CONSERVATION STRATEGY
FOR SPOKANE RIVER BASIN WETLANDS

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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 information summarized here can be applied to state biodiversity, conservation, and water quality enhancement projects on a watershed basis. Previous project areas included the Henrys Fork Basin, Big Wood River Basin, southeastern Idaho watersheds, the Idaho Panhandle, and east-central basins. This document is a summary of information compiled for the Spokane River Basin.

We used the United States Fish and Wildlife Service National Wetlands Inventory (NWI) to gain a broad perspective on the areal extant and types of wetlands in the survey area. Land ownership and management layers were overlaid on the NWI to determine ownership and the protected status of wetlands. Plant communities 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 communities and the occurrence of rare plant and animal species allowed us to categorize twenty-four 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. Less than 5 percent of the wetlands in the survey area have protection beyond regulatory provisions of the Clean Water Act. Most of the protected wetlands are in the emergent vegetation category. Deciduous forested wetlands and scrub-shrub weltands are currently under-protected and should be of high priority for conservation activities. Additonally, peatlands should be of high priority for protections due to rarity.

Only portions of the information from the NWI maps and database 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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The preparation of the manuscript and appendices would not have been possible without the assistance of headquarters staff at IDFG. Linda Williams of the Conservation Data Center (CDC) is responsible for most of the data entry from which the appendices were generated. Chris Murphy of the CDC wrote several of the abstracts used in Appendix B. Terry Vernholm provided a careful editorial review of the main text and appendices. Rob Bursik's and Bob Moseley's previous work in wetlands in the Spokane River Basin contributed to information included in this report and was a foundation upon which to add. Bob also provided technical assistance in the field and with administrative aspects of the project. Robin Jones provided assistance with field inventories and moss and lichen identification. Bart Butterfield and Lawrence Hartpence are responsible for the digital map products and spatial data associated with this project.

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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. However, in the past two decades it has become widely recognized that wetland functions, including water quality protection, storm water control, ground water protection, and fish and wildlife habitat, are disproportionate to their small areal extant.

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.

The recognition of the value of wetlands in the landscape has resulted in regulations, incentive programs, research, and protection of wetland habitat. Controversy over wetland definitions, the governments' authority, and the appropriateness of restrictions are ongoing. Wetland legislation during the Bush administration built on previous policy, such as the 1985 Food Security Act and Emergency Wetlands Resources Act of 1985, to achieve "no overall net loss of wetlands". Currently, the Clinton administration's review of the reauthorization of the Clean Water Act places an emphasis on the categorization of wetlands. This would serve to protect functionally and biologically significant wetlands and relax regulations for wetlands that are less significant.

The purpose of this plan is to enhance our ability to identify and classify wetlands to set priorities for wetland conservation. Wetlands related data are frequently retained by agencies in an analog format. Retrieval and application are cumbersome and wetland conservation opportunities have been lost due to the fragmented nature of specific protection, management, and restoration information. The United States Fish and Wildlife Service NWI provides a broad- scale view of the types and areal extent of wetlands. Plant communities 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 may be assessed using plant community information and rare plant and animal occurrence data.

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 within sites. The framework presented here, describing wetlands based on the plant community, can be applied by land managers to sites that were not surveyed as part of this project. Rare plant and animal data can be requested from the CDC and the site significance may be assessed. Description, management, and status of rare plant communities 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 CDC. The methods for accessing this information are included at the end of this document (Table 8).

SURVEY AREA

The survey area is located in the Spokane River Basin and contains most of Kootenai, Shoshone, and Benewah counties. It is bounded on the east and west by the Idaho state line, to the north by the divide separating the Spokane River and Coeur d'Alene drainages from the Pend Oreille drainage and to the south by the divide separating the St. Joe drainage from the Clearwater drainage.

The survey area is mostly within the Bitterroot Mountains (M333D) ecoregional section and includes a small portion of the Palouse Prairie Section (331A). Upland vegetation of the Bitterroot Mountains is dominated by western redcedar-hemlock-pine forest, Douglas-fir forest and western ponderosa pine forest. Woodlands and forests dominated by ponderosa pine and grasslands dominated by bluebunch wheatgrass and Idaho fescue are present at lower elevations of the Palouse Prairie. Douglas-fir dominated forests are dominant at higher elevations with small patches of western redcedar and grand fir (McNab and Avers 1994).

Precambrian metasedimentary formations of the Belt supergroup are the major rock type in mountainous areas of the Spokane River Basin. The Palouse in the western portion of the survey area is composed of dissected loess covered Tertiary basalt plains, hills, and plateaus (McNab and Avers 1994). The Spokane, Coeur d' Alene, St. Maries, and St. Joe drainages are included in the survey area. Many perennial streams are entrenched in narrow valleys and flow through glacial outwash and debris material.

Climate is cool temperate with a maritime influence. Air masses from the Pacific Ocean bring prolonged gentle rains, deep snow accumulations at upper elevations, cloudiness, and frequent fog. Outbreaks of arctic air occur frequently in the winter. St. Maries on the southern end of Lake Coeur d'Alene (2,220 feet in elevation) averages 29" of precipitation annually with 17" of precipitation occurring from November to March as snow, with rain on snow events common. Average annual snowfall is 50 inches. Mean temperatures range from 28° F in January to 67° F in July and August. Mullan (3,320 feet in elevation) averages 38" of precipitation annually with 22" occurring during winter months. Average annual snowfall is 125". Mean temperatures at Mullan range from 26° F in December to 63° F in July. Average temperatures and precipitation are

comparable in Plummer (2,960 feet in elevation) at the northeastern edge of the Palouse Prairie. However, at Plummer most precipitation occurs in the spring and summer months from April to August (Abramovich et al. 1998).

STATUS OF WETLANDS

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. Wetland maps are being developed by the National Wetlands Inventory (NWI) which 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 extends from the shore to a depth of 2 meters below low water. The distribution of systems in the survey area for digitized NWI maps is illustrated in Figure 1.

