WETLAND CONSERVATION STRATEGY
FOR THE WEST-CENTRAL MOUNTAIN VALLEYS OF IDAHO

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

TABLE OF CONTENTS (Continued)

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, and the upper Snake River including the Portneuf drainage. This document summarizes our findings in the west-central mountain valleys of Idaho. The survey area includes the North Fork Payette River upstream of Smith's Ferry to include Long Valley, Round Valley, and adjacent areas in the Payette River Basin. Also included are the upper Secesh River and Meadows Valley in the Salmon River Basin.

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 20 wetland sites based on conservation intent. Five 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 which were not surveyed.

We identify conservation strategies for sites surveyed and for plant communities that are unprotected or under-protected. Approximately three percent of the wetland and deepwater habitat is within areas with special management such as Wildlife Management Areas (WMAs) or Refuges. Palustrine wetlands, which include emergent, forested, scrub-shrub and aquatic bed wetlands, represent 90 percent of the wetlands with special management status. Due to a long history of land use, most of the wetlands have been impacted and 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 west-central mountain valleys. The survey area includes portions of Valley, Adams, and Idaho 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 North Fork Payette River (includes Hydrologic Unit 17050123)
- Little Salmon River (includes Hydrologic Unit 17060210)
- Lower South Fork Salmon River (includes the Secesh River portion of Hydrologic Unit 17060208)

The west-central mountain valleys 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 including the Long Valley, Meadows Valley, and Secesh 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).

The headwaters of the North Fork Payette River originate north of McCall. The river flows south through a broad glacial valley bordered by the West Mountains and Salmon River Mountains. Upstream and at the town of McCall, natural but impounded lakes including Upper Payette Lake and Payette Lake are fed by the river. South of McCall, the Long Valley extends for 36 miles before narrowing near Cabarton. Cascade Reservoir is fed by the North Fork Payette River and other drainages entering from the Salmon Mountains including Lake Fork Creek, Gold Fork Creek, Boulder Creek, and Willow Creek along with smaller tributaries entering from the West Mountains (Rasmussen 1981; Bureau of Reclamation 2000).

Two watersheds (one complete and one partial) that eventually flow into the Salmon River are included in the survey area: the Little Salmon River and the Lower South Fork Salmon River. The Little Salmon River flows north for approximately 30 miles before entering the mainstem of the Salmon River at Riggins. The river flows through the broad Meadows Valley for a short distance before entering a narrow canyon. Lower reaches of the South Fork Salmon River and its tributaries including the Secesh River are also included in the survey area. 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 flow regimes of most of the streams in the Long Valley have been impacted by construction of reservoirs and impoundment. The North Fork Payette River is highly regulated with major impoundments at Payette Lake and Cascade Reservoir. Other streams in the survey area including Lake Fork, Boulder, and Gold Fork Creeks have had reservoirs constructed for water storage. The Little Salmon River and Secesh River are both free flowing rivers. Stream gage data are available from several sites in the survey area, however most are for relatively short periods of record. Data from the North Fork Payette River gaging station near Banks, covering the period 1948 to present, shows annual mean streamflow between 685 cfs and 2,112 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. McCall, at 1,533 m in elevation (5,030 feet), and Cascade, at 1,494 m in elevation (4,902 feet), have average daily high temperatures near 28°C (82°F) in July and average daily low temperature of -12°C (10°F) in January. Warren, at 1,801 m in elevation (5,909 feet), reports an average daily high temperature of 25°C (77°F) in July and an average daily low temperature of -14°C (7°F) in January. Lower elevations including McCall and Cascade receive an average of 56 cm (22 inches) or more precipitation during the late winter and spring months. At higher elevations such as Warren, annual precipitation averages 89 cm (35 inches) (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 Biological and Conservation Data System (BCD) 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 2000 and 2001 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 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 rarest 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. Secondarily, 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 Biological Conservation Data System (BCD) at the IDCDC. The three modules of the BCD described below were the primary ones used for managing and reporting site and community information.

Site Basic Record (*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 the BCD 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 wetland include remnants that are in excellent condition, however drier, accessible sites are 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

The NWI maps were summarized for the Long Valley and New Meadows Valley (Figure 1). Total wetland acres were summarized by Hydrologic Units from available digitized NWI quadrangle maps.

Available National Wetland Inventory maps were digitized for the North Fork Payette River and Little Salmon River to include the Long Valley and Meadows Valley. Acreage of wetlands based on area occupied by NWI polygons in the North Fork Payette drainage (Figure 2) are Riverine (4%), Lacustrine (58%), Emergent (30%) and Scrub-Shrub (3%). Wetlands in the Little Salmon River drainage (Figure 3) include Riverine (3%), Lacustrine (22%), Emergent (62%) and Scrub-Shrub (9%). Appendix D summarizes the acres and frequency of occurrence of wetland deepwater habitat by subclass for the survey area and counties.

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 Wildlife Management Areas, Research Natural Areas, State Park Natural Areas, Wetlands Reserve Program easements and other conservation easements. Thirty-seven percent of the wetlands on digitized quadrangle maps along the upper North Fork Payette and Little Salmon Rivers are in private ownership (Figure 4).

Approximately 1,877 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. The basis for the framework are wetland functions. 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.

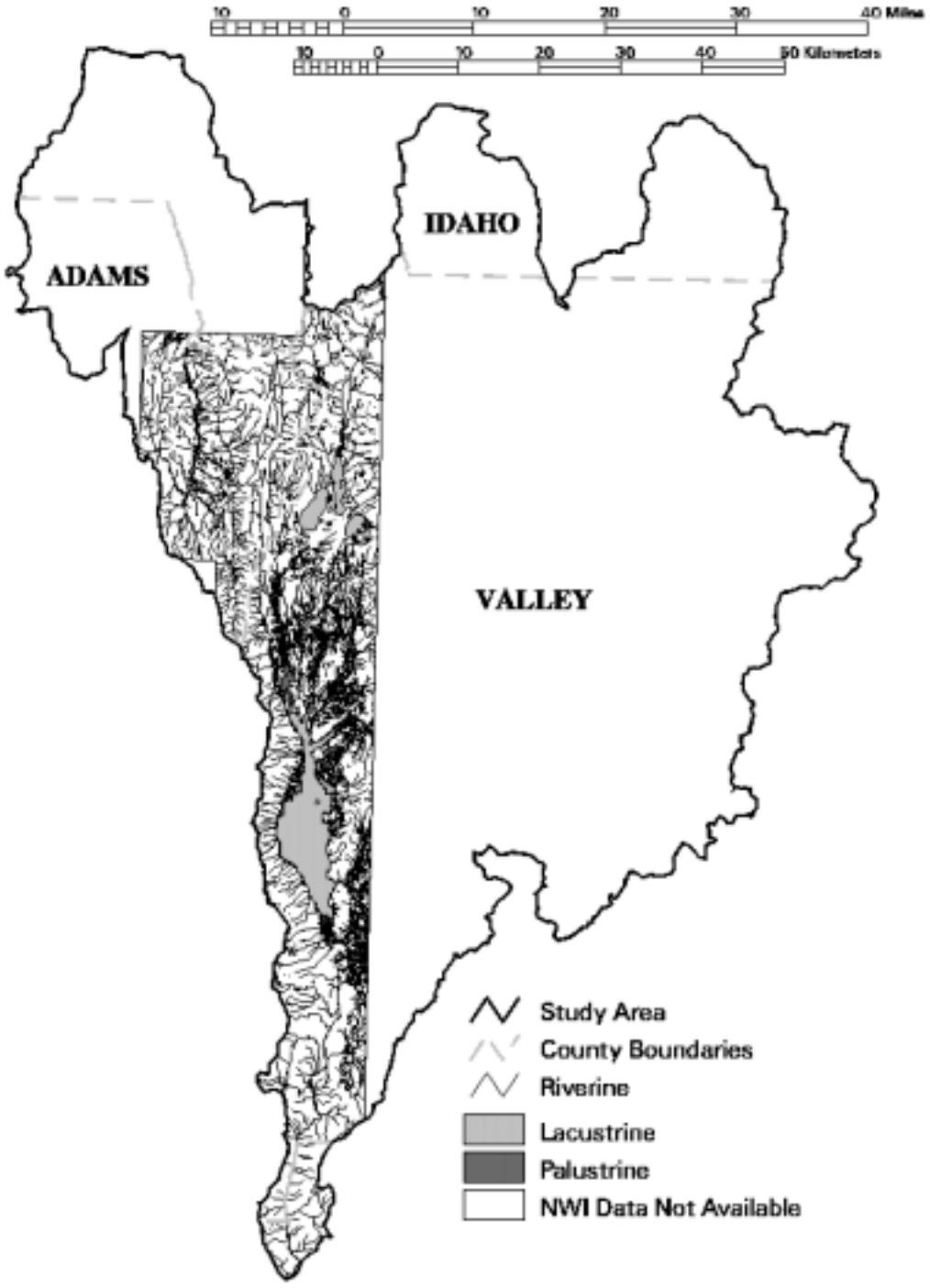

Figure 1. Location of wetland and deepwater habitat for digitized maps in the survey area by system.

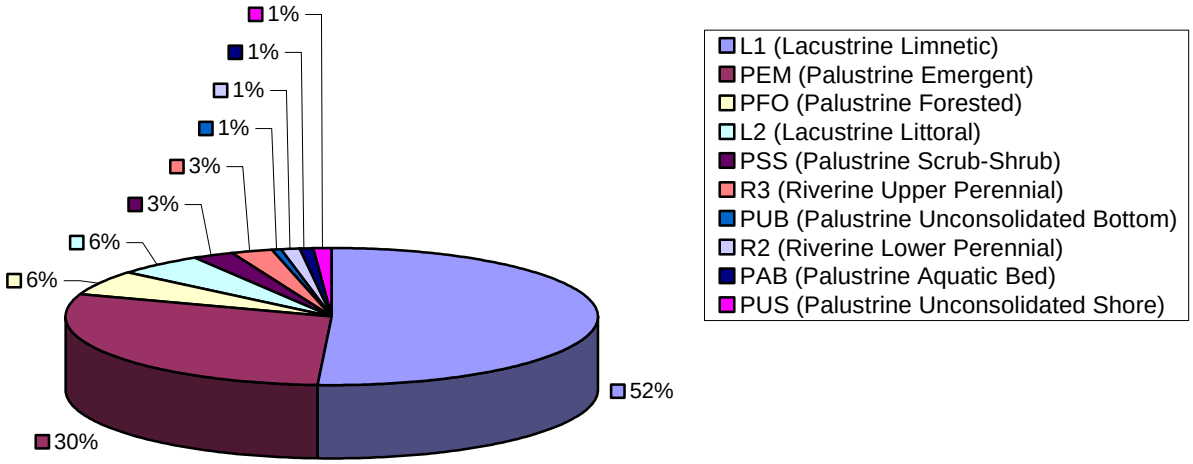

Figure 2. Acreage of wetland and deepwater habitat in Hydrologic Unit 17050123 (North Fork Payette).

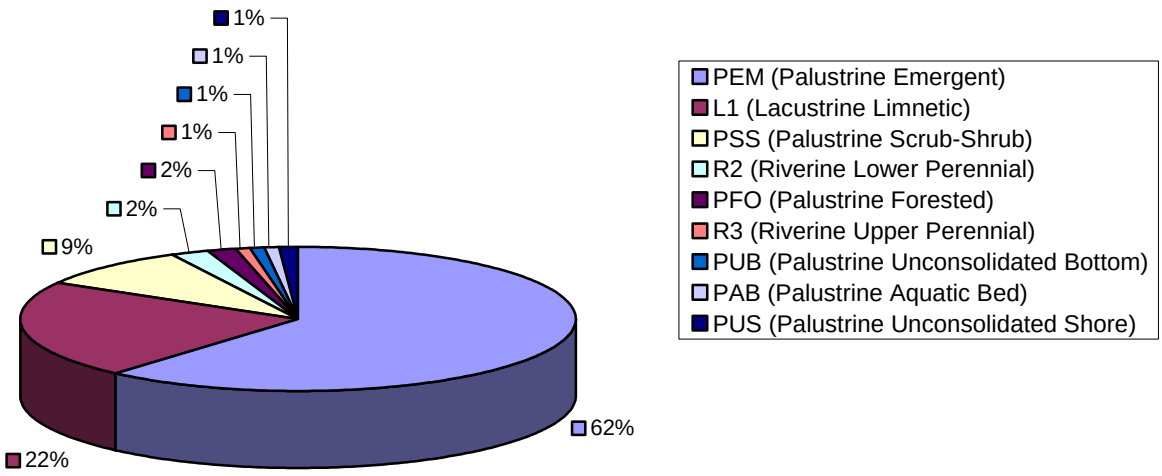

Figure 3. Acreage of wetland and deepwater habitat in Hydrologic Unit 17060210 (Little Salmon).

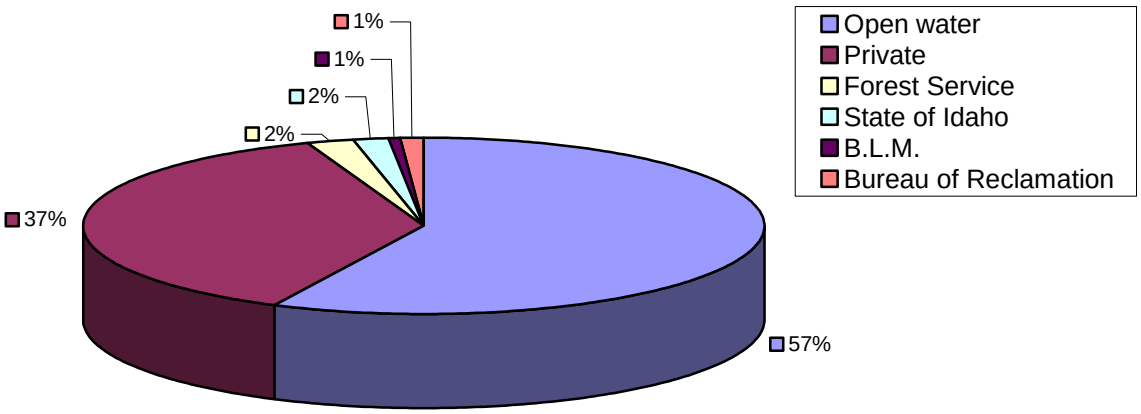

Figure 4. Landownership of wetlands in the project area.

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

System	Acres within managed areas	Total Acres	% of type
Class (subsystem)			
Palustrine			
Emergent	1,387	18,717	7.4
Scrub-shrub	128	1,738	7.4
Forested	139	3,434	4.1
Aquatic bed	21	178	11.8
Unconsolidated bottom	8	378	2.0
Unconsolidated shore	0	16	0.0
Total all Palustrine	**1,683**	**24,461**	**6.9**
Riverine			
Lower perennial	16	1,445	1.1
Upper perennial	1	316	0.3
Total all Riverine	**17**	**1,761**	**1.0**
Lucastrine			
Limnetic	63	29,916	0.2
Littoral	114	3,100	3.7
Total all Lucastrine	**177**	**33,016**	**0.5**
Total all types	1,877	59,238	3.2

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 wetland losses (Dahl 2000). In the survey area, agriculture and development account for 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

Most wetlands in the survey area are accessible and have been impacted by human influences 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 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. Noxious weeds noted in the survey area include *Cirsium arvense* (Canada thistle), *Cirsium vulgare* (bull thistle), *Euphorbia esula* (leafy spurge), *Linaria vulgaris* (butter and eggs), and *Tanacetum vulgare* (common tansy). Other nonnative forbs that become established in disturbed wetlands in the survey area include *Chrysanthemum leucanthemum* (oxeye daisy), *Ranunculus repens* (creeping buttercup), *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), *Bromus inermis* (smooth brome), *Phalaris arundinacea* (reed canary grass), *Phleum pratense* (Timothy), and *Poa pratensis* (Kentucky bluegrass) lack the soil stabilizing characteristics of sedges and rushes. These species have high cover in seasonally flooded/well drained emergent wetlands where they have been seeded as monocultures or inter-seeded with native meadow forbs and graminoids. The previously mentioned grasses are also common in the understory of vegetation stands dominated by trees and shrubs in temporarily flooded wetlands. *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, including stands of *Typha latifolia*, to mudflat drawdown zones along shorelines of streams and reservoirs.

Operation of dams has a significant impact on riparian habitat due to timing and magnitude of peak flows. Reservoirs have altered the natural hydrograph that supports development and availability of alluvial surfaces for regeneration of cottonwoods and other flood dependent species. Cottonwoods and willow require exposed alluvial surfaces created by sediment deposition at appropriate times of the year. The seeds of cottonwood are only viable for a short time period. If water levels are too high, alluvial surfaces are unavailable; if water levels are too low, adequate moisture is not available for seedlings to become established and grow a long enough root to access water sources later in the growing season. Bottomland forests along

streams with an altered hydrograph may eventually become dominated by mature trees that eventually senesce.

Shifting river channels create habitat that supports a diverse mosaic of wetland vegetation types including open water sloughs and swales supporting emergent vegetation. The North Fork Payette River downstream of McCall continues to support an active floodplain 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 this dynamic river system is 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 Cascade Reservoir and could be transported to other water bodies by recreational boat users.

Wetlands can remove elements and compounds, but nutrient overloading can be problematic. Construction activities, residential lawn maintenance, and grazing may contribute excess sediments and nutrients including herbicides. Since the 1970s, water quality at Cascade Reservoir has been a concern. Sources identified as contributing to poor water quality include the McCall sewage treatment plant, Idaho Department of Fish and Game's McCall hatchery, management practices of forestry, agricultural and urban and suburban uses, and internal recycling of nutrients in the reservoir (Bureau of Reclamation 2000).

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 an impairment when the change is to a drier type. Water development projects account for the majority of type changes in the survey area. Most lakes still exist but with extensive alterations. Dams altering the natural hydrograph are maintained on lake outlets and on rivers for hydroelectricity, water storage, flood control, and recreation.

Water development projects at reservoirs have resulted in type changes in the survey area. Within the pool of reservoirs, raised water levels replace riverine and spring fed wetlands with open water habitat. The drawdown zones of reservoirs support both native and nonnative annual species on mudflats. Some of the wetlands surrounding Cascade Reservoir are maintained by water stored in the reservoir (Bureau of Reclamation 2000).

As rivers enter reservoirs, riparian habitat is influenced by slackwater. Sediment accumulation is high due to low gradient and bank erosion may be extensive due to water fluctuation. Where a broad floodplain does exist, such as on the North Fork Payette River above Payette Lake, wet site forbs and grasses may be favored by the artificially raised water tables.

Enhancements

Enhancements increase or improve wetland functions. In the survey area, enhancement projects have been undertaken to improve water quality and wildlife habitat. The Bureau of Reclamation has established WMAs at a number of the larger wetland complexes that are away from highly developed areas surrounding Cascade Reservoir. Management activities at the WMAs have included exclusion of livestock grazing from all areas that do not have an Agricultural Easement, wetland development, and habitat improvement including placement of nesting platforms and boxes.

Wetlands have been developed at ten sites surrounding Cascade Reservoir to improve water quality and wildlife habitat. Wetland development includes on-channel impoundments to create shallow marsh habitat, constructed ponds with emergent habitat, conversion of seasonal wetlands to perennial wetlands, and stream bank stabilization. The wetland enhancements were designed to improve the following functions: sediment trapping and removal, phosphorus uptake, erosion reduction, and wildlife habitat improvement. Monitoring of water quality parameters was initiated in 1996 (Bureau of Reclamation 2000). Wetland restoration efforts began in 1999 along the Little Salmon River through the USDA NRCS Wetland Reserve Program. The 30-year easement in Meadows Valley is designed to improve wetland function by stabilizing riverbanks and allowing re-establishment of remnant natural vegetation.

WETLAND DIVERSITY

Wetland Plant Associations

Fifty-nine 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 are best developed along the North Fork Payette River. The forests 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 grandis* (grand fir), *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 west-central mountain valleys arranged by Cowardin system, class, and subclass.

Scientific Name	Common Name	Rank	
Palustrine Forested Plant Associations			
Needle-leaved evergreen			
Abies grandis/Acer glabrum	grand fir/Rocky Mountain maple	G3	S3
Abies grandis/Senecio triangularis	grand fir/arrowleaf groundsel	G3	S3
Abies lasiocarpa/Calamagrostis canadensis	subalpine fire/bluejoint reedgrass	G5	S3
Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum phase	subalpine fire/bluejoint reedgrass, labrador tea phase	G4	S3
Abies lasiocarpa/Caltha biflora	subalpine fir/white marsh marigold	G3?	S3
Abies lasiocarpa/Streptopus amplexifolius	subalpine fir/twisted-stalk	G4?	S4
Picea engelmannii/Calamagrostis canadensis	Engelmann's spruce/bluejoint reedgrass	G4	S4
Picea engelmannii/Equisetum arvense	Engelmann's spruce/common horsetail	G4	S2
Pinus contorta/Vaccinium occidentale	lodgepole pine/blue huckleberry	G4	S2
Pseudotsuga menziesii/Cornus sericea	Douglas fir/red-osier dogwood	G4	S4
Broad-leaved deciduous			
Populus tremuloides/Calamagrostis canadensis	quaking aspen/bluejoint reedgrass	G3	S2
Populus tremuloides/Cornus sericea	quaking aspen/red-osier dogwood	G4	S4
Populus trichocarpa/Cornus sericea	black cottonwood/red-osier dogwood	G3?	S3
Populus trichocarpa/Salix exigua	black cottonwood/coyote willow	G1	S1
Palustrine Scrub-Shrub Plant Associations			
Persistent			
Alnus incana/Cornus sericea	mountain alder/red-osier dogwood	G3G4	S3
*Alnus incana/*Mesic forb	mountain alder/mesic forb	G3G4	S1
Alnus sinuata	Sitka alder	G2Q	SP
Betula glandulosa/Carex simulata	bog birch/short beaked sedge	G2	S2
Betula glandulosa/Carex utriculata	bog birch/bladder sedge	G4?	S3
Cornus sericea	red-osier dogwood	G4	S3
Crataegus douglasii/Heracleum lanatum	black hawthorn/cow parsnip	G1	S1
Rhamnus alnifolia	alder buckthorn	G3	S3
Salix bebbiana	Bebb's willow	G3?	S?
Salix eastwoodiaea/Carex aquatilis	Eastwood willow/water sedge	G2	S2
Salix exigua/Barren	coyote willow/barren	G5	S4
*Salix exigua/*Mesic forb	coyote willow/mesic forb	G2?	S2?
*Salix exigua/*Mesic graminoid	coyote willow/mesic graminoid	G5	S3?
Salix geyeriana/Carex utriculata	Geyer's willow/bladder sedge	G5	S4
*Salix geyeriana/*Mesic graminoid	Geyer's willow/mesic graminoid	G2G3Q	S3
Salix drummondiana/Calamagrostis canadensis	Drummond's willow/bluejoint reedgrass	G3	S2
Salix drummondiana/Carex utriculata	Drummond's willow/bladder sedge	G3	S3

Table 4. Continued.

Scientific Name	Common Name	Rank	
Salix lemmonii	Lemmon's willow	GU	SU
Salix planifolia/Carex aquatilis	planeleaf willow/water sedge	G5	S4
Salix planifolia var. *monica/Carex scopulorum*	planeleaf willow/Holm's Rocky Mountain sedge	G4	S3
Salix planifolia var. *monica/Carex utriculata*	planeleaf willow/bladder sedge	G3Q	S3
Salix wolfii/Carex aquatilis	Wolf's willow/water sedge	G4	S4
Salix wolfii/Deschampsia cespitosa	Wolf's willow/tufted hairgrass	G3	S2
Palustrine Emergent Plant Associations			
Persistent			
Artemisia ludoviciana	prairie sage	G3	S2
Calamagrostis canadensis	bluejoint reedgrass	G4	S4
Carex aquatilis	water sedge	G5	S4
Carex lasiocarpa	slender sedge	G4	S2
Carex limosa	mud sedge	G3	S1
Carex microptera	small wing sedge	G4	S3
Carex nebrascensis	Nebraska sedge	G4	S3
Carex praegracilis	clustered field sedge	G2G3Q	S2
Carex scopulorum	Holm's Rocky Mountain Sedge	G5	S3
Carex simulata	short-beaked sedge	G4	S2
Carex utriculata	bladder sedge	G5	S4
Carex vesicaria	inflated sedge	GU	S3
Deschampsia cespitosa	tufted hairgrass	G4	S3
Eleocharis acicularis	needle spikerush	G4?	S3
Eleocharis palustris	creeping spikerush	G5	S3
Eleocharis pauciflora	few-flowered spikerush	G4?	S1
Juncus balticus	Baltic rush	G5	S5
Phalaris arundinacea	reed canary grass	G5	S5
Scirpus acutus	hardstem bulrush	G5	S4
Scirpus microcarpus	small-fruit bulrush	GU	SU
Typha latifolia	common cattail	G5	S4
Palustrine Aquatic Bed and Lacustrine Littoral Plant Associations			
Nuphar polysepalum	yellow pond lily	G5	S4

Scrub-Shrub Vegetation

Shrublands dominated by willows and other shrubs occur in association with springs and on subirrigated floodplains. Along the North Fork Payette River and lower reaches of tributaries in the Long Valley, stands of willows including *Salix bebbiana* (Bebb's willow), *Salix drummondiana* (Drummond's willow), *Salix exigua (*coyote willow), *Salix geyeriana* (Geyer's willow), and *Salix lemmonii* (Lemmon's willow) along with the shrubs *Alnus incana* (mountain alder), *Cornus sericea* (redosier dogwood), and *Crataegus douglasii* (black hawthorn) are present. At upper elevations, low 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 *Typha latifolia* (common cattail), *Scirpus acutus (validus)* (hardstem and/or softstem bulrush), and *Carex utriculata* (bladder sedge) are frequently present along overflow channels and in backwater sloughs of the North Fork Payette River.

Broad valley bottoms, including the Long Valley and Secesh Valley, support a mosaic of graminoids, sedges, and rushes including *Deschampsia cespitosa* (tufted hairgrass), *Eleocharis palustris* (common spikerush), *Juncus balticus* (Baltic rush), and *Carex* spp. (*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. The extensive mudflats in the drawdown zone of Cascade Reservoir are mostly dominated by emergent vegetation with occasional patches of shrubs. The mudflats are vegetated with annuals including a carpet of *Eleocharis acicularis* (needle-leaf spikerush) along with *Gnaphalium palustre* (western marsh cudweed), *Hypericum anagalloides* (trailing St. John's-wort), *Lindernia dubia* (moistbank pimpernel), *Plagiobothrys scouleri* (Scouler's popcorn flower), *Polygonum persicaria* (spotted ladysthumb), *Ranunculus flammula* (creeping buttercup), and *Rorippa curvisilique* (western yellowcress).

Peatlands in the survey area typically include emergent vegetation types such as stands of *Typha latifolia* (common cattail), *Carex aquatilis* (water sedge), *Carex diandra* (lesser panicled sedge), *Carex lasiocarpa* (slender sedge), and *Carex simulata* (short-beaked sedge) on organic *Sphagnum* 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 typically high in ash content) 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) and *Brasenia schreberi* (water-shield) are frequently present as monocultures 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

Twelve vascular and one 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 local and regional endemics (*Allium madidum* and *Trifolium douglasii*), disjunct species (*Ribes wolfii* and *Triantha occidentalis* spp. *brvistyla*), and species at the periphery of their range (*Allium validum* and *Eriophorum viridicarinatum*). 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]
Allium madidum	swamp onion	G3	S3	G
Allium validum	tall swamp onion	G4	S3	G
Aster junciformis	rush aster	G5	S2	S
Botrychium lanceolatum var. *lanceolatum*	Lance-leaved moonwort	G5T4	S3	S
Botrychium simplex	Least moonwort	G5	S1	2
Carex buxbaumii	Buxbaum's sedge	G5	S3	S
Epipactis gigantea	Giant helleborine	G4	S3	1
Eriophorum viridicarinatum		G5	S2	1
Helodium blandowii	Blandow's helodium	G5	S2	S
Ribes wolfii	Wolf's current	G4	S2	M
Triantha occidentalis spp. *brevistyla*	short style tofieldia	G5T4	S1	1
Trifolium douglasii	Douglas clover	G3	S2	G

[a] G=Globally Rare, 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 14 terrestrial species of concern (and seven fish species of concern) that are associated with wetland and riparian areas (Table 6). Active bald eagle nests are present in the vicinity of Cascade Reservoir and on the North Fork Payette River. The eagles

typically nest in trees with clear flights to feeding areas, which may include riverine or open water habitat. 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). Breeding sites for western grebes, red-necked grebes, and buffleheads are known from reservoirs (including small reservoirs) and tributaries and ponds 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 and barred owls prefer dense forests or open woodlands and frequent open meadows for foraging. Upland sandpipers prefer large blocks of meadow habitat for breeding and several locations in the North Fork Payette drainage are tracked as probable nest areas.

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

Species	Common Name	Rank	
Fish			
Oncorhynchus clarki lewisi	westslope cutthroat trout	G4T3	S2
Oncorhynchus mykiss	steelhead (Snake River run)	G5T2T3	S2
Oncorhynchus mykiss gairdneri	redband trout (Inland Columbia Basin)	G5T4	S2S3
Oncorhynchus tshwaytscha	chinook salmon (Snake River spring run)	G5T1	S1
Oncorhynchus tshwaytscha	chinook salmon (Snake River summer run)	G5T1	S1
Oncorhynchus nerka	sockeye salmon (Snake River run)	G5T1	S1
Salvelinus confluentus	bull trout	G3	S3
Amphibians			
Bufo boreas	western toad	G4	S4
Birds			
Aechmophorus occidentalis	Western Grebe	G5	S4B,SZN
Podiceps gricegena	Red-necked Grebe	G5	S3B,S3N
Bucephala albeola	Bufflehead	G5	S3B,S3N
Haliaeetus leucocephalus	Bald Eagle	G5	S3B,S3N
Oreotyx pictus	Mountain Quail	G5	S2
Picoides arcticus	Black-backed Woodpecker	G5	S3
Picoides tridactylus	Three-toed Woodpecker	G5	S3?
Strix nebulosa	Great Gray Owl	G5	S3
Strix varia	Barred Owl	G5	S4
Bartramia longicauda	Upland Sandpiper	G5	S3B,SZN
Mammals			
Martes pennanti	fisher	G5	S1
Myotis evotis	long-eared myotis	G5	S3?
Myotis volans	long-legged myotis	G5	S3?

Seven fish and one amphibian species of special concern are present in the survey area. Historic sightings of western toads are reported from throughout Valley County. 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).

Three mammal species of special concern that frequent wetland and riparian habitat are known from the survey area. The bat species, long-eared myotis and long-legged myotis, are reported from the Long Valley and Payette Lake, respectively. 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 19 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 many of the identified sites.

Class I Sites

Five 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. Four of the sites; Back Creek, Needles, Phoebe Meadows, and Pony Meadows, are within established Research Natural Areas. High elevation forested, scrub-shrub, emergent, and open water wetlands are present in the Research Natural Areas. The fifth Class I Site, North Fork Kennally Creek, is within an area of proposed Wilderness on the Payette National Forest. Wilderness designation would be adequate to protect the high quality, old growth bottomland forest found at Kennally Creek. Class I Sites at low elevations were not identified. Small pockets of relatively undisturbed wetlands were found at lower elevations; however this was generally within a larger fragmented landscape.

Table 7. Wetland sites in the west-central mountain valleys. Management categories are defined in the text.

	Wetland Site	Category	Protection[a] Status	Ownership[b]	Latitude	Longitude	County
1	Back Creek	Class I	+	USFS	443055N	1154315W	Valley
2	Needles	Class I	+	USFS	444439N	1154851W	Valley
3	North Fork Kennally Creek Trough	Class I	-	USFS	444838N	1155113W	Valley
4	Phoebe Meadows	Class I	+	USFS	445630N	1153940W	Valley
5	Pony Meadows	Class I	+	USFS	451108N	1154247W	Idaho
6	Burgdorf Meadow	Class II	P	TNC, PRI	451630N	1155500W	Idaho
7	Gold Fork	Class II	P	BOR, PRI	444135N	1160320W	Valley
8	Lake Fork Creek	Class II	P	BOR, PRI	444538N	1160538W	Valley
9	North Beach Meanders	Class II	P	IPR, PRI	450054N	1160327W	Valley
10	North Fork Payette River - McCall to Cascade Reservoir	Class II	P	BOR, IDL, BLM, PRI	444830N	1160905W	Valley
11	Ponderosa Peninsula	Class II	+	IPR	445648N	1160425W	Valley
12	Secesh Meadows	Class II	-	USFS, PRI	451440N	1154840W	Idaho
13	Johnson Creek Pond	REF	-	USFS	443828N	1155025W	Valley
14	Lake Fork Fens	REF	-	USFS	445521N	1155734W	Valley
15	Upper North Fork Payette Meadows	REF	-	USFS, PRI	451020N	1160004W	Valley
16	Duck Creek	HAB	P	BOR	443753N	1160715W	Valley
17	Hot Springs Creek	HAB	P	BOR, PRI	443815N	1160356W	Valley
18	Meadows Valley	HAB	+	PRI	450437N	1161813W	Adams
19	Willow Creek, Valley County	HAB	P	BOR, PRI	442852N	1160354W	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.

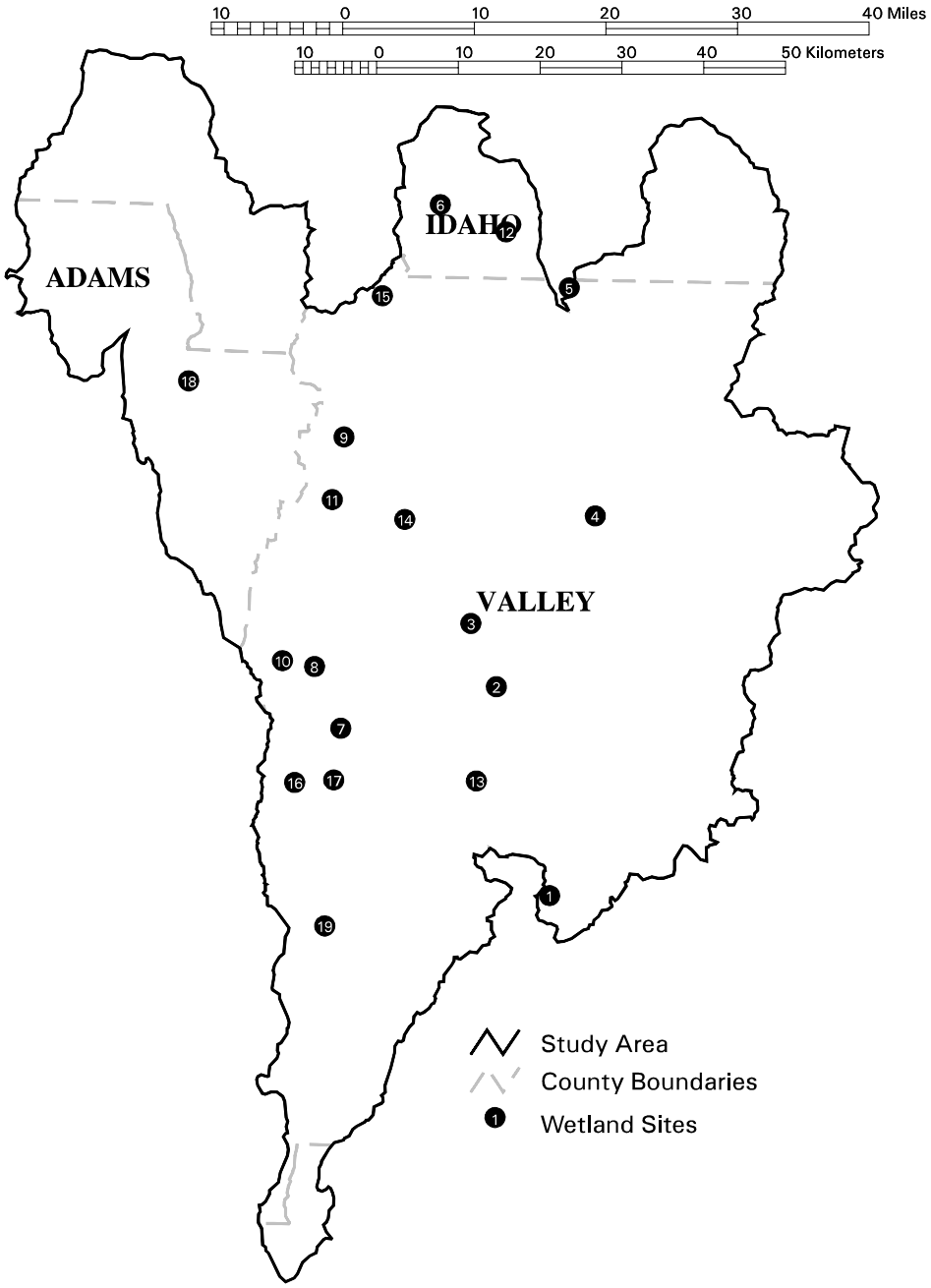

Figure 5. Location of wetland sites in west-central Idaho mountain valleys. Site numbers correspond to those used in Table 7.

