapping sediment (Manning and Padgett 1995).

SUCCESSIONAL DYNAMICS

Numerous studies state unequivocally that the *Juncus balticus* plant association is a livestock grazing-induced type (e.g., Evenden 1989; Hansen et al. 1995; Manning and Padgett 1989; Hall and Hansen 1997; Crowe and Clausnitzer 1997), while others hedge somewhat stating that many or most occurrences are grazing induced (e.g., Padgett et al. 1989; Walford et al. 1997). There is evidence for the latter view. Two stands in central Idaho occur at sites that were never grazed by livestock as they have been excluded by insurmountable cliff bands. They contain extensive near-monocultures of *Juncus balticus* and have significant hummocking (Jankovsky-Jones 1999b). Observations in Montana and elsewhere indicate that *J. balticus* acts as an increaser and/or invader, occurring over a wide range of environmental conditions. It can increase after intensive grazing on sites occupied by *Carex nebrascensis*, *Deschampsia cespitosa*, *Calamagrostis canadensis*, and possibly others because of its high tolerance of grazing. Once established, *J. balticus* will maintain community dominance until site conditions are radically changed, either through a severe drop in water table depth or season-long flooding (Evenden 1989; Padgett et al.

1989; Hansen et al. 1995; Manning and Padgett 1995).

WILDLIFE FUNCTIONS

Juncus balticus stands provide important nesting, hiding, and feeding cover for shorebirds and waterfowl. Elk and deer will feed on plants, especially early in the growing season (USDA 2002).

CLASSIFICATION COMMENTS

This plant association has been quantitatively defined and described by many studies throughout the western United States. In Idaho, Tuhy's (1981) *Juncus balticus*-*Muhlenbergia filiformis* plant association is included in this type.

SIMILAR COMMUNITIES

This appears to be a distinctive type. *Eleocharis palustris* - *Juncus balticus* and *J. balticus* - *Carex rossii* plant associations described from central and southern Utah (Bourgeron and Engelking 1994) may be related to the *J. balticus* plant association described here. Similarly, Mattson's (1984) *Deschampsia cespitosa* - *Juncus balticus* from the Yellowstone Plateau is rich with *J. balticus* cover.

AUTHOR/DATE(UPDATE)

Robert K. Moseley/1998-12-09(2001-01-05
Mabel Jankovsky-Jones)

Typha latifolia

Broad-leaved cattail

RANGE

This association is found in virtually every state in the United States and is likely to be found in most Canadian provinces.

ENVIRONMENT

This association is found along margins of streams, rivers, ponds, and in overflow channels and backwater sloughs. It will also form stands along roadways and railways, in drainage ditches and elsewhere water collects to a depth of 2 to 3 feet and remains for over half of the growing season (Kittel et al. 1999).

SOILS

Soils are deep heavy silty clay loams and organic mucks (Kittel et al. 1999) overlying deposits of fine silts or clays that are often inundated throughout the year (Hansen et al. 1995).

VEGETATION COMPOSITION

This association is dominated by hydrophytic macrophytes, especially *Typha latifolia*, which grow to approximately 2 meters. *T. latifolia* can form dense stands in places, almost to the exclusion of other species. Other species typical of wetlands are found in lesser amounts in this community. Among these are *Carex* spp., *Scirpus* spp., *Potamogeton* spp., *Lemna* spp., and *Veronica* spp.

ADJACENT COMMUNITIES

This plant association has a wide range and may be present in both riverine and non-riverine wetlands. Thus adjacent vegetation is highly variable and includes both wetland and upland plant associations that are too numerous to mention.

MANAGEMENT CONSIDERATIONS

Stands of *Typha latifolia* do not provide much forage for livestock. Though they will enter stands and trample vegetation late in the growing season when other forage is not available. In Montana, it is reported that stands may be converted to the *Carex*

nebrascensis association with heavy livestock use (Hansen et al. 1995).

SUCCESSIONAL DYNAMICS

Typha spp. produce abundant seeds and spread rapidly. Under saturated conditions, stands will persist and are adapted to prolonged submergence (Hansen et al. 1995).

WILDLIFE FUNCTIONS

Typha latifolia stands provide an important source of food, hiding cover, and shade for wildlife. Muskrats will use stems for constructing huts. As long as stands are not too thick, they will be utilized by waterfowl. Deer may also use stands for hiding cover and food. This is critical nesting and roosting habitat for yellow-headed and red-winged blackbirds (Hansen et al. 1995).

CLASSIFICATION COMMENTS

The *Typha latifolia* plant association has been described in numerous classifications throughout the United States. Some local classifications have identified associations such as *Typha latifolia-Sagittaria latifolia* and *T. latifolia-Scirpus* spp. that are included in this association. *T. angustifolia* is less common in Idaho and few pure stands have been documented; usually it occurs with and may hybridize with *T. latifolia*. At the present time, stands with *T. angustifolia* are included in the *T. latifolia* association.

SIMILAR COMMUNITIES

Information on similar communities is not available.

AUTHOR/DATE(UPDATE)

J. F. Drake/1995-10-19(2001-01-09)

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APPENDIX G

**TAXONOMY, RANGE, STATUS, AND MANAGEMENT OF RARE WETLAND AND
RIPARIAN PLANT SPECIES IN
THE HIGH VALLEYS OF THE SALMON RIVER.**

Astragalus leptaleus Gray

Common Name: Park milkvetch

Family: Fabaceae (Pea)

Status: State Monitor

Rank: G4/S3

Technical Description: Weak, delicate, diffuse, with a slender taproot and widely branching subterranean caudex, thinly strigulose with fine, appressed hairs up to 0.2-0.5 mm long, the stems and herbage bright green, the leaflets glabrous above, the inflorescence commonly nigrescent; stems loosely tufted, in old plants very numerous and entangled, 5-20 (30) cm long, arising singly or few together from buds on the slender, buried caudex-branches, branched at the first emerged, usually congested nodes, floriferous upward from near or from well below the middle; stipules 2-5 mm long, thinly herbaceous or submembranous, usually several-nerved, the lowest becoming papery in age, all glabrous dorsally, fully amplexicaul and connate, the lowest into a short bidentate sheath, the upper ones longer, united through half their length or less, sometimes only at the very base, with lanceolate free blades; leaves 2.5-10 cm long, petioled but the uppermost shortly so, with subfiliform rachis and (9) 15-23 (27) narrowly elliptic or lanceolate and subacute, or (in the lower leaves) often ovate and obtuse, thin-textured leaflets 3-15 mm long; peduncles filiform, ascending, 2-5.5 cm long, shorter than the leaf; racemes loosely 1-5 (commonly 2- or 3-) -flowered, the flowers ascending at the anthesis, declined thereafter, the axis up to 1 cm long in fruit; bracts membranous, lanceolate or lance-ovate, 1.3-3.3 mm long; pedicels at anthesis straight, 1.2-2.1 mm long, in fruit arched outward, 1.4-2.5 mm long; bracteoles 0-2, minute when present; calyx 4-5.7 mm long, densely to quite thinly black- or rarely white-strigulose, the somewhat oblique disc 0.3-1 mm deep, the campanulate tube 2.7-3.4 mm long, 1.9-2.4 mm in diameter, the subulate or lance-subulate teeth 1.1-2.5 mm long; petals white, the keel tip maculate with dull bluish-purple; banner recurved through 45°, ovate-cuneate, notched, 8.5-11.8 mm long, 4.8-7.2 mm wide; wings 7.2-9.5 mm long, the claws 2.7-3.8 mm, the obliquely obovate, oblong-oblancheolate or -elliptic, obtuse or emarginated blades 4.9-6.5 mm long, 1.8-2.9 mm wide; keel 6-7.3 mm long, the claws 2.8-3.9 mm, the obliquely half-obovate blades 3.2-3.9 mm long, 1.8-2.3 mm wide, incurved through 85-120° to the bluntly deltoid apex; anthers 0.3-0.5 mm long; pod pendulous, obscurely stipitate or sessile, the stipe not over 1.5 mm long, often reduced to a narrow neck, the body oblong-, lance-, or subclavate-elliptic in dorsiventral view, 8-14 mm long, 2.5-4 mm in diameter, slightly decurved, shortly subulate- or cuspidate-beaked, obcompressed and bluntly trigonous, with obtuse lateral angles and low-convex lateral faces, keeled ventrally by the prominent, convexly arched suture, flattened or shallowly and openly sulcate dorsally, the thin, green, sparsely black- or white- strigulose valves becoming stramineous and papery, not inflexed; ovules 6-10; seeds brown, smooth, lustrous, 1.8-2.1 mm long (Barneby 1964).

Nontechnical Description: Delicate perennial from a deeply buried taproot and creeping underground cadex. Stems 5-20 cm long, bearing flowers from near or well below the middle; flowers white, tip of the keel purplish. Leaflets 15-27, bright green, thinly hairy, mostly

lanceolate and acute. Pod 8-14 mm long, oblong-ellipsoid, somewhat obcompressed, with thin, black and white hairs (Caicco and Henderson 1981).