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.
Riverine	Wetland and deepwater habitats contained within a channel.
Lacustrine	Lakes and ponds which exceed 2 meters in depth.
Palustrine	All nontidal wetlands dominated by trees, shrubs, persistent emergents, and emergent mosses and lichens.

NOTE: Figure 1 not available in CDC homepage version.

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

WETLAND ACREAGE AND TYPES

The NWI maps wetlands at a scale of 1:24,000 as lines, points, and polygons. Available NWI data was digitized and entered into a Geographic Information System for maps in the Spokane River Basin. Total wetland acres were summarized for NWI wetland polygons within the survey area and for counties. Wetlands, including deepwater habitat, represent approximately 4 percent of the 1.9 million acres of land area in the Spokane River Basin (Figure 2(A)). Lacustrine systems, which include mostly deepwater habitat, make up over ½ of this percentage (Figure 2(B)).

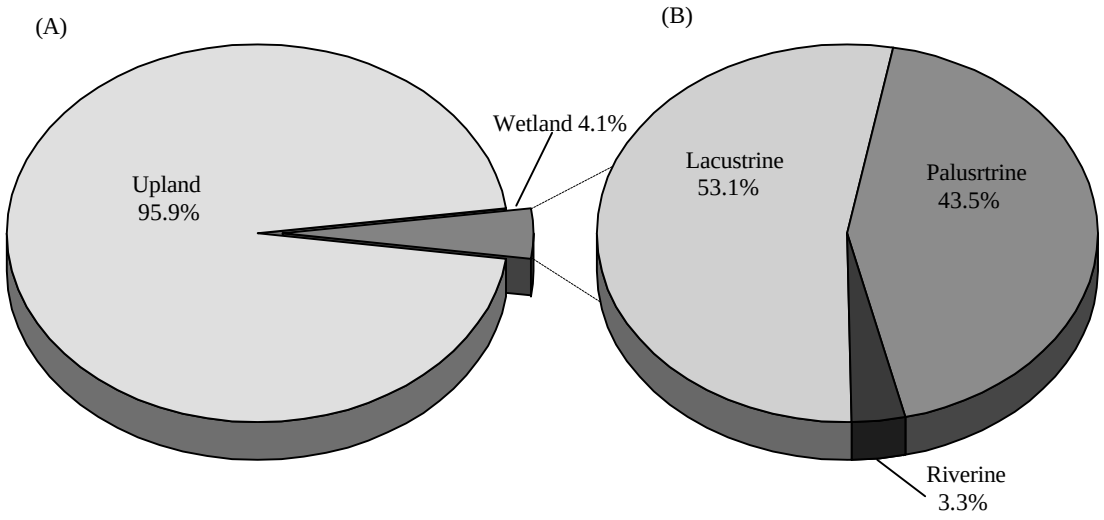

Figure 2. (A) Comparison of upland and wetland (including deepwater) habitat in the Spokane River Basin. (B) Dominant wetland (including deepwater) systems in the Spokane River Basin.

T

he percentage of upland versus wetland habitat was also compared excluding deepwater habitat. Wetlands (excluding deepwater habitat) represent approximately 2 percent of the total land area in the Spokane River Basin (Figure 3(A)). The dominant wetland types in the survey area include Palustrine emergent, Palustrine scrub-shrub, and Palustrine forested (Figure 3(B)). Wetland (including deepwater) habitat acreage is summarized for most of Benewah and Kootenai counties and portions of Shoshone County in Figures 4, 5, and 6. Appendix E summarizes the acres and frequency of occurrence of wetland and deepwater habitat by subclass for the survey area and counties.

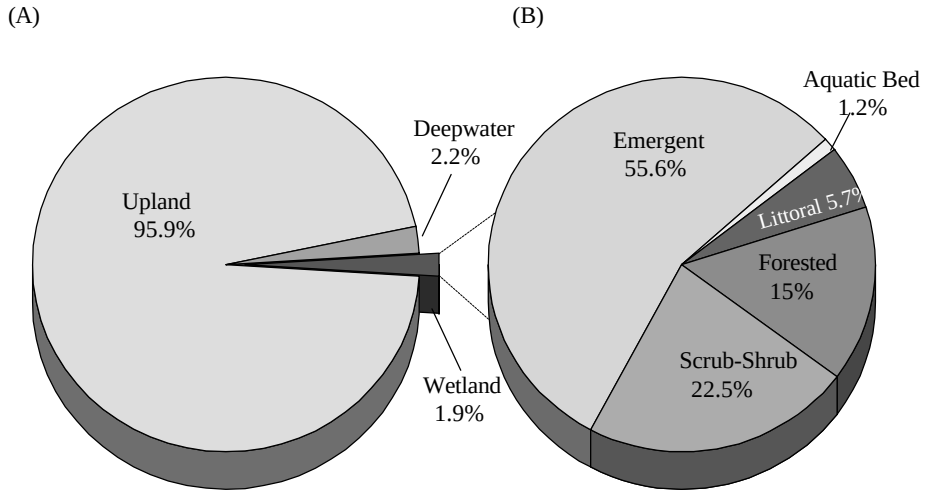

Figure 3. (A) Comparison of upland and wetland habitat in the Spokane River Basin. (B) Dominant wetland (excluding deepwater) systems, subsystems, and classes in the Spokane River Basin.