Class II Sites

The Class II Sites include wetlands associated with larger riverine systems, broad spring fed meadows, and kettle ponds. The North Fork Payette River between McCall and Cascade and lower reaches of the Gold Fork River and Lake Fork Creek have been categorized as Class II Sites. These reaches include habitat that has been extensively modified by livestock use and reservoir operations interspersed with high quality wetlands including unique peatland habitat. The peatlands include stands of *Betula glandulosa*, *Carex* spp., and *Typha latifolia* on organic *Sphagnum* spp. soils. In addition, the North Fork Payette River is a dynamic system where channel migration and sediment deposition creates landforms supporting forested, scrub-shrub, and emergent wetlands. Impacts to remnant vegetation stands and peatlands along these river reaches should be avoided. Maintenance of floodplain processes should be integrated into land-use plans. The remnant peatlands are on maps housed at the CDC and would be good starting points for conservation efforts including fee title acquisition or easements.

Burgdorf Meadow and Secesh Meadow include streams supporting wild populations of Chinook salmon that are unaffected by hatchery stock. The meadows function to improve water quality and quantity by providing baseflow to streams and filtering sediments. Roads and cabins have been built in the meadows and subdivisions are platted and being developed in the Secesh Valley. The Nature Conservancy currently manages a parcel at Burgdorf Meadow and the U.S. Forest Service manages much of the Secesh Meadow. Opportunities for conservation easements or acquisitions on private land should be pursued.

Ponderosa Peninsula is managed by the Idaho Department of Parks and Recreation as part of Ponderosa State Park. Lily Lake is the largest wetland feature at the park and includes a central floating mat of vegetation surrounded by open water. The mat includes peatland habitat dominated by *Carex* spp. and *Menyanthes trifoliata.* Imminent threats were not observed and current management by Idaho Parks and Recreation should be adequate to maintain wetland processes. Establishment of permanent long-term monitoring at peatlands may be worthwhile to identify subtle changes impacting water quality and/or species composition.

All of the Class II sites have had impacts to wetland functions from factors including livestock grazing, development, and impoundments. Alteration of high quality wetland remnants within Class II sites should be avoided. Most of the sites, however can be enhanced by reducing ground disturbance, minimizing sediment and nutrient inputs, and weed control.

Reference Sites

Reference Sites are areas that represent high quality assemblages of plant associations. The Class I and Class II sites discussed previously all contain areas that support high quality plant associations. Three additional sites were identified during surveys that are considered Reference Sites. The Reference Sites include a pond at the head of Johnson Creek, fen habitat at Lake Fork Creek, and wetlands downstream of Upper Payette Lake (the area referred to as Upper Payette Meadows). The 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

The four Habitat Sites include wetlands in the Long Valley and Meadows Valley. The valleys provide important foraging areas for raptors, nesting habitat for waterfowl and shorebirds, and staging areas for migratory birds. The big valleys have a long history of management for livestock operations including pasture development, such as ditching and seeding, and livestock grazing. Currently, the valleys are mostly dominated by emergent habitat which includes patches of native vegetation (mostly in semi-permanently flooded sites) and vegetation dominated by nonnative species. Willows are occasionally present along channels, though most stands are in poor condition due to channel downcutting and browsing of woody species.

Sites in the Long Valley including Duck Creek, Hot Springs Creek, and Willow Creek have mixed ownership and portions are managed by the Bureau of Reclamation as WMAs. Current management of the WMAs focuses on improving wildlife habitat conditions through vegetation management, fencing, and nesting structures. Meadows Valley is mostly privately owned. Much of the Meadows Valley is in the Wetland Reserve Program with a 30-year easement. The Little Salmon River that flows through the valley is spawning habitat for Chinook salmon and restoration measures will create good wildlife habitat. As opportunities for easements or cooperative agreements to maintain wetland functions become available on private lands adjacent to currently managed areas, they should be pursued. All of the Habitat Sites have potential for restoration or enhancement due to past use by domestic animals and/or alterations of hydrologic regimes. Revegetation, channel stabilization, weed control, and hydrologic restoration may be necessary on these sites and should be evaluated on a site-by-site basis.

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 west-central mountain valleys study area, the majority of the wetland and deepwater habitat acreage is in the Lacustrine (56%) or Palustrine (41%) systems (Table 3). Most of the wetland and deepwater habitat in the Lacustrine system is contained in reservoirs such as Cascade Reservoir and in lakes where the water levels have been artificially raised by impoundment of the outlet such as Payette Lake. Natural wetlands are much less common. 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 structual diversity. The wetland acreage within special management areas, however, is disproportionate to actual acreage existing in the study area and some abundant wetland types are well represented while other types are poorly represented. For example, emergent wetlands within special management areas often contain a large percentage of cattail stands while peatlands are under-represented. In addition, some special management areas support vegetation with high percentages of non-native plants while native vegetation types are under-represented.

Approximately half of the wetlands within special management areas represent highly altered systems. This is somewhat representative of the overall landscape due to a long history of land use. 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 deciduous forests or native emergent habitat, which are unprotected (or 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. The majority of wetlands in the survey area are in private ownership; thus, 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 west-central mountain valleys 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://www2.state.id.us/fishgame/info/cdc/cdc.htm. 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[a].

Data	Format	What is Available	How to Access Data
NWI	GIS	USFWS NWI maps at 1:24,000	NWI Homepage: http://www.nwi.fws.gov
BCD	GIS	Rare plant and animal distributions. Conservation site locations. Managed area locations.	IDFG CDC Information Manager
BCD	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 Information Manager

[a] NWI = National Wetlands Inventory, BCD = Biological and Conservation Database. 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

FORM I. **SITE SURVEY FORM** **WHTF 10/30/92**

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	MANAGEMENT URGENCY
U1 immediate threat	M1 needed this year
U2 threat w/i 5 yrs	M2 needed w/i 5 yrs (or loss)
U3 threat but not w/i 5 yrs	M3 needed w/i 5 yrs (or degrade)
U4 no threats	M4 may be needed in future
U5 land protected	M5 none needed
PU COMMENTS:	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 H_2O_____
Channel Depth_____Distance from H_2O_____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____
Tal Cv____ Med Cv____
Low Cv____ Grd Cv____ CC

T1_____/ _____ _____
T2_____/ _____ _____
T3_____/ _____ _____
T4_____/ _____ _____
T5_____/ _____ _____

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_____/ _____ _____

FORBS Tot Cv____ Mht____
Med Cv____ Low Cv____
Grd Cv____ CC

F1_____/ _____ _____
F2_____/ _____ _____
F3_____/ _____ _____
F4_____/ _____ _____
F5_____/ _____ _____
F6_____/ _____ _____
F7_____/ _____ _____
F8_____/ _____ _____
F9_____/ _____ _____
F10_____/ _____ _____
F11_____/ _____ _____
F12_____/ _____ _____
F13_____/ _____ _____
F14_____/ _____ _____
F15_____/ _____ _____

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:**

Trees	Shrubs	Herbs/Graminoids

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 mountain valleys of the North Fork Payette, South Fork Salmon, and Little Salmon Rivers

BACK CREEK

Location:

Back Creek RNA is located about 10 miles south of Warm Lake along the South Fork Salmon River. From the Cascade Ranger Station in Cascade, Idaho, take State Route 55 approximately 1 mile (1.6 km) north to its junction with FS Road 22, a paved road coming in from the east. Take FS Road 22 east for about 20 miles (32 km) to the intersection with FS Road 474, just after crossing the South Fork Salmon River. Take FS Road 474 south along the east side of the river for about 10 miles (16 km), where it crosses Mormon Creek, just after the intersection of FS Road 479. About 1 mile (1.6 km) past Mormon Creek, FS Road 474 passes the mouth of Back Creek, which is on the opposite side of the river from the road. From this point, the road forms the boundary of the RNA for about 0.5 mile (0.8 km) in either direction. There are no developed trails within the site.

Richness:

Back Creek RNA encompasses the entire watershed of a tributary to the South Fork Salmon River. Elevations in the RNA range from about 6,200 feet (1,891 m) at the juncture of the South Fork Salmon River with the northern boundary of the RNA, to 8,922 feet (1,721 m) at a peak along the drainage divide forming the northern boundary. ,The RNA contains a diversity of subalpine fir (*Abies lasiocarpa*) habitat types ranging from wet to dry site types. Wetland complexes, including graminoid meadows, sphagnum fen, and wet-site forest, are interspersed among the subalpine fir types. The upper slopes on the south side of the drainage support subalpine fir and Engelmann spruce (*Picea engelmannii*). Douglas-fir (*Pseudotsuga menziesii*) and lodgepole pine (*Pinus contorta*) dominate the drier, south-facing aspects on the north side of the drainage. Shrub glades of Sitka alder (*Alnus sinuata*) and Labrador tea (*Ledum glandulosum*) are interspersed among the forest types. The rare lodgepole pine/Idaho fescue (*Festuca idahoensis*) habitat type occurs on gently sloping river benchland. The second and third order streams in the RNA support a diverse assemblage of aquatic flora and fauna. The South Fork Salmon River, about one mile of which flows through the RNA, is considered critical habitat for the spring and summer runs of Chinook salmon (*Oncorhynchus tschawytscha*). The upper South Fork and its tributaries provide spawning habitat for bull trout (*Salvelinus confluentus*) as well.

Rarity:

The site contains identified critical habitat for spring and summer runs of Chinook salmon. The site also may contain spawning habitat for bull trout. The site is within designated recovery habitat for gray wolf (*Canis lupus*), an Endangered species. Sightings of gray wolf have been documented within five to seven miles of the RNA. The RNA supports a small example of the rare lodgepole pine/Idaho fescue habitat type.

Condition:

Back Creek is within Management Area 56 - the Stolle Management Area - in the Boise National Forest Land and Resource Management Plan. The site is located within the Peace Rock Roadless Area. The site lies within the "Sixteen to One" sheep grazing allotment, which is currently vacant and has not been grazed for many years. Two active but undeveloped mining claims occur within the site. Stream reaches in the vicinity are closed to fishing for much of the year. No exotic species populations have been reported for the area.

Viability:

The site is surrounded by Forest Service lands within Management Area 56. Current management direction for the area specifies the protection of scenic qualities along the South Fork Salmon River road, emphasis on dispersed recreation opportunities, and management of dispersed recreation to protect water quality and riparian areas. The site is within the Peace Rock Roadless Area. This segment of the South Fork Salmon River is currently undergoing evaluation for designation as a Recreational River under the Wild and Scenic Rivers Act.

Key Environmental Factors:

Information not available.

Other Values:

The relatively undisturbed streamside meadows are an unusual occurrence in Idaho, as many areas of this type are grazed by livestock. The site supports a diverse representation of subalpine fir series habitat types. Streams within the site contain a rich aquatic flora and fauna. The site protects the entire watershed of a second-order tributary to the South Fork Salmon River, an important anadromous fishery, and therefore has high watershed values.

Conservation Intent:

Established Research Natural Area.

Management Needs:

The status of the mining claims that occur partially within the RNA needs to be determined.

Information Needs:

None identified.

Plant Association Occurrences:

Pinus contorta/Festuca idahoensis	G3	S2
Abies lasiocarpa/Calamagrostis rubescens	G4G5	SP
Abies lasiocarpa/Caltha biflora	G3?	S3
Abies lasiocarpa/Carex geyeri	G5	S5
Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum phase	GG4	S2
Abies lasiocarpa/Streptopus amplexifolius	G4	S4
Abies lasiocarpa/Vaccinium caespitosum	G5	S3
Abies lasiocarpa/Vaccinium globulare	G5	S4
Pseudotsuga menziesii/Calamagrostis rubescens	G5	S4?
Pseudotsuga menziesii/Carex geyeri	G4?	S4?
Abies lasiocarpa/Calamagrostis canadensis, Ligusticum canbyi phase	G5	S5
Abies lasiocarpa/Calamagrostis canadensis, Vaccinium caespitosum phase	G5	S5
Abies lasiocarpa/Luzula hitchcockii, Luzula hitchccokii phase	G5	S5
Abies lasiocarpa/Luzula hitchcockii, Vaccinium scoparium phase	G5	S5
Abies lasiocarpa/Menziesia ferruginea, Menziesia ferruginea phase	G5	S5
Abies lasiocarpa/Vaccinium scoparium, Calamagrostis rubescens phase	G5	S5
Abies lasiocarpa/Vaccinium scoparium, Pinus albicaulis phase	G5	S5
Abies lasiocarpa/Vaccinium scoparium, Vaccinium scoparium phase	G5	S5

Author:

J. H. Kaltenecker

NEEDLES

Location:

Needles RNA is located in the North Fork Payette River drainage at the headwaters of an unnamed tributary to the North Fork Gold Fork River. The site is about 34 miles (55 km) northeast of Cascade, Idaho. From Cascade, Idaho, drive 13.1 miles (21.2 km) north on State Route 55. Turn east on FS Road 498 along the Gold Fork River and travel for about 12.4 miles (20.1 km) to FS Road 402. Follow FS Road 402 for 7.4 miles (12 km) to the Gold Fork Trail No. 114 trailhead where a bridge crosses the North Fork of the Gold Fork River. Take the Gold Fork Trail north along the river for

about 1.5 miles (2.4 km) where it crosses the unnamed tributary that drains the RNA. The best access to the lake and basin is up the east ridge after crossing the bottomland at the stream mouth. The southeastern corner of the RNA is approximately 1.5 walking miles (2.4 km) north from this point. The best access to the Needles is up the west ridge for about 1.5 miles (2.4 km). An old trail enters the basin by way of the valley bottom from Trail 114, but the trail is not maintained.

Richness:

Needles RNA encompasses the headwaters of a perennial tributary to the North Fork Gold Fork River and includes a high-elevation glacial cirque occurring on granitic rocks of the Idaho Batholith. The watershed is surrounded on three sides by ridges of bare rock topped in places by granite monoliths, some of which are up to 50 feet tall. The RNA derives its name from a summit in the southwest corner which is topped by such monoliths. Elevations in the RNA range from approximately 6,750 feet (2,060 m) in the stream bottom at the lower RNA boundary, to 8,880 feet (2,700 m) on a peak on the east side of the upper cirque basin. A large portion of the area is exposed granite bedrock supporting little vegetative cover. The RNA supports at least nine subalpine fir (*Abies lasiocarpa*) habitat types. Slopes surrounding the basin are dominated by exposed granite with very open stands and stringers of Engelmann spruce (*Picea engelmannii*), subalpine fir, and whitebark pine (*Pinus albicaulis*). The Douglas-fir/elk sedge (*Pseudotsuga menziesii/Carex geyeri*) habitat type occurs on dry sites at the lowest elevations. Small inclusions of Sitka alder (*Alnus sinuata*) glades occur on forested slopes. The upper basin is fed by numerous springs, resulting in extensive sedge (*Carex* spp.) meadows surrounding a shallow lake. Most of the area within the RNA burned in the 1989 Needles Complex fires but nothing is known of the extent of the damage within the RNA.

Rarity:

The site supports a diversity of high-quality aquatic features, including ungrazed graminoid wetlands.

Condition:

Needles is within Management Area 54 - Needles - in the Boise National Forest Land and Resource Management Plan. Recreation is the primary use of this Management Area which is recommended for wilderness designation as part of the Payette Crest recommended wilderness. The site is located within the Needles Roadless Area. No exotic species populations have been reported for the area.

Viability:

The site is surrounded by Forest Service lands within Management Area 54 and the Needles Roadless Area, which is recommended for wilderness designation. Management direction for the Needles area specifies the improvement and maintenance of Forest Trails 115 (Needles Route) and 080 (White Rock Peak or Square Top) which provide non-motorized access to the RNA. Wilderness values of the area will be protected.

Key Environmental Factors:

The subalpine fir habitat types found in the RNA are associated with granitic substrates of the Idaho Batholith. Sparsely vegetated talus, scree, and cliff vegetation communities occupy large areas of exposed granitic bedrock. Sedge meadows occupy portions of the upper basin fed by a number of springs.

Other Values:

One of the primary features of the site is the unusual geologic formations. The site contains a wide representation of subalpine fir habitat types occurring on granitic substrate. The RNA has high watershed values.

Conservation Intent:

Established Research Natural Area.

Management Needs:

Information not available.

Information Needs:

The effects of the 1989 fire on the vegetation of the RNA should be determined.

Plant Association Occurrences:

Pinus albicaulis/Abies lasiocarpa	G5?	S3
Abies lasiocarpa/Calamagrostis canadensis	G5	S3
Abies lasiocarpa/Streptopus amplexifolius	G4	S4
Pseudotsuga menziesii/Carex geyeri	G4?	S4?
Alnus sinuata	G2Q	SP
Abies lasiocarpa/Carex geyeri, Carex geyeri phase	G5	S5
Abies lasiocarpa/Luzula hitchcockii, Luzula hitchcockii phase	G5	S5
Abies lasiocarpa/Luzula hitchcockii, Vaccinium scoparium phase	G5	S5
Abies lasiocarpa/Menziesia ferruginea, Menziesia ferruginea phase	FG5	S5
Abies lasiocarpa/Vaccinium globulare, Vaccinium globulare phase	G5	S4
Abies lasiocarpa/Vaccinium globulare, Vaccinium scoparium phase	G5	S4
Abies lasiocarpa/Vaccinium scoparium, Pinus albicaulis phase	CAG5	S5
Abies lasiocarpa/Vaccinium scoparium, Vaccinium scoparium phase	G5	S5
Abies lasiocarpa/Xerophyllum tenax, Vaccinium scoparium phase	G5	S5

Rare Plant Occurrences:

Lewisia kelloggii	G4	S2

Author:

J. H. Kaltenecker

NORTH FORK KENNALLY CREEK TROUGH

Location:

From Highway 55, just north of Donnelly, Idaho, take Paddy Flat Road (USFS 388) east, over a low summit to the Paddy Flat area. Remain on this graded gravel road, going past Paddy Flat, following signs to the North Fork Kennally Creek Campground/Trailhead (total of ca 15+ miles). From the trailhead/campground, hike up North Fork Kennally Creek trail. Site begins ca 200 meters above the trailhead and includes 0.5 mile of this lower gorge. Upon reaching the glaciated trough, the trail continues up the creek for ca 7 miles to the upper end of site.

Richness:

The North Fork Kennally Creek site includes ca 7 miles of moist bottomlands and toeslopes of the large, south trending, U-shaped trough valley. This glacially carved trough forms a "question mark" pattern in the granitic Lick Creek Range of the Salmon River Mountains. Typical of glacial troughs, the lowest end is "dammed" by a low moraine and bedrock lip and the upper end steeply rises to a cirque basin with tarns. The lower 0.5 mile-section of the site, below the moraine, includes a steep, tumbling portion of North Fork Kennally Creek that carves a gorge through granite bedrock. The gorge includes an old growth stand of upland mixed conifer forest with notably large *Larix occidentalis* (western larch). Within the flat-bottomed glacial trough, North Fork Kennally Creek flows with a low gradient and tight meanders (10-25 m or 2 times the width of the stream), forming a moderately wide floodplain, ca 100 to 400 meters wide. Deposition of sandy and fine gravelly alluvium has formed terraces, in which the creek is entrenched, ca 50 cm deep. The alluvial terraces of North Fork Kennally Creek are often dominated by thick *Calamagrostis canadensis* (bluejoint reedgrass) stands and cut by water tracks supporting *Carex aquatilis* (water sedge) communities. *Saxifraga arguta* (brook saxifrage), *Parnassia fimbriata* (fringed grass of Parnassus), *Mimulus lewisii* (purple monkeyflower), and *Cardamine cordifolia* (heartleaf bittercress) form a colorful border along the wet banks of the picturesque stream. Small patches of *Spiraea douglasii* (pink spiraea) may also occur

on terraces. The trough bottom, however, is dominated by *Abies lasiocarpa/Calamagrostis canadensis* (subalpine fir/bluejoint reedgrass) forest stands of varying successional ages, covering nearly the whole length of the site. The lower half of the site is predominantly mixed stands of mature *Pinus contorta* (lodgepole pine) with reproducing *Abies lasiocarpa* and *Picea engelmannii* (Engelmann's spruce) in the sub-canopy and in the understory, *Calamagrostis canadensis*, *Carex* spp. (sedges), and mesic forbs. In contrast, the upper half of the site has old growth stands dominated by mature and large diameter *Picea engelmannii* with reproducing *Abies lasiocarpa* and little *Pinus contorta*, over a slightly drier (still mesic) understory consisting of *Calamagrostis canadensis, Festuca subulata* (bearded fescue), *Vaccinium* spp. (huckleberries), and *Xerophyllum tenax* (common beargrass). Occasionally, moister forest stands, identified as the *Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum* (Labrador-tea) phase habitat type, are present both in the floodplain and occasionally perched on bedrock toeslopes that are spring-fed. These stands are characterized by open canopies and widespread L*edum glandulosum, Dodecatheon jeffreyi* (Sierra shootingstar), *Carex aquatilis, C. scopulorum* (Holm's Rocky Mountain sedge), other *Carex* spp., *Juncus mertensianus* (Mertens' rush) occurring in water tracks, occasional Sphagnum moss, and mesic herbs typical of subalpine fens and wetlands. Throughout the trough bottom, there are wet microsites, including abandoned meander scars, oxbow ponds, or kettle depressions, that are typically dominated by sedges including *Carex aquatilis, C. vesicaria* (inflated sedge), or occasionally *C. utriculata* (bladder sedge) with *Sparganium minimum* (small burreed) in standing water. The only large meadow, located ca 1.5 miles up from the trailhead, is dominated by *Deschampsia cespitosa* (tufted hairgrass) with wetter inclusions of *Carex aquatilis* or other *Carex* spp. and small patches of *Eleocharis pauciflora* (few-flowered spikerush). This graminoid meadow was ringed discontinuously by low *Salix eastwoodiae* (Eastwood willow) with a mesic graminoid understory of mostly *Calamagrostis canadensis, Carex aquatilis, and C. luzulina* (wood-rush sedge). Numerous perennial and intermittent creeks tumble down from hanging side-valleys and avalanche chutes on the trough walls. *Alnus sinuata* (Sitka alder) stands are the most common vegetation type along these drainages. The *Alnus sinuata*/Mesic forb community type was observed as a riparian stringer along a small perennial stream and characterized by a high diversity of species. Springs emanating from the toeslopes of the trough are often dominated by *Rhamnus alnifolia* (alder buckthorn) with a diverse understory of tall forbs.

Rarity:

The glacial trough probably supports the most extensive undisturbed, continuous stands including old growth stands of *Abies lasiocarpa/Calamagrostis canadensis* in the region. Wetland vegetation stands are suitable as reference communities. The forests provide excellent ungulate cover and habitat for old growth dependent species. North Fork Kennally Creek supports native rainbow trout. Gray wolves have been observed in adjacent drainages. No rare plant species are known from the site but potential exists.

Condition:

One maintained recreation trail, mainly used for hiking and horse packing but also allowing motorcycle and mountain bike use, goes up the valley to access Kennally Lakes and the Lick Creek Range crest. Most use appears concentrated in the lower few miles closest to the campground, located below the gorge. Wheeled-vehicle use is limited by occasional steep and rocky sections of trail and off-trail travel is limited by downfall. One area near the lower meadow may have the extremely faint remnants of a very old trail or road but the evidence is inconclusive. No noxious weeds were observed. Total exotic graminoid cover is very low.

Viability:

A developed campground in a nice setting of old growth larch exists at the lower end of the site. Numerous hikers, horse riders, mountain bikers, and motorcycle riders use this access but concentrate their use in the lower few miles of the trail. The area below the campground, toward Paddy Flat, has been extensively logged and roaded.

Key Environmental Factors:

The glacial trough supports old growth forest stands in a wilderness setting. These are probably the most extensive undisturbed and continuous stands of *Abies lasiocarpa/Calamagrostis canadensis* in the region. These forests provide excellent ungulate cover and North Fork Kennally Creek supports native rainbow trout. Gray wolves have been observed in adjacent drainages.

Other Values:

The North Fork Kennally Creek valley provides excellent opportunities for wilderness-based recreation including hiking, hunting, wildlife viewing, and solitude.

Conservation Intent:

A portion of the North Fork Kennally Creek drainage is within an area of proposed wilderness identified in the Payette National Forest Plan and is recommended for official designation.

Management Needs:

The valley should be maintained in its roadless and unlogged condition. Motorized and non-motorized vehicle use should be eliminated to make management compatible with wilderness values.

Information Needs:

Need to survey the adjacent upland conifer forests, the lowest 0.5 mile of the site including the steeper gradient riparian zone of North Fork Kennally Creek. Need to survey the upper 1.5 miles of the site, which appears similar when viewed from a high point, the steeper section of the upper valley and Kennally Lakes basin, and the steep side drainages on valley walls. The Dismal Lake basin was quickly surveyed but not included in the site due to differences in landform and ecology; however, some information was included on the *Deschampsia cespitosa* community observation form from Dismal Lake. Further surveys of Dismal Lake may yield *Carex utriculata* and *Salix commutata/Carex scopulorum* community occurrences. Further surveys may necessitate expanding the site boundaries to include the whole watershed.

Plant Association Occurrences:

Abies lasiocarpa/Calamagrostis canadensis	G5	S3
Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum phase	G4	S2
Rhamnus alnifolia	G3	S3
Salix eastwoodiae/Carex aquatilis	G2	S2
Calamagrostis canadensis	G4	S4
Deschampsia cespitosa	G4	S3
Carex aquatilis	G5	S4
Alnus sinuata/Mesic forb	G3G4	SP
Carex vesicaria	GU	S3

Author:

C. Murphy

PHOEBE MEADOWS

Location:

Phoebe Meadows is located in the western Salmon River Mountains, at the head of Phoebe Creek, south of Indian Ridge, between the South Fork Salmon River and East Fork South Fork Salmon River. The area is about 22 air miles east of McCall, Idaho. From McCall, take the Lick Creek Road (FH 48) eastward for approximately 34 miles (54 km) to the South Fork Salmon River. Continue south for one mile (1.6 km) to the junction with FS Road 674 (South Fork Salmon River Road). Take

674 south 10.7 miles (17 km) to the trailhead for Phoebe Meadows. Access to the RNA is via FS Trail 291 which leaves the road to the east in the vicinity of Reed Ranch and leads through the RNA.

Richness:

Phoebe Meadows is located in a granitic, montane basin that forms the headwaters of Phoebe Creek, a tributary of the South Fork Salmon River. The fluvial basin is formed from granitic bedrock and dissected by a network of streams that feed an unusually extensive system of wet meadows on the floor of the basin. These extensive wetlands, which include a small pond, include sedge meadow (*Carex* spp.), cotton grass (*Eriophorum polystachion*), Sphagnum mat and riparian shrub communities. Upland areas within the basin support examples, in various successional stages, of Douglas-fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis*) series habitat types, an unusual lodgepole pine (*Pinus contorta*) habitat type, and a particularly diverse representation of at least eight subalpine fir (*Abies lasiocarpa*) habitat types. Forest types in the Douglas-fir (*P. menziesii*) series are dominated by Ponderosa pine (*Pinus ponderosa*), individuals of which, occur all the way up Indian Ridge at the northern boundary of the site.

Rarity:

The site provides high quality representation of a great number of prominent plant associations. The site provides the only protected occurrence of *Pinus contorta/Vaccinium scoparium* and *Pseudotsuga menziesii/Vaccinium caespitosum*. The occurrences of *Abies lasiocarpa/Vaccinium caespitosum* and *Pseudotsuga menziesii/Vaccinium globulare* are the largest and most significant within the Idaho Batholith ecoregional section. Occurrences of *Pseudotsuga menziesii/Calamagrostis rubescens* and *Pseudotsuga menziesii/Spiraea betulifolia* are among the largest and most significant within the Idaho Batholith Section.

Condition:

A trail passes through the area. Recreational use of the area occurs in the fall, during hunting season. There is a camp site located within the southern portion of the site. Hiking and stock use appear to be restricted to the established trails. Populations of exotic species have not been documented.

Viability:

Landscape-scale alteration of natural fire disturbance regimes will compromise the natural integrity of fire disturbance within the natural area. A road, which would pass through the northern part of the area, was proposed in the past. The area is in Forest Plan Management Area 24, Caton Lake. Dispersed recreation is the primary use of this management area.

Key Environmental Factors:

Plant communities present in the area are typically associated with a natural disturbance regime of relatively frequent, low intensity fire. Data is not available on the natural disturbance history of the area.

Other Values:

The area could serve as a reference site for research and management questions regarding disturbance processes and terrestrial and aquatic systems interactions.

Conservation Intent:

Establishing Research Natural Area.

Management Needs:

The natural area is in good condition. The area provides high quality representation of plant associations within the Abies lasiocarpa and *Pseudotsuga menziesii* series. Stands were clearly historically maintained by repeated, low- to medium intensity, moderately frequent fire. *Pinus ponderosa* dominated stands are late mid- and late-seral. Recreational use of the area and adjacent land uses should be monitored to assess changes in trail and off-trail use. Action should be taken to limit, and eventually eliminate, use of the campsite located in the southern portion of the area.

Information Needs:

The areal extent of plant associations within the site were determined only to the series level. More precise information is needed on the size of plant association occurrences within the site. As well, information on stand age and stem structure will effectively increase the value of the area as an ecological reference area.

Plant Association Occurrences:

Pinus contorta/Vaccinium scoparium	G5	S5
Abies grandis/Vaccinium globulare	G3	S3
Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum phase	G4	S2
Abies lasiocarpa/Vaccinium caespitosum	G5	S3
Abies lasiocarpa/Vaccinium globulare	G5	S4
Abies lasiocarpa/Vaccinium scoparium	G5	S5
Pseudotsuga menziesii/Calamagrostis rubescens	G5	S4?
Pseudotsuga menziesii/Vaccinium caespitosum	G5	S2
Pseudotsuga menziesii/Vaccinium globulare	G5?	S2
Abies lasiocarpa/Calamagrostis canadensis, Calamagrostis canadensis phase	G5	S5
Abies lasiocarpa/Calamagrostis canadensis, Ligusticum canbyi phase	G5	S5
Abies lasiocarpa/Menziesia ferruginea, Menziesia ferruginea phase	G5	S5
Pseudotsuga menziesii/Spiraea betulifolia, Calamagrostis rubescens phase	G5	S3
Pseudotsuga menziesii/Spiraea betulifolia, Calamagrostis rubescens phase	G5	S3

Author:

A. H. Pitner and S. Rust

PONY MEADOWS

Location:

Pony Meadows RNA is located in the Salmon River Mountains ca 61 miles northeast of McCall and ca 11 miles south of Warren. From McCall, follow the Warren Wagon Road (FH 21) north along the west side of Payette Lake and the North Fork Payette River to the town of Warren, ca 50 miles (80 km). Continue southeast on FS Road 340 ca 1.5 miles (2.4 km) past Warren. Turn right (southwest) onto FS Road 359 and follow for 9 miles (15 km). Turn right again onto FS Road 361 which dead ends within the RNA.

Richness:

Pony Meadows RNA encompasses wet meadows, streams, kettle pond, and a cirque basin containing a shallow lake at the head of Steamboat Creek as well as adjacent burned and unburned forested and rocky slopes. The area includes stands of old-growth *Picea engelmannii* (Engelmann's spruce), *Abies lasiocarpa* (subalpine fir), *Pseudotsuga menziesii* (Douglas-fir), *Pinus contorta* (lodgepole pine), and *Pinus albicaulis* (whitebark pine). Young stands of *Pinus contorta, Picea engelmannii*, and *Abies lasiocarpa* are also present. A portion of the RNA burned in 1947 and is now in early seral vegetation. Wetland vegetation surrounding Steamboat Lake includes a mosaic of *Carex aquatilis* (water sedge), *Carex utriculata* (beaked sedge), and *Salix planifolia* (planeleaf willow). The area also contains granite boulder fields and rock cliffs with vegetation typical of these habitats. Much of the lake is covered with *Nuphar polysepalum* (pond lily). A kettle pond just southeast of Steamboat Lake has a central area of open water surrounded by steep banks with stands of *Deschampsia cespitosa* (tufted hairgrass) in areas where snow accumulates. Kettle ponds are present at the head of Pony Creek. The uppermost (southern) pond has an outlet that appears to be

flowing to the south rather than to Pony Creek. Stands of *Carex prionophylla* (saw-leaved sedge) as well as floating mats of *Eleocharis pauciflora* (few-flowered spikerush) are present. The lower kettle pond is nearly filled with *Carex utriculata* and *Eleocharis pauciflora*. Meadows along lower reaches are a mosaic of mesic forbs and *Deschampsia cespitosa* along outer margins with extensive stands of *Carex utriculata* and *Eleocharis pauciflora* in semi-permanently saturated area. The area also contains granite boulder fields and rock cliffs with vegetation typical of these habitats.

Rarity:

The area contains a lake and associated wetlands that are in excellent condition. Wetlands in the Pony Creek drainage are also of high quality. Elk use in the area is very high with use concentrated in wetlands and meadows.

Condition:

Recreational use of the site was assessed as light in 1979. Unauthorized motorized (and/or wheeled) recreation vehicles may access the site. Recreational uses are confined to roads and trailheads. No impacts (campsites or trails) were observed at Steamboat Lake. Populations of exotic species have not been documented.

Viability:

The site is within Forest Plan Management Area 13, Marshall/Ruby. Current uses of this area are primarily recreation and mining.

Key Environmental Factors:

Information not available.

Other Values:

Information not available.

Conservation Intent:

Established Research Natural Area.

Management Needs:

Recreational use of the area and adjacent land uses should be monitored.

Information Needs:

Information on plant community composition and structure is needed to more fully realize the value of the site as a reference area. Wetland surveys in 2001 focused on Steamboat Lake, the kettle pond southeast of Steamboat Lake, and the wetlands along Pony Creek. The lake in the southwest corner of the RNA is unsurveyed.

Plant Association Occurrences:

Pinus albicaulis/Abies lasiocarpa	G5?	S3
Abies lasiocarpa/Calamagrostis canadensis, Ledum glandulosum phase	G4	S2
Abies lasiocarpa/Xerophyllum tenax	G5	S5
Salix planifolia/Carex aquatilis	G5	S4
Carex utriculata	G5	S4
Deschampsia cespitosa	G4	S3
Carex aquatilis	G5	S4
Eleocharis pauciflora	G4	S1
Abies lasiocarpa/Calamagrostis canadensis, Calamagrostis canadensis phase	G5	S5
Abies lasiocarpa/Menziesia ferruginea, Menziesia ferruginea phase	G5	S5
Abies lasiocarpa/Vaccinium globulare, Vaccinium globulare phase	G5	S4

Author:
M. Jankovsky-Jones

BURGDORF MEADOW

Location:

Burgdorf Meadow is located along Lake Creek in the upper Secesh River drainage, about 27 miles north of McCall. Proceed north from McCall on the upper Payette River Road over Secesh Summit. Turn left onto FS Road 246 and proceed ca 1 mile up Lake Creek to the meadow.

Richness:

The site includes the bottomland meadow along Lake Creek west of FS Road 246 and forested slopes west of the creek. The entire site is on private land. The primary feature of the site is Lake Creek, which has a relatively slow gradient through the meadow. Lake Creek contains spawning habitat for summer Chinook salmon, which are listed as Threatened. In 1996, 4 Chinook redds were observed on the site; spawning habitat extends up and downstream from the site onto the Payette NF. The strain of summer Chinook in the Secesh River drainage is unique by being unaffected by hatchery stock, making the survival of salmon in this drainage especially important for the recovery of Snake River runs. In addition, Lake Creek is becoming more important as habitat lower in the drainage, at Secesh Meadows, is subdivided and developed. Other important native fish in Lake Creek include bull trout, westslope cutthroat trout, and steelhead trout. Another important feature of the site is the mountain meadow, which comprises most of area. It is largely ungrazed by domestic livestock (at least in the recent past) and is heavily used by elk during the summer. Most mountain meadows in central Idaho have been heavily grazed, such as to the north around Elk City and to the south around McCall. The native meadow communities are intact and have very few weeds. Most of the meadow is dominated by graminoids, with small areas of willow and subalpine fir. Slopes of glacial till comprise the western part of the site and are mostly forested with lodgepole pine. In the southwest corner, seeps emanate from the till, creating small, subirrigated peatlands and associated rivulets, which flow down slope for several hundred feet into Lake Creek. A small section of the hot springs outflow channel crosses beneath the road and flows through the site. It appears that elk heavily concentrate in this area.

Rarity:

Very high biodiversity significance, especially for aquatic elements: Chinook salmon and bull trout, among others. The mountain meadow system unaltered by intensive livestock grazing is also significant.

Condition:

Very little use takes place in the site. There are very few exotic species in the wetland and terrestrial portion of the site. Brook trout occur in Lake Creek.

Viability:

The site is adjacent to the developed resort around Burgdorf Hot Springs (to the east). There is a logging road and clearcuts on the Payette NF, to the west. A major travel route, FS Road 246 lies on the eastern boundary of the site.

Key Environmental Factors:

The key environmental feature of the site is the hydrology, which is important in Lake Creek, as well as maintaining the extensive graminoid meadow in the valley bottom and small peatlands on the slope.

Other Values:

Other values at the site are high also, especially the large herd of elk that feed in the meadow every night during the summer (up to 180 animals have been reported). They are predictable and highly visible, making Burgdorf Meadow an excellent wildlife viewing area.