Distinguishing Features and Similar Species: (From Moseley 1991) Park milkvetch has a delicate habit, has bright green leaflets, has only two or sometimes three white flowers at the middle of the stem, and most distinguishing, has a slightly obcompressed, one-celled pods that are not visibly stipate. The stipe, if present, is concealed by the calyx. In our area, park milkvetch is most similar to *Astragalus alpinus*, but at least three other milkvetches and an *Oxytropis* also occur in the riparian communities of the region that could be confusing. The following key, modified from Hitchcock (1961a), will help distinguish park milkvetch from similar-looking riparian legumes of east-central Idaho:

- A. Keel of the corolla abruptly narrowed to a beaklike point; plants without leafy stems.....*Oxytropis deflexa*
- A. Keel of the corolla not abruptly beaked; plants with leafy stems.
 - B. Terminal leaflet is confluent (continuous) with the rachis; plants robust with prostrate stems from a taproot; flowers white; calyx red
.....*Astragalus diversifolius*
 - B. All leaflets jointed to the rachis, including the terminal one.
 - C. Banner (measured along the curvature of the midvein) over 15 mm long; flowers purple, strongly erect, crowded into ovoid heads; stems arising from a buried rootcrown.....*A. agrestis*
 - C. Banner not over 15 mm long; flowers not strongly erect or crowded into ovoid heads.
 - D. Keel petals 2.5-6 mm long; herbage dark green; flower deep purple; pods pendulous.....*A. eucosmus*
 - D. Keel petals over 6 mm long.
 - E. Stipe of the pod 1.4-3.5 mm long, the valves inflexed as a narrow but evident septum 0.2-0.7 mm wide; racemes (5) 7-23 flowered, occurring at ends of the stems and usually exceeding the leaves; petals lavender.....*A. alpinus*
 - E. Stipe of the pod not over 1.5 mm long, often obscure and reduced to a narrow stipe-like neck, the valves not inflexed; racemes mostly 2-3, rarely 5-flowered, occurring at about the middle of the stem, the leaves far surpassing the raceme; petals

white, with purple keel tip.....*A. leptaleus*

Range: (From Moseley 1991) Park milkvetch is endemic to the Rocky Mountains, where it occurs sporadically and apparently never in abundance. It is most widespread in Colorado, with several disjunct stations north in the Rockies to western Wyoming, east-central Idaho, western Montana, and reportedly from Alberta (Hitchcock 1961, Barneby 1964, Isley 1985). At least three collection of park milkvetch were made in Idaho during the 1940's all were along the Big Lost River, between Mackey and Chilly. Steve Caicco "rediscovered" the species in 1981, along the North Fork Big Lost River, as part of an evaluation of rare plants on the Lost River Ranger District, Challis NF (Caicco and Henderson 1981; Caicco et al. 1983). In 1988, Caryl Elzinga extended the known Idaho range of park milkvetch to the East Fork Salmon River Drainage, with the discovery of three populations along Road Creek.

Results from surveys by Moseley in 1991, increased the number of known populations in the Big Lost and East Fork Salmon drainages, and extended the known distribution in the state 50 miles to the east, with the discovery of populations along Birch Creek and along Texas Creek, in the Lemhi Valley. As of 1998, park milkvetch is known for 22 extant sites in Idaho. It is locally abundant, but the aerial extent of the extant populations generally range from a few square feet to about three acres. The Lower Wildhorse Creek population is an exception, however, covering approximately 50 acres.

Habitat, Ecology and Associated Species: (From Moseley 1991) The habitat of park milkvetch is best characterized as being the mesic ecotone between saturated riparian communities and dry, upland sagebrush-steppe. This can occur in at least two settings (1) the tops and sides of hummocks and (2) the dry fringe of Geyer's willow/bluegrass or graminoid-dominated communities. The substrate is loamy, mineral soil that, in August, was dry at the surface, but somewhat moist just below the surface. Soil of the hummocky sites was generally white and alkaline-looking. All sites were more or less flat and open, although park milkvetch sometimes occurs in the partial shade of Geyer's willow and occasionally Booth's willow.

Except for Geyer's willow (*Salix geyeriana*) and Booth's willow (*Salix boothii*), most associated species are low growing. The most common/plentiful associates include *Poa pratensis*, *Juncus balticus*, and *Sisyrinchium idahoense*. Others include *Oxytropis deflexa*, *Astragalus eucosmus*, *A. agrestis*, *A. alpinus*, *A. diversifolius*, *Hordeum brachyantherum*, *Trifolium longipes*, *Zizia aptera*, *Antennaria anaphaloides*, *A. microphylla*, *Glaux maritima*, *Haplopappus uniflorus*, *Senecio debilis*, *Phlox kelseyi*, *Ranunculus cymbalarioides*, *Iris missouriensis*, *Trichlochin maritimum*, *Deschampsia cespitosa*, *Salix brachycarpa*, *Polygonum viviparum*, *Potentilla fruticosa*, *Thalictrum alpinum*, *Pedicularis groenlandica*, *Betula glandulosa*, and *Hesperochiron pumilus*.

Threats: Most sites are grazed by cattle. Moseley (1991) noted that two occurrences along Road Creek appear to be grazed the heaviest, followed by the Lower Wildhorse and Whiskey Springs occurrences. Very little flower and fruit production was seen at the two Road Creek occurrences in 1991, possibly resulting from heavy and constant cattle grazing. The riparian zone is very narrow at these two sites and the adjacent upland vegetation is very xeric. In contrast, the dense and vigorous Lower Wildhorse occurrence, while being heavily grazed, occurs in a very wide

riparian zone surrounding relatively mesic sagebrush-steppe communities. It appeared that cattle disperse widely throughout the valley bottom, as compared to Road Creek where the cattle were concentrated in the narrow riparian corridor. The long-term effects of livestock grazing on these populations is unknown, however, research on another rare *Astragalus* (Sugden 1985) found that livestock grazing may have considerable long-term effects on population viability. Undoubtedly, these practices have been taking place for many years.

Road building is another threat to park milkvetch populations. Several roads have undoubtedly impacted populations in the past, but the full extent of this is unknown because the habitat is already destroyed. Road building represents a direct threat to a population, in contrast to cattle grazing with its more subtle, indirect effects.

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***Astragalus paysonii* (Rydb.) Barneby**

Common Name: Payson's milkvetch

Family: Fabaceae (Pea)

Status: Global Priority 3

Rank: G3/S3

Description: Payson's milkvetch is an upright, multi-stemmed perennial herb growing to 50 cm tall. Stem leaves are 4-9 cm long and pinnately compound with 7-15 oval to wedge shaped leaflets. Stipules are free to the base. The small, pea-like flowers are white with a tinge of lilac and are borne in numerous, loose, axillary racemes. Fruit pods are crescent-shaped, 10-17 mm long, and glabrous or white-hairy. Each fruit has a distinct groove on the upper side and has two separate locules. At maturity, fruits are straw-colored and deflexed (USDA Forest Service 1991; Dorn 1992; Fertig and Marriott 1993; Fertig et al. 1994).

Distinguishing Features and Similar Species: *Astragalus candaensis* has cream or pale yellow flowers, a congested inflorescence, and erect fruit. *A. alpinus* has black-haired fruit and fused stipules. In the absence of fruits or flowers, *Hedysarum* spp. can be distinguished by their united stipules and conspicuously veiny leaflets (Dorn 1992; Fertig and Marriott 1993; Fertig et al. 1994).

Range: Regional endemic of the Clearwater Mountains of north-central Idaho, the Palisades Reservoir area of east-central Idaho, and the Wyoming, Salt River, and Gros Ventre ranges of western Wyoming (Lincoln, Teton, and Sublette counties).

Habitat, Ecology and Associated Species: Occurs primarily in disturbed area such as recovering burns, clear cuts, road cuts, and blow downs. Usually found on sandy soils with low cover of forbs grasses. Elevation 6700-9600 feet (Fertig and Marriott 1993). Historically, this species is probably in decline due to fire suppression in western National Forests. Most populations are very small and probably are unable to persist over long periods of time without some form of disturbance. Today, the plants thrive best in human-disturbed sites, such as road cuts and recovering clear-cuts.

Threats: Threatened primarily by succession which makes habitats unsuitable for long-term persistence. This species requires periodic disturbances to create new habitat or keep competing late-seral species or weeds at bay.

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Botrychium lanceolatum* (Gmel) Angstr. var. *lanceolatum

Common Name: Lance-leaved moonwort

Family: Ophioglossaceae (Adder's-tongue)

Status: State Sensitive

Rank: G5T4/S3

Technical Description: Plants mostly 0.5-3.5 dm tall, glabrous from the first; sterile blade sessile or nearly so, attached near the summit of the plant (the common stalk 3-25 cm long), deltoid in outline, as wide as or wider than long, commonly 1-6 cm long and 1-9 cm wide, rather openly bipinnatifid or subbipinnatifid, the pinnae and pinnules mostly longer than wide; fertile stalk short, mostly (0.5) 1-3 cm long; fruiting spike 1-5 cm long; sterile blade and fertile spike both completely reflexed in bud; bud glabrous, wholly concealed by the base of the common stalk. N=45 (Hitchcock et al. 1969).

Nontechnical Description: Stems producing 1 frond per season, bearing main roots mostly 0.5-1 mm in diameter; stipes 3-14 cm long; fertile portion of the laminae 1.5-8 cm long; sterile portion of the laminae 1-6 cm long, 1-6.5 cm wide, obtuse at the base, acute or round at the apex, pinnate-pinnatifid to 2-pinnate-pinnatifid, with scarcely lobed to pinnatifid, acute pinna apices and acute to round pinnule and segment apices, the segments lanceolate to oblong, the margins entire.

Distinguishing Features and Similar Species: Lance-leaved moonwort is a slightly larger, darker green fern with distinctly triangular leaf high up on the stalk. Lance-leaved moonwort resembles a tiny *Botrychium virginianum*, which is easily distinguished by its thin-textured, non-leathery, and lacy-cut leaf.

Range: Alaska to California; Idaho, Montana, Wyoming, Nevada, Colorado, Utah, New Mexico, and Arizona at high elevation.

Habitat, Ecology and Associated Species: Lance-leaved moonwort is more likely to be in moist, cool, rich, more acid woodlands, but also occurs on rocky slopes and in meadows where the soil is cold, mostly subacid. Associated species is *Botrychium matricariifolium*.

Threats: Lance-leaved moonwort habitat is impacted by road construction/maintenance, logging and timber salvage, stream restoration, invasion of noxious weeds, trampling by humans and animals, off-road vehicles and is susceptible to any disturbance that would open the canopy.

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Hitchcock, C. L., A. Cronquist, M. Owenby, and J. W. Thompson. 1969. Vascular Plants of the Pacific Northwest, Part 1: Vascular cryptogams, gymnosperms, and monocotyledons. University of Washington Press, Seattle. 914 pp.