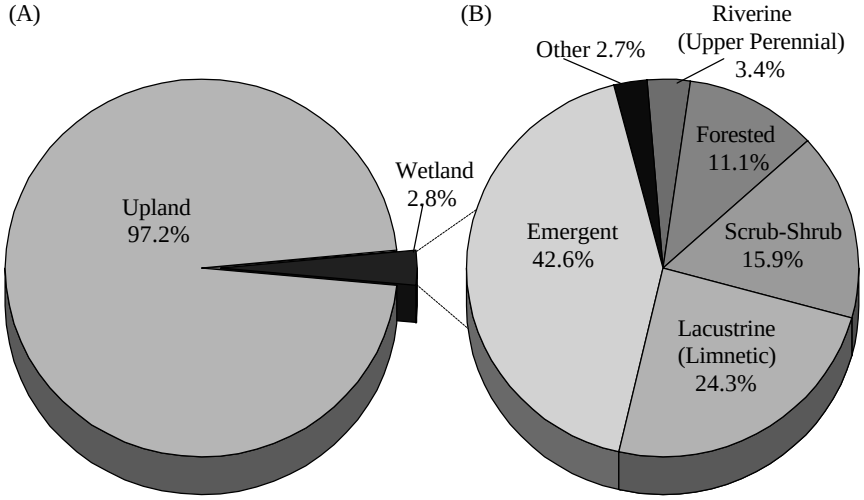

Figure 4. (A) Comparison of upland and wetland (including deepwater) habitat in Benewah County, Idaho. (B) Dominant wetland (including deepwater systems) in Benewah County, Idaho.

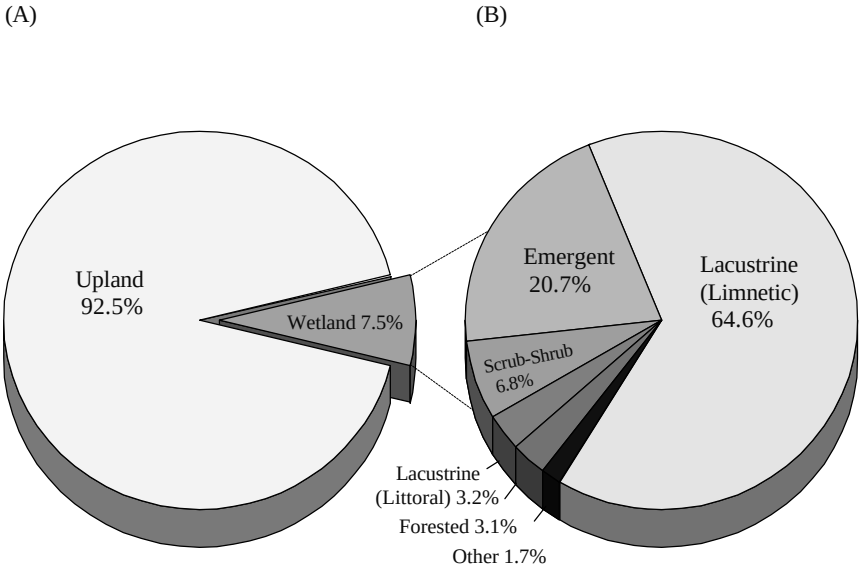

Figure 5. (A) Comparison of upland and wetland (including deepwater) habitat in Kootenai County, Idaho. (B) Dominant wetland (including deepwater) systems in Kootenai County, Idaho.

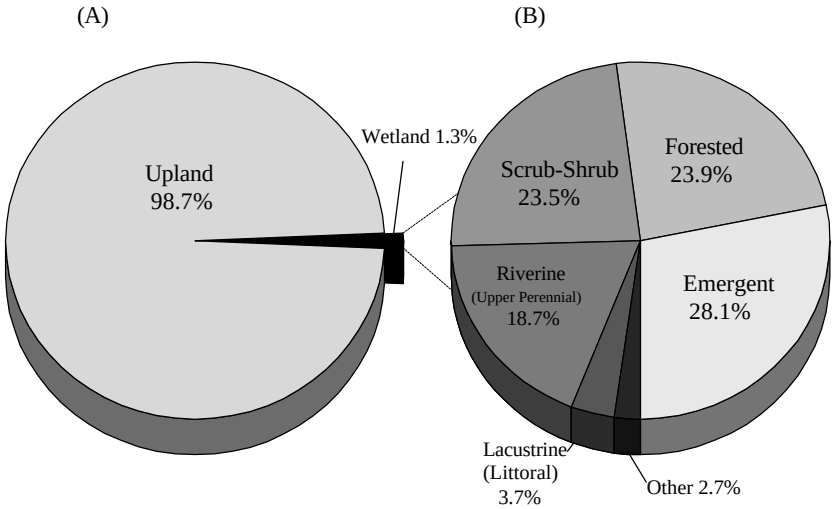

Figure 6. (A) Comparison of upland and wetland (including deepwater) habitat in Shoshone County, Idaho. (B) Dominant wetland (including deepwater) systems in Shoshone County, Idaho.

WETLAND OWNERSHIP

Land ownership was overlaid on the NWI to summarize the ownership of wetland (including deepwater habitat) acres in the survey area (Figure 6). Slightly over ⅓ of the wetlands in the survey area are in private ownership. Open water makes up 45,270 acres or 55.8 percent of the land area. The United States Forest Service is the largest public land manager of wetland habitats with lesser amounts being managed by the State of Idaho. The Bureau of Land Management administrates less than 1 percent or 306 acres of wetlands in the Spokane River Basin.

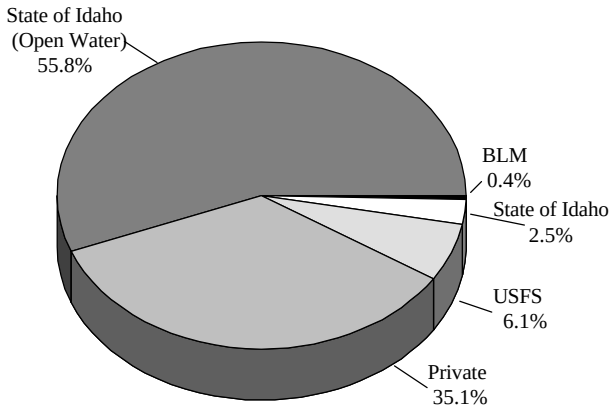

Figure 7. Land ownership of wetlands (including deepwater habitat) in the Spokane River Basin.

WETLAND PROTECTION STATUS

The 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, and Preserves. Approximately 3,999 acres of wetland and deepwater habitat are currently protected, representing less than 5 percent of the wetland and deepwater habitat in the survey area. This equates to approximately 0.2 percent of the total land base in the survey area. Almost ⅔ of the wetlands which are protected are in the Palustrine emergent system. The acres of wetland and deepwater habitats protected are summarized in Table 2.