Conservation Intent:

Much of the private land is managed as a preserve by The Nature Conservancy.

Management Needs:

None identified.

Information Needs:

None identified.

Plant Association Occurrences:

Pinus contorta/Vaccinium occidentale	G4	S2
Pinus contorta/Vaccinium scoparium	G5	S5
Abies lasiocarpa/Calamagrostis canadensis	G5	S3
Betula glandulosa/Carex utriculata	G4?	S3
Carex utriculata	G5	S4
Deschampsia cespitosa	G4	S3
Carex simulata	G4	S2
Eleocharis palustris	G5	S3
Salix drummondiana/Carex utriculata	G3	S3
Thermal springs aquatic community	G3?	S2

Rare Plant Occurrences:

Botrychium lanceolatum var. *lanceolatum*	G5T4	S3
Botrychium simplex	G5	S2

Author:

R. K. Moseley

GOLD FORK

Location:

The Gold Fork River is located in the west-central mountains of Idaho in Long Valley. From the town of Cascade, travel ca 16 miles north on State Highway 55 to the bridge crossing the Gold Fork River. The area can be accessed by foot from the bridge. It is a bit tenuous getting into the peatlands in Section 25 by walking upstream of the bridge. The easiest access is probably through private land south of the fen.

Richness:

The Gold Fork River is a major tributary to the North Fork Payette River (now part of Cascade Reservoir). The lower Gold Fork River supports a rich suite of wetland and riparian plant communities. Some of the communities represented upstream of Highway 55 include extensive stands consisting of *Salix lemmonii* (Lemmon's willow), *S. geyeriana* (Geyer's willow), *S. lasiandra* (whiplash willow), *S. boothii* (Booth's willow), *S. lutea* (yellow willow), *S. lasiolepis* (arroyo willow), and *Typha latifolia* (broadleaf cattail) that are hydrologically tied to flows in the Gold Fork River and the pool of Cascade Reservoir. It is also upstream of the bridge where subirrigated Sphagnum dominated peatlands or Poor fen habitat is present. The Poor fen includes a mosaic of *Betula glandulosa* (bog birch), *Carex simulata* (short beaked sedge), *C. aquatilis* (water sedge), *C. diandra*

(lesser panicled sedge), *C. utriculata* (beaked sedge), and *Typha latifolia*. Downstream of Highway 55 bridge, most of the bottomland is inundated by the pool of Cascade Reservoir. The extensive drawdown zone is dominated by *Eleocharis acicularis* (spike rush) and other pioneer species including *Gnaphalium palustre* (western marsh cudweed), *Hypericum anagalloides* (trailing St. Johns wort), *Rorippa curvisiliqua* (curvepod yellowcress), and *Lindernia dubia* (moistbank pimpernel). Vast stands of Salix species are also present just downstream of the bridge.

Rarity:

The area includes a high quality Poor fen where hydrology is mostly intact. Wetlands including mudflats provide critical waterfowl and furbearer habitat. The Gold Fork River is reported by the Bureau of Reclamation (2000) to have the greatest potential to support wild fish reproduction out of all the tributaries feeding Cascade Reservoir. Fish access to most of the river however, is blocked by an irrigation diversion.

Condition:

Exotic species, which threaten native plant associations at the site, were not noted.

Viability:

Operation of Cascade Reservoir influences the hydrology of much of the area. It is unknown how this impacts peatland habitat.

Key Environmental Factors:

Information not available.

Other Values:

Information not available.

Conservation Intent:

Portions of the site are managed as a Wildlife Management Area (WMA) by the Bureau of Reclamation (BOR). If grazing easements exist on BOR lands, they should be retired or managed to avoid impacts to wildlife during the breeding season. Private land upstream of Highway 55 bridge should be high priority for conservation easements and/or fee title acquisition.

Management Needs:

Management of BOR WMAs focuses on improving wildlife habitat conditions through vegetation management, fencing, and nesting structures as appropriate.

Information Needs:

None identified.

Plant Association Occurrences:

Betula glandulosa/Carex utriculata	G4?	S3
*Salix geyeriana/*Mesic graminoid	G2G3	QS3
Carex utriculata	G5	S4
Carex aquatilis	G5	S4
Carex simulata	G4	S2
Eleocharis palustris	G5	S3
Typha latifolia	G5	S4

Author:

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LAKE FORK CREEK

Location:

Lake Fork is located in the west-central mountains of Idaho in Long Valley. The south end of Lake Fork Creek is accessible by traveling ca 1 mile west of Donnelly. From the Lake Fork bridge, one can walk upstream, after water levels have dropped, to access lands managed by the Bureau of Reclamation. Upper reaches of Lake Fork Creek are accessible by traveling 4 miles north of Donnelly on Highway 55 to Smiley Lane where Lake Fork Creek crosses the highway. Lake Fork Creek is accessible by foot and via roads on private land downstream of this point.

Richness:

Lake Fork Creek flows into the north end of Cascade Reservoir. The floodplain supports emergent, scrub-shrub, and forested wetland habitat. Remnant wetlands are best developed in side channels, backwater sloughs, and ancient oxbows in the valley bottom rather than adjacent to the Lake Fork channel. As Lake Fork Creek slows down upon entering Cascade Reservoir, a significant delta composed of mixed alluvial deposits is present. Remnant wetlands occur in former and active floodplain features carved by the channel of Lake Fork Creek and in flats adjacent to the reservoir. Seasonally saturated benches support stands of *Deschampsia cespitosa* (tufted hairgrass), *Juncus balticus* (Baltic rush), and *Carex nebrascensis* (Nebraska sedge). Seeps and springs emanate at toeslopes along valley walls and support stands of moist site species including *Typha latifolia* (common cattail), *Carex aquatilis* (water sedge) or *Salix* spp./Mesic graminoid (willow/mesic graminoid) communities with some Sphagnum moss. *Rhamnus alnifolia* (alderleaf buckthorn), *Spiraea douglasii* (hardhack), *Vaccinium occidentale* (bog blueberry), and *Betula glandulosa* (bog birch) are locally abundant. Peatlands fed primarily by subirrigation from adjacent sloping seeps and springs are also present in former oxbows adjacent to the valley walls. Peatland communities form a complex mosaic composed of a border of *Betula glandulosa/Carex simulata* (bog birch/short beaked sedge), *Salix lemmonii* (Lemmon's willow) and *S. geyeriana* (Geyer's willow), *Juncus balticus* (Baltic rush), and *Carex utriculata* (beaked sedge) surrounding *Eleocharis pauciflora* (few-flowered spikerush) and *Carex limosa* (mud sedge) patches. Sphagnum moss is locally common to widespread. Livestock use does compact soil and alter the hydrology of some sites, causing the loss of Sphagnum, or its restriction to hummocky microsites. Where trampling has occurred, standing water, algal blooms, and accelerated hummocking are often observed. In addition, physical removal of vegetation hinders accumulation of organic matter and can damage plants to the point that regrowth does not occur (e.g., some clumps of hairgrass were physically uprooted by grazing animals). Lake Fork Creek creates an extensive delta where it enters Cascade Reservoir. *Juncus balticus* forms extensive, irregularly shaped patches at the high water line. *Salix geyeriana*, with a mesic graminoid understory, is common on the margins of islands and terraces, as well as along backwater sloughs and lagoons, at or slightly above the high water line (but not occupying as broad an elevation gradient as *Juncus balticus* stands). Other willow species including *S. lemmonii* and *S. bebbiana* are also common. The understory of willow stands is typically dominated by mixed sedge species, especially *Carex vesicaria* (inflated sedge), but *Juncus balticus* is locally common on drier sites. *Deschampsia cespitosa* dominated stands complete the mosaic with the prior mentioned communities. It forms small to moderately sized patches on terraces/islands with alluvial soils that may be seasonally shallowly flooded. The adjacent upland vegetation is mostly dominated by *Pinus contorta* (lodgepole pine) with other conifer species and quaking aspen and with a transitional, mixed, herbaceous or shrub understory. Below the high water line of the reservoir, an extensive mudflat drawdown zone occurs where old creek meanders are evident. The drawdown zone is a vast mosaic of areas dominated by either exotic weedy species such as *Rumex crispus* (curly dock) and *Agrostis stolonifera* (red top), native colonizing species including *Eleocharis acicularis* (needle-leaf spikerush), *Alopecurus aequalis* (shortawn foxtail), *Ranunculus flammula* (spearwort), *Epilobium* spp. (willowweed), or annuals including *Gnaphalium palustre* (marsh cudweed) and *Plagiobothrys scouleri* (Scouler's popcornflower). Old meander scars and swales typically support poorly defined communities of *Carex vesicaria, Sparganium* sp. (burreed), *Nuphar polysepalum* (pond lily), *Typha latifolia, Potamogeton natans* (floating pondweed), and *Sagittaria cuneata* (water potato). *Phalaris arundinacea* (reed canarygrass) is commonly dominant along the main reservoir shoreline with

patchy areas dominated by *Carex utriculata* or *C. vesicaria*. A minor amount of *Salix exigua* (coyote willow) occurs on sandy reservoir shores.

Rarity:

Lake Fork Creek is of general interest for habitat functions for shorebirds, furbearers (otter observed), big game, and raptors including *Strix nebulosa* (great gray owl), a special status bird species. In addition, the area includes high quality peatland habitat where the hydrology is intact. The peatlands include stands of the globally rare *Carex limosa* plant association. The special status plants, *Eriophorum viridicarinatum* (green keeled cotton-grass) and *Carex buxbaumii* (Buxbaum's sedge) are also present.

Condition:

Lake Fork Creek has a long history of land use that includes livestock grazing. In some areas, the uplands have considerable deadfall and livestock use may be concentrated in accessible non-forested wetlands. The wetlands are also impacted by operation of Cascade Reservoir. Historic floodplain wetlands have been replaced by open water and unconsolidated bottom wetland habitat. This includes loss of peatlands. Small peat deposits were observed below the high water line of the reservoir. Peatlands at the high water line of the reservoir are also present where organic substrate is being cut away by fluctuating water levels. *Phalaris arundinacea* (reed canary grass) is present and sometimes co-dominant in stands of *Carex utriculata*. The grasses, *Phleum pratense* (common timothy) and *Poa pratensis* (Kentucky bluegrass), are common with low cover in stands of *Deschampsia cespitosa*. The nonnative species *Rumex crispus* (curly dock) and *Agrostis stolonifera* (red top) are present and sometimes dominate on mudflats surrounding the reservoir.

Viability:

Housing developments are present on terraces above Lake Fork Creek. These developments as well as agricultural conversion on the uplands may have impacts on water quality and quantity.

Key Environmental Factors:

Wetland habitat in the Lake Fork drainage includes both natural wetlands and those that are maintained by the operation of Cascade Reservoir. The hydrology of natural wetlands is influenced by overbank flooding (side channels and sloughs) and springs or toeslope seeps (ancient oxbows) along Lake Fork Creek. Streamside riparian vegetation along Lake Fork Creek is somewhat limited due to bank failure and channel downcutting. Extensive mudflats supporting early seral wetland species are present below the high water line of Cascade Reservoir.

Other Values:

Information not available.

Conservation Intent:

The area is partially within an established Wildlife Management Area managed by the Bureau of Reclamation. Natural wetlands should be of high priority for programs such as the Wetlands Reserve Program or for easements by local land trusts.

Management Needs:

None identified.

Information Needs:

Surveys focused on private lands downstream of the Highway 55 bridge crossing and lands managed by the Bureau of Reclamation. Wetlands are apparent upstream of Highway 55 that may include peatland habitat. These areas were not surveyed. Known locations of Poor Fen peatland habitat are available on hard copy maps from the Conservation Data Center.

Plant Association Occurrences:		
Salix geyeriana/Mesic graminoid	G2G3	QS3
Carex utriculata	G5	S4
Deschampsia cespitosa	G4	S3
Carex limosa	G3	S1
Carex nebrascensis	G4	S3
Eleocharis pauciflora	G4	S1
Juncus balticus	G5	S5
Typha latifolia	G5	S4
Betula glandulosa/Carex simulata	G2	S2
Salix lemmonii	GU	SU
Rare Plant Occurrences:		
Carex buxbaumii	G5	S3
Eriophorum viridicarinatum	G5	S2
Rare Animal Occurrences:		
Strix nebulosa	G5	S3

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NORTH BEACH MEANDERS

Location:

The North Beach Meanders begin ca 3 miles north of Payette Lake on the North Fork Payette River. The area may be accessed by canoe by launching where the meanders begin, at the bridge ca 1.25 miles north of Payette Lake or at Payette Lake. The lower river has backwater from Payette Lake and one can canoe upstream. The area may also be accessed by foot travel and the river upstream of the bridge can be waded by late summer.

Richness:

The North Fork Payette River meanders through a moderately wide valley bottom, upstream of Payette Lake. The valley bottom is mostly dominated by conifers with small patches of cottonwood. The cottonwood stands are composed of mature trees with an understory most commonly dominated by mesic graminoids and forbs. Backwater sloughs, side channels and former channels support dense swards of sedges that are near monocultures of *Carex aquatilis* (water sedge), *C. vesicaria* (inflated sedge), and *C. utriculata* (beaked sedge) on a moist to saturated gradient. Small pools are present in the backwater areas that support *Ranunculus aquatilis* (whitewater crowfoot). Shrublands are occasionally present in small stands and include patches dominated by *Cornus sericea* (dogwood), *Rhamnus alnifolia* (alderleaf buckthorn), *Salix drummondiana* (Drummond's willow), *S. lutea* (yellow willow), *S. lasiandra* (whiplash willow), *S. commutata* (undergreen willow), and *S. geyeriana* (Geyer's willow). Cobble bars and sandbars along the channel have patches of *Salix exigua* (sandbar willow), and *Artemisia ludoviciana* (sagewort). The conifer forests are mostly upland forest types with small patches of moist forest supporting mesic forbs and graminoids. The backwater of Payette Lake influences the lower reaches of the North Fork Payette River, starting near the bridge crossing ca 1.75 miles upstream of Payette Lake. Downstream of this point, backwater creates more mesic conifer and deciduous forests and more extensive emergent wetlands and open water areas.

Rarity:

The area supports mostly native vegetation including high quality mature cottonwood forests. Also present are emergent wetlands in former channels and sloughs. The area provides nesting habitat for bald eagles (*Haliaeetus leucocephalus*).

Condition:

The floodplain of the North Fork Payette River has been lightly used since it is in public ownership. Some logging has taken place and a former homestead was observed. It does not appear that the area has been grazed. Current use of the area is mostly for recreation. A notable feature of the site is the low cover of exotic species. This is very uncommon along low to moderate elevation floodplains. *Phalaris arundinacea* is present, but native grasses and sedges are clearly dominant. The noxious weeds *Cirsium arvense* (Canada thistle), *Hieracium aurantiacum* (orange hawkweed), and *Linaria vulgaris* (toadflax) are present, but no large populations were observed. Most of the surveys were conducted on the floodplain on the opposite bank from the road, so more weeds may be present on the west bank. The dense native graminoids may function to outcompete noxious species and ground disturbing activities (such as livestock grazing) should be avoided to prevent establishment and spread of non-natives.

Viability:

The hydrology of the upper reach is mostly intact with some impacts from the impoundment at Upper Payette Lake. Starting approximately 1.75 miles upstream of Payette Lake, the channel is influenced extensively by raised lake levels. The influence includes cut headwalls from reservoir operations and an increase in the extent of emergent and moist forest wetlands.

Key Environmental Factors:

Information not available.

Other Values:

The area is habitat for numerous songbirds, deer, and moose.

Conservation Intent:

Endowment land, managed by the State Department of Lands, should be designated as a Natural Area. Lands currently managed by the Department of Parks and Recreation are managed to maintain recreational and biological values.

Management Needs:

The area, in particular the upper 1.5 miles, should be left alone as much as possible. Some areas receiving heavy recreational use currently have limited access so the channel can recover. Weeds should be monitored, particularly near the road. Cottonwood regeneration was not observed and the viability of the deciduous forest is uncertain.

Information Needs:

Surveys focused on the east side of the river are needed.

Plant Association, Rare Plant and Rare Animal Occurrences:

Picea engelmannii/Calamagrostis canadensis	G4	S4
Populus trichocarpa/Cornus sericea	G3?	S3
Salix drummondiana/Calamagrostis canadensis	G3	S2
Carex utriculata	G5	S4
Carex aquatilis	G5	S4
Carex vesicaria	GU	S3

Author:

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NORTH FORK PAYETTE RIVER - MCCALL TO CASCADE RESERVOIR

Location:

The North Fork Payette River, between McCall and Cascade Reservoir, Idaho, is best accessed via canoe. It can be floated by putting in at Sheep Bridge near the Smokejumper Base in McCall and taking out at Hartsell Bridge on Smiley Lane (3.9 miles north of Donnelly). The float is ca 10 miles and may include portages around logjams. It is recommended that this be an overnight trip in the Guide to Idaho Paddling. The trip can conceivably be extended to the flat water of Cascade Reservoir, taking out near the Tamarack Falls Bridge or Huckleberry Campground. This reservoir arm, including the North Fork Payette Wildlife Management Area, is best reached by hiking from Tamarack Falls Bridge or at access points from West Mountain/Abbott Road at ca 3 miles and 6 miles north of the Tamarack Falls Bridge. Tamarack Falls Bridge is located ca 4 miles west of Donnelly, Idaho.

Richness:

The North Fork Payette River meanders through Long Valley between McCall and Cascade Reservoir. The river has created a broad riparian wetland that is up to 1.0 mile wide in places. The wetland includes a complex mosaic of aquatic bed, emergent, scrub-shrub, and forested wetlands on landforms carved by the river. Logjams are common on the river (especially the lower reaches closer to the reservoir) and contribute to the development of new channels leaving old channels behind. Ancient oxbows and former channels support open water habitat where *Nuphar polysepalum* (pond lilies) float on the water surface. Other former channels are filled with a wide (30 m) swath of *Carex utriculata* (beaked sedge) and *Carex aquatilis* (water sedge). Stands of willows are also common and include drier sites with a sparse, but diverse understory and saturated sites that are dominated by the previously mentioned sedges. Willow diversity is seemingly high with at least five species identified along the river. Near the valley walls, former meanders are sometimes filled with somewhat unique peatlands dominated by *Betula glandulosa* (bog birch), *Carex simulata* (short beaked sedge), and *Carex diandra* (lesser panicled sedge). These peatlands are in-part subirrigated, or fed by seepage/springs emanating from the valley walls. Springs are dominated by heterogeneous stands of tall *Glyceria elata* (mannagrass) and *Aster* spp., with widespread *Mimulus* spp. (monkey flower), *Cicuta douglasii* (water hemlock), *Solidago canadensis* (goldenrod), *Rumex occidentalis* (bog dock), sedges, and *Rorippa palustris* (watercress). Other seeps and springs on terraces support *Populus tremuloides* (aspen), *Salix* spp. (willow), and sedge dominated communities. Drier sites, including well drained terraces, support stands of graminoids including *Juncus balticus* (Baltic rush) and *Deschampsia cespitosa* (tufted hairgrass) as well as moist forests with *Pseudotsuga menziesii* (Douglas fir), *Picea engelmannii* (Engelmann's spruce), *Pinus contorta* (lodgepole pine), and *Populus tremuloides*. In spite of upstream dams, coarse sandy alluvial surfaces continue to be deposited that support cottonwood and willow regeneration. Mature *Populus trichocarpa* (black cottonwood) stands are also present though most that were observed were in a somewhat degraded condition due to past grazing and removal of understory shrubs. The wetland habitats along the meandering river perform the important functions of water storage, water quality improvement, as well as providing high quality habitat for a variety of wildlife. Below Hartsell Bridge, the gradient of the river lessens and the floodplain becomes influenced by the high water line of Cascade Reservoir (elevation of 4,828 feet). Alluvial and woody debris depositions as well as cattle grazing increase significantly here. Nevertheless, low-lying areas of the former floodplain and flats around the reservoir support sedge or willow dominated vegetation or, in some abandoned meanders, poor fen peatlands. For example, a large peatland in the SW quarter of Section 5 (T16N, R3E), is dominated by *Carex limosa* (mud sedge), *C. simulata*, and *C. diandra* with *Eleocharis pauciflora* (spikerush) inclusions. The peatland is ringed by a moat of *Menyanthes trifoliata* (buckbean). Sphagnum moss dominates the ground layer throughout the poor-intermediate fen. Extensive areas of *Betula glandulosa* (bog birch), *Carex utriculata* (beaked sedge), *Salix* spp. (willow), and *Typha latifolia* (cattail) border the peatland. The valley walls of this lower reservoir reach also have seeps supporting *Betula glandulosa* and *Salix* spp. (willow). Where the North Fork Payette River enters Cascade Reservoir, it forms an extensive delta-like area with sand deposits and islands. This area, within the North Fork Payette Wildlife

Management Area, is a complex mosaic of *Salix geyeriana* (Geyer's willow) stands and other *Salix* spp. with mesic graminoid understories and Baltic rush, all reflecting the unstable, fluctuating nature of the reservoir and easily disturbed sandy soils. Sedge species and *Typha latifolia* typically dominate other low-lying areas of reservoir shoreline. Cattle grazing is extensive here. At minimum pool (4,816 feet elevation), extensive mudflat drawdown areas occur. These flats are dominated by a mosaic of weedy (e.g., *Rumex crispus* [curly dock] and others) and native species (*Eleocharis acicularis* [needle spikerush], *Ranunculus flammula* [creeping spearwort], *Rorippa* spp., ephemeral annuals, etc.). Swales and abandoned meanders support remnant *Nuphar polysepalum* and *Sparganium* sp. (burreed) stands.

Rarity:

The North Fork Payette River between McCall and Hartsell Bridge is one of the best examples of montane riparian habitat in Idaho. In spite of upstream dams, alluvial surfaces are present where cottonwood and willow can regenerate. Along much of the river, there continues to be an active floodplain. The floodplain has high habitat diversity ranging from open water oxbows with *Nuphar polysepalum*, to extensive stands of *Carex* spp. and *Salix* spp., to former meanders near valley walls that are filled with *Betula glandulosa, Carex* spp., and Sphagnum moss dominated peatlands. The river is habitat for nesting *Haliaeetus leucocephalus* (bald eagles), *Pandion haliaetus* (osprey), and large ungulates.

Condition:

A number of land uses have impacted the quality of habitat in the valley bottom. Past grazing has altered the species composition in mature cottonwood stands reducing cover of understory shrub species. Portions of the semi-permanently saturated wetlands and peatlands have also been grazed resulting in hummocky microtopography and soil compaction. The conifers on some of the well-drained terraces have also been logged. Some roads are present near the river and a handful of large homes have been built near channel banks. Only small sections of banks, near roads, have been stabilized by rock riprap. Exotic species are abundant on drier well-drained terraces and include *Phleum pratense* (timothy), *Agropyron repens* (quackgrass), *Tanacetum vulgare* (common tansy), and *Bromus inermis* (smooth brome). *Phalaris arundinacea* (reed canarygrass) forms large patches on bars and on margins of semi-permanently saturated wetlands. Exotics seem to be best established on drier sites and less of a threat in areas that are wet throughout the growing season. *Phalaris arundinacea* is especially common along reservoir shorelines.

Viability:

Site hydrology has been impacted by the operation of water control structures on Payette Lake and Upper Payette Lake. The river is influenced by Cascade Reservoir operation below Hartsell Bridge, altering hydrology and increasing deposition of sandy alluvium and woody debris. Adjacent uplands are mostly used for agriculture, including grazing and hay pasture, but also (increasingly) housing subdivisions.

Key Environmental Factors:

Information not available.

Other Values:

The North Fork is a scenic river and wildlife-viewing opportunities are abundant. It is considered a "must do" trip by canoeists. The wetlands along the river perform the important wetland functions of storage of floodwater, flood attenuation, maintenance of base flow, and removal of particulates and pollutants. These functions will be lost if the river is not allowed to continue to take its natural meander course.

Conservation Intent:

The area contains a mix of private and public lands. State owned (IDL) and Bureau of Land Management managed parcels should be managed to maintain wetland functions. This should include avoidance and elimination of practices that alter hydrology or alter species composition.

Privately owned parcels are at high risk for development, particularly drier benches. Development will likely result in flood control measures to protect homes and roads from both overbank flooding and from channel migration. Conservation easements as well as fee title acquisition should be the priority for high quality floodplain habitat supporting extensive wetlands. Appropriate setbacks are also necessary that consider the movement of the river cross the wide valley bottom. The area below about river mile 60 to Tamarack Falls Bridge (the Cascade Reservoir section) is managed for fish and wildlife habitat (the North Fork Payette Wildlife Management Area).

Management Needs:

No commercial and residential developments should be allowed on channel banks. Flood flows should be maintained. Exotic species should be monitored and removed when necessary. Livestock grazing should be eliminated in areas adjacent to the river, especially in semi-permanently saturated wetlands and peatlands.

Information Needs:

Areas surveyed included public lands (Idaho Department of Lands, Bureau of Reclamation, and Bureau of Land Management) and a few privately owned parcels where access was obtained (near river mile 67 and elsewhere). Additional surveys may identify high quality cottonwood stands, tufted hairgrass communities, and additional occurrences of unique bog birch communities. Prior to cattle use in summer, the area needs to be surveyed for *Carex vesicaria* (blister sedge) and *C. nebrascensis* (Nebraska sedge) communities. Known poor fen peatland locations are available from the Conservation Data Center. Due to time constraints, conifer/aspen stands were not sampled.

Plant Association Occurrences:

Populus trichocarpa/Salix exigua	G1	S1
Salix drummondiana	G3Q	S3
*Salix geyeriana/*Mesic graminoid	G2G3Q	S3
Carex utriculata	G5	S4
Carex aquatilis	G5	S4
Carex limosa	G3	S1
Carex simulata	G4	S2
Eleocharis pauciflora	G4	S1
Juncus balticus	G5	S5
Nuphar polysepalum	G5	S4
Typha latifolia	G5	S4
Betula glandulosa/Carex simulata	G2	S2
Artemisia ludoviciana	G3	S2

Rare Animal Occurrences:

Haliaeetus leucocephalus	G4	S3B,S4N

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PONDEROSA PENINSULA

Location:

Ponderosa Peninsula is located within Ponderosa State Park on Payette Lake. The peninsula is just northeast of McCall, Idaho.

Richness:

Ponderosa Peninsula extends for several miles into Payette Lake. The basalt peninsula ranges in elevation from 4,986 feet at the shoreline of Payette Lake to 5,280 feet at the top of a knoll. Forested vegetation includes stands of *Abies grandis* (grand fir) with lesser amounts of *Abies lasiocarpa* (subalpine fir) and *Pseudotsuga menziesii* (Douglas fir). Shrublands, dominated by *Purshia tridentata* (bitterbrush) and *Artemisia tridentata* (Great Basin sage brush), are also present. Glacial activity created depressional wetlands supporting emergent and open water habitat. Lily Lake is the largest wetland feature and includes a central floating mat of vegetation surrounded by an open water moat or lag. The mat supports poor fen vegetation with high cover of Sphagnum species and stands of *Carex lasiocarpa* (woollyfruit sedge), *C. utriculata* (beaked sedge), and *Menyanthes trifoliate* (common buckbean). *Nuphar polysepalum* (Rocky Mountain pondlily) is present in open water habitat. Meadow marsh is the other prominent wetland feature and is mostly dominated by a sward of *Carex vesicaria* (blister sedge). Moist woody vegetation stands in drainage paths and on wetland margins include stands of *Cornus sericea* (redosier dogwood), *Populus trichocarpa* (black cottonwood) and *Picea engelmannii* (Engelmann's spruce).

Rarity:

The peninsula has not been grazed by livestock and supports reference quality stands of upland forests and shrublands and peatlands. The peninsula is habitat for *Bucephala albeola* (bufflehead), *Strix varia* (barred owls), and *Haliaeetus leucocephalus* (bald eagles).

Condition:

No exotics that threaten wetland habitat were noted.

Viability:

Current land use seems to be compatible with the long term viability of wetlands at this site.

Key Environmental Factors:

Information not available.

Other Values:

The peninsula has very high recreational, educational, and wildlife values. Interpretive talks and events are scheduled throughout the year.

Conservation Intent:

Established Natural Area.

Management Needs:

None identified.

Information Needs:

None identified.

Plant Association Occurrences:

Abies grandis/Acer glabrum	G3	S3
Abies grandis/Clintonia uniflora	G5	S3
Abies grandis/Spiraea betulifolia	G3	S2
Abies grandis/Vaccinium globulare	G3	S3
Abies lasiocarpa/Clintonia uniflora	G5	S4
Picea engelmannii/Equisetum arvense	G4	S2
Pseudotsuga menziesii/Symphoricarpos albus	G5	S4
Pseudotsuga menziesii/Vaccinium globulare	G5?	S2
Cornus sericea	G4	S3
Salix geyeriana/Carex utriculata	G5	S4
Carex utriculata	G5	S4

Carex lasiocarpa	G4	S2
Carex vesicaria	GU	S3

Rare Animal Occurrences:

Bufo boreas	G4	S4
Bucephala albeola	G5	S3B,S3N

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SECESH MEADOWS

Location:
The Secesh Meadows are ca 25 air miles northeast of McCall, Idaho. From McCall, take Warren Wagon Road (Forest Highway 21) north along the west side of Payette Lake and North Fork Payette River for ca 40 miles. Much of the meadow is in private ownership. The easiest access to lands managed by the USFS is on the west side of the meadow. In 2001, steel fence posts marked the USFS boundary.

Richness:
Secesh Meadows are located in a broad valley bottom in the Salmon River Mountains. The Secesh River flows through the valley, which includes broad wetland meadows on both sides of the river. Surveys along the river were limited due to private land access. The west side of the meadow supports a wetland complex with emergent, scrub-shrub, and forested wetlands. Stands of emergent vegetation include *Carex utriculata* (beaked sedge), *C. aquatilis* (water sedge), *C. simulata* (short beaked sedge), *Juncus balticus* (Baltic rush), and *Deschampsia cespitosa* (tufted hairgrass) on an approximate wet to dry gradient. These communities appear as near monocultures as well as in mixed stands where clear dominance is unclear. *Salix* species, including *Salix wolfii* (Wolf's willow) and *S. planifolia* (planeleaf willow), form patches with moderate cover throughout the meadow. Stands of *Betula glandulosa* (bog birch) are present in areas with slightly elevated topography and on the outer margins of the meadow.

Rarity:
Information not available.

Condition:
No exotics were noted.

Viability:
The area and portions of wetlands have been fragmented by roads and development of homes.

Key Environmental Factors:
Information not available.

Other Values:
The Secesh River is a spawning and rearing habitat for wild Chinook salmon. The meadow is used by elk and deer that browse heavily on willows and bog birch.

Conservation Intent:
Wetlands in the valley should be left alone as much as possible. Opportunities for easements or fee title acquisitions should be actively pursued.

Management Needs:

It is unknown what can be done to reduce the impacts of development on hydrology and water quality. The meadows surrounding the Secesh River play an extremely important role in providing cool, clean water to the river throughout the growing season. Hydrologic manipulation that disrupts this subsurface flow should be avoided. Water quality should be carefully monitored to ensure that septic systems are adequate.

Information Needs:

Areas surveyed in 2001 included lands managed by the USFS on the west side of the meadow and two private parcels near the "Wagon Wheel Stage Stop". Further surveys would likely identify additional plant communities along the Secesh River as well as communities dominated by conifers and tall willows.

Plant Association Occurrences:

Abies lasiocarpa/Calamagrostis canadensis	G5	S3
Betula glandulosa/Carex utriculata	G4?	S3
Salix wolfii/Carex aquatilis	G4	S4
Carex utriculata	G5	S4
Deschampsia cespitosa	G4	S3
Carex simulata	G4	S2
Juncus balticus	G5	S5

Author:

M. Jankovsky-Jones

JOHNSON CREEK POND

Location:

Johnson Creek Pond is located ca 13 miles northeast of Cascade, Idaho. From Cascade, travel northwest on Highway 22 to Forest Service Road 497, which is the road to Gold Fork Lookout. Turn north and travel ca 6 miles on Forest Service Road 497. From the road, the pond can be reached by foot. The access is fairly steep, but a safe route can be chosen.

Richness:

The small glacial kettle pond creates the headwaters of Johnson Creek. The pond is surrounded on three sides by steep cliffs with an outlet trending to the south. Wetlands are well established including open water with *Nuphar polysepalum* (pond lily) with floating islands of *Menyanthes trifoliata* (buckbean) and *Carex canescens* (silvery sedge). The pond is surrounded by stands of *Carex utriculata* (bladder sedge) that are permanently saturated. Wetter sites including the "moat" at the wetland edge are dominated by *Menyanthes trifoliata*. Drier sites are dominated by *Carex scopulorum* (Holm's Rocky Mountain sedge) with a rich mix of mesic forbs.

Rarity:

Johnson Creek Pond is of general interest as a wetland reference site.

Condition:

Site is only lightly visited by occasional hunters or hikers. No exotic species were observed.

Viability:

Some cattle signs were noted on slopes above pond. Area is quite well protected from most land uses by steep cliffs.

Key Environmental Factors:

The kettle pond is fed by groundwater. Water levels appear to be consistent throughout the growing season.

Other Values:

The slow release of water from the wetland helps to maintain flows in Johnson Creek throughout the growing season.

Conservation Intent:

This area is naturally protected by its landscape location at the base of steep slopes and cliffs. However, designation as a Special Interest Area botanical may be appropriate to recognize the high quality wetlands.

Management Needs:

None identified.

Information Needs:

None identified.

Plant Association Occurrences:

Carex utriculata	G5	S4
Carex scopulorum	G5	S3

Author:

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LAKE FORK FENS

Location:

The Lake Fork Fens are located ca 8.5 miles east of McCall, Idaho, on Lick Creek Road. The fens are upstream of Browns Pond in glacial kettles on the north and south side of Lake Fork Creek.

Richness:

Glacial kettles and depressions support rich fens (pH 5.8 to 6.0) in the upper Lake Fork drainage upstream of Browns Pond. The fens are dominated mostly by emergent graminoids, sedges, and rushes. Fens are present both north and south of Lake Fork Creek. The portion north of Lake Fork Creek is an oval shaped meadow that is bounded to the south by Lick Creek Road, granitic outcrops and moraines. The meadow substrate is mostly sedge peat with Sphagnum spp. absent and other mosses patchy. The area is poorly drained and flooded to 10 cm in the middle of the summer. Stands of *Carex lasiocarpa* and *Juncus balticus* are in semi-permanently flooded sites. *Carex utriculata, C. cusickii, C. buxbaumii*, and *Eleocharis palustris* are in seasonally flooded sites. Overall, however, the vegetation is a mosaic with much intergradation. *Salix* spp. (heavily browsed by ungulates) are scattered around edges along with a few *Pinus contorta, Picea engelmannii*, and *Abies lasiocarpa*. Mixed dry-conifer forest is present on slopes. A spring creek enters the fen from the north and flows underground in places. The upper reach of the stream channel is a dense stand of *Populus tremuloides/Cornus sericea*. The channel exits a glacial depression that is filled with a rich mix of mesic forbs with dominance by *Equisetum arvense* and smaller patches of *Cornus sericea* and *Carex utriculata*. South of Lick Creek Road and Lake Fork Creek, another depressional wetland is present. Springs emerge in the kettle and small spring creeks flow through the area. The species composition here is somewhat mixed also with only the wettest sites supporting near monocultures. The driest sites are dominated by a diverse mix of mesic forbs and graminoids including *Deschampsia cespitosa* and *Agrostis stolonifera*. Areas that are saturated throughout the growing

season are a mix of *Juncus balticus* and *Carex utriculata*. The wettest sites support nearly pure stands of *Carex utriculata*. Cover by non-vascular species is high and of particular interest are extensive patches carpeted by liverworts. Springs emerge in and on the east side of the meadow and are used heavily by elk for wallows.

Rarity:

Stands of vegetation are in very good condition. The northern fen is habitat for *Carex buxbaumii*.

Condition:

The area may have been grazed in the past. No recent grazing or other vegetation disturbance was noted. Only the drier margins of fens have exotic plant species present, including *Poa pratensis*, *Phleum pratense*, and *Agrostis stolonifera*.

Viability:

Roadside weed spraying, road grading, and associated fill deposited in wetland are potential impacts.

Key Environmental Factors:

Information not available.

Other Values:

The meadows and spring creeks provide habitat for spotted frogs, western toads, elk, and mallards. A giant larch (57.5 inches dbh) is present on the inlet of the fen on the north side of Lake Creek. This fen is also adjacent to a road, which may provide wildlife viewing.

Conservation Intent:

The area supports extensive, high quality stands of emergent vegetation. Designation as Special Interest Area botanical may be appropriate.

Management Needs:

The fens should be left alone as much as possible. Activities, which compact soils, alter hydrology, or create pathways for non-native species invasion, should be avoided. Road maintenance actions should be sensitive to the hydrology of the fen.

Information Needs:

Nonvascular species including liverworts need to be collected and identified.