***Botrychium simplex* E. Hitchc.**

Common Name: Least moonwort

Family: Ophioglossaceae (Adder's-tongue)

Status: State Priority 2

Rank: G5/S2

Technical Description: Plants mostly 3-13 cm tall, glabrous from the first; sterile blade with an evident, sometimes sheathing petiole, gen. 1.0-3.5 cm long, attached from ground level (common in our area) to high on the common stalk, which is seldom more than 2.5 cm long; sterile leaf highly variable from simple to broadly ternate with 3-main pinnate branches each with 2-4 pairs of pinnae at maturity; pinnae segments subflabellate to oblong, the lowest one commonly larger than the others, margins generally entire with rounded apices, flat, often approximate; fertile stalk mostly 2-8 cm long; sterile blade and fertile spike both erect or nearly so in bud; bud glabrous, wholly concealed by the base of the common stalk (Cronquist 1969; Lellinger 1985; Wagner and Devine 1989).

Nontechnical Description: A small, somewhat fleshy, perennial growing from 3-13 cm tall. Plants arise from a single stem that divides into a single fertile and sterile "leaf", attached to a common stem seldom more than 2.5 cm long. The sterile leaf is attached from ground level (common in our area) to high on the common stalk and is highly variable in shape and size. The sterile leaf can be simple or more commonly divided into three main branches (ternate), each with 2-4 pairs of pinnae, the lowest generally the largest. Pinnae are fan-shaped, flat, slightly overlapping with entire, rounded outer margins. The fertile portion ranges from 2-8 cm long.

Distinguishing Features and Similar Species: As with all moonworts, least moonwort is a rather inconspicuous species that must be searched for diligently. It grows in moist to rather dry open, grassy meadows and woods in deep shade and duff. Within these habitats, search for a small, somewhat fleshy fern with a single fertile and sterile frond portion. The sterile frond is long-stalked, often attached at ground level and variable from simple to three main branches with fan-shaped segments that slightly overlap.

Larger, mature plants of least moonwort are difficult to confuse, since no other species in this area has a sterile leaf that is divided into three main branches. Smaller plants, however, could be confused with *Botrychium crenulatum* or *B. lunaria*. Least moonwort can be distinguished from these taxa based on the shape of the sterile portion of the frond, which is generally attached near ground level (our area) and has few fan-shaped pinnae that somewhat overlap. In contrast, *B. lunaria* and *B. crenulatum* have once pinnate sterile leaves that attach to a distinct common stalk and both species have broadly fan-shaped pinnae.

Additionally, *B. lunaria* is fleshy, bluish-green in color with 4-7 pairs of very crowded pinnae that overlap and *B. crenulatum* is herbaceous, yellow-green in color with an average of three pairs of separate pinnae that do not overlap and have distinctly crenate margins (Wagner and Devine 1989; Cronquist 1969).

Range: Least moonwort is regarded as rare and local but has an enormous range in North America and is probably much more common than usually assumed (Wagner and Devine 1989). It is known to occur from high elevations in southern California and North Carolina northward to Alaska and Newfoundland, and is also widespread in the Old World (Wagner and Devine 1989). In Idaho, least moonwort is found in Bonner, Boundary, Custer, Idaho, and Latah counties.

Habitat, Ecology and Associated Species: Least moonwort grows in a wide variety of habitats including meadows, barrens, and woods in usually subacid soil (Lellinger 1985). The small northern Idaho population occurs in the understory of a shaded *Thuja plicata*/*Gymnocarpium dryopteris* (western redcedar/oakfern) habitat type (Cooper et al. 1987). Associated species throughout the range include *Pinus contorta*, *P. ponderosa*, *Pseudotsuga menziesii*, *Hypericum perforatum*, *Leucanthemum vulgare*, *Centaurea biebersteinii*, *Hieracium caespitosum*, *Antennaria microphylla*, *A. rosea*, *Bromus inermis*, *Poa pratense*, *Plantago lanceolata*, *Larix occidentalis*, *Spiranthes romanzoffiana*, *Achillea millefolium*, *Agrostis stolonifera*, *Dactylis glomerata*, *Berberis repens*, *Equisetum arvense*, *Carex lenticularis*, *Veronica americana*, *Solidago canadensis*, *Danthonia intermedia*, *D. californica*, *Veratrum californicum*, *Betula glandulosa*, *Juncus* spp., *Alnus incana*, *Salix myrtilifolia*, *S. scouleriana*, *Deschampsia cespitosa*, *Danthonia intermedia*, *Clintonia uniflora*, *Pachistima myrsinites*, *Coptis occidentalis*, *Goodyera oblongifolia*, *Taxus brevifolia*, and *Asarum caudatum*.

Threats: A closed canopy will probably shade out least moonwort. All terrain vehicles, building, road construction, cattle grazing, and timber extraction are threats. Potential natural threats might include windthrow or trampling by large game animals.

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***Carex buxbaumii* Wahl.**

Common Name: Brown Bog Sedge

Family: Cyperaceae (Sedge)

Status: State Sensitive

Rank: G5/S3

Technical Description: Culms arising singly or few together from well-developed creeping rhizomes, mostly 3-10 dm tall, strongly aphyllopodic, not surrounded by old sheaths from previous years (though these are often persistent separately from the new stems); leaves glabrous, elongate, mostly 2-4 mm wide; spikes mostly 2-5, approximate or somewhat remote, erect or closely ascending, sessile or (especially the lower) with more or less well-developed peduncle, the terminal spike gynaeandrous, 1-3 cm long, the lateral ones pistillate, about the same length or somewhat shorter; bract subtending the lowest spike sheathless or nearly so, from distinctly shorter to somewhat longer than the inflorescence; pistillate scales lanceolate to lanceovate, brown to purplish black with a usually paler midrib, surpassing the perigynia, tapering to an awn-tip 0.5-3 mm long; perigynia 2.7-4.3 mm long, beakless or very shortly beaked, rather narrowly elliptic to sometimes elliptic-obovate or elliptic-ovate, up to barely over half as wide as long, firm-walled, not strongly flattened, light gray-green, densely papillate all over, with prominent marginal nerves and 6-8 inconspicuous or obscure nerves on each face; stigmas 3; achene trigonous, 1.4-1.9 mm long, somewhat narrower and much shorter than the perigynial cavity (Hitchcock et al. 1969).

Nontechnical Description: Stems arising singly or few together from well-developed creeping rhizomes, mostly 3-10 dm in height, lowest leaves strongly reduced to scales; new stems are not

surrounded by old sheaths from previous years (though old sheaths can be found separately from the new stems). Leaves are smooth and 2-4 mm in width. Spikes mostly 2-5, borne erect or closely ascending, and loosely sessile on the stem. On the terminal spike, pistillate flowers are borne above the staminate flowers; the lateral spikes are entirely pistillate. Bract which subtends the spike is sheathless, and will sometimes exceed the inflorescence.

Distinguishing Features and Similar Species: *Carex buxbaumii* is a well-marked and distinct species. The light gray-green, densely papillate perigynia give the inflorescence a distinctive coloration than makes field inventory for flowering stems rather easy. The plants retain this distinctive aspect until the perigynia cure to a pale straw color, which makes them more difficult to spot at a distance.

Range: The brown bog sedge is distributed throughout the boreal regions of the Northern Hemisphere; although it is widespread, it is relatively uncommon and infrequently collected. In the western United States it reaches as far south as Colorado, Utah, and central California, but is not recorded for Nevada. *Carex buxbaumii* is rare in Idaho and is known from three widely separated areas (Caicco 1988).

Habitat and Associated Species: Throughout its range, the brown bog sedge can be found in peat bogs, marshes, wet meadows, and other wet places (Hitchcock et al. 1969). *Carex lasiocarpa* and *Deschampsia cespitosa* are common associates. Associated shrubs include *Alnus incana*, *Betula glandulosa*, *Salix bebbiana*, and *Spiraea douglasii*. *Carex utriculata* is common on adjacent sites that are apparently too wet for *Carex buxbaumii*.

Threats: Any change in local hydrology could negatively impact brown bog sedge populations. Livestock grazing may possibly have a negative effect on certain populations.

References:

Hitchcock, C.L., A. Cronquist, M. Ownbey, and J.W. Thompson. 1969. Vascular plants of the Pacific Northwest. Part 1: Vascular cryptogams, gymnosperms and monocotyledons. University of Washington Press, Seattle, WA. 914 pp.

***Carex flava* L.**

Common Name: Yellow Sedge

Family: Cyperaceae (Sedge)

Status: State Monitor

Rank: G5/S3

Description: Stems 4 to 32 inches tall, clustered, not at all rhizomatous, phyllopodic. Leaves basal and cauline, flat, mostly 1/16 to 1/4 inch wide, the basal sheaths pale at the base. Terminal spike slender, wholly staminate or with some distal perigynia, 1/4 to 1 inch long. Lateral spikes pistillate, 2-5, short and stout, 1/4 to 2/3 inch long, all sessile or short-pedunculate and crowded close to each other and to the staminate spike, or one or more of the lower ones more or less remote and more evidently pedunculate. One or more bracts with conspicuous, elongate, spreading blade much surpassing the inflorescence, the bracts subtending the spikes in the terminal cluster sheathless or nearly so, those subtending the more remote spikes (when these are present) with a more or less well-developed sheath as well as a long blade. Perigynia mostly 1/8 to 1/4 inch long, most of them spreading and evidently falcate-recurved, relatively slender and tapering gradually to the poorly defined beak, which is 1/16 inch long, the perigynium strongly yellowish toward the base, usually more greenish (or eventually brownish) distally, prominently several-nerved on the upper surface, more obscurely so on the lower. Stigmas 3. Achenes 1/16 inch long, a larger part of the perigynium thus empty. Adapted from Hitchcock et al. (1969).

Distinguishing Features and Similar Species: Diagnostic characteristics include glabrous perigynia, lower pistillate scales that are not at all leaf-like, the bracts subtending the spikes are all sheathless, leaf surfaces are glabrous, and the stems are clustered, not rhizomatous. *C. flava* is very similar to *Carex oederi*. *C. oederi* has smaller perigynia, 1/16 to 1/8 inch long versus 1/8 to 1/4 inch long for *C. flava*. *C. oederi* has narrower, channeled leaves, 1/16 to 1/8 inch wide versus wider, flatter leaves 1/16 to 1/4 inch wide for *C. flava*, which then appears leafier than *C. oederi*.