Table 2. Acres of wetland and deepwater habitat and protected status.

SYSTEM Subsystem	Acres protected	Total acres	% of type protected
PALUSTRINE			
Emergent	2,496	20,658	12.1%
Scrub-shrub	281	8,373	3.4%
Forested	181	5,577	3.2%
Aquatic bed	85	436	19.4%
Open water	5	370	1.4%
Uncosolidated bottom	3	166	1.8%
Uncosolidated shore	0	5	0.0%
TOTAL PALUSTRINE	3,051	35,585	8.6%
LACUSTRINE			
Limnetic	246	41,302	0.6%
Littoral	599	2,099	28.5%
TOTAL LACUSTRINE	845	43,401	1.9%
RIVERINE			
Lower perennial	68	226	30.1%
Upper perennial	35	2,501	1.4%
TOTAL RIVERINE	103	2,727	3.8%
TOTAL ALL TYPES	3,999	81,713	4.9%

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.

WETLAND LOSSES

Wetland losses may be permanent or reversible. The distinction is made to identify those areas where restoration may be possible albeit costly. In the Spokane River Basin agriculture and urbanization account for wetland losses. Historically drainage, land clearing, and conversion to cropland accounted for most wetland loss. Loss to road construction and home building has surpassed agricultural loss in recent years. Lake front property continues to be sought for development and many lakes are circled by homes. As population increases and economies switch

from agricultural based to service based losses due to development are likely to exceed losses to agriculture (Brown 1995) .

The National Resource Inventory estimates that Kootenai-Pend Oreille-Spokane sub-basin was stable in terms of wetland losses and gains on private land from 1982 to 1992 (Soil Conservation Service 1992). The estimates represent net gain versus net loss and do not evaluate the quality of the wetland habitat. Nationally, losses of forested and scrub-shrub habitats have been offset by gains in open water and emergent habitat (Dahl 1990).

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 input or increased water temperatures. 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., scrub-shrub to emergent). Functional shifts improving wetland functions are considered **enhancements**.

Impairments

Impairments to wetland functions may result from agricultural activities, mining, 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 hydrology is altered. Lowered water quality often results due to loss of thermal cover along streams, loss of filtering functions, and decreased bank stability.

The 1992 National Resource Inventory indicates that 30 percent and 29 percent of nonfederal wetlands in the Kootenai-Pend Oreille-Spokane sub-basin are used for cropland and pastureland, respectively (Soil Conservation Service 1992). Pasture development has included placement of tile drains, ditching, reseeding or interseeding with pasture grasses, and removal of native tree and shrub species. The Soil Conservation Service estimated that less than a thousand acres of wetlands are used exclusively as rangelands. Grazing in the Spokane River Basin typically occurs in emergent meadows or along riparian bottomlands. 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.

Human activities, including livestock grazing, ground disturbance, and recreational activities, may introduce exotic plant species, create suitable conditions for the increase of less desirable native species, eliminate woody tree and shrub cover, and compact wetland soils. The noxious weeds *Centaurea* spp. (knapweeds), *Tanecetum vulgare* (common tansy), *Hieracium pratense* (meadow hawkweed), *H. aurantiacum* (orange hawkweed), *Chrysanthemum leucanthemum* (oxeye daisy),

Cirsium arvense (Canada thistle), *Carduus nutans* (musk thistle), and *Linaria dalmatica* (dalmation toad-flax) may become established in drier wetlands and on the margins of mesic wetland sites. *Tanecetum vulgare, Centaurea maculosa,* and *Phalaris arundinacea* (red canary grass) often colonize recent alluvial deposits along major rivers and may displace native riparian pioneer species such as *Populus trichocarpa* (black cottonwood), *Salix* spp. (willow species), or *Agropyron smithii* (bluebunch wheatgrass).

Lythrum salicaria (purple loosestrife) and *Myriophyllum spicatum* (Eurasian water milfoil) are two noxious wetland plant species that may be spread by recreational activity. Both are difficult to control once they become established. Purple loosestrife spreads by both rhizomes and seeds. The seeds may be transported by humans or animals. Eurasian water milfoil was found in one location in the survey area and is reported from Hayden Lake and Spirit Lake. This aquatic species has the potential to choke out native vegetation and hinder navigation and recreational actives. Milfoil is known to spread from water body to water body via boats. Identification of milfoil species is difficult and several native species of water milfoil are known to occur in the Spokane Basin. Plants that are identified to genus should be confirmed by an expert. Information on where to send plants and resources for control can be obtained from the Kootenai County Waterways and Noxious Weeds (Freeland pers. comm. 1999). Due to the difficulty in controlling populations of Eurasian water milfoil once it becomes established, prevention of distribution is desirable through education and surveys documenting presence to locate populations while they are small and manageable.

Phalaris arundinacea (reed canary grass) is a grass species that has been planted for forage that invades wetlands. This species is well established in the survey area and creates dense monocultures in areas subject to sedimentation and water level manipulation. Attempts to control the distribution and spread of this species have been largely ineffective (Apfelbaum and Sams 1987). Additional exotic graminoid species, including *Agrostis stolonifera* (redtop), and *Poa pratensis* (Kentucky bluegrass), are the dominant understory species in many riparian wetlands and lack the soil stabilizing characteristics of native species. These species have been planted as pasture grasses and are readily spread by livestock and water. Wetland vegetation along with soils on banks and islands of regulated rivers and lakes may be lost due to wind and wave action and daily and seasonal water fluctuations. Erosion is accelerated when banks are compacted or vegetation consists of shallow rooted graminoids such as Kentucky bluegrass.