Plant Association Occurrences:

Populus tremuloides/Cornus sericea	G4	S4
*Alnus incana/*Mesic forb	G3G4	S1
Carex utriculata	G5	S4
Deschampsia cespitosa	G4	S3
Carex lasiocarpa	G4	S2
Eleocharis palustris	G5	S3
Juncus balticus	G5	S5

Rare Plant Occurrences:

Carex buxbaumii	G5	S3

Author:

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UPPER NORTH FORK PAYETTE MEADOWS

Location:

Upper North Fork Payette Meadows are located ca 20 miles north of McCall, Idaho. From McCall, travel north along the west side of Payette Lake on the Warren Wagon Road for ca 20 miles. About 1.5 miles past Upper Payette Lake turn left (northwest) on Forest Service Road 465 and follow this road to the meadows.

Richness:

Upper North Fork Payette Meadows are an ungrazed, intact wet meadow complex in a glacial carved trough. The meadow is surrounded by granitic rock outcrops in low mountains with mosaic burned (1994) and salvage-logged *Pinus contorta* (lodgepole pine), *Abies lasiocarpa* (subalpine fir), and *Picea engelmannii* (Engelmann's spruce) forest. The meadow is fed by the deep, sinuous and entrenched North Fork Payette River as well as numerous small tributary drainages, springs in the meadows, and early summer snow melt. The vegetation is indicative of cold air sink/frost pockets. The surrounding uplands are roaded and partially logged and the meadow has several roads leading to it and skirting its eastern edge. This has led to the proliferation of campsites along the eastern edge and some motorized vehicle damage to the meadow in this area. Overall, however, the meadow is in good to excellent ecological condition. There is a moisture gradient from the slightly drier upper end to the wetter lower outlet end. For example, the upper third of the meadow is characterized by encroachment of mesic mixed conifer "islands" and "peninsulas" with extensive patches of *Vaccinium occidentale* (blue huckleberry) and *Calamagrostis canadensis* (bluejoint reedgrass) in the understory. There is inter-gradation with stands of *Salix wolfii/Deschampsia* cespitosa (Wolf's willow/tufted hairgrass) and Betula glandulosa (bog birch) with intermixed *Salix eastwoodiae* (mountain willow), *S. wolfii* (Wolf's willow), and *S. planifolia monica* (diamondleaf willow) around slightly moister transition areas and meadow fringes. In this area, there are large stands of *Deschampsia cespitosa* with patches of *Danthonia intermedia* (timber oatgrass) often on hummocks or on slightly better drained but ephemerally wet soil. Slightly wetter areas are dominated by *Salix wolfii/Deschampsia cespitosa* stands grading into *Carex utriculata* (bladder sedge) stands with inclusions of *C. aquatilis* (water sedge) and patches of *Salix planifolia monica*. This area has soil that is moist throughout the growing season with large areas of very shallow standing water. There are also shallowly flooded areas, which dry later in the growing season and support *Eleocharis palustris* (creeping spikerush) stands. The lower third of the meadow is narrower and wet with more *Salix planifolia* stands in mosaic with *Carex utriculata* and *C. aquatilis* patches. Around springs and seeps are small patches of Sphagnum dominated by *Carex utriculata* and rarely *C. lasiocarpa* (slender sedge). Throughout the meadows, river and spring channels and banks act as naturally formed levees and are generally lined by *Salix planifolia monica/Carex utriculata* with varying amounts of *Vaccinium occidentale, Betula glandulosa*, and other *Salix* spp. The wet meadow complex is excellent habitat for elk, deer, and moose as well as birds and spotted frogs.

Rarity:

The area has good plant community diversity.

Condition:

The area was probably historically grazed but not for many years. Within the area, there is an old cabin, old corral, and private land inholdings. No exotic plant species were observed.

Viability:

Road building and logging within the watershed may alter hydrology of the meadow complex.

Key Environmental Factors:

Information not available.

Other Values:

The area is wildlife habitat and has scenic value. Recreational activities include hunting, fishing, and camping.

Conservation Intent:

The area includes private lands as well as land managed by the United States Forest Service. Gains in wetland function may be accomplished by removing or minimizing ground disturbing activities.

Management Needs:

Need to prohibit encroaching campsites and motor vehicle access to the wet meadows.

Information Needs:

A revisit to the area in mid-summer during peak vegetation period is needed to better describe plant communities with plots. Need to better delineate communities on site maps. Sphagnum areas need to be searched for special status plant species or communities. Site boundaries need to be reassessed after visiting upper meadows.

Plant Association Occurrences:

Pinus contorta/Vaccinium occidentale	G4	S2
Betula glandulosa/Carex utriculata	G4?	S3
Salix planifolia monica/Carex aquatilis-carex utriculata	G3Q	S3
Salix wolfii/Deschampsia cespitosa	G3	S2
Carex utriculata	G5	S4
Deschampsia cespitosa	G4	S3
Carex aquatilis	G5	S4
Eleocharis palustris	G5	S3

Author:

C. Murphy

DUCK CREEK

Location:

The Duck Creek Wildlife Management Area (WMA) is easily reached by traveling west from Donnelly for ca 4 miles to Tamarack Falls, following signs to Cascade Reservoir recreation areas. At Tamarack Falls junction, after the bridge crossing the North Fork Payette River arm of Cascade Reservoir, go south on West Mountain Road ca 4 miles to the north boundary of Duck Creek, which is near Mallard Bay and just south of the Poison Creek campground. The site extends about 7 miles south of this point to the mouth of Gibson Creek. The center of the site is roughly near Osprey Point Group Camp, which is administered by Lake Cascade State Park. The WMA is closed to most uses from March 1 to July 15.

Richness:

The Duck Creek Wildlife Management Area occupies toeslopes of the West Mountains and adjacent low-lying flats along Cascade Reservoir. Despite the sandy to fine gravelly alluvial soils from mostly alluvial fan deposits of granitic origin, the area is rich in wetland communities including *Populus tremuloides* (quaking aspen), *Salix* spp. (willows), *Crataegus douglasii* (black hawthorn), *Carex* spp. (sedges), and mesic graminoid dominated stands. Wetlands are supported by the combination of subirrigation from groundwater emanating from the mountain toeslopes, numerous perennial and intermittent streams draining the mountains, and elevated groundwater when Cascade Reservoir is at full pool. It is typically full, or near full, from mid-June to mid-July and slowly draws down during the summer to the 4,816 foot elevation level, where it remains until mid-October. The lowest elevation

communities at the 4,828 to 4,830 foot elevation are most influenced by, and tolerant of, fluctuating reservoir levels and have generally developed after the filling of Cascade Reservoir in 1957. Many wetland communities, such as those occupying swales and creek bottoms, however, are relicts and probably pre-date the reservoir as evidenced by their topographic position and loam or muck soils typical of older, natural wetland communities. Throughout the site, *Phalaris arundinacea* (reed canarygrass) dominates the high water line of the reservoir, forming a band varying in width from over 50 meters wide to as narrow as 10 meters wide, depending on the slope. It thrives in this unstable, disturbed zone, where water levels fluctuate and wave action can erode soils, but is less common above about the 4,830 foot contour. Included within the site is an extensive area of mudflats that support a heterogeneous carpet of both weedy and native vegetation. For example, large patches of exotic *Rumex crispus* (curly dock), *Agrostis stolonifera* (creeping bentgrass), and *Poa palustris* (fowl bluegrass) form a mosaic with patches of native *Eleocharis acicularis* (needle spike-rush), *Alopecurus aequalis* (shortawn foxtail), *Epilobium* spp. (willowherbs), *Ranunculus flammula* (creeping spearwort), *Agrostis scabra* (rough bentgrass), and various ephemeral mudflat annuals. The northern section, near Mallard Bay, supports several large patches of scrub-shrub wetland dominated by *Salix geyeriana* (Geyer willow) or *Salix bebbiana* (Bebb willow) with mixed mesic graminoid understories of mostly *Carex lanuginosa* (wooly sedge), other *Carex* spp., and *Juncus balticus* (Baltic rush). A large, but irregularly shaped, mixed age stand of *Populus trichocarpa* (black cottonwood) and adjacent *Populus tremuloides* stands are also found here with a weedy, mesic herbaceous understory. These woody herbaceous communities are probably dependent on reservoir-fed groundwater and are limited to shorelines or low lying flats along the reservoir. On slightly higher, better-drained soils adjacent to scrub-shrub or forested wetland vegetation in the northern 2 miles of the site, *Danthonia intermedia* (timber oatgrass) and other species tolerant of seasonally moist conditions form meadows. Interspersed moister swales are dominated by *Deschampsia cespitosa* (tufted hairgrass) or *Carex* spp. In the north half of the site, there are several ponds or seasonally flooded depressions that support *Typha latifolia* (common cattail) and *Sparganium emersum* (narrowleaf burreed) stands with open water. Some of these areas including two sites northwest of Osprey Point are created wetlands. These wet areas are ringed by *Carex utriculata* (bladder sedge) and, occasionally, *Carex vesicaria* (inflated sedge) stands. The moist basins below Osprey Point are dominated by a mosaic of *Carex nebrascensis* (Nebraska sedge), *Juncus balticus*, and *Deschampsia cespitosa*, grading into *Carex utriculata* swards with *Salix bebbiana* patches. Duck Creek, the largest perennial stream on the site, is entrenched in a gully filled mostly by *Alnus incana/Cornus sericea* (mountain alder/red-osier dogwood) and lined by mixed conifer spp. and *Populus tremuloides* on drier soil. A large area on a low ridge, in the NW quarter of section 20 (T15NR3E), south of Osprey Point, is dominated by seeded exotic hay grass species. South of this area near the SE quarter of section 19 is a large area of wetlands characterized by large *Populus tremuloides* stands with *Calamagrostis canadensis* (bluejoint reedgrass) and/or *Carex aquatilis* (water sedge), exotic grass spp., and tall mesic forbs in the understory. *Crataegus douglasii* stands with tall forbs and *Salix bebbiana* occupy adjacent swales and creek banks. Some stands have understories dominated by exotic grasses or forbs, reflecting historic grazing disturbance. Vast low-lying flats below these woody communities are dominated by *Carex utriculata* with smaller inclusions dominated by *Carex aquatilis*, other *Carex* spp., *Juncus balticus, Salix geyeriana*, and *Deschampsia cespitosa*. Two small islands in the reservoir are ringed by *Salix lasiandra* (whiplash willow) or *Salix exigua* (coyote willow) dominated stands, with barren, wave disturbed understories on the shoreline and *Juncus balticus* on the islands. On upland areas along West Mountain Road throughout the site, there are mixed conifer stands often with *Symphoricarpos albus* (common snowberry) or mesic herbs in the understory.

Rarity:

The Duck Creek Wildlife Management Area has excellent osprey nesting habitat in conifers and on artificial platforms. Bald eagles and other raptors also use the area for roosting and hunting. Sandhill cranes utilize marshes and reservoir drawdown areas. The site supports a good quality example of *Crataegus douglasii/Heracleum lanatum* (black hawthorn/cow parsnip), a special status plant community. No rare plants are known from the site.

Condition:

Cascade Reservoir is a multi-purpose reservoir providing irrigation, hydropower, flood control, recreation, and fish and wildlife habitat. The Duck Creek Wildlife Management Area was historically used for livestock grazing, which is now excluded, and some sections of land were drained and/or seeded with exotic hay grass species to increase forage. Currently, the vast majority of the site includes lands designated as a Wildlife Management Area and managed by the Bureau of Reclamation for open space for fish and wildlife as well as for human recreation. A narrow strip about 1 mile long in the Mallard Bay area is designated as Conservation Open Space. The only recreation development occurs on about 2 acres of land at Osprey Point where a group camp is located, managed by Lake Cascade State Park, consisting of a gravel road, parking area, three yurts, and informal trails for hiking and cross-country skiing. Other Osprey Point developments only occur in upland habitats. Public fishing access is proposed at Mallard Bay with parking, trails, a restroom, and monitoring of impacts to the shoreline. Currently there is a rough gravel road accessing the reservoir at Mallard Bay. Improvement of the road and development of parking and trail areas may impact a small area of emergent and mesic graminoid wetlands. See the "Cascade Resource Management Plan: Draft EA (2000)" for more information. *Euphorbia esula* (leafy spurge) and *Cirsium arvense* (Canadian thistle) are present. The *Euphorbia esula* infestation is found on upland/wetland margins (see 2001 boundary/vegetation map) and is currently small and controllable.

Viability:

The western boundary of the site essentially follows the West Mountain Road and the property boundary of land owned and managed by the Bureau of Reclamation. The road is a well-maintained and well-used gravel road that may introduce sediment to creeks crossing under the road through culverts. Impacts caused by the culverts to the hydrology of these small streams are generally minimal except possibly at high flows when water could dam upslope of the road. Private homes and cabins in small, single lot subdivisions are widely distributed along the western side of West Mountain Road immediately adjacent to the WMA. The proposed West Rock four-season resort with large numbers of condominiums, a golf course, and ski area is located ca 1 mile northwest of the northern boundary of the site near Mallard Bay and across from Poison Creek campground. The housing and other developments will negatively impact the WMA by isolating low elevation wildlife habitat from mountain habitats. The only linkage from mountain to reservoir via public land is at the south end of the site. For wildlife, other negative impacts of the resort development include increased human and pet use (e.g., predation), groundwater pollution (e.g., septic systems), noise pollution, and traffic (e.g., both on road and off highway vehicles).

Key Environmental Factors:

The Duck Creek Wildlife Management Area provides both natural, created, and reservoir-influenced wetlands supporting emergent, graminoid, scrub-shrub, and forested cover types. Uncommon *Populus tremuloides* and *Crataegus douglasii* communities occur in this area. Wildlife, nesting, and foraging habitats are excellent.

Other Values:

The area provides important open space of high recreation and scenic value.

Conservation Intent:

Over 75% of the site is located in the Duck Creek Wildlife Management Area, which manages and protects fish and wildlife habitat and excludes cattle grazing. The Mallard Bay area is protected as open space with proposed minimal recreation developments and is mostly excluded from cattle grazing.

Management Needs:

In order to continue excluding cattle from the area, the fence along West Mountain Road should be maintained. The immediate control and elimination of *Euphorbia esula* (leafy spurge) populations is needed.

Information Needs:

The far southern end near Gibson Creek and the mouth of Duck Creek need to be surveyed.

Plant Association Occurrences:

Populus tremuloides/Calamagrostis canadensis	G3	S2
Crataegus douglasii/Heracleum lanatum	G1	S1
Alnus incana/Cornus sericea	G3G4	S3
Salix bebbiana	G3?	S3
*Salix exigua/*barren	G5	S4
*Salix exigua/*Mesic forb	G2?	S2?
*Salix geyeriana/*Mesic graminoid	G2G3Q	S3
Carex utriculata	G5	S4
Deschampsia cespitosa	G4	S3
Carex microptera	G4	S3
Carex aquatilis	G5	S4
Carex nebrascensis	G4	S3
Carex praegracilis	G2G3Q	S2
Juncus balticus	G5	S5
Typha latifolia	G5	S4
Carex vesicaria	GU	S3

Rare Animal Occurrences:

Aechmophorus occidentalis	G5	S4B,SZN

Author:

C. Murphy

HOT SPRINGS CREEK

Location:

The Hot Springs Creek area, including the Bureau of Reclamation's (BOR) Hot Springs Creek WMA, is located ca 10 miles north of Cascade, Idaho, on Highway 55. The BOR's WMA is easily accessed by foot at several locations. The WMA is closed to most uses from March 1 to July 15 for nesting. Permission to access private land should be obtained from the various landowners in the valley.

Richness:

The Hot Springs Creek area is on the east side of Cascade Reservoir at the upper (northern) end of Long Valley. It is estimated that one third to one half of the valley continues to support native vegetation. Native emergent wetlands include *Carex microptera* (small wing sedge), *Juncus balticus* (Baltic rush), *C. nebrascensis* (Nebraska sedge), *C. vesicaria* (inflated sedge), *C. aquatilis* (water sedge), and *C. utriculata* (bladder sedge) on a dry to wet gradient. *Carex nebrascensis* and *Juncus balticus* create the most extensive stands of native vegetation. Large areas of mudflats are exposed as Cascade Reservoir falls to low pool. The mudflats are dominated by a number of annual grasses and forbs including *Eleocharis acicularis* (needle spikerush), *Rorippa curvisiliqua* (curvepod yellowcress), and *Plagiobothrys scouleri* (Scouler's popcornflower). The area also includes extensive areas dominated by *Phalaris arundinacea* (reed canarygrass) and *Alopecurus pratensis* (meadow foxtail).

Rarity:

The area is of general interest for wetland functions, habitat, and open space.

Condition:

Private lands are used to support livestock operations. Meadows are used for grazing and possibly hay pasture. Lands owned by Bureau of Reclamation are managed as a Wildlife Management Area. Livestock grazing is excluded from all areas managed by BOR that do not have a grazing right through an agricultural easement. Roughly one half of the wetland complex is dominated by non-native pasture grasses. No noxious or troublesome weeds were observed. Tilapias are being raised in Hot Springs Creek but apparently stay within the channel reaches that have raised temperatures.

Viability:

The adjacent upland landscape is largely intact. Uses include livestock grazing and logging.

Key Environmental Factors:

The hydrology is driven by melting of deep snows in the valley and upwelling of groundwater. Wetlands near Cascade Reservoir are partially maintained by raised lake levels.

Other Values:

Information not available.

Conservation Intent:

Portions of the wetland are within a Bureau of Reclamation Wildlife Management Area (WMA). Grazing easements are in place within the WMA. Habitat values could be enhanced by establishing cooperative agreements or easements with landowners. Further ditching and seeding should be discouraged.

Management Needs:

Current management should maintain exiting functions and processes. Restoration potential is high if hydrology were restored. This would potentially increase the area occupied by native wetland plant communities.

Information Needs:

No information needs were noted.

Plant Association Occurrences:

Carex utriculata	G5	S4
Carex microptera	G4	S3
Carex aquatilis	G5	S4
Carex nebrascensis	G4	S3
Eleocharis acicularis	G4?	S3
Eleocharis palustris	G5	S3
Juncus balticus	G5	S5
Carex vesicaria	GU	S3

Author:

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MEADOWS VALLEY

Location:

Meadows Valley is located on the floodplain of the Little Salmon River, north of New Meadows, Idaho. From New Meadows, travel north on Highway 95 for ca 8 miles. On the west side of the highway will be a pull-off area with a wetland restoration educational sign. Park here to access the lower half of the site.

Richness:

Meadows Valley occurs in the wide valley of the meandering Little Salmon River. The area is characterized by degraded mesic meadows with remnant patches of *Deschampsia cespitosa* (tufted hairgrass) on ephemerally wet ground with interspersed swales, vernal pools, and flood overflow wetlands occupying old meander scars. The most common community on wet low-lying soils that are flooded to saturated yearly is *Carex utriculata* (beaked sedge) with small patches of *Carex aquatilis* (water sedge) intermixed. A few patches of *Juncus balticus* (Baltic rush) with *Carex nebrascensis* (Nebraska sedge) and *Scirpus microcarpus* (small-fruit bulrush) occur on wet soils having standing water in the fall. Wetter swales and meander scars, which pool water into the summer, are essentially vernal pools dominated by large areas of *Sparganium emersum* (narrowleaf burreed) or *Eleocharis palustris* (creeping spikerush) and smaller patches of *Puccinellia pauciflora* (pale false mannagrass) with *Alopecurus aequalis* (shortawn foxtail) and *Glyceria* spp. (mannagrass). There are several small seeps and small inflowing streams entering the site from toeslopes. These often have small patches of *Salix bebbiana* (Bebb's willow), *Crataegus douglasii* (black hawthorn), or other shrubby vegetation. The surrounding uplands are mostly *Pinus ponderosa* (ponderosa pine) dominated forest. The area is currently heavily grazed by cattle and degraded by years of over use. For example, the river channel is entrenched with large areas of unvegetated, sloughing cut banks due to loss of willows, sedges, and other bank stabilizing plants by cattle trampling and grazing. Noxious weeds, including *Ranunculus repens* (creeping buttercup) and exotic hay grasses, especially *Agrostis stolonifera* (creeping bentgrass) and *Phleum pratense* (timothy), have also significantly invaded mesic meadows including *Deschampsia cespitosa* meadows. There is an apparent decline and absence of *Salix* spp. along the riverbanks with only a small patch of *Salix lemmonii* (Lemmon's willow) observed along a flood overflow channel. In addition, there are scattered *Crataegus douglasii* patches on drier ground, which have weedy understories. The area is currently being restored through the USDA NRCS Wetlands Reserve Program. With alterations to grazing regimes, hydrology, and channel morphology, combined with willow and other plantings, the remnant natural vegetation can expand and wetland functions can be restored.

Rarity:

Meadows Valley is in the upper watershed for *Oncorhynchus tshawytscha* (Chinook salmon) spawning and has potential to become good wildlife habitat.

Condition:

The entire valley including Meadows Valley is grazed by cattle. Exotic hay grasses are very common as well as *Ranunculus repens* and other competitive weeds, which are impacting the integrity of native communities. *Linaria vulgaris* (butter and eggs) is present in low numbers and is scattered throughout the area.

Viability:

Logging and livestock grazing occur in the watershed causing water pollution including sedimentation, which may limit stream quality.

Key Environmental Factors:

Information not available.

Other Values:

The area is a scenic valley with recreation opportunities including canoeing. With the restoration of the wetland, water quality will improve causing a reduction in sedimentation.

Conservation Intent:

Meadows Valley is in the Wetland Reserve Program as a restoration site with a 30-year easement, which began in 1999.

Management Needs:

Need to limit livestock use to allow wet meadows to recover. Riverbanks need stabilization by grading to re-establish river meandering and by, subsequently, planting with willows.

Information Needs:

Need to conduct additional surveys in midsummer or before the area is disturbed by cattle to determine if other plant communities exist.

Plant Association Occurrences:

Carex utriculata	G5	S4
Deschampsia cespitosa	G4	S3
Eleocharis palustris	G5	S3
Juncus balticus	G5	S5

Author:

C. Murphy

WILLOW CREEK, VALLEY COUNTY

Location:

Willow Creek, Valley County is at the southern end of Cascade Reservoir. Access is by vehicle from Cabarton Road or Southeast Shore Drive. Most of the area is a Bureau of Reclamation Wildlife Management Area. It is closed to most uses from March 1 to July 15.

Richness:

Willow Creek, Valley County is at the southern tip of Cascade Reservoir. An estimated 50% of the area supports native wetland vegetation including shrub and emergent habitat. The scrub-shrub wetlands dominated by *Salix geyeriana* (Geyer willow) seem to be rebounding from the effects of past grazing. Emergent wetlands include stands of *Eleocharis pauciflora* (few-flowered spikerush), *Carex utriculata* (bladder sedge), *C. aquatilis* (water sedge), *C. nebrascensis* (Nebraska sedge), *Deschampsia cespitosa* (tufted hairgrass), and *C. microptera* (small wing sedge) on a wet to dry gradient. The non-native species *Phalaris arundinacea* (reed canarygrass), *Bromus inermis* (smooth brome), and *Alopecurus pratensis* (meadow foxtail) are widespread in the area. Extensive areas of mudflats dominated by annual species are present in the drawdown zone of the reservoir.

Rarity:

The area is of general interest for open space and wildlife habitat functions.

Condition:

Exotic species are abundant, though no noxious weeds were observed that require immediate management attention.

Viability:

Current management is compatible with long term viability of the area.

Key Environmental Factors:

Hydrology is maintained by melting of deep snow in the valley, inputs from Willow Creek, and operations of Cascade Reservoir.

Other Values:

Information not available.

Conservation Intent:

Most of the area is managed as a Wildlife Management Area by the Bureau of Reclamation. Easements or cooperative agreements to maintain wetland functions on adjacent private land would be appropriate.

Management Needs:

None identified.

Information Needs:

This area was visited very briefly on July 3, 2001. Information is needed on cover and species composition.

Plant Association Occurrences:

Salix geyeriana/Carex utriculata	G5	S4
Carex utriculata	G5	S4
Deschampsia cespitosa	G4	S3
Carex microptera	G4	S3
Carex nebrascensis	G4	S3
Eleocharis acicularis	G4?	S3
Eleocharis palustris	G5	S3
Juncus balticus	G5	S5

Author:

M. Jankovsky-Jones

SURVEY NOTES ON OTHER SITES

BEAVER CREEK

Plant Associations

Carex aquatilis
Carex simulata
Carex utriculata
Deschampsia cespitosa
Eleocharis palustris

Description

Beaver Creek is a tributary to the North Fork Payette River that enters just below Cascade Dam. There are two large reservoirs in the upper reach of Beaver Creek. The lower reaches of the creek run through a broad, low gradient valley where two small tributaries enter. A reservoir is present on the southern tributary along with a small impoundment downstream. The middle tributary also has two small impoundments. These impoundments, as well as flood and sprinkler irrigation, help to maintain a mosaic of seasonally saturated emergent and open water wetlands on the terraces and within and along the channels. The site supports a broad (25 m) swath of mesic graminoids. Included in the wetland are small stands of *Carex aquatilis*, *C. nebrascensis*, *C. simulata*, *C. stipata*, *C. utriculata*, *Deschampsia cespitosa*, *Eleocharis palustris*, *Juncus balticus*, *Phalaris arundinacea*, *Glyceria borealis*, *Scirpus microcarpus*, *Sparganium emersum* and *Typha latifolia*. The drier terraces are mostly dominated by *Stipa occidentalis*, *Poa pratensis*, *Bromus inermis*, *Achillea millefolium* and *Trifolium repens*. The lower end of the site near the highway supports *Salix geyeriana* and *S. drummondiana* communities. The Beaver Creek channel is entrenched into the valley bottom up to 4 m. Spotted frogs were seen at this site.

Author:

C. Murphy

KENNALLY CREEK MEADOWS

Plant Associations

Betula glandulosa/Carex simulata
Carex aquatilis
Carex simulata
Deschampsia cespitosa
Eleocharis pauciflora
Juncus balticus
*Salix eastwoodiae/*Mesic graminoid
*Picea engelmannii/*Mesic graminoid
Salix drummondiana/Calamagrostis canadensis

Description

Kennelly Meadows supports a small, but unusual wet meadow, fen, and peatland complex in fair to good ecological condition. The site consists of a wet meadow complex surrounded by mesic *Pinus contorta*, *Populus tremuloides*, and *Picea engelmannii* forest. The forest has been logged and the area is grazed by horses and occasionally by domestic sheep. Grazing appears heaviest in *Salix drummondiana*/*Calamagrostis canadensis* stands along Kennally Creek. Gravel roads, with dispersed campsites are nearby along two sides of the wetland complex. The wet meadow complex occupies a depression (somewhat resembling an old kettle pond now filled in with peat) that is

subirrigated and fed by seeps, seasonal runoff, and springs. A small stream drains the meadow to Kennally Creek. The lowest part of the meadow, where there is significant inflow and subirrigation, supports a mosaic of intergrading small patch communities (none greater than 0.25 acre in size). *Eleocharis pauciflora* dominates the wettest sections, with patchy *Carex simulata*. Adjacent, *Carex aquatilis* dominates the center of the meadow on saturated soil, while patches dominated by either *Juncus balticus* or *Deschampsia cespitosa* occur on slightly drier meadow margins. *Carex utriculata*, *Lonicera caerula*, and *Muhlenbergia filiformis* are widespread throughout the wet meadow. Several heterogenous stands of *Salix eastwoodiae*/Mesic graminoid, mixed with *Betula glandulosa*, *Spiraea douglasii*, and *Pinus contorta*, occur along the meadow margins. Granite bedrock is exposed along the northern margin of the wetland. Seeps emanate from the base of these rocks, feeding a small peatland. A small sized, but good condition stand of *Betula glandulosa/Carex simulata*, with scattered *Pinus contorta*, *Salix* spp., and *Spiraea douglasii* occurs along the lower margin of the peatland. A small (15 x 35 m) domed peatland occurs between *Betula glandulosa* and downslope wetland meadow complex. The ground is sphagnum-dominated (70-80% cover, 10 cm thick), seepy, and wet just below the surface all year. *Carex simulata* is the dominant vascular plant, with lesser amounts of *Carex utriculata*. The surface of this domed feature is about 75 cm above the adjacent vegetation.

Author:
C. Murphy

PADDY FLAT

Plant Associations
Abies lasiocarpa/Calamagrostis canadensis
Betula glandulosa/Carex simulata
Carex utriculata
Eleocharis pauciflora
Juncus balticus
*Picea engelmannii/*Mesic graminoid
Pinus contorta/Calamagrostis canadensis
*Salix lemmonii/*Mesic graminoid

Description
Paddy Flat is located in the Rapid Creek drainage about 12 miles east of Donnelly. A U.S. Forest Service guard station and campground are nearby and there is private land along the creek below the site. The meadow by the guard station is heavily grazed by horses and in poor ecological condition. *Salix* shrubs are small and reduced in number. The meadow is currently dominated by *Poa pratensis* and forbs that increase in abundance with grazing pressure. Also found at the site is a small, slightly wetter area supporting an open stand of dead-topped *Salix lemmonii*, with a few *S. boothii*, *S. geyeriana*, and *Populous tremuloides*, and a mixed forb-graminoid understory of *Poa pratensis*, *Carex nebrascensis*, and *Deschampsia cespitosa*. The area is drier than would be expected, as if the willows and mesic graminoids have lost their connection to groundwater after the surrounding *Pinus contorta* forest was clearcut or the flow in the irrigation ditches feeding the horse pasture has diminished over time. Several small drainage ditches occur throughout the area. The bottomlands around Rapid Creek support *Abies lasiocarpa/Calamagrostis canadensis* forest. A small wet meadow complex, in better ecological condition, occurs north of the Paddy Flat guard station. This gently sloped meadow is subirrigated and has seasonally wet and saturated organic soils. *Picea engelmannii/*Mesic graminoid stands occur on moister sites around the meadow, while logged *Pinus contorta* forest occurs on drier soil. *Carex utriculata* is the most widespread plant in the meadow, but only rarely is it the clear dominant. The meadow is characterized by a mosaic of intergrading stands dominated by *Juncus balticus* and *Carex utriculata* on better-drained soil, and *Eleocharis pauciflora*,

Carex simulata, and *C. utriculata* on poorly drained soil. These wetter meadow communities grade into *Betula glandulosa/Carex simulata* stands at the lower end of the meadow. In the middle of the meadow there is an "island" stand of *Pinus contorta*, with *Betula glandulosa*, numerous low shrubs, *Carex* spp., and *Calamagrostis canadensis* in the understory. Two elk were flushed out of this wetland.

Author:
C. Murphy

ROUND VALLEY

Plant Associations
Detailed plant community information is not available.

Description
The site lies at the center of Round Valley about 10 miles south of Cascade in Valley County, Idaho. The high mountain valley, located at about 4,800 feet elevation, is surrounded on all sides by thick, sloping forests comprised of both coniferous and deciduous trees. Five small creeks flow through the flat, wide-open meadow on the valley floor, and much of the ground is wet meadow and lush grassland. The creeks converge on the site to form Round Valley Creek which in turn feeds the North Fork of the Payette River. During the summer months, the grasslands and meadows of the site provide good pasture and are used primarily to graze cattle. The vegetation in the meadows is a mix of native and nonnative species. The area has been heavily seeded with *Phleum pratense* (Timothy). Upland sandpipers have been observed at or near the site and are suspected of breeding there.

Author:
M. Elsbree/E. Bottum

APPENDIX D

Acres of wetland and deepwater habitat for digitized maps by Hydrologic Unit

Wetland and deepwater habitat for digitized maps within Hydrologic Unit 17050123 (North Fork Payette).

Cowardin Type	Frequency	Acres	Percent
L1UBFh	13	125.37	0.22
L1UBH	32	81.51	0.15
L1UBHh	177	29,032.66	51.67
L2UBFh	26	313.34	0.56
L2USAh	35	34.12	0.06
L2USCh	251	2,752.80	4.90
PABF	76	45.41	0.08
PABFh	27	14.65	0.03
PABFx	8	10.81	0.02
PABH	29	50.89	0.09
PABHh	6	9.42	0.02
PABHx	4	9.20	0.02
PABKrx	3	12.02	0.02
PEMA	589	5,019.65	8.93
PEMAd	4	27.16	0.05
PEMAh	82	360.39	0.64
PEMB	54	94.50	0.17
PEMC	888	8,748.00	15.57
PEMCd	1	15.96	0.03
PEMCh	342	2,059.10	3.66
PEMCx	1	0.87	0.00
PEMF	123	385.94	0.69
PEMFh	43	91.06	0.16
PEMFx	1	1.14	0.00
PEMH	4	17.07	0.03
PEMHh	1	3.17	0.01
PEMKx	2	3.92	0.01
PFOA	276	2,682.76	4.77
PFOAh	59	143.57	0.26
PFOB	21	58.09	0.10
PFOC	74	285.27	0.51
PFOCh	49	215.20	0.38
PSSA	133	546.51	0.97
PSSAh	36	62.72	0.11
PSSB	52	96.62	0.17
PSSC	172	470.86	0.84
PSSCh	84	278.31	0.50
PUBF	94	41.20	0.07
PUBFh	70	49.24	0.09
PUBFx	21	10.03	0.02
PUBH	33	25.29	0.05
PUBHb	1	0.40	0.00
PUBHh	90	183.60	0.33
PUBHx	22	28.51	0.05
PUBKrx	5	11.91	0.02
PUSA	1	5.16	0.01
PUSC	1	0.42	0.00

Hydrologic Unit 17050123 (continued)

Cowardin Type	Frequency	Acres	Percent
PUSCh	3	8.67	0.02
PUSCx	5	0.68	0.00
R2UBH	27	199.61	0.36
R2USA	9	8.85	0.02
R2USC	59	36.30	0.06
R3RBH	159	981.61	1.75
R3RSA	12	47.50	0.08
R3RSC	16	7.92	0.01
R3UBH	6	88.51	0.16
R3USA	63	175.66	0.31
R3USC	160	114.19	0.20
TOTAL	4,635	56,185.30	100.00

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

Cowardin Type	Frequency	Acres	Percent
R3UB1H	2	1.38	76.68
R3US1C	2	0.42	23.32
TOTAL	4	1.80	100.00

Wetland and deepwater habitat for digitized maps within Hydrologic Unit 17060210 (Little Salmon).

Cowardin Type	Frequency	Acres	Percent
L1UBH	6	18.21	0.60
L1UBHh	32	657.96	21.58
PABF	11	7.59	0.25
PABFh	1	0.24	0.01
PABH	5	9.28	0.30
PABKrx	1	8.79	0.29
PEMA	145	1,189.68	39.01
PEMAh	1	4.05	0.13
PEMB	11	8.34	0.27
PEMC	153	646.15	21.19
PEMCh	4	5.27	0.17
PEMF	23	32.37	1.06
PEMFh	5	3.21	0.11
PFOA	15	42.22	1.38
PFOB	1	1.35	0.04
PFOC	3	4.89	0.16
PSSA	99	150.30	4.93
PSSB	14	30.59	1.00
PSSC	53	102.24	3.35
PUBF	16	3.48	0.11
PUBFb	1	0.89	0.03
PUBFh	13	4.25	0.14
PUBFx	2	0.37	0.01
PUBH	8	12.07	0.40
PUBHh	5	5.43	0.18
PUBHx	3	0.97	0.03
PUSCh	2	0.40	0.01
R2ABH	4	8.52	0.28
R2RSA	1	1.15	0.04
R2UBH	3	43.29	1.42
R2USA	26	17.18	0.56
R2USC	2	1.00	0.03
R3RSA	5	2.05	0.07
R3USA	30	25.06	0.82
R3USC	1	0.51	0.02
TOTAL	705	3,049.35	100.00

APPENDIX E

Key to Wetland and Riparian Plant Associations in the West-Central Mountain Valleys

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 m^2 (25 x 10), and emergent communities 100 m^2 (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).