Range: Circumboreal; southern British Columbia to Newfoundland, south to New Jersey, Pennsylvania, Indiana, and Montana.

Habitat, Ecology and Associated Species: Wet meadows, forested wetlands, bogs and shores of streams and lakes. *Carex flava* is an obligate wetland species (USFWS 1988). Seeds, after being released, remain dormant in the soil for one to several winters. After a period of low-temperature enforced dormancy, the seeds may or may not germinate the following year. Seeds from different plants or even the same plant may require different conditions to germination (Schmid 1984). This strategy may insure the long-term survival of this taxon at a favorable site. Associated species in Idaho include *Carex lasiocarpa*, *C. aquatilis*, *C. buxbaumii*, *C. utriculata*, *Scheuchzeria palustris*, *Schoenoplectus subterminalis*, *Nuphar polysepalum*, *Juncus balticus*, and *Cicuta bulbifera*.

Threats: Threats to the taxon include grazing, timber harvesting and changes in hydrology.

References:

Hitchcock, C. L., A. Cronquist, M. Owenby, and J. W. Thompson. 1969. Vascular plants of the Pacific Northwest, Part 1: Vascular cryptogams, gymnosperms, and monocotyledons. University of Washington Press, Seattle. 914 pp.

Schmid, B. 1984. Life histories of clonal plants of the *Carex flava* Group. *Journal of Ecology*

72: 93-114.

U.S. Fish and Wildlife Service. 1988. National list of vascular plant species that occur in wetlands. USFWS Biological Report 88 (24).

Washington Natural Heritage Program. 2000. Field guide to selected rare vascular plants of Washington. Washington Department of Natural Resources. Olympia, WA.

***Carex livida* (Wahlenb.) Willd.**

Common Name: Pale sedge

Family: Cyperaceae (Sedge)

Status: State Sensitive

Rank: G5/S2

Description: Grass-like perennial growing in small clumps with flowering stems up to 20 cm tall arising from long-slender rhizomes. Leaves are deeply channeled, 1-4 mm wide, clustered on the lower third of the stem, and have a glaucous blue-green color. The inflorescence consists of 2-3, or sometimes 4, loosely clustered spikes. The narrow terminal spike is usually wholly staminate. The lateral spikes are pistillate and nearly sessile. Flowers have 3 stigmas, and the oval-shaped scales subtending the perigynia have a green midvein stripe, brown marginal stripes, and membranous edges. The perigynia are 2-4 mm long, pale green, elliptic or ovate in outline, and have a minutely bumpy surface. Fruit matures in late June-August.

Distinguishing Features and Similar Species: The pale blue-green, stiff, channeled, more or less falcate-shape leaves are quite distinctive in the field. *Carex aquatilis* has long-stalked lateral spikes and flowers with two stigmas. *Carex limosa* is rhizomatous and has three stigmas, but has drooping lateral spikes on slender stalks. *Carex buxbaumii* has 3 stigmas and bluish-green foliage, but differs in having pistillate flowers at the tip of the upper spike and long-awned scales.

Range: Circumboreal; in the western part of North America it reaches from southern Alaska south to northwestern California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, and Utah. In Idaho pale sedge is known from four widely separated areas. It occurs in the Panhandle region; the Sawtooth Valley in the central mountains; the upper Lemhi River in east-central Idaho; and the Greater Yellowstone region near the state's eastern border.

Habitat, Ecology and Associated Species: Bogs and fens, swampy woods, or sometimes on mineral substrates adjacent to slow moving streams; from low to moderately high elevations.

Threats: Information not available.

References:

Caicco, S.L. 1987. Field investigations of selected sensitive plant species on the Idaho Panhandle National Forest. Unpublished report prepared for the Panhandle National Forests by the Idaho Department of Fish and Game, Conservation Data Center, Boise. 44 pp + appendices.

Caicco, S. L. 1988. Studies in the genus *Carex* on the Idaho Panhandle National Forests. Unpublished report prepared for the Panhandle National Forests by the Conservation Data Center, Idaho Department of Fish and Game, Boise. 26 pp. plus appendices.

Hurd, E. G., N. L. Shaw, J. Mastrogiuseppe, L. C. Smithman, and S. Goodrich. 1998. Field guide to intermountain sedges. General Technical Report RMRS-GTR-10, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT. 282 pp.

Montana Natural Heritage Program. Montana rare plant field guide. Available at:
<http://nhp.nris.state.mt.us>.

Moseley, R. K., R. J. Bursik, F. W. Rabe, and L. D. Cazier. 1994. Peatlands of the Sawtooth Valley, Custer and Blaine Counties, Idaho. Cooperative Cost Share Project, Sawtooth National Forest, The Nature Conservancy, and Idaho Conservation Data Center, Idaho Department of Fish and Game. 64 pp. plus appendices.

Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado rare plant field guide. Prepared for the Bureau of Land Management, the U.S. Forest Service, and the U.S. Fish and Wildlife Service by the Colorado Natural Heritage Program.

***Cicuta bulbifera* L.**

Common Name: bulb-bearing water-hemlock

Family: Apiaceae (Parsley)

Status: State Sensitive

Rank: G5/S2

Description: Plants generally single-stemmed, 12 to 40 inches tall, mostly relatively slender, not much thickened at the base and sometimes without thickened roots. Leaves all cauline, the middle and lower ones more or less dissected, with narrowly linear, entire or obscurely few-toothed segments mostly 1/16 inch wide and 1/4 to 1 2/3 inch long, the upper and rameal ones

more or less reduced, with fewer segments, or undivided, many of them bearing one or more axillary bulbils. Umbels frequently wanting, or present but not maturing fruit, the rays mostly ½ to 1 inch long. Fruit orbicular, 1/16 inch long, constricted at the commissure, the ribs broader than the narrow intervals. Identifiable August through September. Adapted from Hitchcock et al. (1961).

Distinguishing Features and Similar Species: This species can be distinguished from *Cicuta douglasii* by its narrow leaflet segments (<¼ inch wide) and its bulblet bearing upper leaf axils.

Range: The taxon is known from Newfoundland to British Columbia, south to Virginia, Indiana, Nebraska, and Oregon.

Habitat, Ecology and Associated Species: Occurs along the edges of marshes and lake margins, in bogs, wet meadows, shallow standing water and along slow moving streams. It can grow on hummocks and floating mats as well as on partially submerged rotting logs and even on beaver dams. Some sites, but not all, have a significant Sphagnum component. Many sites are dominated by a variety of sedges, including *Carex utriculata*, *C. vesicaria*, *C. lenticularis*, *C. aurea*, and *C. limosa*, among others. Other graminoids commonly present include *Scirpus* spp., *Juncus ensifolius*, *Eriophorum gracile*, *Glyceria* spp. Other native species present include *Potentilla palustris*, *Menyanthes trifoliata*, *Equisetum* spp., and *Spiraea douglasii*. *Phalaris arundinacea* is also present at some sites. *Cicuta bulbifera* is an obligate wetland species (USFWS 1988). It is extremely poisonous and should be handled with caution.

Threats: Information not available.

References:

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J.W. Thompson. 1961. Vascular plants of the Pacific Northwest, Part 3: Saxifragaceae to Ericaceae. University of Washington Press, Seattle. 614 pp.

Mulligan, G.A. 1980. The genus *Cicuta* in North America. *Can. J. Bot.* 58: 1755-1767.

U.S. Fish and Wildlife Service. 1988. National list of vascular plant species that occur in wetlands. USFWS Biological Report 88 (24).

Washington Natural Heritage Program. 2000. Field guide to selected rare vascular plants of Washington. Available at <http://www.dnr.wa.gov/nhp>.

***Drosera intermedia* Haynes**

Common Name: Spoon-leaved sundew

Family: Droseraceae (Sundew)

Status: State Priority 1

Rank: G5/S1

Description: Plants 5-20 cm tall, bearing leaves in a rosette or also at intervals for several centimeters along the stem. The ascending, spoon-shaped blades are about 4-5 mm wide, 8-20 mm long, and narrow to a long glabrous petiole 3-4 times as long as the blade. Long glandular hairs cover the upper leaf surfaces. Rosettes produce a single scape with up to 20 flowers. The corolla is white or tinged with pink and 5-8 mm long, and the sepals are up to about 5 mm long. The capsule is scarcely as long as the sepals. After the growing season, plants die back to an over-wintering bud. Flowers June - August.

Distinguishing Features and Similar Species: *Drosera intermedia* is a distinctive small, low-growing carnivorous plant. The basal rosette of leaves are covered by long, reddish, glandular hairs. A few white flowers occur on short stems, however, they bloom very early and the plants are most often found in fruit. The leaves of *D. rotundifolia* are usually more spreading than ascending and more rotund in outline, generally being as broad as long. The leaves of *D. anglica* look more similar to *D. intermedia*, but have stipules adnate to the petiole except at the tip versus the stipules free nearly to the base for *D. intermedia*. In addition, the seeds of *D. anglica* are spindle-shaped and blackish, as opposed to the ellipsoid-obovoid, reddish-brown seeds of *D. intermedia*.

Range: North America, Europe, Asia Minor, and Cuba. Its main distribution in North America is between Minnesota and Newfoundland, south to eastern Texas and Florida, with isolated stations in Manitoba, Saskatchewan, British Columbia, and Idaho. Occurs in two separate areas in Idaho - the Selkirk Mountains in Boundary County, and the Sawtooth Valley in Custer County.

Habitat, Ecology and Associated Species: Bogs, fens, and moist, acidic, sandy soils; often in standing water. Idaho populations occur in peatland habitats.

Threats: Information not available.

References:

Moseley, R.K., R.J. Bursik, F.W. Rabe and L.D. Cazier. 1994. Peatlands of the Sawtooth Valley, Custer and Blaine Counties, Idaho. Cooperative Cost Share Project, Sawtooth National Forest, The Nature Conservancy, and Idaho Conservation Data, Idaho Department of Fish and Game. 64 pp. plus appendices.