Intentional introduction of exotic species may reduce or shift wetland functions. *Vaccinium macrocarpon* (cultivated cranberry) has been introduced at two peatlands in the basin. At Hidden Lake informal observations indicate that this species has replaced native fen species such as *Carex lasiocarpa* (slender sedge) and *Drosera* spp. (sundews). *Zizinia aquatica* (wild rice) has been planted in wetlands in the lower Coeur d'Alene and lower St. Joe River drainages to enhance wildlife habitat and to harvest for human consumption. The stands of wild rice have likely replaced stands of more diverse native aquatic plant communities. *Rana catesbeiana* (bullfrogs) are abundant at Hauser Lake. Frequently no other amphibiums are found in lakes with bullfrog populations. Transporting bulfrogs to other lakes and wetlands in the basin is a potential threat to

native amphibium populations. Known populations of bullfrogs should be removed if possible and educational signs placed to discourage transport of the species to other lakes (Beck et al. 1998).

Mining in the Coeur d'Alene drainage has resulted in wetland losses and wetland impairments. Extensive mining began after silver was discovered in the South Fork of the Coeur d'Alene River Valley in the 1800s. Tailings from early milling processes were large rock size particles that were discharged directly into the river or deposited in dumps that leached and eroded into the river. In the early 1900s mining processes were refined and tailings were finer grained. These were also disposed of in the river and then washed down and deposited throughout the lower Coeur d'Alene River Valley. The tailings contained toxic levels of heavy metals and other pollutants and complaints allegating that mine wastes were polluting livestock and crops were voiced as early as 1911. In 1932 dredging of tailings in the river began and they were deposited in wetlands at Mission Flats. In the 1960s tailing ponds were built and mines discontinued discharging wastes directly into water bodies. Tailings deposited in streams and wetlands were strongly saline or in some cases extremely acidic and native vegetation was suppressed or destroyed. Upper reaches of the South Fork Coeur d'Alene River, Canyon Creek, along with other tributaries to the South Fork are nearly void of vegetation, though costly efforts are underway to develop soils and reestablish woody vegetation. At Mission Flats *Phragmites australis* (common reed) has been planted and has become established, but few other species are able to survive. Little aquatic life is present in the upper reaches of the South Fork and waterfowl deaths in the lower watershed have been linked to lethal levels of lead (Ridolfi Engineers and Associates 1993, Rabe and Flaherty 1974).

Logging has led to both direct and indirect impacts to riparian and wetland habitat. Stream channels and riparian vegetation have been impacted by splash dams and log chutes used for transporting logs in the 1800s. Splash dams were used to move logs through portions of the river that did not have enough current to carry them. Water was held behind the dams and then let go to carry logs downstream to the next dam. The action of water and logs on channels and banks removed vegetation and altered channel morphology (Rabe and Flaherty 1974). Logging activities continue to contribute sediments to streams via deposition from clearcuts and road developments. The sediments may be carried throughout the river system during high flows.

Construction of roads and railroads may fragment water and gene flow in wetlands. Railroads servicing mining communities were constructed through wetlands associated with the chain lakes in the lower Coeur d'Alene River system. The dikes along railroad beds alter water levels and hydrologic flows.

Offsite activities which introduce nutrients or alter hydrology can also impair wetlands. Sediment inputs from mining, road building, logging, poor upstream channel conditions, and agriculture can change species composition. Changes can be rapid in peatlands resulting in the loss of numerous species over a short period of time. Research at Hager Lake Fen and Huff Lake Fen on the Priest River Ranger District north of the Spokane River Basin documented that regulation of water levels, upland logging, and forest fires can result in water chemistry changes and extirpation of

plant species (Bursik and Moseley 1992a and 1992b). Maintenance of roads adjacent to water courses can introduce sediments to streamside wetlands.

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 water level fluctuations are maintained for hydroelectricity and recreation. Raised water levels replace wetlands with open water habitat. Post Falls Dam was constructed on the outlet of Lake Coeur d'Alene in the 1940s. The dam raised water levels approximately 12 feet and inundated wetlands and agricultural ground. Water is stored in Lake Coeur d'Alene during the summer months when power demands are low and released throughout the winter when demands are high. With stable high water, plant community diversity may be reduced with emergent communities being replaced by submerged aquatic species. During the winter months mudflats may be exposed. On the south end of Lake Coeur d'Alene four small lakes are present: Benewah Lake, Chatcolet Lake, Hidden Lake, and Round Lake. The lakes and associated wetlands were flooded with the construction of Post Falls Dam. A unique feature that remains is the channel of the St. Joe River which is still evident within Lake Coeur d'Alene. Natural levees, built up from years of sediment accummulations, are vegetated with strings of cottonwood gallery forests surrounded by open water.

Northern Idaho experienced several major forest fires in the early 1900s including one of the most extensive fires in history in 1910. In August of 1910, over 1,000,000 acres of forest were burned in the St. Maries, St. Joe, and Coeur d'Alene drainages. In some cases topography determined the effects of fires. In canyons, draws, and other drainages that favored *Pinus monticola* (white pine), *Pseudotsuga menziesii* (Douglas-fir), *Abies grandis (*grand fir), and *Thuja plicata* (western redcedar) the intensity of fires left few if any trees alive (Humphrey and Weaver 1915). Evidence of former forested wetlands dominated by *Thuja plicata* are present in the St. Joe drainage. Burned out stumps or "cedar skeletons" are all that remain of the former forests. The drainages currently support a complex mosaic of riparian shrubs and western redcedar regeneration was not observed.

Beaver are a keystone species in wetlands with their activity resulting in natural type changes. The fur trade in the late 1800s nearly drove the species to extinction. In more recent times beaver have been suppressed for development of agricultural land. Complexes which once extended across broad valley bottoms have been removed, channels straightened, and drainage ditches developed to create lands suitable for grazing and haying. Wetlands adjacent to a number of high quality peatlands identified in the study area could be enhanced by plugging periphery ditches and allowing beaver to return. Maintaining beaver populations is a critical element in sustaining natural wetland complexes.

Enhancements

Enhancements increase or improve wetland functions. In the survey area enhancement projects have focussed on wetland reclamation, fencing, pond development, and weed control. The IDFG, USFWS, and Natural Resources Conservation Service (NRCS) are currently active in wetland enhancement on private lands in the Spokane River Basin focussing on fencing, revegetation, and development of management plans. The Idaho Department of Fish and Game has an active control program for purple loosestrife on department managed lands. Kootenai County Waterways and Noxious Weeds is the primary contact for status of weed management plans in the basin.