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 Overstory Dominance Groups

1.	*Picea engelmannii, Abies lasiocarpa, Pinus contorta*, or *Pseudotsuga menziesii* with at least 25% cover or dominating the overstory.	Needle-leaved evergreen forest types
1.	Not as above.	2
2.	*Populus trichocarpa* or *P. tremuloides* present with a canopy cover of at least 15% and not representing a sere to conifer or shrub dominated types.	Broad-leaved deciduous forest
2.	Trees absent or if present with less than 10% cover or restricted to microsites.	3
3.	Shrubs present with a canopy cover of at least 10%.	Scrub-shrub types
3.	Not as above shrubs and trees contributing minor amounts to composition or restricted to microsites. Herbaceous species with a combined cover of at least 15% or emergent herbaceous species with at least 4% cover.	Emergent types

Key to Needle-Leaved Evergreen Forest Types

1.	*Abies lasiocarpa* or *Picea engelmanii* with at least 25% cover and successfully reproducing. Stands dominated by *Pinus contorta* are also included here.	2
1.	*Pseudotsuga menziesii* or *Pinus contorta* dominate the overstory.	6
2.	*Cornus sericea* with at least 25% cover.	*Picea engelmannii/Cornus sericea*
2.	Not as above.	3
3.	*Calamagrostis canadensis* with at least 25% cover.	*Abies lasiocarpa/ Calamagrostis canadensis*
3. a.	*Ledum glandulosum* with at least 4% cover.	*Ledum glandulosum* phase
3. b.	Not as above.	*Calamagrostis canadensis* phase
3.	Not as above.	4
4.	*Carex disperma* with at least 10% cover.	*Picea engelmannii/Carex disperma*
4.	Not as above.	5
5.	*Streptopus amplexifolius, Aconitum columbianum, Senecio triangularis, Mertensia* spp., or *Saxifriga odontoloma* with at least 10% cover individually or in combination.	*Abies lasiocarpa/Streptopus amplexifolius*
5.	Not as above.	12
6.	*Pseudotsuga menziesii* with at least 25% cover and successfully reproducing.	7
6.	Not as above.	8
7.	*Cornus sericea* alone or in combination with willows, *Equisetum arvense*, or *Actea rubra* with at least 10% cover.	*Pseudotsuga menziesii/ Cornus sericea*
7.	Not as above.	8

Key to Needle-Leaved Evergreen Forest Types (continued)

8.	Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.	9
8.	Site without wetland characteristics.	Upland site
9.	Overstory and understory dominated by native plant species.	Unclassified or undocumented palustrine needle-leaved evergreen forest community type
9.	Overstory or understory dominated by exotic plant species.	Human induced palustrine needle-leaved evergreen forest

Key to Broad-Leaved Deciduous Forest Types

1.	*Populus tremuloides* with greater than 15% cover.	2
1.	*Populus trichocarpa* with at least 15% cover.	4
2.	*Cornus sericea* with at least 25% cover.	*Populus tremuloides/Cornus sericea*
2.	Not as above.	3
3.	*Calamagrostis canadensis* with at least 25% cover.	*Populus tremuloides/ Calamagrostis canadensis*
3.	Not as above.	12
4.	*Populus trichocarpa* with at least 25% cover.	5
4.	Not as above.	12
5.	Seedlings or saplings of *Populus trichocarpa* dominate the site on a recently deposited alluvial bar or island.	*Populus trichocarpa*/Recent Alluvial Bar
5.	Not as above.	6
6.	*Alnus incana* with at least 25% cover or the dominant understory shrub.	*Populus trichocarpa/Alnus incana*
6.	Not as above.	7

Key to Broad-Leaved Deciduous Forest Types (continued)

7.	*Salix lutea* alone or in combination with *Salix lasiandra* with at least 25% cover.	*Popular trichocarpa/Salix lutea*
7.	Not as above.	8
8.	*Symphoricarpos albus* with at least 15% cover or the dominant understory shrub.	*Populus trichocarpa/ Symphoricarpos albus*
8.	Not as above.	9
9.	*Cornus sericea* with at least 25% cover or the dominant understory shrub.	*Populus trichocarpa/Cornus sericea*
9.	Not as above.	10
10.	*Rosa woodsii* with at least 15% cover or the dominant understory shrub.	*Populus trichocarpa/Rosa woodsii*
10.	Shrubs with low cover. Native herbaceous species dominate the understory.	11
11.	Mesic graminoids including *Carex lanuginosa, Calamagrostis canadensis*, and *Juncus balticus* dominate the understory with at least 15% cover.	*Populus trichocarpa*/Mesic graminoid
11.	Not as above.	12
12.	Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.	13
12.	Site without wetland characteristics.	Upland Site
13.	Overstory and understory dominated by native plant species.	Unclassified or undocumented palustrine broad-leaved deciduous forest community type
13.	Overstory or understory dominated by exotic plant species.	Human induced palustrine broad-leaved deciduous forest community type

Key to Scrub-Shrub Types

1.	Willows with at least 25% cover.	2
1.	Willows absent or with less than 25% cover.	Mixed scrub-shrub dominated community type
2.	Tall willow species including *Salix lutea, S. lasiandra, S. exigua, S. boothii, S. geyeriana, S. drummondiana*, or *S. bebbiana* alone or in combination with at least 25% cover.	Tall willow community types
2.	Low willow species including *Salix arctica, Salix nivalis, Salix wolfii, S. brachycarpa, S. planifolia* var. *monica* alone or in combination with at least 25% cover.	Low willow community types

Key to Mixed Scrub-Shrub Types

1.	Low shrubs including *Potentilla fruticosa, Betula glandulosa, Artemisia cana, Artemisia tridentata tridentata*, or *Sarcobatus vermiculatus*, alone or in combination with at least 15% cover. Tall shrubs absent or contributing less than 5% cover.	3
1.	Not as above.	2
2.	Tall shrubs including *Alnus incana, Betula occidentalis, Cornus sericea, Crataegus douglasii*, or *Rosa woodsii* dominant.	15
2.	Not as above.	28
3.	*Potentilla fruticosa* or *Betula glandulosa* with at least 10% cover.	4
3.	Not as above.	8
4.	*Carex simulata* with at least 25% cover.	*Betula glandulosa/Carex simulata*
4.	Not as above.	5
5.	*Carex utriculata (rostrata)* and/or *C. aquatilis* with at least 25% cover.	*Betula glandulosa/Carex utriculata*
5.	Not as above.	6

Key to Mixed Scrub-Shrub Types (continued)

	6.	*Deschampsia cespitosa* with at least 5% cover.	*Potentilla fruticosa/ Deschampsia cespitosa*
	6.	Not as above.	7
7.	*Distichlis spicata, Carex parryana, Carex scirpoidea, Muhlenbergia richardsonis, Spartina gracilis*, or other alkali tolerant graminoids with at least 25% cover.		*Potentilla fruticosa*/Alkali graminoid
7.	Not as above.		28
	8.	*Sarcobatus vermiculatus* with at least 10% cover (in low quality stands *Chrysothamnus nauseousus* may be present with high cover).	9
	8.	Not as above.	11
9.	*Elymus cinereus* with at least 5% cover.		*Sarcobatus vermiculatus/ Elymus cinereus*
9.	Not as above.		10
	10.	*Distichlis stricta* with at least 10% cover.	*Sarcobatus vermiculatus/ Distichlis stricta*
	10.	Not as above.	28
11.	*Artemisia cana* with at least 10% cover.		12
11.	Not as above.		13
	12.	*Festuca idahoensis* with at least 5% cover.	*Artemisia cana/Festuca idahoensis*
	12.	Not as above.	28
13.	*Artemisia tridentata* with at least 10% cover.		14
13.	Not as above.		28

Key to Mixed Scrub-Shrub Types (continued)

	14.	*Elymus cinereus* with at least 5% cover.	*Artemisia tridentata tridentata/Elymus cinereus*
	14.	Not as above.	28
15.	*Alnus incana* with at least 25% cover.		16
15.	Not as above.		18
	16.	Mesic forbs including *Mertensia* sp., *Heracleum lanatum, Aconitum columbianum, Smilacina stellata, Hydrophyllum fendleri* alone or in combination with at least 25% cover.	*Alnus incana*/Mesic forb
	16.	Not as above.	17
17.	Graminoids, shrubs, or bare ground dominates the understory.		*Alnus incana* cover type
17.	Not as above.		28
	18.	*Cornus sericea* with at least 25% cover.	*Cornus sericea*
	18.	Not as above.	19
19.	*Crataegus douglasii* with at least 25% cover.		20
19.	Not as above.		22
	20.	*Symphoricarpos albus* with at least 15% cover.	*Crataegus douglasii/ Symphoricarpos albus*
	20.	Not as above.	21
21.	*Rosa woodsii* with at least 15% cover.		*Crataegus douglasii/Rosa woodsii*
21.	Not as above.		22
	22.	*Betula occidentalis* the dominant shrub with at least 15% cover.	23
	22.	Not as above.	27

Key to Mixed Scrub-Shrub Types (continued)

23.	*Cornus sericea* with at least 10% cover.	*Betula occidentalis/Cornus sericea*
23.	Not as above.	24
24.	*Potentilla fruticosa* with at least 5% cover. Stands occur on alkaline substrates.	*Betula occidentalis/potentilla fruticosa*
24.	Not as above.	25
25.	Mesic forbs including *Mertensia* spp., *Heracleum lanatum, Aconitum columbianum, Smilacina stellata, Hydrophyllum fendleri* alone or in combination with at least 25% cover.	*Betula occidentalis*/Mesic forb
25.	Not as above.	26
26.	Other species than those listed above are understory dominants.	*Betula occidentalis* cover type
26.	Not as above.	28
27.	*Rosa woodsii* the dominant shrub with at least 40% cover.	*Rosa woodsii* cover type
27.	Not as above.	28
28.	Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.	29
28.	Site without wetland characteristics.	Upland Site
29.	Overstory and understory dominated by native plant species.	Unclassified or undocumented palustrine scrub-shrub community type
29.	Overstory or understory dominated by exotic plant species.	Human induced palustrine scrub-shrub vegetation

Key to Tall Willow Types

1.	*Salix lutea, S. lasiandra, S. exigua, S. bebbiana* alone or in combination with at least 25% cover.	2
1.	Not as above.	12
2.	*Salix exigua* with greater cover than any of the other tall willow species.	3
2.	Not as above.	7
3.	Understory poorly developed or barren due to annual scouring or recent colonization by *S. exigua*.	*Salix exigua/*Barren
3.	Not as above.	4
4.	*Rosa woodsii* with at least 10% cover.	*Salix exigua/Rosa woodsii*
4.	Not as above.	5
5.	Mesic forbs including *Heracleum lanatum, Senecio triangularis, Smilacina stellata*, and *Mertensia* spp. alone or in combination contribute at least 10% cover to the understory.	*Salix exigua/*Mesic forb
5.	Not as above.	6
6.	Mesic graminoids including *Carex lanuginosa, Juncus balticus*, and *Glyceria striata* with at least 25% cover.	*Salix exigua/*Mesic graminoid
6.	Not as above.	26
7.	*Salix lasiandra* the dominant willow and alone or in combination with other shrubs with at least 25% cover.	8
7.	Not as above.	9
8.	Mesic forbs including *Smilacina stellata, Actaea rubra, Aconitum columbianum* and other forb species with at least 25% cover.	*Salix lasiandra/*Mesic forb
8.	Not as above.	26

Key to Tall Willow Types (continued)

9.	*Salix lutea* the dominant willow and alone or in combination with other shrubs with at least 15% cover.	10
9.	Not as above.	12
10.	*Carex utriculata (rostrata)* with at least 10% cover.	*Salix lutea/Carex utriculata*
10.	Not as above.	11
11.	Other species dominate the understory.	*Salix lutea* cover type
11.	Not as above.	26
12.	*Salix bebbiana* with at least 25% cover.	*Salix bebbiana* cover type
12.	Not as above.	13
13.	*Salix boothii* the dominant willow, alone or in combination with *S. geyeriana*, or *S. drummondiana*, with at least 25% cover.	14
13.	Not as above.	19
14.	*Carex utriculata (rostrata)* with at least 25% cover.	*Salix boothii/Carex utriculata*
14.	Not as above.	15
15.	*Carex aquatilis* with at least 25% cover.	*Salix boothii/Carex aquatilis*
15.	Not as above.	16
16.	*Carex nebrascensis* with at least 25% cover.	*Salix boothii/Carex nebrascensis*
16.	Not as above.	17
17.	Other mesic graminoids including *Carex lanuginosa, Juncus balticus* or *Glyceria striata* alone or in combination with 25% cover.	*Salix boothii/*Mesic graminoid
17.	Not as above.	18

Key to Tall Willow Types (continued)

	18.	Mesic forbs including *Mertensia* spp., *Heracleum lanatum, Aconitum columbianum, Hydrophyllum fendleri* alone or in combination with at least 25% cover.	*Salix boothii/*Mesic forb
	18.	Not as above.	19
19.	*Salix drummondiana* the dominant willow with at least 30% cover.		20
19.	Not as above.		21
	20.	*Carex utriculata (rostrata)* with at least 25% cover.	*Salix drummondiana/Carex utriculata*
	20.	Not as above.	26
21.	*Salix geyeriana* the dominant willow contributing up to 25% cover to the somewhat open shrub layer (*Salix boothii* absent or present in minor amounts).		22
21.	Not as above.		26
	22.	*Carex aquatilis* the dominant graminoid with at least 25% cover.	*Salix geyeriana/Carex aquatilis*
	22.	Not as above.	23
23.	*Carex utriculata (rostrata)* the dominant graminoid with at least 25% cover.		*Salix geyeriana/Carex utriculata*
23.	Not as above.		24
	24.	*Deschampsia cespitosa* the dominant graminoid with at least 5% cover.	*Salix geyeriana/Deschampsia cespitosa*
	24.	Not as above.	25
25.	*Calamagrostis cana*densis with at least 10% cover.		*Salix geyeriana/Calamagrostis canadensis*
25.	Not as above.		26

Key to Tall Willow Types (continued)

	26.	Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.	27
	26.	Site without wetland characteristics.	Upland Site
27.	Overstory and understory dominated by native plant species.		Unclassified or undocumented palustrine scrub-shrub community type
27.	Overstory or understory dominated by exotic plant species.		Human induced palustrine scrub-shrub vegetation

Key to Low Willow Types

1.	The low alpine willow species *Salix artica* alone or in combination with *Salix nivalis* with at least 50% cover.		2
1.	Not as above.		3
	2.	*Carex subnigricans* percent with at least 5% cover.	*Salix artica/Carex subnigricans*
	2.	Not as above.	10
3.	*Salix planifolia* with at least 25% cover.		4
3.	Not as above.		7
	4.	*Carex utriculata* present and alone or in combination with other sedge species with at least 25% cover.	*Salix planifolia/Carex utriculata*
	4.	Not as above.	5
5.	*Carex aquatilis* the dominant understory species with at least 25% cover.		*Salix planifolia/Carex aquatilis*
5.	Not as above.		6
	6.	*Carex scopulorum* the dominant understory species with at least 25% cover.	*Salix planifolia/Carex scopulorum*
	6.	Not as above.	7

Key to Low Willow Types (continued)

7.	Other species dominate the understory.	*Salix planifolia* cover type
7.	Not as above.	10
8.	*Salix brachycarpa* with at least 25% cover or the dominant overstory willow.	9
8.	Not as above.	10
9.	*Carex elynoides* with at least 10% cover or the dominant understory species.	*Salix brachycarpa/Carex elynoides*
9.	Not as above.	10
10.	Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.	11
10.	Site without wetland characteristics.	Upland Site
11.	Overstory and understory dominated by native plant species.	Unclassified or undocumented palustrine scrub-shrub community type
11.	Overstory or understory dominated by exotic plant species.	Human induced palustrine scrub-shrub vegetation

Key to Emergent Vegetation Types

1.	*Carex* species dominant.	Sedge types
1.	Not as above or grass or forb species dominant.	Non-sedge types

Key to Sedge Types

1.	*Carex utriculata (rostrata)* with at least 50% cover or the dominant species.	*Carex utriculata*
1.	Not as above.	2
2.	*Carex aquatilis* with at least 50% cover or the dominant species.	*Carex aquatilis*
2.	Not as above.	3
3.	*Carex praegracilis* with at least 25% cover or the dominant species.	*Carex praegracilis*
3.	Not as above.	4
4.	*Carex simulata* with at least 25% cover or the dominant species.	*Carex simulata*
4.	Not as above.	5
5.	*Carex nebrascensis* with at least 25% cover or the dominant species.	*Carex nebrascensis*
5.	Not as above.	6
6.	*Carex limosa* with at least 10% cover or the dominant species.	*Carex limosa*
6.	Not as above.	7
7.	*Carex nova* with at least 10% cover. Stands are in the alpine zone and associated with seeps and snowmelt areas.	*Carex nova*
7.	Not as above.	8
8.	*Carex subnigricans* with at least 25% cover. Stands are in the alpine zone and associated with seeps and snowmelt areas.	*Carex subnigricans*
8.	Not as above.	9

Key to Sedge Types (continued)

9.	Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.	10
9.	Site without wetland characteristics	Upland Site
10.	Community dominated by native plant species.	Unclassified or undocumented palustrine emergent community type
10.	Native species replaced or nearly replaced by exotic plant species.	Human induced palustrine emergent vegetation

Key to Non-Sedge Types

1.	Graminoids dominant.	2
1.	Forbs dominant.	17
2.	*Calamagrostis canadensis* with at least 25% cover or the dominant species.	*Calamagrostis canadensis*
2.	Not as above.	3
3.	*Deschampsia cespitosa* with at least 5% cover.	*Deschampsia cespitosa*
3. a.	Alpine/subalpine stands of *Deschampsia cespitosa* with *Caltha leptosepala, Polygonum bistortoides, Pedicularis groenlandica* and other mesic forbs present.	*Caltha leptosepala/ Deschampsia cespitosa*
3.	Not as above.	4
4.	*Agropyron smithii* with at least 25% cover and the dominant species.	*Agropyron smithii*
4.	Not as above.	5
5.	*Elymus cinereus* with at least 10% cover and the dominant species.	*Elymus cinereus*
5.	Not as above.	6

Key to Non-Sedge Types (continued)

	6.	*Muhlenbergia richardsonis* with at least 10% cover and the dominant species.	*Muhlenbergia richardsonis*
	6.	Not as above.	7
7.	*Spartina gracilis* with at least 10% cover and the dominant species.		*Spartina gracilis*
7.	Not as above.		8
	8.	*Poa juncifolia* present with at least 5% cover. Grassland is a mix of alkali tolerant graminoids with none of the previous species clearly present.	*Poa juncifolia*
	8.	Not as above.	9
9.	*Phalaris arundinacea* with at least 25% cover or the dominant species.		*Phalaris arundinacea*
9.	Not as above.		10
	10.	*Scirpus acutus* with at least 25% cover or the dominant species.	*Scirpus acutus*
	10.	Not as above.	11
11.	*Scirpus validus* with at least 25% cover or the dominant species.		*Scirpus validus*
11.	Not as above.		12
	12.	*Scirpus americanus* with at least 10% cover or the dominant species.	*Scirpus americanus*
	12.	Not as above.	13
13.	*Eleocharis palustris* with at least 25% cover or the dominant species.		*Eleocharis palustris*
13.	Not as above.		14

Key to Non-Sedge Types (continued)

	14.	*Eleocharis rostellata* with at least 25% cover or the dominant species.	*Eleocharis rostellata*
	14.	Not as above.	15
15.	*Eleocharis pauciflora* the dominant species with at least 10% cover. Areas of open water or unvegetated marl substrates often present.		*Eleocharis pauciflora*
15.	Not as above.		16
	16.	*Juncus balticus* with at least 25% cover or the dominant species	*Juncus balticus*
	16.	Not as above.	17
17.	*Typha latifolia* and/or *Typha angustifolia* alone or in combination with at least 50% cover.		*Typha latifolia*
17.	Not as above.		18
	18.	*Arnica longifolia* with at least 10% cover and the dominant species on spring seeps often at the base of rock talus.	*Arnica longifolia*
	18.	Not as above.	19
19.	Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.		29
19.	Site without wetland characteristics.		Upland Site
	20.	Community dominated by native plant species.	Unclassified or undocumented palustrine emergent community type
	20.	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 tremuloides/Calamagrostis canadensis

Quaking aspen/Bluejoint reedgrass

RANGE

The *Populus tremuloides/Calamagrostis candensis* plant association is an incidental type known from eastern Idaho (Hall and Hansen 1997), Montana (Hansen et al. 1995), northeastern Oregon, (Crowe and Clausnitzer 1997), Colorado, and Wyoming.

ENVIRONMENT

The *Populus tremuloides/Calamagrostis candensis* plant association is found as low as 850 m in Montana (Hansen et al. 1995), but is generally a higher elevation type ranging from 1,525 m in northeastern Oregon (Crowe and Clausnitzer 1997) to over 1,965 m in Montana and eastern Idaho (Hall and Hansen 1997). It is found in wet basins and on alluvial terraces adjacent to moderate gradient streams and rivers. Based on vegetation composition, this association represents a relatively moist *Populus tremuloides* type. Sites have surface water tables in spring which may drop to over 1 m deep by mid-summer.

SOILS

The association is on fine to coarse textured alluvial soils with many coarse fragments which allow water to stay aerated as it moves easily through the soil (Hansen et al. 1995; Hall and Hansen 1997). Soils include silt and clay loams and may be Entisols (Fluvents) or Mollisols (Borolls) (Hansen et al. 1995; Crowe and Clausnitzer 1997; Hall and Hansen 1997).

VEGETATION COMPOSITION

The *Populus tremuloides/Calamagrostis candensis* plant association is dominated by an overstory of *Populus tremuloides*. There are sometimes understory trees, including young stems of *Populus tremuloides*, but also *Pinus contorta*, *Picea engelmannii*, *Abies lasiocarpa*, and *Abies grandis*. Occasionally, the tall shrub *Alnus incana* is present. The low shrub layer varies from low to high cover. It is dominated by *Symphoricarpos albus* and sometimes *Rosa woodsii*. The herbaceous layer is a lush mix of mesic forbs and graminoids, the most common species being *Calamagrostis canadensis*. *Phleum pratense* and *Deschampsia cespitosa* may also be present. Other important graminoids including *Trisetum canescens*, *Carex scopulorum*, *Carex lenticularis*, and *Carex utriculata*. *Carex athrostachya*, *Trisetum wolfii*, and *Bromus ciliatus* may also be present with low cover. The most common forbs are *Equisetum arvense* and *Aster* species (*Aster foliaceus* or *A. occidentalis*). Other forbs with low cover but high constancy include *Aconitum columbianum* and *Fragaria virginiana*. Forbs which sometimes have high cover with low constancy include *Senecio foetidus*, *Actaea rubra*, and *Heracleum lanatum* (Hansen et al. 1995; Crowe and Clausnitzer 1997; Hall and Hansen 1997). Similar plant associations are either structurally or successionally related to *Populus tremuloides/ Calamagrostis candensis*. They include: *Alnus incana/Calamagrostis canadensis*, *Populus tremuloides/Alnus incana-Symphoricarpos albus*, *Populus tremuloides/Symphoricarpos albus*, *Populus tremuloides/Carex aquatilis*, or communities dominated by conifer or *Salix* species with *Calamagrostis canandensis* understories (Crowe and Clausnitzer 1997). *Calamagrostis canadensis* is also nearly co-dominant in the *Populus tremuloides/ Carex lanuginosa* community described by Kovalchik (1993) in eastern Washington and the *Populus tremuloides/Carex aquatilis* community (Crowe and Clausnitzer 1997). *Populus tremuloides/Calamagrostis candensis* is not easily confused with other plant associations unless stands are disturbed or in successional transition. For example, overgrazing by livestock will increase *Poa pratensis* and move stands toward *Populus tremuloides/Poa pratensis* (Hansen et al. 1995; Hall and Hansen 1997).

ADJACENT COMMUNITIES

Wetter sites adjacent to stands of *Populus tremuloides/Calamagrostis candensis* may include *Alnus incana*, *Salix drummondiana*, *Carex utriculata*, and *Populus trichocarpa* types (Hansen et al. 1995; Hall and Hansen 1997). Adjacent uplands are dominated by conifers such as *Abies grandis* (Crowe and Clausnitzer 1997), *Abies lasiocarpa*, *Picea engelmannii*, or *Pseudotsuga menziesii* (Hansen et al. 1995; Hall and Hansen 1997).

MANAGEMENT CONSIDERATIONS

Stands of *Populus tremuloides/Calamagrostis candensis* usually provide large amounts of livestock forage and livestock bed in the shade of stands causing trampling, soil compaction, and weed invasion (Hansen et al. 1988). *Calamagrostis canadensis* is moderately to highly palatable to livestock, especially in the spring (Hansen et al. 1995; Hall and Hansen 1997). Livestock also browse *Populus tremuloides* root suckers. However, spring grazing, when conditions are moist and plants are reproducing, should be avoided to prevent soil damage and decreases in both *Populus tremuloides* and *Calamagrostis canadensis*. Sustained grazing pressure decreases *Calamagrostis canadensis* vigor, reproduction, and competitive ability, thus promoting *Poa pratensis*, other exotics, and grazing tolerant forbs (Hansen et al. 1988; Hansen et al. 1995; Hall and Hansen 1997). *Populus tremuloides* is intolerant of shade and, though mainly reproducing by clonal root suckers, also produces seeds which germinate on moist mineral soil (Crowe and Clausnitzer 1997). *Populus tremuloides* suckers grow best and proliferate after moderate intensity fire or overstory tree removal, though, high intensity fires kill the roots. Most young trees die after a fire, though older trees resist some fires. Fire damage to trunks, however, allows insect or fungal species into trees, sometimes eventually killing them (Crowe and Clausnitzer 1997). *Calamagrostis canadensis* is an effective colonizer of moist, burned sites due to both seed and rhizome reproduction mechanisms (Hansen et al. 1988; Hansen et al. 1995; Hall and Hansen 1997). In order for the community to recover after fire or logging, livestock grazing of root suckers must be eliminated until trees can withstand grazing. Though beneficial for *Populus tremuloides* reproduction, logging for the limited lumber or fuel wood is often not compatible with wet, compactible soils (Hansen et al. 1995; Hall and Hansen 1997). Recreation values are high but development is not compatible due to site wetness. Both *Populus tremuloides* and *Calamagrostis canadensis* reduce erosion by slowing overland flow and stabilizing streambanks with roots. They are also good for long-term revegetation (Hansen et al. 1988; Hansen et al. 1995; Hall and Hansen 1997).

SUCCESSIONAL DYNAMICS

Populus tremuloides/Calamagrostis candensis is a stable, self-perpetuating plant association that is unlikely to be seral to conifer dominated associations with *Calamagrostis canadensis* understories (Crowe and Clausnitzer 1997). It may originate from a moister community, such as *Salix* species/*Calamagrostis canadensis* or *Alnus incana/Calamagrostis canadensis*, which has become slightly drier through hydrologic alteration (Hansen et al. 1995; Crowe and Clausnitzer 1997; Hall and Hansen 1997). Heavy, sustained grazing will decrease cover and reproduction of both *Populus tremuloides* and *Calamagrostis canadensis*, thus, converting stands to the grazing disclimax *Populus tremuloides/Poa pratensis* (Hansen et al. 1995; Hall and Hansen 1997). If site conditions dry due to grazing, induced stream downcutting, or natural hydrologic changes, stands may move toward *Populus tremuloides/Symphoricarpos albus* and eventually conifer dominated stands (Crowe and Clausnitzer 1997).

WILDLIFE FUNCTIONS

Stands of this association have high value as wildlife cover and forage, especially during spring, fall, and winter. *Populus tremuloides* suckers, buds, leaves, and bark are often heavily browsed by beaver, rabbits, moose, deer, porcupine, small mammals, and elk (Hansen et al. 1995; Crowe and Clausnitzer 1997; Hall and Hansen 1997). In addition, elk commonly utilize *Calamagrostis canadensis* in the summer (Hansen et al. 1995). Numerous bird species nest and feed in aspen stands including grouse, flickers, red-breasted nuthatches, chickadees, sapsuckers, grosbeaks, crossbills, and woodpeckers (Hansen et al. 1995; Crowe and Clausnitzer 1997; Hall and Hansen 1997). Excellent fish habitat is found in this association because its roots stabilize undercut streambanks and the vegetation overhangs streams.

CLASSIFICATION COMMENTS

The *Populus tremuloides/Calamagrositis canadensis* plant association is classified based on 3 plots in northeastern Oregon (Crowe and Clausnitzer 1997) and 6 stands in Montana (Hansen et al. 1995). It has been observed in eastern Idaho but plot data is limited (Hall and Hansen 1997). An unknown number of stands have been sampled in Colorado and elsewhere.

AUTHOR/DATE(UPDATE)

Chris Murphy/1999-01-12(2002-03-04)

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)

Populus trichocarpa/Salix exigua

Black cottonwood/Coyote willow

RANGE

Populus trichocarpa/Salix exigua is a widespread plant association occurring throughout the range of the tree species along larger naturally functioning rivers in Idaho, Montana, Washington, Oregon, California, British Columbia, Alaska, and elsewhere. High quality examples of the association are rare. Examples degraded by dams, diversions, channelization, dredging, and weed invasion are not uncommon.

ENVIRONMENT

The *Populus trichocarpa/Salix exigua* plant association is found on narrow to broad valley floodplains of major streams (often meandering,

with low to high gradients) at low to mid-elevations. The association is found within floodplains and channels on point bars, side bars, mid-channel bars, deltas, and islands where frequent flooding (nearly every year) deposits fresh alluvium (Moseley and Bursik 1994; Manning and Padgett 1995; Hansen et al. 1995; Hall and Hansen 1997). Soils, thus, range from coarse loamy or sandy-skeletal (Manning and Padgett 1995; Hansen et al. 1995; Hall and Hansen 1997) to predominantly river cobble and gravel with fines removed by scouring. Soils are shallow, well-drained Entisols (Fluvents) overlying gravel and cobble with the water table at the surface during spring flood, dropping to 50 cm by late summer (Manning and Padgett 1995; Hansen et al. 1995; Hall and Hansen 1997).

SOILS

Information on soils is not available.

VEGETATION COMPOSITION

Populus trichocarpa/Salix exigua is an early seral plant association dominated by *Populus trichocarpa*. Stands are mostly even-aged with cohorts ranging from seedling and sapling thickets (less than 5 cm dbh, 2 to 3 m tall) to older, pole size tree woodlands (about 30 cm dbh, up to 20 m tall) (Moseley and Bursik 1994; Hansen et al. 1995; Manning and Padgett 1995; Hall and Hansen 1997). *Populus trichocarpa* cover ranges from 40 to 98% with constancy over 50%. Other trees, such as *Populus angustifolia*, *Populus deltoides*, *Populus* hybrids, and conifers are occasionally present with low cover. There is a sparse and patchy tall-shrub layer composed of *Salix exigua* (or other *Salix* species) and *Alnus incana* (each usually less than 10% cover) with occasional *Amelanchier alnifolia* and *Cornus sericea*. A few low shrubs, such as *Rosa woodsii* and *Symphoricarpos albus*, may also be present (usually with low cover and constancy) (Moseley and Bursik 1994; Hansen et al. 1995; Manning and Padgett 1995; Hall and Hansen 1997). The herbaceous understory usually has low cover. Instead, rock cover is typically over 30% with bare soil and gravel with over 20% cover combined. The understory is often dominated by exotic, weedy forbs and grasses which are usually rhizomatous perennials or biennials able to withstand, and thrive with,annual flooding disturbance. Native forbs, all usually with low cover and constancy, often include *Achillea millefolium*, *Artemisia ludoviciana*, *Aster* spp., *Castilleja miniata*, *Epilobium* spp., *Equisetum arvense*, *Fragaria vesca*, *Heracleum lanatum*, *Smilacina stellata*, *Solidago canadensis*, and *Thalictrum occidentale*. Native grasses have even less cover and include *Calamagrostis canadensis*, *Carex* spp., *Elymus glaucus*, and *Muhlenbergia richardsonis*. Moss is occasionally present. *Populus trichocarpa/Salix exigua* is synonomous with other frequently flooded communities such as *Populus trichocarpa/*Recent alluvial bar. Slightly higher terraces, that have less frequent flooding, may quickly develop shrubby understories under young *Populus* trees. However, the understories are often damaged by floods or ice resulting in stands resembling *Populus trichocarpa/Salix exigua*. These early and mid-seral stands include *Populus trichocarpa/Rhamnus* spp., *Populus trichocarpa/Symphoricarpos albus* (or *Symphoricarpos occidentalis*), *Populus trichocarpa/Cornus sericea*, and other types dominated by *Populus angustifolia* or *P. deltoides* (Moseley and Bursik 1994; Hansen et al. 1995; Weixelman et al. 1996; Hall and Hansen 1997).

ADJACENT COMMUNITIES

Populus trichocarpa/Salix exigua is located between bare cobble/gravel shorelines and other alluvial bar communities such as *Salix exigua/*Barren, *Agropyron smithii*, *Artemisia tridentata*, and *Alnus incana* patches. Wetter communities, such as *Carex* (e.g. *Carex nebrascensis* or *C. utriculata*), *Juncus balticus*, *Typha* spp., *Eleocharis* spp., or *Salix* dominated types (e.g. *Salix lutea*, *S. exigua*, *S. boothii*, or *S. geyeriana*), may be adjacent in backwater areas, overflow channels, or sloughs. The neighboring higher alluvial bars, terraces, and islands support drier mid-seral *Populus trichocarpa* floodplain communities with understories dominated by *Cornus sericea*, *Rhamnus* spp., *Symphoricarpos albus* (or *Symphoricarpos occidentalis*), *Salix* spp., *Rosa woodsii*, *Poa pratensis*, and mesic graminoid or forbs (Moseley and Bursik 1994; Hansen et al. 1995; Manning and Padgett 1995; Weixelman et al. 1996; Hall and Hansen 1997). Other floodplain associations, dominated by *Betula occidentalis*, *Populus tremuloides*, and *Sarcobatus vermiculatus* (on alkaline benches), may also be adjacent. In addition, many adjacent floodplain terraces, benches, and

islands have been diked and converted to pasture grasses, agriculture, or weedy forb old fields. Adjacent uplands are often mixed conifer forests dominated by a variety of species such as *Tsuga heterophylla*, *Thuja plicata*, *Pinus ponderosa* (*Pinus jeffreyi* in western Nevada), *Pseudotsuga menziesii*, *Abies grandis*, *Picea* spp., *Abies lasiocarpa*, *Juniperus scopulorum*, and pinyon-juniper (Moseley and Bursik 1994; Hansen et al. 1995; Manning and Padgett 1995; Hall and Hansen 1997). *Artemisia tridentata* steppe or *Cercocarpus ledifolius* associations may also be adjacent.

MANAGEMENT CONSIDERATIONS

Early seral *Populus trichocarpa/Salix exigua* stands are very important for reproduction and maintenance of floodplain *Populus trichocarpa* stands. This community does not produce large amounts of forage, however, livestock do browse *Populus trichocarpa*, especially when there is little else to eat. Though *Populus trichocarpa* produces many suckers and seedlings after flood damage, overgrazing of young stems and foliage will eventually eliminate *Populus trichocarpa*. Thus, post-flood stands should be protected from livestock (Hansen et al. 1995; Manning and Padgett 1995; Hall and Hansen 1997). Equally important is protection of the hydrologic processes which produce recent alluvial bars essential for *Populus trichocarpa* reproduction. This community only persists on natural, free-flowing rivers (e.g. not dammed or diverted) with unconfined banks (e.g. not channelized, rip-rapped, or diked) where frequent flooding and associated channel migration, erosion, and deposition still occur. Likewise, other watershed activities, such as logging, road building, dredging, and development, can alter sediment inputs and the hydrologic system supporting this association. Elimination of these floodplain associations destabilizes the erodible streambanks and terrace soils because *Populus trichocarpa* effectively reduces flood erosion energy (Hansen et al. 1995; Hall and Hansen 1997). *Populus trichocarpa* communities, especially younger stands, are easily eliminated by wildfire (Moseley and Bursik 1994; Hansen et al. 1995; Hall and Hansen 1997). Cuttings can be planted on recent alluvial bars for long-term revegetation. Though soils are not easily compacted, frequent flooding precludes any development in this community.

SUCCESSIONAL DYNAMICS

The *Populus trichocarpa/Salix exigua* plant association originates from, and is maintained by, frequent flooding (and ice flow damage) which removes understory vegetation and promotes *Populus trichocarpa* reproduction. Lateral migration (meandering) of stream channels, especially during floods, erodes banks and deposits fresh alluvium on point bars, side bars, and islands. *Populus trichocarpa* produces many reproductive suckers after flood damage on these bars. Its seeds and seeds of *Salix* spp. germinate on the sunny, moist, and barren alluvium forming the early seral *Populus trichocarpa/Salix exigua* plant association. The resulting pattern is one of even-aged stands which are progressively older (later seral states) as you go from active alluvial bars to higher bars further away on the floodplain (Moseley and Bursik 1994; Manning and Padgett 1995; Hansen et al. 1995; Hall and Hansen 1997). Older stands, on drier bars, terraces, and islands, are mid-seral *Populus trichocarpa* communities with understories dominated by *Cornus sericea*, *Rhamnus* spp., or *Salix* spp. (Moseley and Bursik 1994; Hansen et al. 1995; Manning and Padgett 1995; Weixelman et al. 1996; Hall and Hansen 1997). With further disturbance by livestock grazing or floods, secondary succession will produce *Populus trichocarpa* types with understories of *Symphoricarpos albus* (or *Symphoricarpos occidentalis*), *Rosa woodsii*, *Poa pratensis*, or mesic graminoids or forbs. If stream downcutting continues, the community may become a drier conifer or shrub-steppe (e.g. *Sarcobatus vermiculatus* and *Artemisia tridentata* var*. tridentata)* type. This association is perpetuated by channel migration and large-scale floods that remove older stands and replace them with *Populus trichocarpa /Salix exigua* (Moseley and Bursik 1994).

WILDLIFE FUNCTIONS

Stands of *Populus trichocarpa/Salix exigua* are used for cover, shade, and food by numerous species of small mammals and ungulates such as deer (Hansen et al. 1995; Hall and Hansen 1997). Beaver utilize *Populus trichocarpa* for food and building. Waterfowl may nest on bars and neo-tropical migrant songbirds (and other birds) utilize *Populus trichocarpa* and understory shrubs for nesting and foraging (Hansen et al. 1995; Hall and Hansen 1997).