***Epilobium palustre* L.**

Common Name: Swamp willow-weed

Family: Onagraceae (Evening-primrose)

Status: State Monitor

Rank: G5/S3

Technical Description: Simple to branched perennial 1-4 (8) dm tall, from slender rhizomes which often end in small turions, finely canescent-strigillose throughout or only sparsely so below; leaves mainly opposite, sessile or subsessile, entire to slightly denticulate, obtuse, linear to lanceolate or narrowly oblong, (1) 2-6 cm long, mostly 4 (8) mm broad; inflorescence loosely racemose to paniculate; pedicels slender, 1-4cm long; free hypanthium 1-1.5 mm long, the sepals about twice as long; petals white to pinkish, notched, 3-5 mm long; styles shorter than the petals; stigma about 1 mm long, 4 lobed, but the lobes usually completely coalescent; capsule linear, 3-6 cm long; usually canescent; seeds minutely papillate, the coma white to tawny.

Nontechnical Description: Swamp willow-weed has an erect, simple to few-branched stem that is approximately 1 to 1.5 feet tall. Turions (small white bulbs) are present at the lower stem/upper root interface. The flowers are small, generally light pink to white, and are borne on the end of the branches and stem. The leaves are narrow and somewhat revolute (margins rolled downward). The entire plant has a pale appearance due to a fine covering of small, straight, appressed hairs all pointing in the same direction.

Distinguishing Features and Similar Species: Swamp willow-weed is readily distinguished from other willow-weeds occurring in wetlands of the study area by its grayish-strigillose appearance in combination with the presence of turions.

Range: Swamp willow-weed is distributed from Alaska to the Cascades of central Washington, east to the Atlantic coast and south in the Rockies to Colorado.

Habitat, Ecology and Associated Species: All populations occur in open wetland communities with a saturated organic substrate. Associated species include *Carex aquatilis*, *C. canescens*, *C. nebrascensis*, *C. simulata*, *C. utriculata*, *Eleocharis rostellata*, *Epilobium watsonii* and *Salix pseudomonticola*.

Threats: No threats were readily apparent to populations in the high valleys of the Salmon River.

References:

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J.W. Thompson. 1961. Vascular plants of the

***Epipactis gigantea* Dougl. ex Hook.**

Common Name: Giant helleborine

Family: Orchidaceae (Orchid)

Status: State Priority 2

Rank: G3G4/S3

Technical Description: Stems 1 to many from short rhizomes, mostly 3-7 (up to 12) dm tall; leaves numerous, sheathing, the lowest blades almost lacking, but gradually enlarged upward, almost glabrous to scabridulous-puberulent, broadly elliptic-lanceolate, mostly 7-14 (19) cm long and 1.5-5 cm broad; flowers 3-15, rather showy, the racemes usually secund, the bracts gradually reduced upward, but even the uppermost one usually exceeding the ovary; sepals coppery-green, lightly brownish-veined, 12-16 mm long; petals similar to the sepals, but thinner and (at least the venation) more brownish-purple; lip 15-20 mm long, the sac with prominent, raised purplish lines leading to the base, 3-lobed, the outer (basal) lobe prominent, the blade (central lobe) about as long as the basal lobes, somewhat curved downward, triangular-ovate, the tip flattened but with uprolled margins, greenish-yellow, the basal portion much thickened, yellow, the margins thickened and erect, with numerous linear callosities leading to the sac; column 6-9 mm long; anther 4-5 mm long; capsule reflexed, 2-3.5 cm long (Hitchcock et al. 1969).

Nontechnical Description: Giant helleborine is a tall orchid with leafy stems, which reach 3 feet in height. Abundant sword-shaped leaves, up to 8 inches long, clasp the tall, usually unbranched stems. Numerous flowers are borne in a leafy-bracted inflorescence at the tops of the stems. Flowers have a sac-like lip petal that is reddish-brown. The two upper lance-shaped petals are also reddish-brown but with a greenish tinge. Three lance-shaped sepals subtend the flowers and are light green with a brownish tinge. *Epipactis gigantea* is a perennial plant that grows from a rhizome each year (Schassberger 1988).

Distinguishing Features and Similar Species: *Epipactis gigantea* is distinguished by its tall leafy stems and numerous-flowered racemes. The reddish-green flowers blend in with background vegetation and are not easily noticed. Its relatively large stature, many long leaves, and many brownish-colored flowers hanging on one side of a long raceme, combine to make giant helleborine a distinctive species when it is in flower. In a vegetative state, giant helleborine can be confused with some members of the orchid genus *Habenaria*, or more likely with *Smilacina stellata* in the lily family. These species can occur sympatrically with giant helleborine. The prominently clasping leaf bases and taller habit of giant helleborine distinguishes it from

Smilacina, and its generally more numerous and larger leaves and taller habit from *Habenaria*. Except for *E. helleborine*, no other species resembles *E. gigantea*. *E. helleborine* has escaped from cultivation in Montana. It is unknown if this has occurred in Idaho. *E. helleborine* is distinguished from *E. gigantea* by its smaller flowers and a smaller unlobed lip (Schassberger 1988).

Range: Giant helleborine occurs from central Mexico northward throughout the western United States and into southern British Columbia. In the northern portion of its range, which includes Idaho, giant helleborine typically occurs along the margins of hot springs when found at higher elevations.

In Idaho, giant helleborine has been documented at 43 sites but is believed to be extirpated from at least two of these sites. All of these populations except two in the Panhandle region occur south of the Salmon River with the majority found in the west-central part of the state.

Habitat, Ecology and Associated Species: In general, giant helleborine occurs in moist areas along streambanks, lake margins, seeps and springs, especially near thermal waters (Hitchcock et al. 1969). All populations of giant helleborine in Idaho are associated with the thermal waters of hot springs or seeps. The hot springs provide clean water with a constant flow and temperature. Such hot spring habitats are often localized along a larger watercourse and associated with various types of riparian vegetation. Associated species include *Carex vesicaria*, *Carex* spp., *Juncus* spp., *Scirpus acutus*, *Panicum occidentale*, *Mimulus guttatus*, *Oenothera hookeri*, *Hypericum formosum*, *Epilobium watsonii*, *Solidago* sp., and *Prunella vulgaris*.

Threats: Throughout its range, giant helleborine is subject to various current or potential threats. In the mountainous regions of Idaho, giant helleborine is apparently restricted to thermal water areas. This is the same pattern found in Montana (Schassberger 1988) and other parts of its northern distribution. In Idaho, habitat at almost all known sites has been altered, and several populations are known to be extirpated or at critically low numbers. Many giant helleborine populations in Idaho face current or potential threats mainly from impacts associated with recreational use of their hot springs habitats from people potentially picking plants or from more ambitious people exploring and inadvertently trampling or even dislodging the hummocks of vegetation supporting giant helleborine. Alteration of the spring flow, such as diverting hot water for soaking pools, can have serious adverse impacts.

Livestock use the area around some hot springs, but the slippery, steep nature of the springs discourages livestock use except around the perimeter. Wildlife eating the plants early in the season may, at least in part, be responsible for the depauperate nature of the giant helleborine plants at some locations. Logging in the proximity of the springs is another potential threat to the integrity of the hot spring habitat, either from altering a site's hydrology or from problems associated with erosion. Road alteration or maintenance projects may also cause problems with erosion and alteration of hydrology. The area around some hot springs has been invaded by several exotic species, especially Canada thistle.

Preserving the integrity of the hot springs habitat is crucial to maintaining the giant helleborine populations. Diverting or in any way altering the natural flow of the hot springs is likely to have adverse impacts on giant helleborine populations.

References:

Hitchcock, C. L., A. Cronquist, M. Owenby, and J. W. Thompson. 1969. Vascular plants of the Pacific Northwest, Part 1: Vascular cryptogams, gymnosperms, and monocotyledons. University of Washington Press, Seattle. 914 pp.

Schassberger, L.A. 1988. Status review of *Epipactis gigantea*. Prepared for USDA Forest Service – Region 1, Flathead National Forest Montana, Montana Natural Heritage Program.

***Helodium blandowii* (Web& Mohr) Warnst. (Musci)**

Common Name: Blandow's helodium

Family: Helodiaceae

Status: State Sensitive

Rank: G5/S2

Technical Description: Plants in loose tufts, yellow-green. Stems more or less erect, 4-13 cm long, simple or sometimes divided, regularly pinnate; branches simple, about 1 cm long; stems and branches with a dense covering of paraphyllia, the paraphyllia also on the leaf bases. Leaves appressed to somewhat crisped when dry; stem leaves 1.3-1.8 x 0.7-1 mm, more or less ovate, acuminate, narrowed to a somewhat decurrent base; margins plane or often revolute below, entire or usually serrate at least in the middle and lower part of the leaf; costa extending beyond the middle; leaf cells papillose, the papillae on the dorsal surface of the cell ends; median cells elongate, 3-5; branch leaves smaller, to about 0.8 mm long, the apical cells not papillose. Autoicous, the perigonia and perichaetia on the stem. Seta to 5 cm long. Capsule cernuous, shrunken under the mouth when dry; annulus of 3 rows of deciduous cells; cilia 2-3, long and more or less appendiculate. Spores 11-15 microns, smooth. Calyptra cucullate.

Nontechnical Description: Plants are yellow-green in color, and closely pinnately branched with the branches all in one plane like a feather. Plants are pleurocarpous, but have ascending branches. The stems are clothed in green filamentous paraphyllia, becoming brown below. The stem leaves are large, appressed except at the tips, and have paraphyllia emanating from the decurrent leaf bases. Branch leaves are small and contorted when dry. Capsules are rare.

Distinguishing Features and Similar Species: *Helodium blandowii* is likely to be confused with *Thuidium abietinum*. *H. blandowii* never occurs on dry, calcareous rock outcrops as does *T. abietinum*; thus these two superficially similar species are easily distinguished by habitat alone. *T. abietinum* has densely branched, stubby paraphyllia that are very different from those of *H. blandowii*. Other *Thuidium* species are twice pinnately branched and are prostrate in habit. *H. blandowii* always has ascending stems, much like those of *Tomenthypnum niten* (Vitt et al. 1988).