WETLAND PLANT COMMUNITIES

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 community types with wide-ranging biological significance and unique management implications. The plant community is a vegetation unit that nests into the USFWS classification at the dominance level of the classification hierarchy. Plant communities are used to guide management, as a coarse filter for preservation of biodiversity, and to assess biological significance (Bougeron and Engelking 1994, Hansen et al. 1995, Kovalchik 1993, Padgett et al. 1989, and Youngblood et al. 1985).

The plant community represents repeating assemblages of plant species that occur in response to complex environmental factors. The plant community is 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 community descriptions, stand tables, and on-the-ground reference sites provide a baseline for replicating plant communities in restoration efforts. Plant community descriptions and management information are summarized in many classifications and have been compiled for high ranking plant communities occurring in the Spokane River Basin in Appendix B.

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 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 communities 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. Community 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 1 to 5 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 C.

Review of existing classifications, gray literature, and previous survey work by the CDC were used to develop a preliminary list of wetland plant communities in Idaho. Previous survey work (Bursik and Moseley 1995, Cooper et al. 1991) was summarized along with data collected from field surveys to generate a list of plant communities occurring specifically in the Spokane River Basin (Table 3). A key to the plant communities occurring in the survey area is included in Appendix A. The plant communities are within the Cowardin's Lacustrine littoral system and Palustrine system including the forested, scrub-shrub, emergent (herbaceous), aquatic bed, and moss-lichen classes reviewed below.

FORESTED VEGETATION

Broad-leaved deciduous forests occur along major rivers such as the St. Joe, St. Maries, and North Fork Coeur d'Alene rivers. The forests are most commonly dominated by the cottonwood *Populus trichocarpa,* with occasional stands of *Populus tremuloides* (quaking aspen). Other dominant trees of deciduous forests include *Alnus rubra* (red alder) and *Betula papyrifera* (paper birch). *Alnus rubra* stands are possibly seral to *Thuja plicata* forests, but may be quite persistent due to localized disturbances such as slumping and debris flows along creeks. Stands of *Betula papyrifera* were noted along shorelines of major lakes.

Needle-leaved riparian forests occur at middle and upper elevations of tributaries to major rivers in the survey area and on the perimeter of emergent wetlands. *Thuja plicata*, *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce) and less commonly *A. grandis* and *Pseudotsuga menziesii* dominate needle-leaved forests. *Tsuga heterophylla* (western hemlock) may be codominant with *Thuja plicata* on wet bottomlands. At lower elevations riparian woodlands dominated by *Pinus ponderosa* (ponderosa pine) are occasionally present in drainages in the southwest portion of the survey area in the northern Palouse.

SCRUB-SHRUB VEGETATION

Shrublands dominated by willows and other shrubs occur in nearly impenetrable patches along low gradient channels, as stringers or on narrow floodplains along high gradient streams, as patches within riparian forests, and on margins of meadows and peatlands. At mid- to upper-elevations willow dominated shrublands associated with low gradient meandering channels in broad valley bottoms are dominated by *Salix drummondiana* (Drummond's willow) with lesser amounts or codominance by *Salix geyeriana* (Geyer's willow), *S. sitchensis* (Sitka willow), and *S. bebbiana* var. *bebbiana* (Bebb's willow). *Salix sitchensis* seems to dominate some willow stands,

but due to difficulty distinguishing this species from *Salix drummondiana* and appparent hybridization between the two, stands are included with *Salix drummondiana* types. Dense stands of willows and other shrubs create a complex mosaic in former western redcedar bottomlands that burned over 80 years ago. No evidence of redcedar regeneration was noted in these stands and the diversity of shrub species makes determination of shrub community types difficult.

Willows are frequently absent or a minor component of shrublands associated with high gradient streams. *Alnus incana* (mountain alder), *Cornus sericea* (red-osier dogwood), and *Rhamnus alnifolia* (alder buckthorn) occur as community dominants along high gradient streams. *Alnus sinuata* (sitka alder) is found at upper elevations on pond margins and along streams. Hybridization is apparent between the alder species particularly at low to middle elevations where the ranges of *Alnus rubra* and *Alnus incana* overlap. Stands dominated by tree size plants seem to be mostly *Alnus rubra;* stands with more of a shrubby stature were recognized as *Alnus incana* X *Alnus rubra* hybrids, but included within *Alnus incana* types. Patches of *Cornus sericea, Salix bebbiana* var. *bebbiana,* are common in association with cottonwood forests on larger stream systems. Channel bars are frequently vegetated with *Salix exigua* ssp. *melanopsis* (coyote willow). *Crataegus douglasii* (Douglas hawthorne) forms dense stands in drainages of the northern Palouse Prairie in Idaho, along Hangmen Creek, Lake Creek, and Rock Creek. Stands of *Crataegus* are sometimes present in the mosaic of deciduous forested wetlands as well.

Low willow vegetation was not sampled during surveys and can be considered infrequent in the Spokane River Basin. The low willows *Salix planifolia* and *Salix wolfii* are reported from upper tributaries of the St. Joe drainage, but were not surveyed due to lack of field time. Margins of many emergent wetlands commonly have a dense monoculture of *Spiraea douglasii* (hardhack) or *Alnus incana* around the perimeter.

EMERGENT (HERBACEOUS) VEGETATION

Extensive herbaceous wetlands are present in the survey area with nearly 10,000 acres along lower reaches of rivers flowing into Lake Coeur d'Alene. The wetlands support complexes of near monocultures dominated by *Carex* spp. (sedges), *Scirpus* spp. (bulrushes), *Sagitaria* spp. (water potato), *Equisetum fluviatile* (water horsetail), *Eleocharis palustris* (creeping spikerush), *Glyceria borealis* (northern mannagrass), *Sparganium eurycarpum* (broadfruited bur-reed), and *Typha latifolia* (common cattail). Grasslands and seasonally flooded wetlands are mostly dominated by *Phalaris arundinacea* with occasional *Deschampsia cespitosa* (tufted hairgrass), *Calamagrostis canadensis* (bluejoint reedgrass), or *Carex* spp. (sedge) remnants. The grasslands are accessible and have largely been impacted by grazing, reseeding with pasture grasses, and hydrologic manipulation. Thick layers of sedge and moss peat accumulate where water tables are at or near the surface for most of the year.