CLASSIFICATION COMMENTS

The *Populus trichocarpa/Salix exigua* plant association is synomous with associations described as *Populus trichocarpa/*Recent alluvial bar. It is similar to the *Populus/*Stream bar association dominated by either *Populus trichocarpa* or *Populus angustifolia* described by Manning and Padgett (1995). In Montana and elsewhere, a similar situation exists where any one, or combination of, *Populus* spp. (*Populus trichocarpa*, *P. angustifolia*, and *P. deltoides*) may dominate stands. Though dominance is usually clear (species are generally separated by elevation and region), mixed *Populus* stands (or stands dominated by hybrids) are occasionally found, thus complicating classification (Hansen et al. 1995; Hall and Hansen 1997). This association is recognized by its occurrence on recent alluvial deposits along rivers and perennial streams that are seasonally flooded. Identification of this association is less clear when this community grades into less frequently flooded early or mid-seral stands (such as *Populus trichocarpa/Rhamnus* spp., *Populus trichocarpa/Symphoricarpos albus*, or *Populus trichocarpa/Cornus sericea*) (Moseley and Bursik 1994; Hansen et al. 1995; Hall and Hansen 1997).

AUTHOR/DATE(UPDATE)

IDCDC/(02-11-2002)

Alnus incana/Cornus sericea

Mountain alder/Red-oser 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()

Alnus incana/Mesic forb

Mountain alder/Mesic forb

RANGE

Minor type in Montana, Idaho, Nevada, Utah, and Colorado.

ENVIRONMENT

The *Alnus incana/*Mesic forb plant association occurs on terraces and floodplains adjacent to streams with bedloads of boulders, cobble, and gravel. Soils are generally shallow; surface textures range from sand to loamy sand. Mottling is typically present within 25 cm of the surface, indicating a seasonally high water table, and most sites remain somewhat moist and well-aerated through summer (Padgett et al. 1989).

SOILS

Information on soils is not available.

VEGETATION COMPOSITION

Alnus incana clearly dominates the tall shrub overstory with over 25% cover. Conifers, including *Abies lasiocarpa*, *Picea engelmannii* and *Pinus contorta*, are sometimes present. Undisturbed stands have abundant native forbs and grasses. The undergrowth is characterized by mixed forb cover of *Heracleum lanatum*, *Geranium richardsonii*, *Equisetum arvense*, *Mertensia* spp., *Aconitum columbianum*, *Galium triflorum*, and *Smilacina stellata* with over 100% cover in combination. A somewhat sparse low shrub layer is often present and may include *Lonicera involucrata*, *Ribes* spp., and *Rosa* spp. Stands disturbed by season-long livestock grazing have reduced forb cover and increased non-native grasses including *Poa pratensis* and *Agrostis stolonifera*. Large stands (>100 m2), with the native herbaceous undergrowth intact are uncommon.

ADJACENT COMMUNITIES

Adjacent riparian community types may include the *Populus angustifolia/Rosa woodsii*, *Populus/*Grass, Conifer/*Equisetum arvense*, or *Salix* dominated types. Adjacent forested communities include those dominated by *Picea engelmannii* and *Pseudotsuaga menziesii* (Padgett et al. 1989; Hansen et al. 1995; Manning and Padgett 1992).

MANAGEMENT CONSIDERATIONS

Alnus incana is highly adapted to most forms of disturbance and may exist as a stable sere. Forage value for livestock is rated low to moderate; livestock grazing should be minimized to maintain these communities (Manning and Padgett 1992). Padgett et al. (1989) notes that because of typically open undergrowth, this plant association is more likely to be impacted by livestock grazing. *Alnus incana* plant associations generally occur immediately adjacent to stream channels, and therefore, provide stability to streambanks and shade to the the stream channel, as well as providing habitat for a variety of wildlife and avian species. Cool fires will not kill *Alnus incana* if the root crown does not burn and light fire can be used to rejuvenate older, decadent alder stands (Manning and Padgett 1992).

SUCCESSIONAL DYNAMICS

Some *Alnus incana/*Mesic forb sites may exist as stable seres, while others are successional to various tree- and shrub- dominated associations. Padgett et al. (1989) suggests a trend towards *Abies lasiocarpa* and *Picea engelmanii* types, or as sites become more xeric, *Acer negundo* types. In Montana, the *Alnus incana* plant association is reported to become established after severe stream disturbance resulting from placer mining, annual ice jams, or historic tie drives. Hansen notes the *Alnus incana* plant association may persist for a long time before finally being replaced by the *Salix geyeriana* or *Salix lutea* types, depending

upon elevation. Other areas may see a gradual conversion to *Pseudotsuga menziesii/Cornus stolonifera* habitat type (Hansen et al. 1995). Grazing may result in the type being replaced by the *Alnus incana/*Mesic graminoid plant association (Padgett et al. 1989).

WILDLIFE FUNCTIONS

The high structural diversity provided by this type provides thermal and hiding cover for native ungulates including mule and white-tailed deer. Numerous bird species make use of this type for food and nesting (Hansen et al. 1995).

CLASSIFICATION COMMENTS

The *Alnus incana/*Mesic forb plant association has been described in a number of classifications. Stands considered synonomous include those described in Nevada (Manning and Padgett 1995), Colorado (Kittel et al. 1999), and Utah and southeastern Idaho (Padgett et al. 1989). Kovalchik's (1993) Washington Alnus *incana/*Mesic forbs stands have shrub and tree composition similar to Idaho, Utah, and Nevada stands. The understory of Kovalchik's stands are somewhat distinct, however, with *Cinna latifolia*, *Streptopus amplexifolius*, and *Athyrium* spp. having high constancy. Kovalchik's stands are more appropriately treated as other associations. Hansen et al. (1995) treats all stands with *Alnus incana* as the dominant shrub as the *Alnus incana* dominance type.

AUTHOR/DATE(UPDATE)

Linda Williams/1996-04-22(2000-10-16)

Betula glandulosa/Carex simulata

Bog birch/Short beaked sedge

RANGE

This association was originally described from fens in eastern Idaho. Stands of *Betula glandulosa* along the North Fork Payette River and Lake Fork Creek in west-central Idaho have been tentatively assigned to this association.

ENVIRONMENT

Stands of *Betula glandulosa* occur in broad valley bottoms where springs emerge. Areas supporting this assocation are often at or near the base of slopes. This includes stands in west-central Idaho that are at the base of valley walls in former meanders of major rivers. Shrubs of this association often occur on what appear to be natural hummocks that may be the result of insect and rodent activity.

SOILS

Soils are organic brown moss or Sphagnum moss peat. Sites frequently have water at or above the surface in the spring and may remain saturated to near the surface throughout the growing season.

VEGETATION COMPOSITION

Betula glandulosa contributes an average of 15%-30% cover to the overstory. *Potentilla fruticosa* may co-dominate or dominate with up to 20% cover. *Salix boothii*, *S. candida* and *S. geyeriana* are sometimes present in trace amounts. The canopy cover provided by the various shrubs is sparse to moderate, but graminoid cover is high. *Carex simulata* clearly dominates (50% cover) the understory. However, stands in west-central Idaho may be dominated by *Carex diandra*. Several other sedge species may be present in trace amounts including *Carex aurea*, *C. buxbaumii*, *C. canescens*, *C. lasiocarpa*, *Carex limosa*, *C. oederi*, *C. praegracilis*, and *Eriophorum* spp. The forbs *Menyanthes trifoliata* and *Potentilla palustris* are sometimes present (Jankovsky-Jones 1995; 2001). Several closely related plant associations have been described in the western United States including the *Betula glandulosa/Carex utriculata* plant association from Montana (Hansen et al. 1995), the *Betula glandulosa/*Mesic forb-Mesic graminoid (Kittel et al. 1999) and *Betula glandulosa/Carex scopulorum* plant associations from Colorado (Johnston 1987).

ADJACENT COMMUNITIES

Adjacent plant associations may include stands of *Potentilla fruticosa/Deschampsia cespitosa*, *Carex limosa*, *C. simulata*, *C. utriculata*, *Deschampsia* cespitosa, and Eleocharis pauciflora (Jankovsky-Jones, 1995; 2001).

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 species due to unstable substrates. However, livestock and livestock use has been observed in stands where human access was difficult (Jankovsky-Jones 2001). Grazing, primitive trail use, and other soil compacting activities makes sites susceptible to surface erosion and may contribute to a shift in species composition to exotics and increasers such as *Poa pratensis*, *Phalaris arundinacea*, and *Juncus balticus*. Fencing and exclusion of domestic livestock is an effective management tool when shrubs are intact, native graminoids are present, and hydrologic regime is unaltered. Sites supporting this association burn infrequently due to saturated conditions. Nonetheless, *Betula glandulosa* 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

Stands of this association are found on landforms where the water table is high throughout the growing season due to upwelling springs. This species is tolerant of shade and will become established in the shade of conifers. Often the conifers will not reach maturity. *Betula glandulosa* typically maintains itself on these wet sites and this association can be considered a late seral vegetation type (USDA Forest Service 2002).

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).

CLASSIFICATION COMMENTS

This plant association was originally described by Moseley et al. (1991) from fens in eastern Idaho. Stands observed in west-central Idaho in 2001 have been tentatively placed within this association. However, identification of sedges in the lab indicates the dominant sedge in west-central Idaho stands may be *Carex diandra*. Further sampling may warrant recognition of a separate association where *C. diandra* is the understory dominant.

AUTHOR/DATE(UPDATE)

Mabel Jankovsky-Jones/2002-02-25()

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. aquatilus*. *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. geyeriana*, *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 lasicocarpa*, *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 my 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)

Crataegus douglasii/Heracleum lanatum

Black hawthorne/Cow parsnip

RANGE

Found in the Columbia Basin within the Palouse grassland zone, of southeastern Washington, northeastern Oregon, and into western Idaho.

ENVIRONMENT

Elevations range from 1,800 to 2,600 feet in the semi-arid steppe region of eastern Washington. Typically found on aggraded valley floors (locally called "flats") which border intermittent or permanent streams and with dependable soil moisture. These are valleys which accumulated glacial outwash materials of fine silts and clays. Often extends up contiguous north-facing slopes where there is seepage providing constant moisture.

SOILS

Information on soils is not available.

VEGETATION COMPOSITION

This is a dense thicket of the broad-leaved, deciduous shrub *Crataegus douglasii* of 5 to 7 meters height. The understory is dominated by a lush layer of a combination of the tall (up to 2 m tall) perennial forbs *Heracleum lanatum*, *Hydrophyllum fendleri* or *Urtica dioica*. The dense herbaceous layer provides so much shade that few shorter species are able to establish, unless they have a growth peak in the spring before the *Heracleum* develops. A few locations have a tree layer of *Populus tremuloides*, but apparently do not differ in environmental characteristics.

ADJACENT COMMUNITIES

Information on adjacent communities is not available.

MANAGEMENT CONSIDERATIONS

Information on management considerations is not available.

SUCCESSIONAL DYNAMICS

Information on successional dynamics is not available.

WILDLIFE FUNCTIONS

Crataegus thickets support a rich avifauna. The berries are utilized for food well into autumn and the canopies are much used for nesting. Black-billed magpies build nests in the crowns which are then used by long-eared owls for nest foundations. Thrushes and vireos of the steppe region inhabit these thickets, apparently year-round.

CLASSIFICATION COMMENTS

Information on classification comments is not available.

AUTHOR/DATE(UPDATE)

Reid/1993-06-10()

Rhamnus alnifolia

Alder buckthorn

RANGE

Rhamnus alnifolia is known from throughout the northern United States. The plant association has been reported in Idaho, Wyoming, Montana, Washington, and Oregon.

ENVIRONMENT

Stands of the *Rhamnus alnifolia* plant association occur on seeps, alluvial terraces, and in broad wet basins at low to middle elevations.

SOILS

Soils are typically loams and often contain coarse rock fragments. Soils often show signs, including mottles, of a seasonally high water table which may drop up to a meter below the surface later in the growing season (Youngblood

et al 1985). This association may also occur on semi-permanently saturated sites. The diagnostic species of this association is not found on organic, acidic, saline, alkaline, or heavy clay soils (Elzinga and Rosentreter 2000).

VEGETATION COMPOSITION

This plant association is characterized by nearly complete cover of *Rhamnus alnifolia* with few associates due to dense cover. Associated shrubs that may be present with low cover include *Cornus sericea*, *Crataegus douglasii*, *Lonicera involucrata*, and *Ribes* spp. The graminoids *Calamagrostis canadensis*, *Elymus glaucus*, and *Glyceria striata* and forbs *Smilacina stellata*, *Heracleum lanatum*, *Galium triflorum*, and *Equisetum* spp. may also be present. This association is easily recognized by dense, near monocultures of *Rhamnus alnifolia*. *Rhamnus* is a competitive rhizomatous species. Youngblood et al. (1985) indicate that where species composition is mixed; *Rhamnus* has likely invaded other plant associations.

ADJACENT COMMUNITIES

Adjacent uplands are dominated by *Pseudotsuga menziesii*, *Abies lasiocarpa*, *Pinus contorta*, *Populus tremuloides*, or *Artemisia tridentata* spp. *vaseyana* (Youngblood et al 1985).

MANAGEMENT CONSIDERATIONS

Stands receive little use from cattle due to dense growth and low palatability. Since livestock do not typically graze the diagnostic species of this association, stands can expand with overgrazing (Elzinga and Rosentreter 2000). *Rhamnus alnifolia* is considered a noxious weed in some states (USDA NRCS 2001). However, it does provide good erosion control and may have potential as a species for use for reclamation. Plants can be propagated from seed and fresh seed will germinate without pretreatment. Stored seed requires wet prechilling for 3 months to break dormancy (Elzinga and Rosentreter 2000).

SUCCESSIONAL DYNAMICS

The competitive habit of the diagnostic species makes establishment of other species unlikely. Where there is a mix of shrub species present, it is thought that *Rhamnus* may have invaded stands (Youngblood et al. 1985).

WILDLIFE FUNCTIONS

Stands of this plant association provide some cover, but little forage, for deer. Fruits are eaten by song and gamebirds. It is notable that fruits are not palatable to humans and they contain a glycoside that causes vomiting and diarrhea (Elzinga and Rosentreter 2000).

CLASSIFICATION COMMENTS

This plant association has been documented in vegetation classifications developed for western Wyoming and adjacent Idaho (Youngblood et al. 1985), and eastern Oregon (Crowe and Clausnitzer 1997). It has also been reported from surveys in west-central Idaho and northern Idaho.

AUTHOR/DATE(UPDATE)

Mabel Jankovsky-Jones/2002-03-04()

Salix bebbiana/Mesic graminoid

Gray willow/Mesic graminoid

RANGE

*Salix bebbiana/*Mesic graminoid is a potentially rare type known from southern Utah (Padgett et al. 1989) and where Pack River enters Lake Pend Oreille in northern Idaho (Jankovsky-Jones 1997b). The similar *Salix/*Mesic graminoid community is scattered in the mountains of Nevada (Manning and Padgett 1995) and the general *Salix bebbiana* dominance type is known in eastern Idaho and Montana. In addition, similar *Salix bebbiana* dominated communities have been described in Yellowstone National Park in Wyoming, Arizona, and New Mexico (Hansen et al. 1995; Hall and Hansen 1997).

ENVIRONMENT

*Salix bebbiana/*Mesic graminoid and the similar *Salix bebbiana* dominance type are found at variable elevations ranging from as low as 630 to 1,000 m in northern Idaho and Montana (Jankovsky-Jones 1997b) to over 1,950 m in Montana, eastern Idaho, and southern Utah (where *Salix bebbiana/*Mesic graminoid is as high as 2,805 m) (Padgett et al. 1989; Hansen et al. 1985; Hall and Hansen 1997). *Salix bebbiana/*Mesic graminoid is located in meadows of small, intermittent stream valleys or broad valley floodplains and deltas of major

rivers. It is found on alluvial terraces, subirrigated lower slopes, and abandoned oxbows (Padgett et al. 1989; Jankovsky-Jones 1997b). The broad Salix *bebbiana* dominance type is on those landforms and on streambanks of active channels and near seeps or springs (Hansen et al. 1995; Hall and Hansen 1997). Stream gradients range from about 2 to 5% (Padgett et al. 1989). Soils for this community, and the similar *Salix bebbiana* dominance type, are clay, silt, or sandy loams with up to 50% coarse gravel and cobble fragments formed over old alluvium deposits. Soils are Mollisols classified as Aquic, Pachic, or Cumulic Cryoborolls with a high accumulation of organic matter (sometimes nearly enough to be Histosols) and low to high water holding capacity (Padgett et al. 1989; Hansen et al. 1995; Hall and Hansen 1997). Water tables are often deep, but mostly within 1 m of soil surface indicated by gleyed and mottled soils.

SOILS

Information on soils is not available.

VEGETATION COMPOSITION

Padgett et al.'s (1989) *Salix bebbiana/*Mesic graminoid stands were dominated by *Salix bebbiana* with 79% cover. This compares with 32 to 75% cover for the general *Salix bebbiana* dominance type (Hansen et al. 1995; Hall and Hansen 1997) and 85% cover in mixed *Salix/*Mesic graminoid community (Manning and Padgett 1995). Other tall willows commonly associated with *Salix bebbiana* are *Salix boothii*, *S. lutea*, and *S. exigua*. However, *Salix lasiandra*, *S. drummondiana*, *S. lasiolepis*, and *S. pseudomonticola* are occasionally common with cover and constancy varying from low to high (Padgett et al. 1989; Hansen et al. 1995; Manning and Padgett 1995; Hall and Hansen 1997). There is a shrub understory at willow bases dominated by *Ribes inerme* and *Rosa* species (usually *Rosa woodsii* with variable cover and constancy) with *Symphoricarpos oreophilus* and *Potentilla fruticosa* occasionally present (with low cover). The general *Salix bebbiana* dominance types described by Hansen et al. (1995) and Hall and Hansen (1997) have much higher shrub cover and diversity. The understory is dominated by a variable mix of graminoids and low mesic forbs. The most common graminoids in *Salix bebbiana/*Mesic graminoid are *Poa pratensis*, *Carex nebrascensis*, and *Carex praegracilis*, and *Phalaris arundinacea* (Padgett et al. 1989; Jankovsky-Jones 1997b). In this community (Padgett et al. 1989), and the broader *Salix/*Mesic graminoid (Manning and Padgett 1995), *Agrostis stolonifera*, *Juncus balticus*, *Carex microptera*, *Eleocharis palustris*, *Hordeum brachyantherum*, and *Scirpus microcarpus* are sometimes important. Forb species cover ranges from low to high with the most common species being *Trifolium species*, *Galium triflorum*, *Equisetum arvense*, *Actaea rubra*, *Taraxacum officinale*, *Aconitum columbianum*, and *Geranium richardsonii* (Padgett et al. 1989; Manning and Padgett 1995).

ADJACENT COMMUNITIES

Wetter associations adjacent to *Salix bebbiana/* Mesic graminoid (and the broader *Salix bebbiana* community) are dominated by graminoids (such as *Carex aquatilis*, *C. utriculata*, or *C. nebrascensis*) or tall willows (such as *Salix geyeriana*) with a *Carex utriculata* understory (Hansen et al. 1988; Hansen et al. 1995). Adjacent on sites with similar moisture levels as *Salix bebbiana/*Mesic graminoid are mesic graminoid or forb (e.g. *Wyethia* species) meadows or a mosaic of associations dominated by tall *Salix* species, *Populus tremuloides*, *Betula occidentalis*, or *Alnus incana* (Padgett et al. 1989; Hall and Hansen 1997). Drier communities adjacent to *Salix bebbiana* types are *Poa pratensis* and *Potentilla fruticosa/Deschampsia cespitosa* (Hansen et al. 1995). Adjacent uplands are dominated by conifers (such as *Pinus ponderosa*, *Pseudotsuga menziesii*, and *Abies lasiocarpa*), *Populus tremuloides*, *Quercus gambelii*, or *Artemisia tridentata* steppe (Padgett et al. 1989; Hansen et al. 1995; Hall and Hansen 1997).

MANAGEMENT CONSIDERATIONS

The *Salix bebbiana/*Mesic graminoid community produces moderate to high forage amounts for livestock. In addition, the highly palatable *Salix bebbiana* is tolerant of sustained, long-term, and repeated grazing and will remain on sites after other *Salix* species are eliminated (Hansen et al. 1988; Hansen et al. 1995; Hall and Hansen 1997). However, under heavy grazing even *Salix bebbiana* will lose its vigor and decline in cover to the point of elimination. The mesic graminoid understory is also susceptible to overgrazing which causes the loss of native

graminoids and the increase of exotic species cover (Manning and Padgett 1995). In addition, the moist, fine-textured soils of *Salix bebbiana* communities are easily compacted and damaged by livestock trampling (or machines), especially when wet. Overgrazing will also damage streambanks causing erosion, a drop of the water table, and the loss of *Salix bebbiana* and *Salix* reproduction (Hansen et al. 1995; Hall and Hansen 1997; Padgett et al. 1989). The root masses of both *Salix bebbiana* and mesic graminoids are effective streambank stabilizers through their sediment trapping and binding abilities. However, less disturbed communities are more effective because native graminoids, such as *Carex nebrascensis* and *Juncus balticus*, provide much better erosion control than exotic grasses (Manning and Padgett 1995). *Salix bebbiana* and associated native graminoids are also useful for long-term revegetation (Hansen et al. 1988; Hansen et al. 1995; Hall and Hansen 1997). *Salix bebbiana* readily resprouts from roots after quick, hot fires (though it is damaged by slower burns) and, with long periods of rest from grazing, stands will regenerate. Thus, prescribed burning is a good tool for regenerating less vigorous stands (Hansen et al. 1988; Hansen et al. 1995; Hall and Hansen 1997).

SUCCESSIONAL DYNAMICS

*Salix bebbiana/*Mesic graminoid is apparently a stable association (especially when dominated by native graminoids, Padgett et al. 1989), though many *Salix bebbiana* communities are considered by Hansen et al. (1995) and Hall and Hansen (1997) to be browsing or grazing disclimax types. *Salix bebbiana* is both a pioneer successional species and tolerant of long-term, sustained browsing. Thus, it is able to persist under grazing pressures which eliminate other *Salix* species from a site (Hansen et al. 1988; Hansen et al. 1995; Hall and Hansen 1997). Thus, the *Salix bebbiana/*Mesic graminoid community may be derived from related, but overgrazed, types dominated by *Salix geyeriana*, *S. lutea*, *S. boothii*, or *S. drummondiana* with mesic graminoid understories (Padgett et al. 1989; Manning and Padgett 1995; Weixelman et al. 1996). The presence of exotic grasses with significant cover, hedged *Salix* species, and low *Salix* regeneration in the *Salix bebbiana/*Mesic graminoid community also supports the grazing disclimax hypothesis. If site moisture decreases due to environmental changes or further overgrazing, *Populus trichocarpa*, *P. tremuloides*, or *Picea engelmannii* dominated communities may replace *Salix bebbiana/*Mesic graminoid (Padgett et al. 1989; Manning and Padgett 1995).

WILDLIFE FUNCTIONS

The *Salix bebbiana/*Mesic graminoid association provides good forage and cover for elk, moose, mule and white-tailed deer, and beaver (Hansen et al. 1995; Manning and Padgett 1995; Hall and Hansen 1997). *Salix bebbiana* receives heavy browsing in winter by wildlife, especially elk. *Salix bebbiana* is also used by songbirds and game birds for nesting and food (Hansen et al. 1988). The roots of *Salix bebbiana* and associated mesic graminoids protect and build streambanks which form overhanging cover for fish (Hansen et al. 1995; Hall and Hansen 1997).

CLASSIFICATION COMMENTS

Stands of the *Salix bebbiana/*Mesic graminoid association are probably included within a broader *Salix bebbiana* "dominance type" by Hansen et al. (1995) and Hall and Hansen (1997). It is also lumped within a general *Salix/*Mesic graminoid community where *Salix bebbiana*, *S. drummondiana*, *S. exigua*, *S. lutea*, *S. lasiandra*, and/or *S. lasiolepis* are all common (Manning and Padgett 1995; Weixelman et al. 1996). *Salix bebbiana/*Mesic graminoid is possibly a grazing induced disclimax, (due to exotic grasses in the understory) but in less disturbed stands both *Salix boothii* or *S. lutea* sometimes have moderate cover (Hansen et al. 1995; Hall and Hansen 1997). It is unlikely that *Salix bebbiana/*Mesic graminoid would be confused with *Salix boothii/*Mesic graminoid or *Salix lutea/*Mesic graminoid associations because these two types rarely have *Salix bebbiana* present (Padgett et al. 1989; Manning and Padgett 1995; Weixelman et al. 1996).

SIMILAR COMMUNITIES

*Salix bebbiana/*Mesic graminoid is similar to several other communities in structure and understory composition. These communities are dominated by species such as *Salix boothii*, *S. lutea*, *S.* geyeriana, *S. exigua*, *S.* lasiolepis, *S. lasiandra*, and *S. lemmonii* (or a mixture of *Salix* species) with similar mesic graminoid understories (Padgett et al. 1989; Manning and

Padgett 1995; Weixelman et al. 1996). *Salix bebbiana* may be present with low cover and constancy in some of these stands if moisture, elevation, disturbance, or other variables are favorable. However, confusion of *Salix bebbiana/*Mesic graminoid with these other communities is unlikely. The broader *Salix bebbiana* dominance type is very similar to *Salix bebbiana/* Mesic graminoid in both understory shrub composition and the high cover of exotic grass species in the herbaceous layer (Hansen et al. 1995; Hall and Hansen 1997).

AUTHOR/DATE(UPDATE)

Chris Murphy/1999-01-05()

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 exigua/Barren

Coyote willow/Barren

RANGE

Stands occur in Idaho (Jankovsky-Jones 1996; 1997a, 1997b, 1997c; Moseley 1998), Nevada (Manning and Padgett 1995), Utah (Padgett et al. 1989), and probably elsewhere.

ENVIRONMENT

This association occurs along active streambanks or on nearby stream terraces. Flooding in this association is probably an annual event. The soils are young and fluvial in origin. It can occur in valley bottoms with very low to moderate gradients and can be from narrow to very wide. Elevations are mostly below 5,500 feet (Padgett et al. 1989; Manning and Padgett 1995; Moseley 1998).

SOILS

Soils are highly variable, ranging from highly stable Cumulic Haplaquolls and Aquic Cryoborolls to early developmental Typic Udifluvents. All have developed on alluvium of varying ages. Estimated available water-holding capacity ranged from low to high, and particle-size classes include fine-loamy and sandy-skeletal. Water tables ranged from near the surface to over 3 feet below the surface (Padgett et al. 1989).

VEGETATION COMPOSITION

A dense stand of *Salix exigua* dominates the overstory of this otherwise depauperate association. Other willows, such as *S. lasiandra*, *S. amygdaloides*, and *S. lutea*, may occasionally be minor components. *Rosa woodsii*, *Ribes inerme*, or *Cornus sericea* may be present in the shrub layer, but in very low cover. The undergrowth is open with predominantly bare ground, rock, or leaf litter. Forb species are scattered and in low cover, although diversity may be high. Graminoids are generally absent or in low cover (Manning and Padgett 1995).

ADJACENT COMMUNITIES

A wide range of upland associations can occur on adjacent slopes, ranging from salt desert shrub and sagebrush-steppe associations at the lower elevations to low-montane coniferous woodlands and forests at the higher elevations.

MANAGEMENT CONSIDERATIONS

There is essentially no herbaceous livestock forage available in this type. The willows provide stability of streambanks as well as stream shading.

SUCCESSIONAL DYNAMICS

The *Salix exigua/*Barren type is an early successional type with little undergrowth development. Some stands have rather xeric soils which inhibits the establishment of herbaceous species, while others are very wet, but have had insufficient time for establishment. Succession in this association without outside disturbance will likely lead toward the *Salix exigua/*Mesic forb or *S. exigua/*Mesic graminoid types in moist situations, while drier sites may develop into the *S. exigua/Poa pratensis* community (Padgett et al. 1989).

WILDLIFE FUNCTIONS

Stands of this association provide excellent thermal and hiding cover for a wide range of wildlife species. *Salix exigua* is normally not as heavily browsed as other willow species. Beavers utilize *Salix exigua* for both food and for constructing dams (Hansen et al. 1995).

CLASSIFICATION COMMENTS

This is a well-sampled and analyzed association documented with numerous plots. Manning and Padgett (1995) described the *Salix exigua*/Bench community from Nevada that is considered the same as the *S. exigua*/Barren type of Padgett et al. (1989). Tuhy and Jensen (1982) described a similar type with no diagnostic undergrowth for central Idaho. One or more of Cole's (1995) *S. exigua* types may be included here.

AUTHOR/DATE(UPDATE)

Robert K. Moseley/1997-12-31(2001-12-01)

Salix exigua/Mesic graminoid

Sandbar willow/Mesic graminoid

RANGE

Stands occur throughout Utah and extreme western
Colorado (Padgett et al. 1989) and throughout Idaho (Padgett et al. 1989; Jankovsky-Jones 1996; 1997a, 1997b, 1997c, Moseley 1998).

ENVIRONMENT

This type occurs on stream terraces and in meadows associated with stream channels from about 2,000 to 7,700 feet. Valley bottoms may be narrow to very wide and have low to moderate gradient. This association is not in the most dynamic portion of the floodplain, as are some of the other *Salix exigua* types (Padgett et al. 1989).

SOILS

Water tables range from the surface to over 3 feet below the surface. Distinct and prominent mottles are common within 20 inches of the surface, indicating a seasonally high water table. Soils indicate a broad range of development, from the well-developed Terric Borohemists, Cumulic Haploborolls, Typic Cryaquolls, and Pachic Cryoborolls to less-developed Aquic Cryofluvents and Fluvaquentic Haploxerolls. Soils develop on alluvial depositions of varying ages. Particle-size classes were highly variable, with estimated available water-holding capacity from low to moderate (Padgett et al. 1989).

VEGETATION COMPOSITION

Salix exigua dominates the overstory of this type. *S. lutea* and/or *S. lasiandra* may also be prominent in the overstory and in some instances may co-dominate. Other shrubs are typically minor components of this type. The undergrowth is characterized by moderate to dense cover of graminoids species, including *Carex nebrascensis*, *C. lanuginosa*, *Juncus balticus*, *Eleocharis palustris*, *Agrostis stolonifera*, *Scirpus pungens*, *Agropyron repens*, and, in one Idaho stand, *C. sheldonii*. Forb cover is typically sparse (Padgett et al. 1989), although *Equisetum* spp. (*E. arvense* and *E. laevigatum*) can occasionally occur with relative high cover.

ADJACENT COMMUNITIES

Because of the wide elevational gradient over which this type occurs, adjacent upland associations can range from sagebrush-steppe to coniferous forest associations.

MANAGEMENT CONSIDERATIONS

The rhizomatous graminoid cover in this association results in high soil-holding and streambank stabilization ability. Should the stands become drier and/or grazing levels increase, this type might be replaced by the *Salix exigua/Poa pratensis* or possibly the *S. exigua*/Barren association.

SUCCESSIONAL DYNAMICS

In most situations the *Salix exigua*/Mesic graminoid association is considered an early successional type pioneering sand and gravel bars, but it may be persistent in certain instances. This type appears in general to be wetter that other *S. exigua* types and the environment is likely to be more favorable to the establishment of rhizomatous graminoids (Padgett et al. 1989).

WILDLIFE FUNCTIONS

Stands of this association provide excellent thermal and hiding cover for a wide range of wildlife species. *Salix exigua* is normally not as heavily browsed as other willow species. Beavers tend to utilize *S. exigua* heavily (Hansen et al. 1995).

CLASSIFICATION COMMENTS

Classification is based on 7 plots from Utah and adjacent southeastern Idaho and western Colorado (Padgett et al. 1989) and 7 plots in southwestern Idaho.

SIMILAR COMMUNITIES

Some Hansen et al. (1995) stands may fit in this type.

AUTHOR/DATE(UPDATE)

Robert K. Moseley/1997-12-31(1998-12-01)

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, occassionally 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. drummoniana*) 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 palatible 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. drummundiana* 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* associaitions. 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 synonomous 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 urtriculata* 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 (Mannning 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 occassionaly 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., *Achilea 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 polts 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.) (Mannig 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. geyeriana-S. lemmonii* and *S.*

boothii-S. lemmonii types are also similar (Kovalchik 1987; Reid et al. 2000).

AUTHOR/DATE(UPDATE)

Christopher J. Murphy/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. phylicifolia* 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 communties *S. planifolia/C. aquatilis* (Padgett et al. 1989; Hansen et al. 1995; Walford et al. 1997); *S. wolfii/C. aquatilis*, *C. rostrata* and *S. phylicifolia* 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. phylicifolia* 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. phylicifolia* 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. phylicifolia* [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. phylicifolia* 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 (Brunsfield 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 ephemerally 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 ephemerally or intermittently moist, but well-drained, habitats throughout the region.

ENVIRONMENT

The *Artemisia ludoviciana* plant association usually occurs on ephemerally 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 steams (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 palatibility 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 palatibility 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 cespitiosa*, *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. aquatilus*. 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 aquatilus*, *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 cespitosa* 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 be 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 revegating 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 decompositon 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 Inseptisols). 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()

Carex 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*. *praegricilis* 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 palatible 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

Elecharis 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 *Elecharis 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 asociation are classified as Mollisols, Entisols, Histisols, and Inseptisols. 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

Elecharis 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 arvense*, *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 *Elecharis 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 at 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)

Scirpus acutus

Hardstem bulrush

RANGE

Stands are known from Oregon, Washington, Nevada, California, Colorado, Idaho, North Dakota, South Dakota, and Montana.

ENVIRONMENT

Stands of this plant association occur along the margins of ponds, lakes, and reservoirs, stringers paralleling stream and river channels, or broad swaths in backwater marshes and sloughs. It is found at low to mid elevations, from about 2,000 feet to at least 6,600 feet. This type often inhabits relatively deep water, although the water level may be drawn down considerably through the growing season (Hansen et al. 1995; Hall and Hansen 1997).

SOILS

Soils are commonly Mollisols (Aquolls), Entisols (Aquents), or occasionally Histisols. Textures of surface horizons on long-lived stands are predominantly fines, which appear as black or gleyed, mucky clay or silty loam soils with high concentrations of decomposed and partially decomposed plant material that accumulate over time from annual dieback. Alluvial sands, gravels and cobbles may form an unconsolidated matrix in the subsurface horizons. Water tables are generally at or above the soil surface throughout the growing season. Soil reaction varies from neutral to moderately alkaline (pH 7.0 to 8.0) (Hansen et al. 1995; Hall and Hansen 1997).

VEGETATION COMPOSITION

The *Scirpus acutus* plant association usually appears as an impenetrable monotypic stand

often reaching 2 m or more in height. *Scirpus* spp. require high levels of moisture throughout the year, and while stands may colonize saturated soils along streambanks or the periphery of ponds and reservoirs, they typically extend out into the water column to 2 m in depth. Due to the dense growth form and flooded water regimes, other species are largely absent, or if present, in limited amounts (Cole 1995; Hansen et al. 1995; Hall and Hansen 1997).

ADJACENT COMMUNITIES

This is a common, widespread association on the landscape and adjacent communities are variable. Stands of *Typha latifolia* and *Carex* spp. are frequently present as well as shrublands dominated by *Salix* spp. or other shrubs.

MANAGEMENT CONSIDERATIONS

Wet conditions and lack of palatable forage limit livestock use of this type. However, if upland forage becomes sparse and soil conditions dry, livestock may make use of *Scirpus acutus*. Soils are wet throughout the growing season and easily damaged from trampling by livestock and wildlife. Trampling can also damage vegetation. This community will burn in either late fall or early spring if the water levels have dropped sufficiently (Hansen et al. 1995). *S. acutus* is readily available as nursery stock and may be transplanted for restoration. It has potential for revegetation of lake and pond margins and may help other species establish along shorelines due to its effectiveness as a buffer for wind and wave action.

SUCCESSIONAL DYNAMICS

Scirpus acutus occupies some of the wettest sites on the landscape and tolerates prolonged flooding better than most riparian communities. These highly saturated conditions, coupled with an extremely dense growth form, allow this species to colonize sites at an early successional stage and maintain dominance on undisturbed sites as the climax vegetation. However, *S. acutus* is regularly accompanied by other hydrophytes, such as *Sparganium emersum* and *Typha latifolia*. The reasons for the distribution of these species are difficult to discern, but minor changes in water chemistry or nutrient availability may favor the expansion of one species over another. Seasonal climatic changes may also play a role in determining which species may dominate a site at a particular point in time (Hall and Hansen 1997). Cole (1995) discusses tentative successional relationships of her *Scirpus acutus* types.

WILDLIFE FUNCTIONS

Scirpus acutus provides valuable nesting and roosting cover for a variety of songbirds and waterfowl, notably red-winged blackbirds, yellow-headed blackbirds, and wrens. *S. acutus* is a staple for muskrats and is used in construction of their huts. Seeds of *S. acutus* are eaten by a variety of birds. Waterfowl managers often attempt to increase the proportion of *S. acutus* relative to *Typha latifolia* as a means of improving habitat (Hall and Hansen 1997).

CLASSIFICATION COMMENTS

Hansen et al. (1995) and Hall and Hansen (1997) have a *Scirpus acutus* habitat type in their classifications that includes all combinations of *Scirpus acutus* and *S. validus* (*S. tabernaemontani*) due to similarities in environmental conditions and management concerns. *S. validus* is treated as a separate alliance in the Western Regional Vegetation Classification (Bourgeron and Engelking 1994). Characteristics that separate the two species are quite subtle and the two species will hybridize. We are inclined to include stands of *S. validus* in the *S. acutus* association. Cole (1995) described four associations with *S. acutus* as the dominant species, *S. acutus-Veronica anagallis aquatica*, *S. acutus-Lemna* sp., *S. acutus-Lemna* sp.-*Solanum dulcamara*, and *S. acutus-Typha latifolia*. The *Scirpus acutus* type described in here encompasses enough compositional and structural variation to include Cole's types.