Range: In western North America, Blandow's helodium occurs south in the Cascades almost to California and south in the Rocky Mountains to Arizona. In Idaho, Blandow's helodium known occurrences are in Lemhi, Custer, Idaho, Valley, and Adams counties.

Habitat and Associated Species: Blandow's helodium occurs in minerotrophic peatlands. Associated species are *Hypnum lindbergii* and *Drepanocladus vernicosus*. Blandow's helodium sometimes occurs under sedges and shrubs around edges of mires or along streamlets in mires.

Threats: In Idaho, the peatland habitats of Blandow's helodium have been impacted by water diversion, impoundment, drainage projects, road construction, and livestock grazing throughout its range.

References:

Vitt, D. H., J. E. Marsh, and R. B. Bovey. 1988. Mosses lichens and ferns of Northwest North America. Lone Pine Publishing, Redmond, WA. 296 p.

***Primula incana* Jones**

Common Name: Mealy Primrose

Family: Primulaceae (Primrose)

Status: State Priority 1

Rank: G4/G5/S1

Description: Mealy primrose is a fibrous-rooted perennial with leafless stems 10-45 cm tall, arising from a basal rosette of leaves. The leaves usually have a mealy, whitish covering (especially below) and are elliptic or oblanceolate (0.3-1.6 cm wide, and up to 6 cm long), with slightly toothed margins and winged petioles. Seven to nine flowers are borne in head-like inflorescences surmounted by oblong involucral bracts 0.5-1 cm in length and pouched at the base. Both the bracts and calyx also have a whitish, mealy covering. The lavender corolla has notched lobes and a yellow throat; the tube is 0.4-0.8 cm and equals or slightly exceeds the calyx, which is cylindrical and 0.4-0.7 cm long. Stamens are about 1 mm long and of equal

length. The capsule is cylindrical to slightly elliptical, equaling or slightly exceeding the calyx. Flowering occurs in May to June.

Distinguishing Features and Similar Species: *Primula parryi* occurs in rocky habitats near or above treeline. The similar *P. alcalina* is found in the same habitat, but it has white flowers, and its leaves have little or no mealy covering, even below. In addition, the anther filaments of *P. alcalina* are of two different lengths.

Range: From Utah and Colorado north to Alaska and east to Quebec. Rare in southern Utah, Colorado, Wyoming, North Dakota, and Montana, more common in Canada from British Columbia east to western Manitoba, rare in the Yukon and Alaska (where it is limited to stable flood plains along rivers).

Habitat, Ecology and Associated Species: Mealy primrose appears to be restricted to wet meadow habitats with relatively stable water tables. Associated streams have a fairly constant water flow; i.e., permanent flows with little flooding in spring. Soils remain moist to saturated throughout the growing season, but there is little or no inundation. *Primula incana* is often found growing on the sides of hummocks where the density of overtopping vegetation is reduced. Hummock habitats are moist without being wet and are more open than wetter microhabitats dominated by sedges and rushes.

Common associates include *Carex simulata*, *C. nebrascensis*, *Juncus balticus*, *Agrostis stolonifera*, *Muhlenbergia richardsonis*, and *Eleocharis pauciflora*.

Threats: The effects of livestock grazing on *Primula incana* appear to be both positive and negative. Leaves of *P. incana* are all at ground level, so herbivory by livestock can eliminate seed production but will not kill the plant or remove significant photosynthetic tissue. Grazing can partially remove the overtopping canopy of grasses and sedges, allowing more light to reach *P. incana* rosettes. Furthermore, trampling by livestock undoubtedly is instrumental in causing hummocks, often the most productive habitat for *P. incana*. No significant association was found between grazing pressure and the abundance of the closely related *P. alcalina* in an Idaho study (Muir and Moseley 1994), and grazing was positively associated with the persistence of *P. farinosa*, a closely related European species (Lindborg and Ehrlen 2002).

Wetland habitats of mealy primrose can be adversely affected by water diversions that lower water tables. The wet meadow habitat can also be affected by livestock grazing. Livestock congregate in the vicinity of wetlands in summer for the lush, succulent vegetation and proximity to water. Mealy primrose is low to the ground and may benefit by having the canopy of dominant graminoids reduced. Trampling by cattle may also benefit this species by creating mesic microhabitats on the tops and sides of the hummocks. However, livestock grazing in the uplands can reduce vegetal cover, thereby increasing runoff, flash flooding and channel downcutting. The lowered water table that accompanies downcutting causes a loss of wetland habitat, which could result in population declines for this plant.

References:

Kelso, S. 1987. Systematics and biogeography of the arctic and boreal species of *Primula*. Ph.D.

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***Ranunculus gelidus* Kar. & Kir.**

Common Name: Arctic Buttercup

Family: Ranunculaceae (Buttercup)

Status: State Monitor

Rank: G4/S1

Description: Arctic Buttercup is a short-lived perennial with fibrous roots and 1 to several slender, erect or ascending stems that are 3-9 cm tall. The basal leaves have long petioles and broadly spade-shaped blades that are 1-2 cm long and deeply palmately divided into 3-13 oblong lobes. Stem leaves are lacking or reduced to small, 3-lobed, leaf-like bracts. Foliage is glabrous below but sparsely short-hairy above. Flowers are generally solitary at the stem tips. The 5 spreading or reflexed, purplish sepals are 2-5 mm long, and the yellow petals are 3-5 mm long and narrow into a short basal stem. There are numerous stamens. There are 30-80 glabrous achenes; each is ca. 2 mm long with a short beak and borne in a short-cylindric cluster. Mature fruit in August.

Distinguishing Features and Similar Species: *Ranunculus* is a large genus; a technical manual should be consulted for identification. *R. eschscholtzii* has petals greater than 8 cm long, *R. verecundus* has seeds less than 2 mm long, and *R. pygmaeus* has petals usually less than 3 mm long.

Range:

Habitat, Ecology and Associated Species: Moist, open soil on tundra and talus slopes in the alpine zone.

Threats:

References:

Montana Natural Heritage Program. 2004. Montana rare plant field guide. Helena, MT

***Rhynchospora alba* (L.) Vahl.**

Common Name: White beakrush

Family: Cyperaceae (Sedge)

Status: State Priority 1

Rank: G5/S2

Technical Description: Culms densely tufted, (0.8) 1.5-5 dm tall, slender, with several cauline leaves, the lowest of these more or less reduced, often to mere scales, the others slender and elongate, up to 1 mm wide, channeled or triquetrous to thick and flat; inflorescence of 1-3 compact, head-like clusters mostly 5-15 mm wide, the terminal one larger than the others and subtended by an inconspicuous bract longer or shorter than the head, the lateral ones, when present, peduncled and arising from within the sheaths of more or less well-developed leaves; spikelets light brown, small, mostly 3-5.5 mm long, 2 (3) -flowered, maturing 1 or 2 achenes; bristles 10-12, well-developed, stiffly connivent, retrosely minutely barbellate, exceeding the body of the achene and sometimes also exceeding the tubercle; achene lenticular, the body biconvex, 1.5-2 mm long, faintly patterned, broadest above the middle, tapering to a narrow, often substipitate base, and capped by an elongate, narrow tubercle; style-branches elongate (Cronquist 1969c).

Nontechnical Description: White beakrush is a grass-like herb with narrow leaves growing in small, densely tufted clumps. The thin stems are triangular and solid, less than one 1 foot tall. The inflorescence has 1-3 compact, head-like clusters that are whitish in appearance, especially at anthesis.

Distinguishing Features and Similar Species: White beakrush could be confused with a sedge (*Carex*), however, the whitish, head-like inflorescences and fruits that have bristles but lack perigynia is quite distinctive on close examination.

Range: White beakrush is interruptedly circumboreal, but not at the highest latitudes; in North America, it is distributed from Newfoundland to North Carolina, inland to the Great Lakes region and occasionally to Saskatchewan, the range perhaps continuous across southern Canada to the Pacific; where it is found from the Alaska panhandle to central California, chiefly west of the Cascade-Sierran summits, but also inland in northern Idaho. In the Northern Region, the Ecosystem Classification Handbook (USDA Forest Service 1987) lists it as occurring only in Idaho.

In Idaho, white beakrush is known only from five sites despite the fact that considerable floristic exploration has taken place recently in Idaho wetlands, especially in northern Idaho. The five populations occur in two widely disjunct areas: at Tule Lake in Valley County; and four sites in Bonner (Kaniksu Marsh RNA, Bailey Bog, Chase Lake) and Boundary (Perkins Lake) counties. The Tule Lake population was discovered by Bob Bursick of the University of Idaho Herbarium in 1987, and represents a significant rare extension for this rare species. Moseley discovered a small but dense population at Perkins lake in 1989, at the north end of the lake.

White beakrush is not known to occur in Montana, although Perkins Lake is less than two miles from the border.

Habitat, Ecology and Associated Species: At Perkins Lake, white beakrush is abundant in the understory of *Betula pumila* var. *glandulifera*/*Carex lasiocarpa*/sphagnum community. In addition to *Betula pumila*, six other rare plant species occur with white beakrush on the sphagnum mat at Perkins Lake, including *Carex comosa*, *Carex flava*, and *Cicuta bulbifera*. Other associated species include *Carex rostrata*, *C. limosa*, *Drosera rotundifolia*, *Menyanthes trifoliata*, and *Potentilla palustre*.

Threats: One of the private sites in the Priest River drainage has been illegally filled. The effect of this filling on the white beakrush population is unknown. No threats were observed to the Perkins Lake population in 1989.

References:

Hitchcock, C. L., A. Cronquist, M. Ownby, and J. W. Thompson. 1969.

Rhynchospora. Page 369 In: Vascular plants of the Pacific Northwest, Part 1. University of Washington Press, Seattle. 914 pp.

Moseley, R. K. 1989. Field investigations of 16 rare plant taxa occurring in wetlands on the Bonners Ferry Ranger District, Idaho Panhandle National Forest.

Unpublished report prepared for the Panhandle National Forests by the Idaho Department of Fish and Game, Conservation Data Center, Boise. 75 pp. plus appendices.

USDA Forest Service. 1987. Ecosystem classification handbook. Appendix K.