AQUATIC BED AND LACUSTRINE LITTORAL VEGETATION

Palustrine and Lacustrine aquatic bed vegetation occurs in littoral (< 2 meters) and limnetic (> 2 meters) zones of ponds and lakes in the survey area. Vegetation types correspond to water depth to form somewhat concentric rings. *Potamogeton natans* (floating-leaved pondweed), *Myriophyllum* spp. (water-milfoil), *Utricularia* spp. (bladderwort), and other *Potamogeton* spp. occur alone or in combination in shallow littoral zones. *Nuphar polysepalum* (yellow pond lily) and *Brasenia shreberi* (water-shield) are frequently present as monocultures in deep littoral zones. *Potamogeton amplifolius* (large-leaved pondweed), *Potamogeton praelongus* (white-stalked pondweed), and *Potamogeton richardsonii* (Richardson's pondweed) are common in limnetic zones. Our current classification of aquatic vegetation types is incomplete. Aquatic plant species lists are available for several of the ponds and lakes in the Spokane River Basin: however, plant species cover and environmental data are insufficient to develop an aquatic classification (Bursik 1995).

MOSS-LICHEN VEGETATION

Palustrine moss-lichen wetlands are defined as areas where mosses or lichens cover surface substrates and vascular plants make up less than 30 percent of the areal cover (Cowardin et al. 1979). Moss species are frequently present in the vegetation types discussed previously, but vascular species are prominent. Moss-lichen wetlands, as defined by Cowardin et al. (1979), are present in the Spokane River Basin and include the *Sphagnum*-rich Poor Fen community type. Poor Fens are characterized by continuous cover of *Sphagnum* and scattered vascular species and may cover several acres. In the Spokane River Basin, Moss-Lichen wetlands are mapped by NWI with emergent wetland map units due to the resolution at which the maps were developed.

PEATLANDS

The forested, scrub-shrub, and emergent vegetation types discussed previously may occur, and moss-lichen vegetation types always occur as peatlands where accumulation of organic matter exceeds decomposition. Peatlands in the survey area can be further divided into poor fens, intermediate fens, and rich fens (Bursik and Moseley 1995). The first type of peatland has been discussed in a previous section and discussion here will focus on intermediate and rich fens. Intermediate fens and rich fens are *Sphagnum*-poor peatlands with vascular plants contributing significant cover. Intermediate fens have equal dominance by bryophyte and vascular species. *Carex lasiocarpa* and *Dulichium arundinaceum* (dulichium) community types usually occur in intermediate fens. Organic soils of rich fens are formed by accumulation of sedge, grass, and brown moss (*Aulacomnium* spp. and *Calliergon* spp.) peat. *Carex utriculata* (bladder sedge), *Carex vesicaria* (inflated sedge), *Carex aquatilis* (water sedge), *Typha latifolia*, *Calamagrostis canadensis*, *Deschampsia cespitosa*, and *Salix* spp. dominated community types may occur as rich fens. Peatlands are among the most floristically significant wetlands providing habitat for nearly half of the rare wetland plant species in the survey area.

Table 3. Plant communities and ranks in the Spokane River Basin wetlands arranged by Cowardin system, class and subclass.

Scientific Name	Common name	Rank		
	Palustrine Forested Communities			
	Needle-leaved evergreen			
Abies grandis/Senecio triangularis	Grand fir/Arrowleaf groundsel		G3	S3
Abies lasiocarpa/Calamagrostis canadensis	Subalpine fir/Bluejoint reed grass		G5	S5
Calamagrostis canadensis phase	Bluejont reed grass phase		G5	S5
Ligusticum canbyi phase	Canby's licorice-root phase		G5	S5
Vaccinium caespitosum phase	Dwarf huckleberry phase		G5	S5
Abies lasiocarpa/Oplopanax horridum	Subalpine fir/Devil's club		G2	S2
Abies lasiocarpa/Streptopus amplexifolius	Subalpine fir/Claspleaf twistedstalk		G4	S4
Ligusticum canbyi phase	Canby's licoroce-root phase		G4	S4
Menziesia ferruginea phase	Fools huckleberry phase		G4	S4
Streptopus amplexifolius phase	Claspleaf twistedstalk phase		G4	S4
Pinus pondersosa/Crataegus douglasii	Ponderosa pine/Douglas hawthorne		G1	S1
Pseudotsuga menziesii/Physocarpus malceceus	Douglas fir/Mountain ninebark		G5	S5
Smilacina stellata phase	Claspleaf twistedstalk phase		G5	S5
Thuja plicata/Adiantum pedatum	Western redcedar/Maidenhair fern	G2?	S2	
Thuja plicata/Athyrium filix-femina	Western redcedar/Ladyfern	G3G4	S3	
Adiantum pedatum phase	Maidenhair fern phase	G3	S2	
Athyrium filix-femina phase	Ladyfern phase		G3	S3
Thuja plicata/Gymnocarpium dryopteris	Western redcedar/Oak-fern		G3	S2
Thuja plicata/Lysichitum americanum	Western redcedar/Skunk cabbage		G4Q	S2
Thuja plicata/Oplopanax horridum	Western redcedar/Devil's club		G3	S3
Tsuga heterophylla/Asarum caudatum	Western hemlock/Wild ginger		G3	S3
Aralia nudicaulis phase	Wild sarsaparilla phase		G3	S3
Tsuga heterophylla/Clintonia uniflora	Western hemlock/Queencup beadlily		G4	S5
Aralia nudicaulis phase	Wild sarsaparilla phase		G5	S2?
Tsuga heterophylla/Gymnocarpium dryopteris	Western hemlock/Oak-fern		G3	S3
Tsuga mertensiana/Streptopus amplexicaulis	Mountain hemlock/Claspleaf twistedstalk		G2	S2
Luzula hitchcockii phase	Smooth woodrush phase		G2	S1?
Menziesia ferruginea phase	Fools huckleberry phase		G2?	S1?
	Broad-leaved deciduous			
Alnus rubra/Athyrium felix-femina	Red alder/Ladyfern		GU	SU
Betula papyrifera	Paper birch		GU	SU
Populus tremuloides/Calamagrostis canadensis	Quaking aspen/Bluejoint reedgrass	G3	S4	
Populus tremuloides/Cornus sericea	Quaking aspen/Red-osier dogwood	G4	S4	
Populus tremuloides/Spiraea douglasii	Quaking aspen/Hardhack		GU	SU
Populus trichocarpa/Cornus sericea	Black cottonwood/Red-osier dogwood		G3?	S3
Populus trichocarpa/Crataegus douglasii	Black cottonwood/Douglas hawthorne		G1	S1
*Populus trichocarpa/*Recent alluvial bar	Black cottonwood/Recent alluvial bar		G?	S3?
Populus trichocarpa/Rhamnus alnifolia	Black cottonwood/Alder buckthorn	G?	S3	
Populus trichocarpa/Symphoricarpos albus	Black cottonwood/Common snowberry		G3	S2
	Palustrine Scrub-Shrub Communities			
	Broad-leaved deciduous			