SIMILAR COMMUNITIES

Information on similar communities is not available.

AUTHOR/DATE(UPDATE)

Robert K. Moseley/1998-01-05(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-Sagitaria 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 Long Valley, Meadows Valley, and the upper South Fork Salmon River.

Allium madidum Wats.

CURRENT STATUS

USFS R4 - Sensitive (Payette NF)
USFWS - 3C
Idaho Native Plant Society - Global Priority 3
Heritage Rank - G3/S2

TAXONOMY

Family: Liliaceae (Lily)

Common Name: Swamp onion

Citation: Proc. Am. Acad. 14:228. 1879.

Technical Description: Bulbs ovoid or eccentric-ovoid, clustered, larger ones usually with a cluster of easily detached bulblets at one side of the base, inner coats whitish or pinkish, outer coats grayish or brownish, with or without some obscure, contorted, cellular reticulations; leaves 2, concave-convex in cross section, 1-4 mm broad, entire, about equaling the scape in length, green at anthesis, usually persisting at maturity; scape 1-2 dm tall, slender, terete or nearly so, sometimes ridged, persisting at maturity; bracts 2, ovate, acuminate, 7- to 9-nerved; umbel several- to many-flowered, pedicels slender, usually less than twice the perianth length, more or less flexuous in fruit; perianth segments 6-10 mm long, lanceolata, obtuse to acuminate, entire, becoming involute at the tip, white with green midribs or pink, becoming papery and keeled in fruit, the midribs prominent; stamens usually shorter than the perianth, anthers oblong, obtuse or acute, yellowish or purplish; ovary crestless or obscurely crested with 3 low processes, stigma capitate, entire or obscurely lobed; seeds dull black, alveoli not pustuliferous. N=14,21 (Hitchcock et al. 1969).

Nontechnical Description: Swamp onion is a perennial, spring-flowering member of the lily family. The upright, slender scape stands about 1-2 dm tall. The two narrow leaves are channeled and about equal the scape in length. They persist at anthesis. The inner coat of the bulb is white or pinkish. The bulb coat is grayish or brownish and may or may not have obscure, contorted reticulations. A cluster of bulblets is often present on one side of the bulb. Bulblets may also be present in adjacent soil. The umbel contains numerous small flowers and is subtended by two bracts. The similar-looking tepals are white with prominent green or purple midribs, 6-10 mm long. They are entire, becoming involute at the tip. The stamens are yellowish or purplish, and are usually shorter than the tepals. The ovary is without crests or is obscurely crested with three low processes.

Distinguishing Features and Similar Species: Swamp onion is most likely to be confused with *Allium fibrillum* (fringed onion). Investigations by McNeal (1991) have shown that these two species form a polyploid series, with *A. fibrillum* being diploid (n=7) and *A. madidum* being either tetraploid (n=14) or hexaploid (n=21). Many characters overlap between the two species. This is particularly evident in the bulb coat reticulation, which has a contorted cellular pattern in both species. The primary distinguishing feature between the two species is in the mode of asexual reproduction by bulb division. *A. fibrillum* produces new bulbs by equal division of a bulb, generally in two. *A. madidum*, however, produces a distinctive mass of small bulblets on short rhizomes on one side of the bulb. In the field, *A. madidum* can be readily identified by a tuft of small, vegetative plants surrounding the mature plant and growing from detached bulblets in the adjacent soil. The leaves of *A. fibrillum* can equal the length of the scape, as in *A. madidum*, or considerably exceed it.

Genetics: Genetic studies have shown that individuals from swamp onion populations in Oregon and Idaho have different chromosome numbers. Plants from Oregon populations are tetraploid (n=14); plants from Idaho populations are hexaploid (n=21) (Mingrone 1968). Chromatographic studies of populations

from the two states resulted in a high similarity index of 94% (Mingrone 1968). Although plants from the Idaho and Oregon populations are morphologically indistinguishable, they are considered to constitute two separate polyploid races based on chromosome count (Mingrone 1968; McNeal 1991).

DISTRIBUTION

Range: Swamp onion is known from eastern Oregon in Baker, Umatilla, Union, Grant, Wallowa, Crook, Wheeler, and Morrow counties, and from western Idaho in Valley and Adams counties. Previous to 1993, 11 populations were known in Idaho, primarily in the McCall and New Meadows areas, with two sites near Indian Valley. Only one of these sites, in Bear Basin about 2.5 miles north of McCall, had been observed within the past decade.

Habitat and Associated Species: Swamp onion is found in seasonally moist meadows, watercourses and around vernal pools. Sites supporting the onion are saturated during the spring but dry to the surface by late spring or early summer. These sites are often surrounded by coniferous forest – *Pinus ponderosa, P. contorta, Abies grandis, Larix occidentalis*, and *Pseudotsuga menziesii* – but the swamp onion is not found beneath a full canopy. The species appears to be tolerant of moderate disturbance – populations are found in grazed meadows, areas excavated by pocket gophers, ephemeral streams, and along road cuts. Swamp onion occurs on sites that are relatively open and have a flat aspect or slight slope. The majority of populations in Idaho and Oregon occur between 3,800 and 6,500 feet elevation (Atwood 1987), however, the two sites reported from Indian Valley are at approximately 3,000 feet elevation. Swamp onion appears to be restricted to soils originating from Columbia River basalt. The Idaho sites are located on the Weiser embayment, the southeastern most extension of the Columbia Plateau (Fitzgerald 1982).

Associated species throughout the range include *Orogenia linearifolia, Ranunculus glaberriums, Camassia quamash, Hesperochiron pumilus, Viola orbiculata, Castilleja cusickii, Besseya rubra, Thalictrum occidentale, Claytonia lanceolata, Carex* spp., *Alopecurus pratense, Claytonia chamissoi, Deschampsia cespitosa, Floerkea proserpinacoides, Oenothera flava, Antennaria luzuloides, Stipa occidentalis, Saxifraga oregana, Allium brandegei, Wyethia helianthoides, Delphinium* sp., *Lomatium* sp. *Rorippa* sp., *Artemisia tridentata, Poa bulbosa, Linanthus* sp., *Cryptogramma* sp., *Madia* sp., *Navarretia* sp., *Clematis* sp. (Meinke 1978; Kennison 1980; collection records).

MANAGEMENT

Threats: All of the known Idaho populations of swamp onion occur in areas impacted by either human or natural disturbance. It appears to thrive in areas where soil and vegetation have been disturbed to some degree, such as meadows grazed by livestock or inhabited by pocket gophers, roadcuts, and ephemerally wet stream beds. The hydrologic regime of areas supporting the swamp onion appears to be important as it was found only in habitats where the surface is wet early in the growing season but dry later in the spring. Swamp onion also appears to be restricted to basalt substrates.

The primary threats to the species include activities that result in destruction of the meadow habitats and changes in the hydrology of a site. It was noted that some of the populations on private land are in areas that are being developed for residential use. These areas include the Rock Flat South (001) and NNE of Hait Reservoir (014) populations, although no immediate threats were apparent. The Price Valley North (017) population has potential for being impacted in this manner. Although the population is on state land, it might also occur on adjacent private land. Much of the private land in Price Valley is for sale.

Allium validum **Wats.**

CURRENT STATUS

USFS Region 1 - Sensitive Species (Nez Perce NF)
USFS Region 4 - Sensitive Species (Boise NF)
USFWS - None
BLM - Sensitive
Idaho Native Plant Society - Sensitive
Heritage Rank - G4/S2

TAXONOMY

Family: Liliaceae (Lily)

Common Name: Tall swamp onion

Citation: Watson, S. 1871. In: King, U.S. Geological Exploration of the 40th Parallel 5:350.

Technical Description: Bulb elongate, 1-1.5 cm thick, terminating a thick Iris-like rhizome, inner coats reddish purple or whitish, outer coats brownish, membranaceous, minutely striate with elongate cells in regular vertical rows, not fibrous-reticulate, but with coarse, persistent, parallel fibers; leaves several, plane, obtuse, entire, 4-15 mm broad, shorter than the scape, green at anthesis, persistent at maturity; scape 3-7 dm tall, flattened and narrowly winged toward the apex; bracts of the spathe 2, united at base, membranaceous, broadly ovate, acute, 5- to 7-nerved; umbel several – (15- to 30-) flowered, pedicels slender, about equaling the perianth of anthesis, elongating and becoming stout in fruit; perianth segments 8-10 mm long, narrowly lanceolata, acuminate, entire, pink, withering in fruit, the midribs scarcely thickened; stamens much exceeding the perianth in length, filaments broadly dilated below and united into a cup at the base, anthers oblong, obtuse, purplish or yellowish; ovary crestless, style exerted, stigma capitate, entire; capsules mostly longer than broad, valves oblong, barely emarginate; seeds correspondingly long and slender, dull black, alveoli not pustuliferous (Hitchcock et al. 1969).

Nontechnical Description: As its common name indicates, tall swamp onion is relatively tall for a native onion, with the scape being from 3-7 dm tall. It grows in subalpine wet meadows and seeps. Tall swamp onion has a thick iris-like rhizome, in addition to the starchy bulb found in most *Allium* species. It forms dense clumps in sedge-dominated wet meadows and is easy to distinguish from surrounding vegetation even in a vegetative state by its flat, succulent, relatively wide, light green leaves. A capitate cluster with many bright pink flowers usually stands above the surrounding, mostly graminoid vegetation. Tall swamp onion flowers between mid-July and September.

Distinguishing Features and Similar Species: In Idaho, tall swamp onion is likely to be confused only with *Allium brevistylum*, which is smaller in stature and has stamens only half as long as the perianth segments. *A. brevistylum* also differs by having a short style with a trifid stigma, broader than long capsules with cordate valves, and shorter, thicker seeds, the alveoli on which are usually pustuliferous (Hitchcock et al. 1969).

DISTRIBUTION

Range: Tall swamp onion occurs at medium and high elevations in the mountains of west-central Idaho, eastern Oregon, northeast Nevada, and southward to northern California; in the Sierra Nevada as far south as Sequoia National Park; and in the Coast Ranges of southwestern Oregon and northwestern California.

Habitat and Associated Species: Tall swamp onion occurs in three distinct habitats in the subalpine zone of the west-central mountains of Idaho within the Boise National Forest. Around small forested seeps in

the *Abies lasiocarpa/Caltha biflora* habitat type (Steele et al. 1981), the species occurs in low density and does not form large clumps as it does in open-canopy habitats. Associated species in this habitat include *Senecio triangularis, Saxifraga arguta, Polygonum bistortoides, Pedicularis bracteosa, Cardamine cordifolia*, and *Mimulus lewisii*. In meadows in galciated basins dominated by *Carex scopulorum*, associated species include *Caltha biflora, Dodecatheon jeffreyi, Polygonum bistortoides, Salix commutata, Pedicularis groenlandica, Polemonium occidentale, Senecio triangularis, Ribes hudsonianum, Aconitum columbianum, Ranunculus alismaefolius, Corydalis caseana* var. *cusickii, Cardamine cordifolia, Saxifraga arguta, Veratrum californicum, Potentilla flabellifolia*, and *Erythronium grandiflorum*. Tall swamp onion also occurs along moderate-size creeks in the *Abies lasiocarpa/Streptopus amplexicaulis* habitat type, *Streptopus amplexicaulis* phase (Steele et al. 1981). This rather narrow, linear habitat is restricted to stream margins. Associated species include *Dodecatheon jeffreyi, Ligusticum canbyi, Polygonum bistortoides, Salix commutata, Pedicularis groenlandica, Polemonium occidentale, Senecio triangularis, Ribes hudsonianum, Aconitum columbianum, Corydalis caseana* var. *cusickii*, and *Cardamine cordifolia*.

MANAGEMENT

Threats: All known tall swamp onion populations on the Boise National Forest occur in areas that have been extensively grazed by sheep in the past. Tall swamp onion, being large and relatively succulent, is probably highly palatable to sheep; most *Allium* species are. Only the two populations in the Trinity Mountain recreation area are not currently grazed.

One population, consisting of about 20 genets (genetically identical groups of stems produced by the rhizome), occurs immediately adjacent to a pullout for camping on the west shore of a popular lake. Much of the area encompassed by the population has been impacted by recreational activity associated with camping and fishing. Several trails traverse the population, and in July 1989, several genets had been partially trampled. Some of the population may have been destroyed during road and/or camp pullout construction.

***Aster junciformis* Rydb.**

CURRENT STATUS

USFS R1 - Sensitive
USFWS - None
Idaho Native Plant Society - Sensitive
Heritage Rank - G5/S2

TAXONOMY

Family: Asteraceae (Aster)

Common Name: Rush aster, Rushlike aster, Northern bog aster

Citation: Bull. Torrey Club 37:142. 1910.
Bull. Torrey Club 37:141. 1910.

Synonyms: *Symphyotrichum boreale* (Torr. & Gray) A. & D. Löve

Technical Description: Slender perennial from creeping rhizomes seldom over 2 mm thick; stem 1.5-8 dm tall, glabrous below, becoming puberulent in lines upwards; leaves linear or nearly so, commonly 2-5 (rarely 9) mm wide, usually slightly clasping, entire or subentire, the lower-most sometimes reduced and

subpetiolate, but then soon deciduous; inflorescence usually short and broad, sometimes more elongate, or the heads solitary in reduced plants; heads rather small, the disk 7-13 mm wide; involucre 5-7 mm high, glabrous, its slender, mostly acute bracts more or less imbricate, often with purple tips and margins; rays commonly 20-50, white or pale bluish, 7-15 mm long (Cronquist 1955).

Nontechnical Description: Rush aster is a perennial native to North America. The slender, erect plants arise from rhizomes that are 0.5-1.5(2) mm thick. The plants are 3-8 dm tall and hairless except for lines of appressed hairs extending downward from the leaf bases. The stems are simple but usually branched above in the inflorescense. The sessile, linear leaves are 4-11 cm long and 2-6 mm wide. The slightly rough to the touch leaves gradually taper to a sharp point and form concave sides along the tip and may be slightly clasping at the base. The flower heads, ranging in size from 1.5 to 2 cm across, are few to several but seldom many and are uncrowded. The overlapping involucral bracts often have purplish tips and margins. The number of rays is usually 20-50, and the rays are white to light blue or lavender and 7-15 mm long (Larson 1993).

DISTRIBUTION

Range: Rush aster is known from Alaska, Colorado, Idaho, Illinois, Indiana, Iowa, Maine Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, New York, North Dakota, Ohio, Pennsylvania, South Dakota, Vermont, Washington, West Virginia, Wisconsin, Wyoming, Yukon, and British Columbia to Quebec.

In Idaho, known populations of rush aster occur in Bonner, Custer, Fremont, Kootenai, Teton, and Valley counties.

Habitat and Associated Species: Rush aster is found in springs, fens, seepage areas, wet meadows and boggy places, typically where the soil remains saturated all year.

Associated species and community type throughout its range in Idaho include A*lnus incana, Andromeda polifolia, Betula glandulosa, B. pumila, Calliergon stramineum, Carex aquatilis, C. buxbaumii, C. cusickii, C. flava, C. lanuginosa, C. lasiocarpa, C. muricata, C. nebrascensis, C. oederi, C. rostrata, C. simulata, C. utriculata, Cornus stolonifera, Deschampsia cespitosa, Eriophorum chamissonis, E. viridicarinatum, Hypericum majus, Juncus balticus, J. bolanderi, J. ensifolius, Lycopodiella inundata, Lycopodium inundatum, Menyanthes trifoliata, Phlox kelseyi, Picea glauca, Potentilla fruticosa/Betula glandulosa/Carex* sp., *Potentilla palustris, Pyrola asarifolia, Rhamnus alnifolia, Salix candida, S. pedicellaris, S. planifolia, S. pseudomonticola, Scutellaria galericulata, Sphagnum warnstorfii, Sphagnum* spp., *Spiraea douglasii, Thalictrum alpinum, Vaccinium oxycoccos*, and *Zizia aperta*.

MANAGEMENT

Threats: Any change in local hydrology could negatively impact rush aster populations. Livestock grazing may possibly have a negative effect on certain populations.

Botrychium lanceolatum* (Gmel) *Angstr*. var. *lanceolatum

CURRENT STATUS

BLM - Sensitive
USFS R1 - Sensitive
USFS R6 - Sensitive
Idaho Native Plant Society - Sensitive
Heritage Rank - G5T4/S3

TAXONOMY

Family: Ophioglossaceae (Adder's-tongue)

Common Name: Lance-leaved moonwort

Citation: Bot. Not. 1854:68. 1954.

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 l-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-pinnatified to 2-pinnate-pinnatifid, with scarcely lobed to pinnatified, 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.

DISTRIBUTION

Range: Alaska to California; Idaho, Montana, Wyoming, Nevada, Colorado, Utah, New Mexico, and Arizona at high elevation.

Habitat 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*.

MANAGEMENT

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.

***Botrychium simplex* E. Hitchc.**

CURRENT STATUS

USFS Region 1 - Sensitive
USFWS - None
Idaho Native Plant Society - State Priority 2
Heritage Rank - G5/S2

TAXONOMY

Family: Ophioglossaceae (Adder's-tongue)

Common Name: Least moonwort

Citation: Hitchcock, E. 1823. Am. Journ. of Science 6:103.

Synonyms: *Botrychium virginicum* var. *simplex* Gray, *Botrychium lunaria* var. *simplex* Watt, *Botrychium kannenbergii f. compositum* Lasch, *Botrychium simplex* var. *compositum* Milde

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 subflabbellate 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).

DISTRIBUTION

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 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 myrtillifolia, S. scouleriana, Deschampsia cespitosa, Danthonia intermedia, Clintonia uniflora, Pachistima myrsinites, Coptis occidentalis, Goodyera oblongifolia, Taxus brevifolia*, and *Asarum caudatum*.

MANAGEMENT

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.

***Carex buxbaumii* Wahl.**

CURRENT STATUS

USFS Region 1 - Sensitive Species
USFWS - None
Idaho Native Plant Society - State Sensitive
Heritage Rank - G5/S3

TAXONOMY

Family: Cyperaceae (Sedge)

Common Name: Brown bog sedge

Citation: Svenska Vet.-Akad. Handl. 24:163. 1803.

Technical Description: Culms arising singly or few together from well-developed creeping rhizomes, mostly 3-10 dm tall, strongly aphyllopodic, not surrouded 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 gynaecandrous, 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.

DISTRIBUTION

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 which 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.

***Epipactis gigantea* Dougl. ex Hook.**

CURRENT STATUS

USFS - Region 1 Sensitive Species
USFWS - None
Idaho Native Plant Society - State Priority 2
Heritage Rank - G3/S3

TAXONOMY

Family: Orchidaceae (Orchid)

Common Name: Giant helleborine

Citation: Fl. Bor. Am. 2:202. 1839.

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).

DISTRIBUTION

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 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*. The slopes around the hot springs support a forested mix of grand fir, Douglas fir, and ponderosa pine.

MANAGEMENT

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.

***Eriophorum viridicarinatum* (Engelm.) Fern.**

CURRENT STATUS

USFS R1 - Sensitive
USFWS - None
Idaho Native Plant Society - State Priority 1
Heritage Rank - G5/S2

TAXONOMY

Family: Cyperaceae (Sedge)

Common Name: Green keeled cottongrass, Tassel cotton-grass, Thinleaf cottonsedge

Citation: Am. Journ. Sci. 46:103. 1844.
E. polystachion var. *viridicarinatum* Farw. Rep. Mich. Acad. Sci. 21:361. 1920.

Technical Description: Extensively colonial from creeping rhizomes; culms subterete, 2-6 (9) dm tall; leaves basal and cauline, the blade well developed, more or less elongate (especially that of the lower leaves), 2-6 (8) mm wide, flat or nearly so for most of its length, but becoming narrow and triangular or channeled toward the tip; uppermost culm leaf with well-developed blade usually equaling or exceeding the sheath; involucral bracts several, unequal, 2 or more of them evidently foliaceous at least above the broadened, more chartaceous base, the longest one generally surpassing (or at least equaling) the inflorescence; spikelets 2-8, most or all of them individually pedunculate, in a compact to open, umbelliform cyme, the peduncles more or less strongly compressed, smooth or sometimes minutely scabrous-hirtellous; scales blackish-green, with well-developed, notably paler midrib that tends to be expanded distally and reaches the tip of the scale; anthers mostly 2.5-4 mm long (dry); bristles numerous, white or nearly so; achenes blackish, 2-3 mm long, broadly oblanceolate to obovate, 2-3 times as long as wide. N=29, 30 (Hitchcock et al. 1969).

Nontechnical Description: Green keeled cottongrass is a perennial belonging to the sedge family and is native to North America. The stems are mostly solitary, weakly triangular becoming conspicuously so below the inflorescense, finely ridged and are 3-6(9) dm tall and 1.5-3 mm thick. Leaves are few to several with the uppermost arising in the upper half of the stem. The blades, which commonly die back from the tips, are flat or folded together lengthwise with the upper surface within and are 3-6 mm wide when flat. The sheaths are green but sometimes can be reddish. Consisting of 2-8 flowers, the spikelets are roughly cone-shaped with the attachment point at the narrow end and 1-3 cm in diameter with the bristles fully expanded. The pedicels are rather lax with the spikelets drooping. The involucral bracts are leaf-like with the principal one rather erect and usually surpassing the inflorescence. The 4-6 mm long scales are ovate to lance-subulate and are blackish-green with a well-developed, notably paler midrib that tends to be broader toward the tip of the scale and reaches the tip. The perianth bristles are white to

faintly tawny and are sometimes rather short when the achenes fail to develop. The achenes are dark brown to nearly black with blunt tips (Larson 1993).

Distinguishing Features and Similar Species: Green keeled cottongrass is very much like *Eriophorum angustifolium* ssp. *subarcticum* (tall cottongrass), but the scales are consistently blackish-green, with well-developed, notably paler midrib that tends to be expanded distally and reaches the tip of the scale. Also, the sheaths are not dark-girdled at the summit and are green throughout. Tall cottongrass is circumboreal, in contrast to the strictly North American green keeled cottongrass.

DISTRIBUTION

Range: Green keeled cottongrass is known from Alaska, Connecticut, Idaho, Illinois, Indiana, Iowa, Maine, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New Jersey, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, Vermont, Washington, Wisconsin, and Wyoming.

In Idaho, green keeled cottongrass is found in Bonner, Boundary, Fremont, Teton, and Valley counties.

Habitat and Associated Species: Green keeled cottongrass is found in cold swamps and bogs at moderate to high elevations in the mountains.

Associated species and community types throughout its range in Idaho include *Abies lasiocarpa/Clintonia uniflora, Agrostis* spp., *Andromeda polifolia, Aster* spp., *Betula glandulosa/Carex simulata, Carex aperta, C. aurea, C. buxbaumii, C. echinata* ssp. *echinata, C. lasiocarpa, C. magellanica* ssp. *irrigua, C. utriculata, Cypripedium parviflorum, Drosera rotundifolia, Eleocharis* sp., *Eriophorum chamissonis, Eriophorum* sp., *Habenaria dilatata, Juncus ensifolius, Kalmia microphylla, Leptarrhena pyrolifolia, Ligusticum canbyi, Menyanthes trifoliata, Picea engelmannii, Pinus contorta, Rubus pubescens, Salix pedicellaris, S. microcarpus, Scutellaria galericulata, Senecio triangularis, Symphyotrichum boreale, Trichophorum alpinum, Trientalis europaea* ssp. *arctica*, and *Vaccinium oxycoccos*.

MANAGEMENT

Threats: In Valley County, a population occurs in an area where a ski resort and convention center are proposed. While provisions of the Clean Water Act would protect this wetland, impacts such as nutrient and sediment accumulation could alter the species composition of the wetland.

Concerns for other populations of green keeled cottongrass are livestock grazing and weed control methods.

Helodium blandowii (Web& Mohr) Warnst. (Musci)

CURRENT STATUS

BLM - Sensitive
Idaho Native Plant Society - Sensitive
Heritage Rank - G5 S2

TAXONOMY

Family: Helodiaceae

Common Name: Blandow's helodium

Citation: Krypt. Fl. Brandenburg 2:692, 1905.

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).

DISTRIBUTION

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.

MANAGEMENT

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.

***Ribes wolfii* Rothrock**

CURRENT STATUS

USFS Region 6 - Sensitive
BLM - Sensitive
Idaho Native Plant Society - Monitor
Heritage Rank - G4/S2

TAXONOMY

Family: Grossulariaceae (Currant)

Common Name: Wolf's currant

Citation: Am. Nat. 8:358. 1874.

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 exserted, 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).

DISTRIBUTION

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.

MANAGEMENT

Threats: Logging and road construction/maintenance could pose a threat, especially timber harvest practices that may remove too much of the canopy.

Triantha occidentalis (S. Watson) Gates ssp. *brevistyla* (Hitchcock) Packer

CURRENT STATUS

USFS R4 - Sensitive
USFWS - None
Idaho Native Plant Society - State Priority 1
Heritage Rank - G5T4/S1

TAXONOMY

Family: Liliaceae (Lily)

Common Name: Short style tofieldia, Sticky tofieldia

Citation: Amer. Midl. Naturalist 31:495. 1944.
Univ. Wash. Publ. Biol. 17(1):806. 1969.

Synonyms: *Tofieldia glutinosa* spp. *brevistyla* C. L. Hitchc.

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 involucral 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 infloresence 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.

DISTRIBUTION

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 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*.

MANAGEMENT

Threats: Hydrological alterations would have a negative effect on short-style tofieldia.

Trifolium douglasii **House**

CURRENT STATUS

Idaho Native Plant Society - Global Priority 3
Heritage Rank - G3/S2

TAXONOMY

Family: Fabaceae (Legume)

Common Name: Douglas' clover

Citation: Bot. Gaz. 41:335. 1906

Technical Description: Perennial from a thick taproot, nonrhizomatous, usually glabrous; stems generally several, erect, simple or subsimple, 4-8 dm tall; stipules oblong-lanceolate, 2-7 cm long, adnate to the petiole most of their length, the margins serrulate; leaflets 3, linear to oblong-elliptic, 4-10 cm long, the margins very finely serrulate-spinulose; petioles usually shorter than the stipules; heads noninvolucrate, axillary as well as terminal and long-pedunculate, globose to ovoid-cylindric, about 3 cm thick, as long to nearly twice as long, closely 50- to 200-flowered; flowers erect, spreading, or the lowest reflexed, 14-20 mm long, reddish-purple; calyx 1/2-3/5 as long as the corolla, glabrous, the tube strongly 20 (17-25) nerved, oblique, 1/3-3/4 as long as the subulate teeth; upper pair of calyx teeth broader than the lower three and usually conspicuously curved downward; sinuses between the lateral teeth deeper than that between the upper pair; legume usually 1-seeded (Hitchcock et al. 1961).

Nontechnical Description: Douglas' clover is an attractive clover with multistriate calyces, subspheroid heads and curved lateral calyx lobes.

Distinguishing Features and Similar Species: Douglas' clover can be separated from other species of *Trifolium* by the following characters: perennial flowers not subtended by a true involucre, leaflets 3, and the calyx tube with 20 prominent nerves (Washington Natural Heritage Program 1999).

DISTRIBUTION

Range: Douglas' clover occurs from Spokane County in eastern Washington south to Baker County, Oregon and east to adjacent Idaho.

Habitat and Associated Species: Douglas' clover occurs in moist to wet meadows and forested wetlands, and streambanks with yellow pine.

MANAGEMENT

Threats: Douglas' clover habitat has been severely impacted by conversion to agricultural uses and by invasion of exotic grass species.

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APPENDIX H

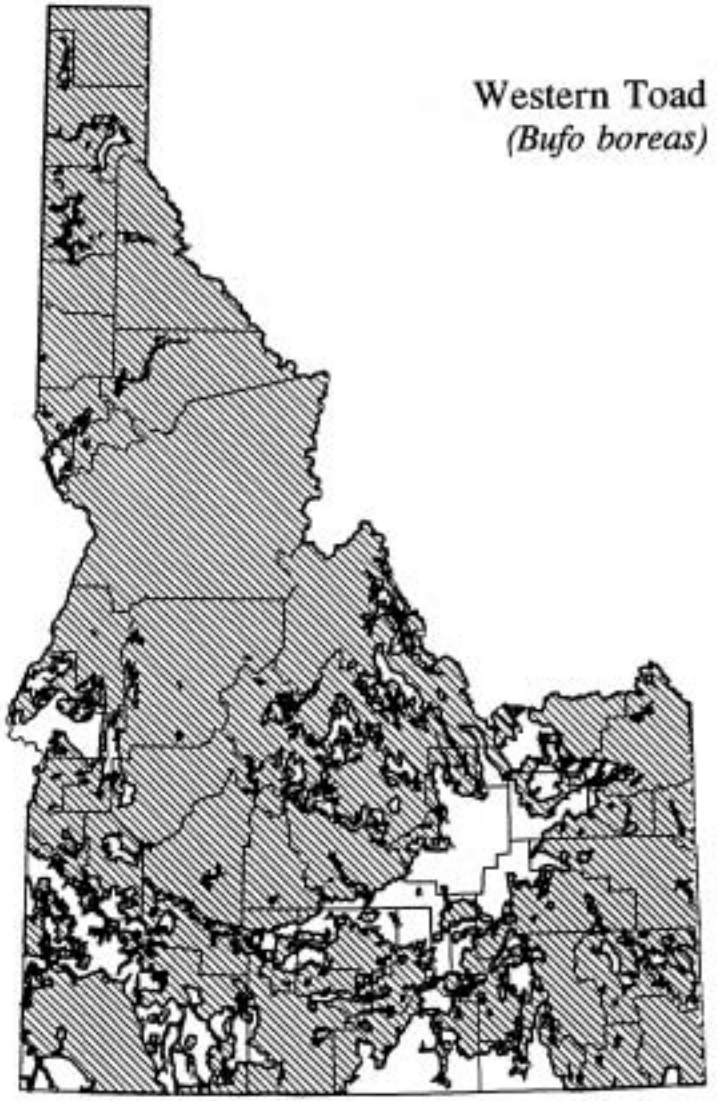
Taxonomy, range, status, and management of animal species of special concern in the west-central mountain valleys.

Taxonomy, range, status, and management of animal species of special concern in the west-central mountain valleys.

Amphibians	
Bufo boreas	western toad
Birds	
Aechmophorus occidentalis	western grebe
Podiceps gricegena	red-necked grebe
Bucephala albeola	bufflehead
Haliaeetus leucocephalus	bald eagle
Oreotyx pictus	mountain quail
Picoides arcticus	black-backed woodpecker
Picoides tridactylus	three toed woodpecker
Strix nebulosa	great gray owl
Strix varia	barred owl
Mammals	
Martes pennanti	fisher
Myotis evotis	long-eared myotis
Myotis volans	long-legged myotis

ORDER: Anura
FAMILY: Bufonidae

Western Toad
(Bufo boreas)



STATUS: Protected nongame species
GLOBAL RANK: G4 STATE RANK: S4

RANGE: Found along Pacific Coast from southern Alaska to Baja California; also found from west-central Alberta, east to Montana, Wyoming, Utah, Colorado, and Nevada.

HABITAT: From sea level to over 3600 m, in wide variety of habitats such as desert springs and streams, meadows and woodlands, and in and around ponds, lakes, reservoirs, and slow-moving rivers and streams.

DIET: In Northwest, larvae filter suspended plant material, or feed on bottom detritus. Adults eat all types of flying insects and spiders, crayfish, sowbugs, and earthworms.

ECOLOGY: Digs burrow in loose soil or uses burrows of small mammals. Activity varies seasonally and geographically. At low elevations, individuals are mainly diurnal in late winter and spring, and nocturnal in summer. Mountain populations are active day or night in summer, depending on conditions. Hibernation occurs in winter in cold climates. Birds and garter snakes prey on adults, and predatory insect larvae feed on young. Western toads appear to be declining in Greater Yellowstone Ecosystem and in other parts of western United States.

REPRODUCTION: Breeding period varies according to conditions, but usually occurs from late January through July (in Snake River Canyon, breeding occurs in early July as an adaptation to high levels of runoff water). Females deposit an average of 12,000 eggs/clutch; eggs are laid in 2 strands. Larvae metamorphose in second summer in mountains, and in first summer in other areas. Males do not have a mating call as do many frogs and other toads, but they do vocalize and can be heard.

GIS MODEL NUMBER: 2

IMPORTANT STATE REFERENCE: Bartelt, P.E. and C.R. Peterson. 1994. Riparian habitat utilization by western toads (*Bufo boreas*) and spotted frogs (*Rana pretiosa*). Final report to the USDA Forest Service Inter. Res. Sta., Boise. 30pp.

ORDER: Podicipediformes
FAMILY: Podicipedidae

Western Grebe
(Aechmophorus occidentalis)

STATUS: Protected nongame species
GLOBAL RANK: G5 STATE RANK: S4

RANGE: Breeds mainly from western Canada, east to southwestern Manitoba, and south through U.S. from California and Utah east to upper midwestern states. Winters mainly along Pacific Coast from southeastern Alaska to northwestern Mexico.

HABITAT: Found on marshes, lakes, and bays. During migration and in winter, also found on sheltered seacoasts, less frequently along rivers. In Idaho, prefers large rivers and reservoirs that include shallow water areas with emergent vegetation.

DIET: Diet consists mainly of fishes; opportunistic as to species eaten. Also eats insects (adults and larvae, especially in spring and summer), mollusks, crabs, marine worms, and salamanders. Ingests feathers and small stones.

ECOLOGY: Builds platform nest on shallow water. Nests in colonies of sometimes hundreds or thousands of birds. In Idaho, nests in large colonies and isolated pairs that are susceptible to water fluctuations. Young may ride on backs of adults. Individuals dive from water surface to obtain food.

REPRODUCTION: Reported average clutch size is about 2.2-3.3 in southeastern Idaho, 2.5 in Utah, 3.4 in Colorado, and 4.2 in North Dakota. Dump nesting may result in large clutch in one nest. Both adults incubate, in turn. Incubation lasts 3-4 wk. Brood size is usually 1-3. Young are tended by both parents.

GIS MODEL NUMBER: 9

IMPORTANT STATE REFERENCE: Trost, C.H. 1994. The status and distribution of colonial waterbirds in northern Idaho and selected species in southern Idaho, 1994. Dept. Biol. Sciences, Idaho St. Univ., Pocatello. 31pp.

ORDER: Podicipediformes
FAMILY: Podicipedidae

Red-necked Grebe
(Podiceps grisegena)

STATUS: Protected nongame species
GLOBAL RANK: G5 STATE RANK: S3

RANGE: Breeds in Alaska and western and south-central Canada, south to Washington, Montana, northeastern South Dakota, and Minnesota; rarely breeds elsewhere in northern United States. Winters coastally from Alaska to southern California, and also from Nova Scotia to central Florida (casually along Gulf Coast). In Idaho, breeds uncommonly on Panhandle and in south-central and southeastern Idaho.

HABITAT: Winters along seacoasts, bays, and estuaries. During migration, found on lakes, ponds, and rivers. In Idaho, prefers large lakes with clear water.

DIET: Feeds on small fishes where available, but also eats aquatic and land insects, crustaceans, mollusks, aquatic worms, tadpoles, salamander eggs, some vegetable matter, and feathers.

ECOLOGY: Nests on floating or half-submerged vegetation. Usually nests solitarily, but will sometimes form loose colonies. Breeding territory size varies in accordance with food supply and other ecological factors. Dives underwater and forages on or near bottom for food. Flees by diving rather than flying.

REPRODUCTION: Peak egg-laying activity occurs in June in many areas. Male and female in turn incubate usually 3-5 eggs for 22-27 days. Both parents tend young, which probably become independent at 8-10 wk.

GIS MODEL NUMBER: 10

IMPORTANT STATE REFERENCE: Taylor, D.M. and C.H. Trost. 1987. The status of rare birds in Idaho. Murrelet 68:69-93.

ORDER: Anseriformes
FAMILY: Anatidae

Bufflehead
(Bucephala albeola)

STATUS: Game species
GLOBAL RANK: G5 STATE RANK: S3

RANGE: Breeds from central Alaska and parts of western Canada, south to northern Washington, and east to northern Montana; also breeds (locally) south to mountains of Oregon and northern California. Winters from Alaska, Great Lakes, and Maritime Provinces, south to Mexico and Gulf Coast.

HABITAT: Found on lakes, ponds, rivers, and seacoasts. Winters on sheltered bays and estuaries. In Idaho, occupies ponds, lakes, rivers, and reservoirs; winters on larger bodies of open water.

DIET: In freshwater, feeds on aquatic insects, snails, amphipods, small fishes, and some aquatic plants. In saltwater, eats crustaceans, mollusks, fishes, and some aquatic plants.

ECOLOGY: Dives underwater to obtain food. Nests in tree near water, either in natural cavity or in cavity made by flicker or woodpecker. Will also nest in burrow in bank. Female strongly defends brood territory. British Columbia study found that breeding density was not limited by nest sites, but rather by territorial behavior. Usually seen in small groups (2-3 individuals). Usually migrates at night. Breeds uncommonly on mountain lakes in Idaho.