***Ribes wolfii* Rothrock**

Common Name: Wolf's currant

Family: Grossulariaceae (Currant)

Status: State Monitor

Rank: G4/S2

Technical Description: Glandular, unarmed shrub 0.5-3 m tall, low and spreading to erect; the young branches puberulent, ultimately glabrous and white-barked, but brownish-red beneath the thin outer bark; leaves bright green and glabrous on the upper surface, slightly paler and somewhat puberulent and sessile-glandular beneath, 2.5-6 (9) cm broad, deeply cordate, rather shallowly (less than half the length) (3) 5-lobed, the lobes nearly triangular, acute to obtuse, finely biserrate-dentate, the petioles subequal to the blade, puberulent and often sparsely glandular; racemes spreading to erect, 2-5 cm long, usually no longer than the leaves, the peduncles, rachis, and pedicels strongly crisp-puberulent and more or less stipitate-glandular, not jointed; bracts oblong-spatulate, (3) 4-5 mm long, equaling to twice as long as the pedicels; flowers (4) 10-20, crowded; ovary puberulent and strongly stipitate-glandular; calyx greenish-white or yellowish-green, the hypanthium flared and saucer-shaped, 1-1.5 mm long, crisp-puberulent, the lobes spreading, oblong, 2.5-3.5 (4) mm long, 3 (5)-veined; petals also spreading or semi-erect, whitish-green or yellowish-green, flabelliform, less than half as long as the calyx lobes; stamens about equaling the petals, barely exerted, the oval anthers barely 0.5 mm long; style 1.5-2 mm long, bifid less than half the length, glabrous, thickened basally; berry ovoid, black, glandular, about 10 mm long (Hitchcock et al. 1961).

Nontechnical Description: The unarmed shrub may reach a height of up to about 10 feet. Leaf blades are 0.5 to about 2.25 inches long and 0.5 to about 3.25 inches wide, orbicular in outline, and with a cordate base. The leaves are generally 3-lobed with the main lobes again shallowly lobed and the margins variously crenate to dentate. The early-blooming flowers are whitish with a shallowly cup-shaped hypanthium. Flowers are borne on racemes, which usually have fewer than 5 flowers. The inflorescences are always erect and protrude upward through the leaves. Fruits are a purple-black berry covered with rust-colored, glandular hairs and are borne on erect (rather than drooping) peduncles.

Distinguishing Features and Similar Species: Distinguishing field characteristics include its unarmed habit, relatively few flowered and erect inflorescence, purplish fruits covered with rust-colored, glandular hairs, and relatively shallowly lobed leaves. Additionally, glands on the underside of the leaf are more clear than yellow and are small. Leaves are smaller than look-

alike *Ribes viscosissimum* and lack hairs on the upper surface. The foliage is not malodorous as in *R. viscosissimum*. Vegetative specimens of *R. wolfii* are sometimes confused with *R. hudsonianum*. Both have sessile crystalline glands on the lower surface of the leaves. In *R. wolfii*, these glands are more clear than yellow, smaller, and they are seldom noticeable on the often puberulent petioles and young twigs. In *R. hudsonianum*, the glands are yellowish, large, and more conspicuous, and they often extend down the less puberulent petioles and twigs (Welsh et al. 1987).

Range: Wolf's currant occurs chiefly in the mountains of Utah and Colorado to New Mexico and Arizona, but also in the Blue Mountains of southeast Washington, and the Seven Devils Mountains in Idaho County, Idaho.

Habitat and Associated Species: *Ribes wolfii* flowers in early spring and fruits are mature by late August. It is an understory shrub in subalpine and montane habitats of moderate elevations of 4,000 to 5,600 feet and does not appear to occur in openings with full sunlight or in densely forested stands. Occasionally, Wolf's currant occurs in fractured basalt. Associated species are mountain brush, aspen, Douglas-fir, and spruce-fir communities.

Threats: Logging and road construction/maintenance could pose a threat, especially timber harvest practices that may remove too much of the canopy.

References:

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J. W. Thompson. Vascular plants of the Pacific Northwest. Part 3. Saxifragaceae to Ericaceae. University of Washington Press, Seattle, WA. 614 pp.

Welsh, S. L., D. Atwood, S. Goodrich, and L. C. Higgins. 1987. A Utah flora. Great Basin Naturalist Memoirs, No. 9. 894 pp.

***Salix farriae* Ball**

Common Name: Farr willow

Family: Salicaceae (Willow)

Status: State Priority 2

Rank: G4/S1

Description: (From Hitchcock 1964) Branching shrub (2) 3-10 dm tall; young twigs slightly puberulent, soon glabrate; leaves relatively small, only slightly hairy at first, but soon glabrous, evidently glaucous beneath; stipules small and soon deciduous, though sometimes green; petioles

short, 2-8 mm long; leaf blades entire or minutely and obscurely serrulate, elliptic or elliptic-obovate, the better-developed ones mostly 3-5 (7) cm long and 1-2 (3) cm wide; aments coetaneous to serotinous, on short leafy peduncles; scales brown or blackish; staminate aments slender, 1-2 cm long; stamens 2; filaments glabrous; pistillate aments 1.5-3 cm long at maturity; ovary and capsule glabrous, the capsule 4-6 mm long, on a short pedicle 1 mm long or less; style short but evident, 0.4-0.7 mm long, longer than short, more or less bilobed stigmas.

Distinguishing Features and Similar Species: *Salix farriae* has a low stature (1-2 m), essentially glabrous, entire or inconspicuously toothed leaves that are glaucous beneath. Capsules are glabrous in aments on leafy flowering branches. The twigs of *Salix planifolia* are less hairy and the lower leaf surfaces are sparsely hairy, capsules are pubescent, and aments are sessile or subsessile. *Salix barclayi* is usually at least 2 m tall and has toothy leaf margins, longer flowering branchlets and styles and larger anthers. *Salix pseudomonticola* has sessile aments and toothed leaf margins. *Salix lemmonii* has glaucous twigs and hairy capsules (Brunsfeld and Johnson 1988).

Range: Occurs irregularly from Alaska to Yukon to Manitoba, southeast British Columbia, western Montana, western Wyoming, central Idaho and eastern Washington. In Idaho it is known from our occurrences in Custer County.

Habitat, Ecology and Associated Species: *Salix farriae* occurs in moist subalpine meadows and shrublands. Associated species may include *Salix brachycarpa*, *Salix planifolia*, *Salix wolfii*, *Pentaphylloides floribunda*, *Betula glandulosa*, *Carex aquatilis*, *Carex utriculata*, *Deschampsia cespitosa*, *Juncus balticus*, and *Phleum alpinum*.

Threats: Two of the populations support less than ten plants and the viability of the populations is questionable due to low numbers. Human impacts to the populations are minor due to remoteness, though livestock use has occurred at the West Fork Pahsimeroi population.

References:

- Brunsfeld, S. J. and F. D. Johnson. 1988. Field guide to willows of east-central Idaho. Bull. No. 39. Forest, Wildlife and Range Experiment Station, University of Idaho, Moscow. 95 pp.
- Hitchcock, C. L. 1964. *Salix*. Pages 37-70 In: Hitchcock, C. L., A. Cronquist, M. Ownbey, and J. W. Thompson; Vascular plants of the Pacific Northwest, Part 2; University of Washington Press, Seattle.

***Scheuchzeria palustris* L.**

Common Name: Pod grass

Family: Scheuchzeriaceae (Pod grass)

Status: State Priority 2

Rank: G5/S2

Technical Description: Flowering stems (1) 2-4 dm tall, covered with marcescent leaves at base; basal leaves 1-4 dm long, the cauline gradually reduced upward, the ligule (1) 2-10 dm long, the blade erect, 1-3 mm broad; racemes 3- to 12- flowered; pedicles up to 25 mm long in fruit, axillary to well-developed bracts; perianth greenish-white, the segments oblong, 1-nerved, about 3 mm long; follicles 5-8 (10) mm long, compressed, divergent, light greenish-brown, connate only at the base, the stylar beak 0.5-1 mm long; seeds 4-5 mm long (Hitchcock 1969).

Nontechnical Description: Pod grass is a trailing, strongly rhizomatous graminoid, with each erect stem having three or four stiff, alternate leaves arranged on opposite sides of the stem (two-ranked). Stems are about one foot tall. The obscure flowers produce three, compressed fruits arranged in a spreading, triangular cluster. The entire plant has a greenish-brown appearance.

Distinguishing Features and Similar Species: Pod grass could be confused with sedge (*Carex*) or rush (*Juncus*), however, upon close examination many differences can be seen, most notably in the fruits. It may be confused with an arrow-grass (*Triglochin*), which has mostly basal leaves and very different fruits.

Range: Pod grass is distributed from southern Alaska to Labrador and Newfoundland, south in British Columbia and Washington to northern California, and to Idaho, Wisconsin, Iowa, Indiana, and New Jersey; also in Eurasia. In the Northern Region, the Ecosystem Classification Handbook (USDA Forest Service 1987) lists it as occurring in Idaho, Montana, and North Dakota.

Pod grass is currently known from nine sites in three widely disjunct areas of Idaho: 1) Priest River valley around Priest Lake; 2) Kootenai River valley north and east of Moyie Springs; and 3) Tule Lake, east of Cascade on the Boise National Forest.

Habitat, Ecology and Associated Species: Throughout its range, pod grass can be found in bogs, where it usually occurs with sphagnum, or on lake margins, where it is often found with *Carex*. In Idaho, both of these statements hold true. At the known Idaho locations, pod grass is usually associated with one to several plants that are considered rare in Idaho. For instance, at Perkins Lake on the Bonners Ferry Ranger District, pod grass is sympatric with seven rare taxa including, *Rhynchospora alba*, and *Betula pumila* var. *glandulifera*. *Betula* is the overstory dominant here with *Carex lasiocarpa* the understory dominant. Other associates include *Carex limosa*, *Carex rostrata*, *Potentilla palustris*, and *Menyanthes trifoliata*.

Threats: Threats to two private population are known: the Bailey Bog population has been illegally filled and the Sinclair Lake population has been largely buried by gravel underlying adjacent train tracks. The Perkins Lake population appears little disturbed.

References:

- Hitchcock, C. L., A. Cronquist, M. Ownby, and J. W. Thompson. 1969.
Scheuchzeria. Page 153 In: Vascular plants of the Pacific Northwest, Part 1. University of Washington Press, Seattle. 914 pp.
- Moseley, R. K. 1989. Field investigations of 16 rare plant taxa occurring in wetlands on the Bonners Ferry Ranger District, Idaho Panhandle National Forest.
Unpublished report prepared for the Panhandle National Forests by the Idaho Department of Fish and Game, Conservation Data Center, Boise. 75 pp. plus appendices.
- USDA Forest Service. 1987. Ecosystem classification handbook. Appendix K.
FSH 12/87 R-1 Supp1. Northern Region, Missoula, MT.
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***Schoenoplectus subterminalis* (Torr.) Sojak.**

Common Name: Swaying bulrush

Family: Cyperaceae (Sedge)

Status: State Sensitive

Rank: G5/S3

Description: Swaying bulrush is a rhizomatous perennial with slender, weak stems that are 20-80 cm long and which float on the water's surface rather than emerging from it. Leaves are long and flaccid and arise mainly from near the base of the plant. The inflorescence consists of a solitary spike subtended by a green, leaf-like bract that is 1-6 cm long and held nearly erect, appearing to be a continuation of the stem. The light brown spike is composed of numerous, membranous scales, each subtending a flower consisting of 3 stamens and an ovary with 6 slender bristles arising from the base. The ovary matures into a three-sided achene that is 2-4 mm long. Flowering in late June-July, fruiting in August.

Distinguishing Features and Similar Species: The flaccid stems and aquatic habit distinguish this species from (all other) *Scirpus* in our area.

Range: Spotty distribution from southern Alaska to Oregon, disjunct to Northeastern North America south to Georgia.

Habitat, Ecology and Associated Species: Open water and boggy margins of ponds, lakes, and sloughs at 0.1-3 m depth in the valley, foothill, and montane zones.

Threats: Information not available.

References:

Bursik, R. J., and R. K. Moseley. 1992. Forty-year changes in Hager Lake Fen, Bonner County, Idaho. Cooperative Challenge Cost-share Project, Idaho Panhandle National Forests and Idaho Conservation Data Center, Idaho Department of Fish and Game. 31 pp.

Bursik, R. J., and R. K. Moseley. 1992. Vegetation and water chemistry monitoring and twenty-year floristic changes at Huff Lake Fen, Kaniksu National Forest. Cooperative Challenge Cost-share Project, Idaho Panhandle National Forests and Idaho Conservation Data Center, Idaho Department of Fish and Game. 27 pp.

Hoitsma, T. 1992. Sensitive Plant Survey, Fortine Ranger District, Kootenai National Forest. Unpublished report. 65 pp. plus appendices.

Maguire, Bassett. 1939. Distribution notes concerning plants of Glacier National Park, Montana - II. *Rhodora*. 41: 504-508.

Montana Natural Heritage Program. 2004. Montana rare plant field guide. Helena, MT

Moseley, R. K. 1991. Floristic inventory of wetlands in Fremont and Teton Counties, Idaho. Unpublished report. Idaho Department of Fish and Game, Boise, Idaho. 60 pp. plus appendices.

Rumely, J. H. 1956. Plant ecology of a bog in northern Idaho. Ph.D dissertation. Washington State University, Pullman. 85 pp.

***Triantha occidentalis* (S. Watson) Gates ssp. *brevistyla* (Hitchcock) Packer**

Common Name: Short style tofieldia, Sticky tofieldia

Family: Liliaceae (Lily)

Status: State Priority 1

Rank: G5T4/S1

Technical Description: Slender, grasslike perennial herbs 1-5(8) dm tall arising from slender, spreading rhizomes mostly less than 0.5 cm thick, with stems glabrous below or nearly so and copiously glandular-hairy above and in the subcapitate to short-racemose inflorescence, this 1-3 cm long in anthesis, often elongating in fruit and becoming 3-7 cm long; leaves mostly in basal tufts or with 1-3 sheathing up the stem a short distance, linear, and 5-15 (20) cm long, 3-8 mm

wide, mostly erect and somewhat rigid; flowers white to somewhat greenish on thin, more or less erect 1-5 (10) mm long pedicels mostly arranged in 3s, with 3 separate, or more commonly almost completely connate, membranous involucre bracts at their tips; tepals more or less spreading, oblong-obovate (2.5) 3-5.5 (6.5) mm long, the inner tepals are somewhat narrower and longer than the outer ones; stamens equaling or slightly exceeding the tepals, the filament filiform, the anther oblong, 0.5-0.5 mm long; ovary with distinct styles (0.4) 0.5-2 (2.5) mm long, these stigmatic only at the tip; capsules mostly ovoid to obovoid, strongly 3-lobed, 4-7 (9) mm long; seeds few to several, 0.6-1 (1.5) mm. long, enclosed in a spongy testa, the testa attached to the body of the brown seed except at the end (Cronquist 1977).

Nontechnical Description: Short-style sticky tofieldia is a slender, erect member of the lily family with inflorescence 2.5-5.1 cm. long, in a dense, terminal spike. The upper stems are sticky to the touch due to glandular hairs.

Distinguishing Features and Similar Species: Short-style sticky tofieldia is most likely to be confused with *Tofieldia glutinosa* ssp. *montana* (sticky tofieldia). Hairs on short-style sticky tofieldia are relatively thick, mostly ca 2 times as long as thick, tapered and semi-papillose while the hairs on sticky tofieldia are relatively slender, 3-4 times as long as thick and nearly uniform in diameter. The outer tepals on the short-style sticky tofieldia are ca 3.5 mm and the inner tepals are ca 4.2 mm. The outer tepals on sticky tofieldia are 3.5 mm and the inner ones are 4 mm.

Range: Short-style tofieldia is known from Alaska, Idaho, Oregon, Washington, Alberta, British Columbia, Ontario, and the Yukon Territory. In Idaho, short-style tofieldia is known from Bonner, Clearwater, Idaho, and Valley counties.

Habitat, Ecology and Associated Species: Short-style tofieldia occurs in meadows and moist places, especially around lakes and along streambanks.

Associated species and community type throughout its range in Idaho include *Alnus* spp., *Aster* sp., *Calamagrostis canadensis*, *Carex aquatilis*, *C. lasiocarpa*, *C. utriculata*, *Castilleja miniata*, *Drosera rotundifolia*, *Dulichium arundinaceum*, *Eleocharis pauciflora*, *Equisetum fluviatile*, *Habenaria dilatata*, *Juncus covillei*, *J. ensifolius*, *Kalmia microphylla*, *Lycopus uniflorus*, *Menyanthes trifoliata*, *Poa pratensis*, *P. palustris*, *Salix* spp., *Scirpus microcarpus*, *Senecio triangularis*, *Sphagnum centrale*/*S. angustifolium*, *Thuja plicata*, *Trientalis arctica*, *Tsuga heterophylla*, *Vaccinium oxycoccos*, and *Viola macloskeyi*.

Threats: Hydrological alterations would have a negative effect on short-style tofieldia.

References:

Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal, and P.K. Holmgren. 1977. Intermountain Flora. Vascular plants of the Intermountain West, U.S.A. Vol. 6; Columbia University Press, New York.

APPENDIX H

**ANIMAL SPECIES OF SPECIAL CONCERN IN THE HIGH VALLEYS OF THE
SALMON RIVER.**

Taxonomy, range, status, and management of animal species of special concern in the high valleys of the Salmon River.

Species	Common Name	Rank	
Fish			
<i>Acipenser transmontanus</i>	white sturgeon	?	?
<i>Oncorhynchus clarki lewisi</i>	westslope cutthroat trout	G4T3	S2
<i>Oncorhynchus mykiss</i>	steelhead (Snake River run)	G5T2T3	S2
<i>Oncorhynchus mykiss gairdneri</i>	Inland Columbia Basin redband trout	G5T4	S2S3
<i>Oncorhynchus tshawytscha</i>	chinook salmon (Snake River spring run)	G5T1	S1
<i>Oncorhynchus tshawytscha</i>	chinook salmon (Snake River summer run)	G5T1	S1
<i>Oncorhynchus nerka</i>	sockeye salmon (Snake River runs)	G5T1	S1
<i>Salvelinus confluentus</i>	bull trout	G3	S3
Amphibians			
<i>Bufo boreas</i>	western toad (northern Rocky Mountain group)	G?	S?
<i>Pseudacris triseriata maculata</i>	boreal chorus frog (not a species of special concern but see note below)	G5	S4
Birds			
<i>Aegolius funereus</i>	boreal owl	G5	S2
<i>Bucephala albeola</i>	bufflehead	G5	S3B,S3N
<i>Bucephala islandica</i>	Barrow's goldeneye	G5	S3B,S3N
<i>Falco peregrinus anatum</i>	pererine falcon	G4T3	S1B
<i>Gavia imer</i>	common loon	G5	S1B, S2N
<i>Haliaeetus leucocephalus</i>	bald eagle	G4	S3B,S4N
<i>Numenius americanus</i>	long-billed curlew	G5	S3B
<i>Oreotyx pictus</i>	mountain quail	G5	S2
<i>Otus flammeolus</i>	flamulated owl	G4	S3B
<i>Picoides arcticus</i>	black-backed woodpecker	G5	S3
<i>Picoides dorsalis</i> (<i>P. tridactylus</i>)	American three-toed woodpecker (three-toed woodpecker)	G5	S3?
<i>Sitta pygmaea</i>	pygmy nuthatch	G5	S2S3
<i>Strix nebulosa</i>	great gray owl	G5	S3
Mammals			
<i>Euderma maculatum</i>	spotted bat	G4	S2
<i>Martes pennanti</i>	fisher	G5	S1
<i>Myotis evotis</i>	long-eared myotis	G5	S3?
<i>Myotis volans</i>	long-legged myotis	G5	S3?
<i>Myotis yumanensis</i>	Yuma myotis	G5	S3?