REPRODUCTION: Breeding begins mid-May in southern range, to early June in north. Clutch size varies from 6-11 eggs (usually 7-9). Incubation lasts 28-33 days; female incubates eggs and tends young, which fly 50-55 days after hatching and breed at 2 yr.

GIS MODEL NUMBER: 5

ORDER: Falconiformes
FAMILY: Accipitridae

Bald Eagle
(Haliaeetus leucocephalus)

STATUS: Protected nongame species
GLOBAL RANK: G4 STATE RANK: S3

RANGE: Breeds from central Alaska, east to northern Saskatchewan, Labrador, and Newfoundland, and south, locally, to northern Mexico, New Mexico, Arizona, Texas Gulf Coast, and Florida; very local breeder in interior North America. Winters generally throughout breeding range except in far north.

HABITAT: Found primarily near seacoasts, rivers, and reservoirs and lakes.

DIET: Catches fish (or steals from osprey); also eats various mammals and carrion. Idaho diet includes fish, big game carrion, waterfowl, and jackrabbits.

ECOLOGY: Forages from high altitudes; often forages from perch. Builds stick nest in fork of tall tree, or occasionally on cliff. In winter, adults often roost communally at night, in trees used in successive years. In winter in some areas, adults preferentially roost in conifers, or other sheltered sites, and may associate with waterfowl concentrations, or congregate in areas with abundant dead fish (in Idaho, individuals congregate in numbers on watercourses in northern, eastern, and southwestern parts of state). Montana study determined introduction of shrimp (*Mysis relicta*) had cascading effect through food chain, ultimately causing displacement of Bald Eagles. North-central Arizona study found February-April home ranges of immatures averaged 400 km^2; birds moved frequently and roosted singly or in small groups. Home ranges of Bald Eagles nesting along Cascade Reservoir in west-central Idaho have ranged from 15-60 km^2 during breeding season, and have typically been half that size at other times (management recommendations suggest 400 m buffer zone around nest sites to protect key habitat features such as nests, perch trees and food resources). From 1979-1995, Idaho's nesting Bald Eagle population increased from 11 to 77 occupied territories. In 1995, 51 pairs from occupied territories successfully fledged an average of 1.2 young/pr.

REPRODUCTION: Both sexes incubate 1-3 eggs (usually 2) for about 5 wk. Second-hatched young sometimes dies. Young first fly at 10-12.5 wk, remain around nest for several more weeks, and generally do not breed until about 5-6 yr. Adults may not lay every year.

GIS MODEL NUMBER: 9

IMPORTANT STATE REFERENCE: Beals, J., and W. Melquist. 1995. Idaho bald eagle nesting report, 1995. Idaho Dept. Fish & Game, Boise. 23pp.

ORDER: Galliformes
FAMILY: Phasianidae

Mountain Quail
(Oreortyx pictus)

STATUS: Game species
GLOBAL RANK: G4 STATE RANK: SE

RANGE: Resident from southwestern British Columbia, western and southern Washington, and central Idaho, south through mountains of California and northern and western Nevada, to northern Baja California and Mexico.

HABITAT: Found in brushy mountainsides, coniferous forests, forest and meadow edges, and dense undergrowth. Also found in more arid conditions in sagebrush, pinyon and juniper. In Idaho, favors areas with tall dense shrubs that are close to water.

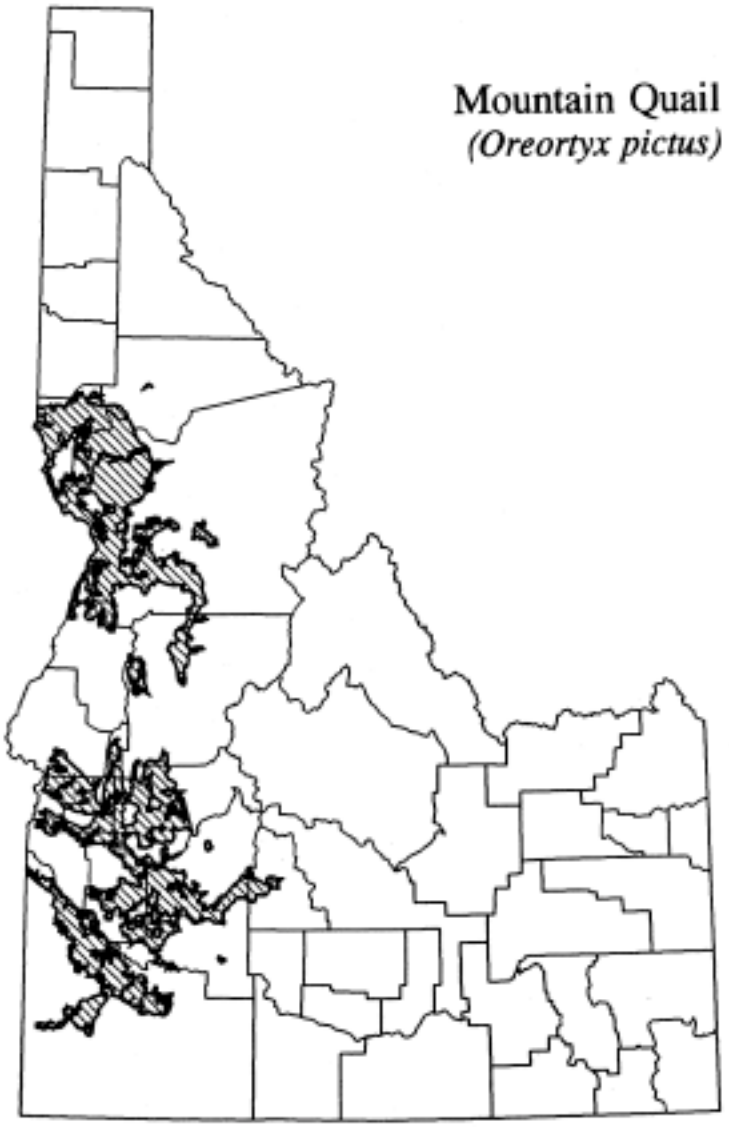
DIET: In spring and summer, feeds on herbaceous vegetation (especially leaves, buds, and flowers of legumes) and some insects (grasshoppers, beetles, and ants). Eats seeds, acorns, and fruits during rest of year. Idaho study determined fringecup and thistle seeds dominated summer diet; elderberry fruits were important in fall.

ECOLOGY: Builds concealed nest in depression on ground, frequently near shrub, base of tree, or fallen log. Forages on ground, usually in early morning and late afternoon; rests at mid-day. Forms coveys of 3-20 birds in late summer and early fall; covey disperses in late winter. Daily range varies by season (less than 920 m in winter, and less than 800 m in summer). Study conducted in different California habitats found 9-30 individuals may inhabit 100 ha. Population in Idaho has been declining for last 30 yr (1960-90), possibly due to riparian habitat degredation. Recent Idaho study points to predation by feral cats as a problem.

REPRODUCTION: Female (sometimes male) incubates 7-10 eggs for 24-25 days. Precocial nestlings are tended by both parents, or by either adult. Young can fly about 14 days after hatching.

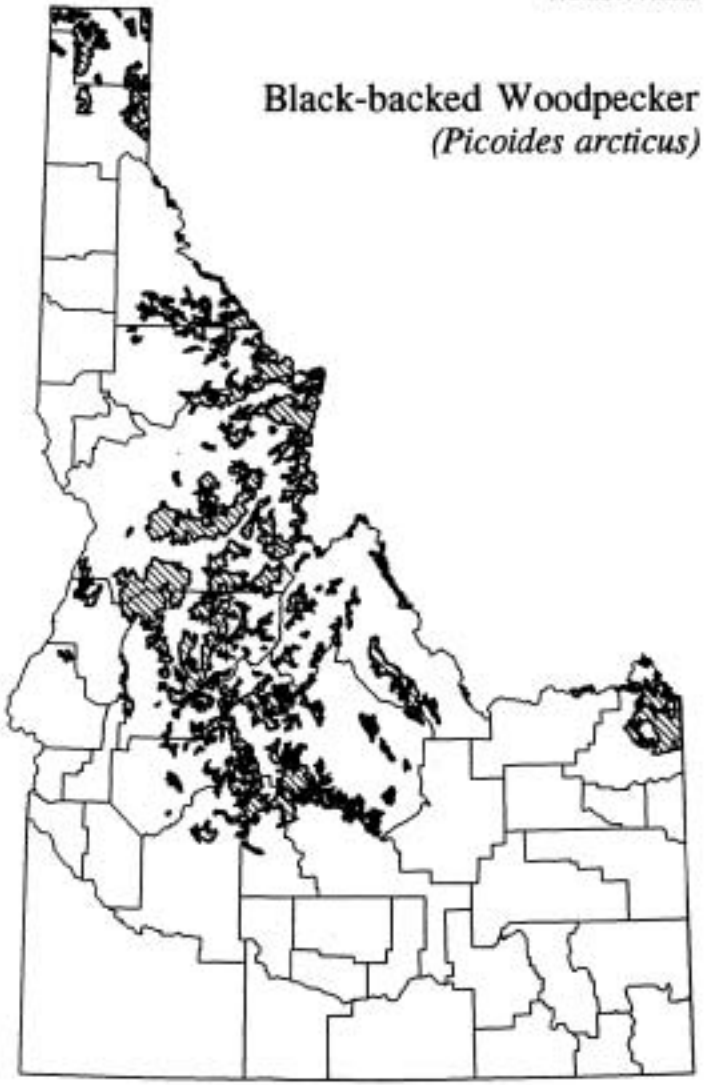
GIS MODEL NUMBER: 7

IMPORTANT STATE REFERENCE: Heekin, P.E., R. Guse, C. Connell, K.P. Reese, and P.M. Zager. 1993. Mountain quail ecology—job progress report, Study I, Job I. Idaho Dept. Fish & Game, Boise. 15pp.



ORDER: Piciformes
FAMILY: Picidae

Black-backed Woodpecker
(Picoides arcticus)



STATUS: Protected nongame species
GLOBAL RANK: G5 STATE RANK: S3

GLOBAL RANGE: Resident, often locally, from western and central Alaska to northern Saskatchewan and central Labrador, and south to southeastern British Columbia, central California, northwestern Wyoming, portions of Great Plains states and Prairie Provinces, and northern New England. Wanders irregularly south in winter.

HABITAT: Found in coniferous forests (primarily spruce/fir), especially in windfalls and burned areas with standing dead trees. Found less frequently in mixed forests, and rarely in deciduous woodlands in winter.

DIET: Eats mainly wood-boring insects, but will also eat spiders, fruits, nuts, and some cambium.

ECOLOGY: Excavates new cavity each year, in decaying tree or standing snag. Forages on bark. Populations can be irruptive in recent burns. Few nests have been located in Idaho. In Oregon, home range size varied from 70-324 ha, and there was no intraspecific overlap.

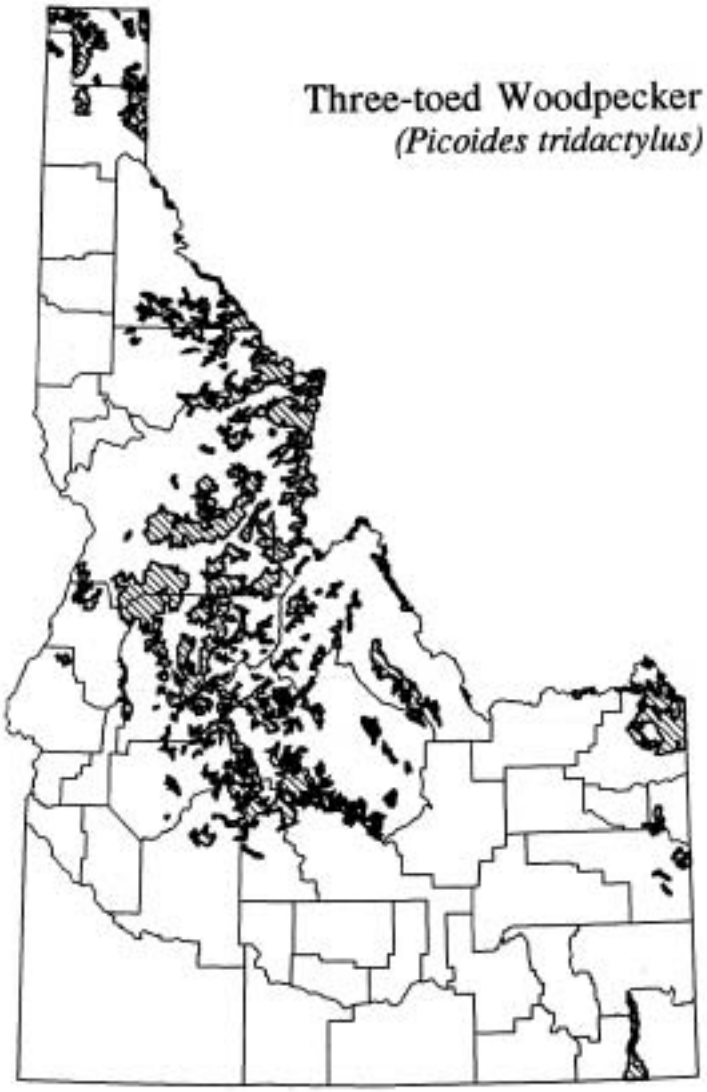
REPRODUCTION: Both sexes incubate 2-6 eggs (usually 4) for 14 days. Young are tended by both parents.

GIS MODEL NUMBER: 1

IMPORTANT STATE REFERENCE: Medin, D.E. 1985. Densities and nesting heights of breeding birds in a Idaho Douglas-fir forest. Northwest Sci. 59:45-52.

ORDER: Piciformes
FAMILY: Picidae

Three-toed Woodpecker
(Picoides tridactylus)



STATUS: Protected nongame species
GLOBAL RANK: G5 STATE RANK: S3

RANGE: Breeds, often locally, from northwestern and central Alaska to northern Saskatchewan and northern Labrador, and south to central Washington, central Arizona, south-central New Mexico, central Saskatchewan, northeastern Minnesota, northern New England, and southern Quebec. Wanders irregularly or casually north and south.

HABITAT: Found in coniferous forests (primarily spruce/fir and lodgepole, less frequently in mixed forests). Found also in willow thickets along streams, in high-elevation aspen groves, in swamps, and in burned-over coniferous forests.

DIET: Eats mainly wood-boring insects, but will also eat spiders, berries, and cambium.

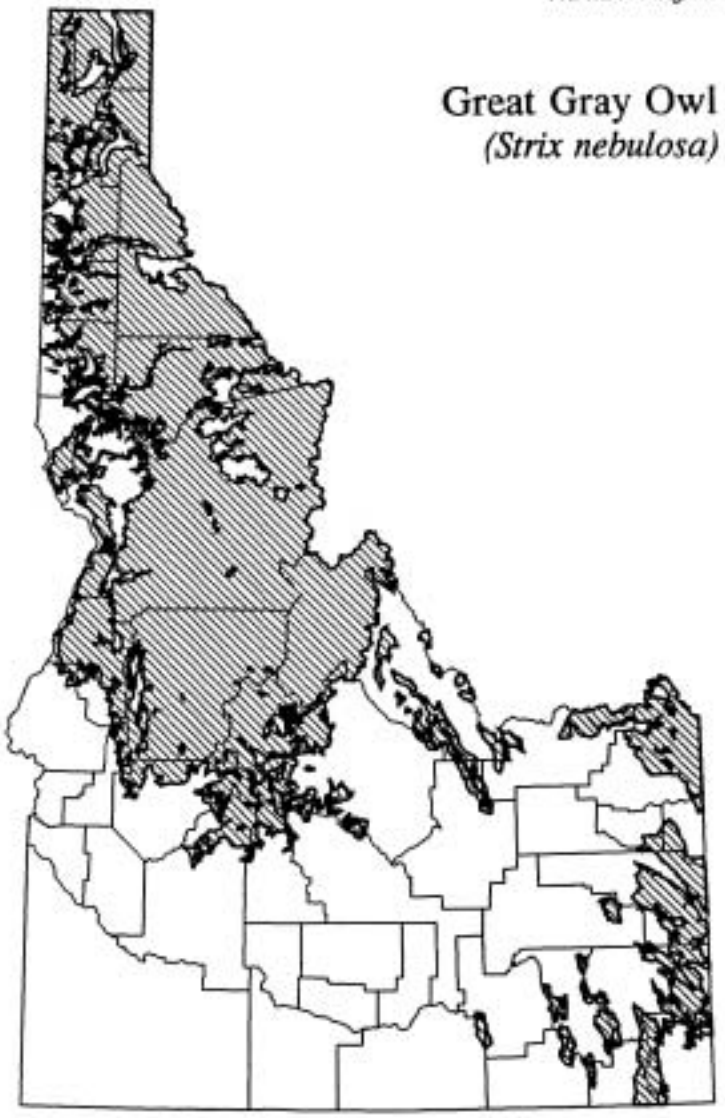
ECOLOGY: Excavates cavities in tree or standing snag. Forages on tree bark. Few nests have been found in Idaho. In Oregon, home range size varied from 52-300 ha, depending on habitat quality.

REPRODUCTION: Both sexes incubate 4 eggs (usually), for 14 days. Young are tended by both parents until fledging at 22-26 days.

GIS MODEL NUMBER: 1

ORDER: Strigiformes
FAMILY: Strigidae

Great Gray Owl
(Strix nebulosa)



STATUS: Protected nongame species
GLOBAL RANK: G5 STATE RANK: S2

RANGE: Breeds from central Alaska to northern Ontario, and locally south in mountains to California (vicinity of Yosemite), Idaho, Montana, Wyoming, northern Minnesota, and portions of south-central Canada. Winters generally throughout breeding range.

HABITAT: Found in coniferous and hardwood forests, especially pine, spruce, paper birch, and poplar; also found in second growth, especially near water. In Idaho, found at lower elevations and in agricultural areas during winter, and in conifer forests in spring and summer, most commonly near extensive meadows.

DIET: Commonly eats pocket gophers and voles; may also eat other small mammals. In Idaho, owls nesting near clearcuts were found to have greater proportions of pocket gophers in diet.

ECOLOGY: Nests in broken-top snags or uses abandoned stick nest of other species, especially Goshawks. Hunts from perch; captures food on ground. Forages usually in open area where scattered trees or forest margin provides suitable sites for visual searching; also uses sound to locate prey under snow cover. When nesting, may hunt day or night. In Oregon study, radio-tagged juveniles moved 9-31 km from nest over period of 1 yr; adults moved 3-43 km during same period. In Idaho study, home range per pair was found to be 2.6 km^2. Predation by Great Horned Owl was greatest known mortality factor in northern Minnesota and southeastern Manitoba study.

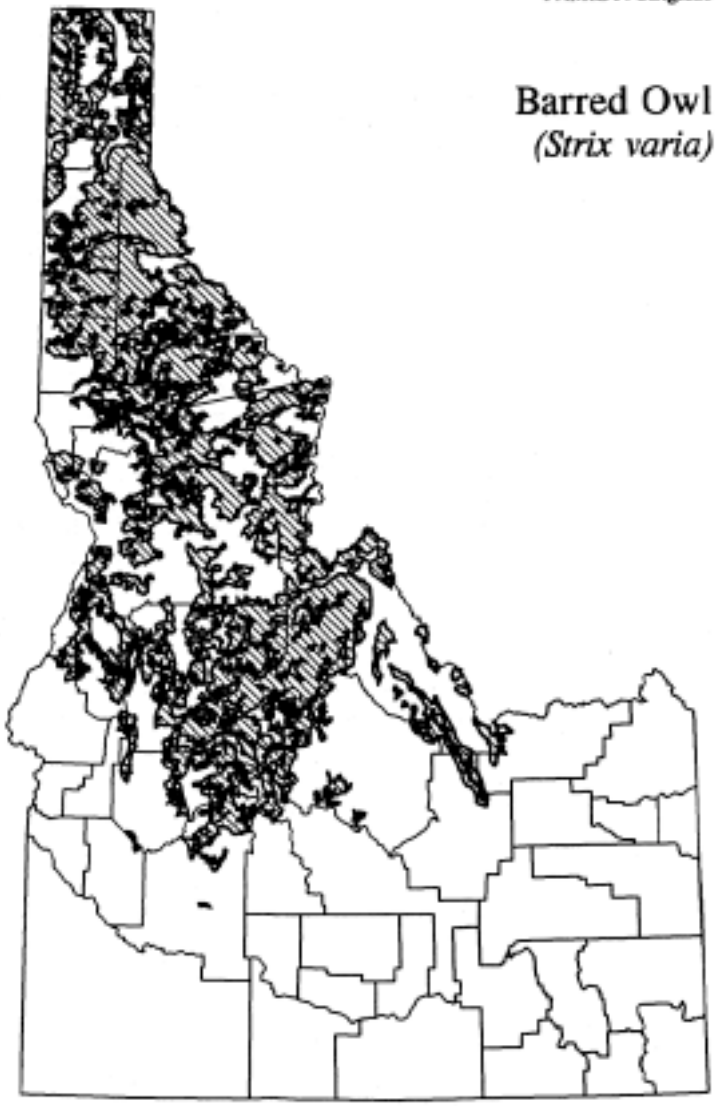
REPRODUCTION: Lays eggs in March-June, depending on range. Mean date of first egg was 5 May in southern Idaho and northwestern Wyoming; egg-laying may be delayed in deep snow years. Female incubates 2-5 eggs (3.3 in Idaho), for 28-29 days. Young leave nest at 3-4 wk (4 wk in Idaho and Wyoming), fly well at 5-6 wk (6 wk in Idaho and Wyoming), and become independent at about 4-5 mo. In Idaho study, mean brood size was 3.0 young/pair.

GIS MODEL NUMBER: 1

IMPORTANT STATE REFERENCE: Franklin, A.B. 1988. Breeding biology of the Great Gray Owl in southeastern Idaho and northwestern Wyoming. Condor 90:689-696.

ORDER: Strigiformes
FAMILY: Strigidae

Barred Owl
(Strix varia)



STATUS: Protected nongame species
GLOBAL RANK: G5 STATE RANK: S4

RANGE: Resident from portions of Alaska, southern British Columbia, western Washington, eastern Oregon, and northeastern California, east through northern Idaho and northwestern Montana to portions of south-central Canada. Also resident in portions of eastern Canada and eastern, midwestern, and southern United States. Appears to be expanding range southward in Idaho.

HABITAT: Found in dense woodlands and forests with large, mature, decadent coniferous or hardwood trees providing secure nesting cavities. May prefer older stands, but uses earlier stages of forest succession if enough large trees, snags, or nest boxes are present. Also found in swamps and wooded river valleys, often in areas bordering streams, marshes, and meadows, but also in upland areas (use reflects vegetation types rather than water proximity).

DIET: Eats mice, birds, reptiles, amphibians, invertebrates, and other mammals. Small mammals such as voles, deer mice, and shrews often comprise bulk of diet.

ECOLOGY: Nests in abandoned or natural cavity in standing snag. Nocturnal. Flies at low altitude to locate prey. Birds feeding young may also forage diurnally. Opportunistic foraging may occur at any time. Minnesota study found home range was usually less than 400 ha (but up to 760) over 2-7 mo; boundaries generally remained constant from year to year, with no overlap (usually), except for mated pair. Annual home range averaged 282 ha in Michigan. Reported density was 0.03-1.0 pairs/km^2. Species has become established in northern and central Idaho since at least 1968.

REPRODUCTION: Egg-laying occurs January-May, depending on range. Clutch size varies from 2-3 eggs; incubation lasts 28-33 days. Young may leave nest at 4-5 wk, fly at 6 wk, but receive some food from parents until 4 mo.

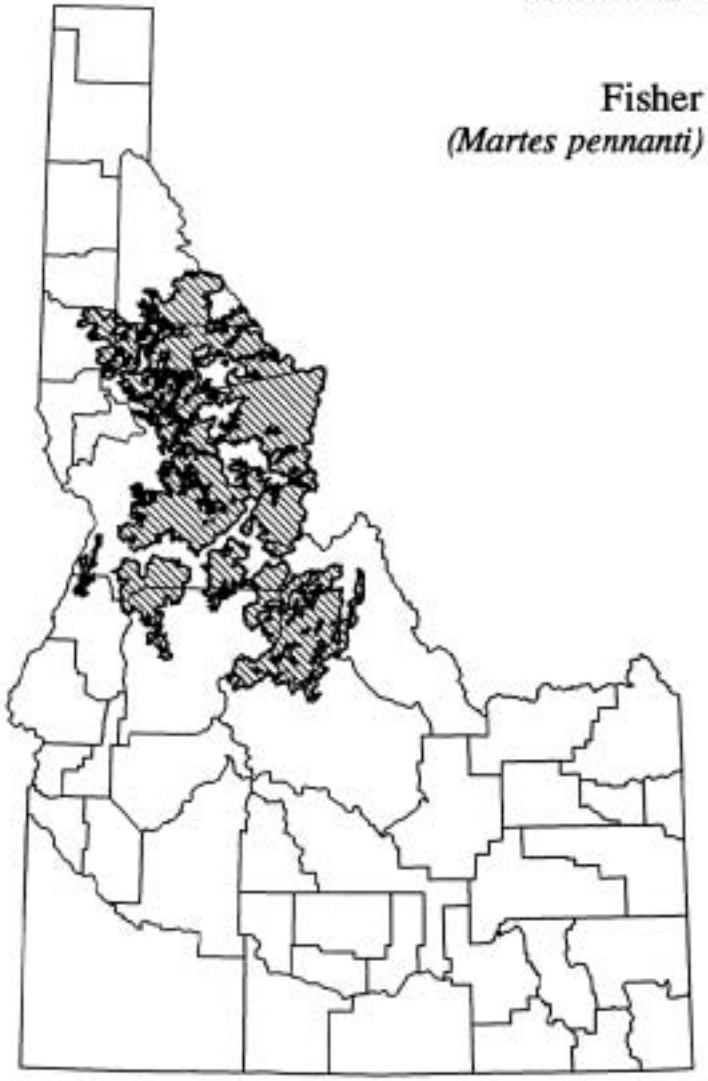
GIS MODEL NUMBER: 1

IMPORTANT STATE REFERENCE: Olson, R.A., T. Craig, and E. Craig. 1978. Recent records of the barred owl, *Strix varia*, in Northern Idaho. J. Id. Acad. Sci. 14:24-25.

STATUS: Protected nongame species
GLOBAL RANK: G5 STATE RANK: S1

ORDER: Carnivora
FAMILY: Mustelidae

Fisher
(Martes pennanti)



RANGE: Throughout much of Canada, and south through Rockies, northern Great Lakes Region, and New England. Species was extirpated from Idaho, and re-introduced to 3 north-central Idaho sites in early 1960's.

HABITAT: Found in upland and lowland mixed, deciduous, or coniferous forests, but prefers mixed or coniferous forests. In Idaho, prefers mature or old-growth coniferous forests (forested riparian habitats in spring, summer, and fall, and younger-aged forests in winter).

DIET: Primarily consumes mammals (small rodents, shrews, squirrels, hares, muskrat, beaver, porcupine, raccoon, and deer carrion), but will also eat birds and fruits.

ECOLOGY: Active both day and night. Mainly nocturnal in summer and diurnal in winter. In south-central Maine, most activity occurred shortly before sunrise and after sunset; activity was reduced in winter. When inactive, occupies den in tree hollow, under log, in ground or rocky crevice, or (in warmer months) rests in branches of conifer. Home range has been estimated at 10-800 km^2 by snow tracking, and 2-75 km^2 by telemetry (Idaho study found 6-120 km^2). Generally, ranges of adults of same sex do not overlap; in Maine, home ranges of females were stable between seasons and years, but males moved extensively in late winter and early spring and their ranges shifted between years. Population density (New England and Great Lakes area) has been estimated at up to about 1/3-11 km^2 in summer, and 1/8-20 km^2 in winter. Densities are lower in western U.S. due to lower habitat quality.

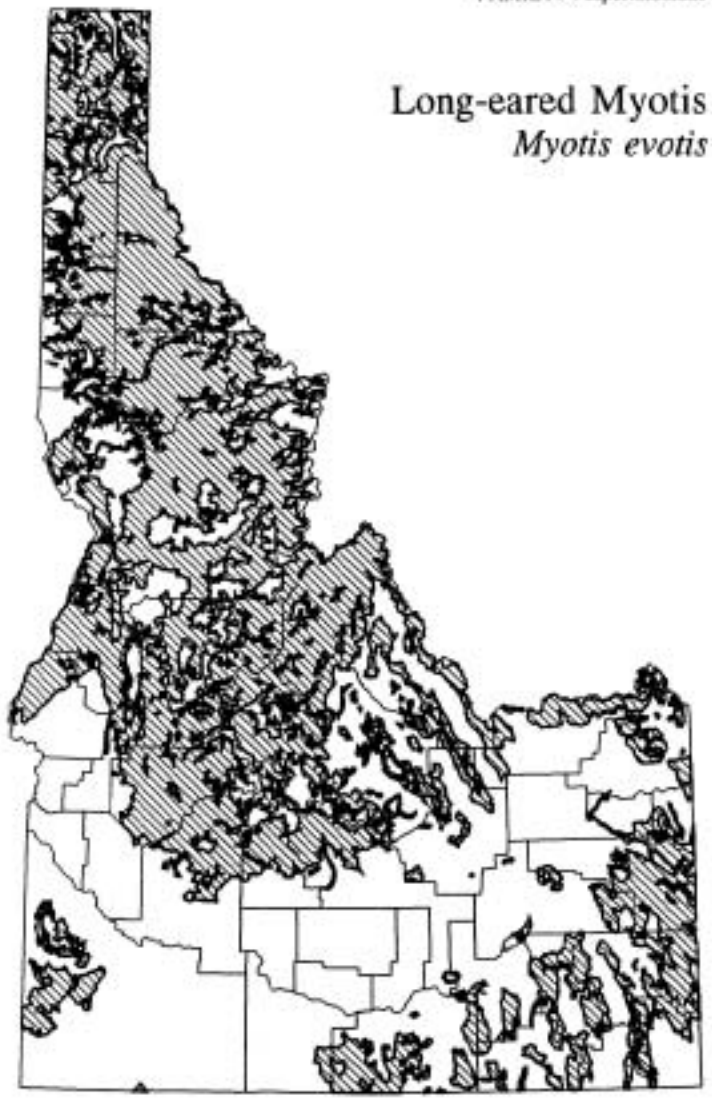
REPRODUCTION: Breeds late February-April; peak occurs in March. Gestation lasts 1 yr, including period before implantation. Litter size averages about 3 young. Births occur March-early April. In Maine, young are weaned mid-May to early June, become independent probably late August-early September, and are sexually mature in 1-2 yr; not all adult females breed in a given year. Apparently, breeding is promiscuous.

GIS MODEL NUMBER: 1

IMPORTANT STATE REFERENCE: Jones, J.L. 1991. Habitat use of fisher in north-central Idaho. M.S. Thesis, Univ. Idaho, Moscow. 147pp.

ORDER: Chiroptera
FAMILY: Vespertilionidae

Long-eared Myotis
Myotis evotis



STATUS: Unprotected nongame species
GLOBAL RANK: G5 STATE RANK: S3

RANGE: From central British Columbia, southern Alberta, and southern Saskatchewan, south along Pacific Coast to Baja California, east through Montana and Idaho to western Dakotas, and from Nevada, Utah, Wyoming, and Colorado south to New Mexico and Arizona. Distribution in Idaho is poorly known.

HABITAT: Found (from near sea level along Pacific Coast, to about 2830 m in Wyoming), mostly in forested areas, especially those with broken rock outcrops; also found in shrublands, over meadows near tall timber, along wooded streams, and over reservoirs. Idaho study found roosts were always located near water. Species is common in lodgepole pine forests.

DIET: Preys primarily on small moths and medium-sized beetles.

ECOLOGY: Widespread and not uncommon species, but little is known about its habits. Reportedly emerges late in evening to feed, though some studies report earlier emergence. Forages over water or among trees. Usually feeds by picking prey from surface of foliage, tree trunks, rocks, or ground; may fly slowly around shrub searching for emerging moths, or perhaps nonflying prey. Known to forage with long-legged myotis, big brown bat, silver-haired bat, and hoary bat, but Idaho study found species foraged earlier in evening than several other bat species. Often roosts in buildings; may also roost in hollow trees, mines, caves, and fissures.

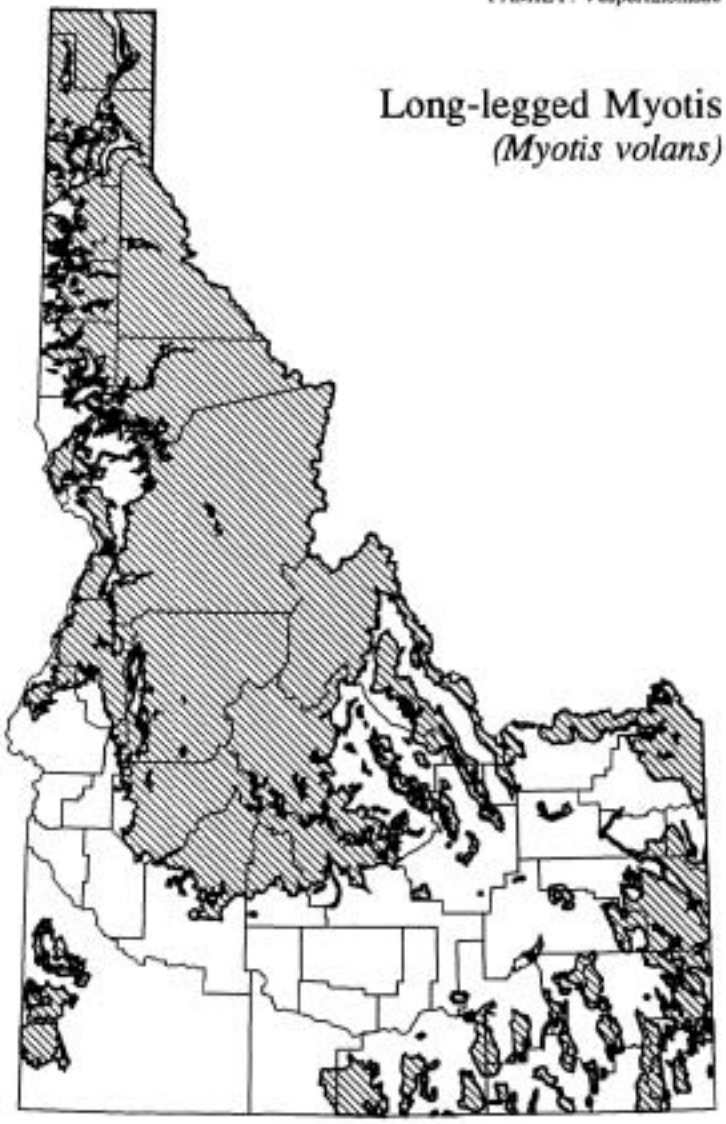
REPRODUCTION: Mating occurs in fall; ovulation and fertilization are delayed until spring. Births have been recorded in mid-July in western Washington. Young and lactating females have been recorded in late July in New Mexico. Female and newborn young have been recorded in late June in California. Female produces 1 young. South Dakota study found that male young-of-year reached approximate adult size in early August.

GIS MODEL NUMBER: 1

IMPORTANT STATE REFERENCE: Bonnell, M.L. 1967. Emergence and foraging behavior in small populations of Idaho bats. M.S. Thesis, Univ. Idaho, Moscow. 63pp.

ORDER: Chiroptera
FAMILY: Vespertilionidae

Long-legged Myotis
(Myotis volans)



STATUS: Unprotected nongame species
GLOBAL RANK: G5 STATE RANK: S3

RANGE: From extreme southeastern Alaska, south through western Canada and U.S. to central Mexico. Winter range is poorly known, although a few records exist from South Dakota. Distribution in Idaho is poorly known.

HABITAT: Found in montane coniferous forests at 2000-3000 m. Also found in riparian and desert (Baja California) habitats. May change habitats seasonally.

DIET: Feeds primarily on moths. Also eats variety of invertebrates (e.g., fleas, termites, lacewings, wasps, small beetles, etc.)

ECOLOGY: Hibernates/aestivates. Active throughout most of night. Peak activity occurs during first 3-4 hr after sunset. Forages for relatively long distances over, through, and around forest canopies and forest clearings, and also over water. In New Mexico, forages primarily in open areas. Uses caves and mines as hibernacula, but winter habits are poorly known. Roosts in abandoned buildings, rock crevices, and under bark. In summer, apparently does not use caves as daytime roost sites. Sometimes attains life span of 21 yr.

REPRODUCTION: In New Mexico study, mating began in late August, sperm was stored over winter in female reproductive tract, ovulation occurred March-May, and parturition took place May-August. In Texas, births probably occur in June or early July. Female produces 1 young. Nursery colonies may include up to several hundred individuals.

GIS MODEL NUMBER: 1

IMPORTANT STATE REFERENCE: Keller, B.L. 1987. Analysis of the bat species present in Idaho, with special attention to the spotted bat, *Euderma maculatum*. Dept. Biol. Sciences, Idaho St. Univ., Pocatello. 25pp.