Alnus incana/Athyrium felix-femina	Mountain alder/Ladyfern	G3	S2		
Alnus incana/Carex utriculata	Mountain alder/Bladder sedge			G3	S2
Alnus incana/Lysichiton americanum	Mountain alder/Skunk cabbage			G3	S3
*Alnus incana/*Mesic forb	Mountain alder/Mesic forb			G3G4	S1
*Alnus incana/*Mesic graminoid	Mountain alder/Mesic graminoid			G2G3?	S3
Alnus incana/Spiraea douglasii	Mountain alder/Hardhack			G3	S3
Alnus sinuata	Sitka alder			G2	S?
Cornus sericea	Red-osier dogwood			G4	S3
Cornus sericea/Heracleum lanatum	Red-osier dogwood/Common cowparsnip	G3	S2		
Crataegus douglasii/Heracleum lanatum	Black hawthorne/Common cowparsnip			G2	S1
Crataegus douglasii-Symphoricarpos albus/ Smilacina stellata	Black hawthorne-Common snowberry/Claspleaf twistedstalk			G2	S2
Salix bebbiana	Bebb's willow			G3	S3
*Salix bebbiana/*Mesic graminoid	Bebb's willow/Mesic graminoid			G3?	S3
Salix exigua ssp. *melanopsis*/Barren	Sandbar willow/Barren	G3?	S4		
Salix exigua ssp. *melanopsis/Equisetum arvense*	Sandbar willow/Common horsetail			G3	S2
*Salix exigua/*Mesic forb	Sandbar willow/Mesic forb			G2?	S2?
Salix drummondiana	Drummond's willow			G3Q	S3
Salix drummondiana/Calamagrostis canadensis	Drummond's willow/Bluejoint reedgrass			G2	S2
Salix drummondiana/Carex utriculata	Drummond's willow/Bladder sedge			G3	S3
Salix geyeriana/Carex utriculata	Geyer's willow/Bladder sedge			G5	S4
*Salix geyeriana/*Mesic forb	Geyer's willow/Mesic forb			G3	S3
*Salix geyeriana/*Mesic graminoid	Geyer's willow/Mesic graminoid			G2G3	S5
Rhamnus alnifolia	Alder buckthorn			G3	S3
Spiraea douglasii	Douglas spiraea			G5	S4

Palustrine Emergent Communities
Persistent

Carex aquatilis	Water sedge		G5	S4	
Carex cusickii	Cusick's sedge			GQ	S3
Carex lanuginosa	Woolly sedge			G3?	S2
Carex lasiocarpa	Slender sedge		G4	S2	
Carex nebrascensis	Nebraska sedge			G4	S3
Carex utriculata (rostrata)	Bladder sedge		G5	S4	
Carex vesicaria	Inflated sedge	GU	S3		
Phalaris arundinacea	Reed canarygrass			G4	S5
Agropyron smithii	Bluestem wheatgrass			G3G5	S1
Calamagrostis canadensis	Bluejoint reedgrass			G4Q	S4
Deschampsia cespitosa	Tufted hairgrass			G4	S3
Eleocharis palustris	Common spikerush			G5	S3
Glyceria borealis	Northern mannagrass			G4	S1
Juncus balticus	Baltic rush			G5	S4
Scirpus acutus	Hardstem bulrush			G5	S4
Scirpus microcarpus	Small-fruit bulrush			GU	SU
Equisetum fluviatile	Water horsetail			G4	S3
Sparganium eurycarpum	Broadfruited bur-reed			GU	SU
Typha latifolia	Broadleaf cattail			G5	S4

Poor Fen	Poor Fen	G4	S1

Palustrine Aquatic Bed and Lacustrine Litttoral Communities

Brasenia shreberi	Water-shield	GU	SU
Nuphar polysepalum	Rocky mountain pond lily	G5	S4

RARE FLORA

Twenty-five rare vascular plant and four non-vascular species are known to occur in Spokane River Basin wetlands (Table 4). Nineteen species are only known in Idaho from occurrences in the northern part of the state and are indicated in Table 4 by an * following the species name. *Blechnum spicant* and *Dodecatheon dentatum* are disjunct species. Two species, *Corydalis caseana* ssp. *hastata* and *Tauschia tenuissima,* are endemic to north-central Idaho and the Palouse respectively. The remaining species are either widespread boreal or circumboreal species with specialized habitat requirements or species that are on the periphery of their range.

Table 4. Rare flora of the Spokane River Basin wetlands, conservation rank, and Idaho Native Plant Society (INPS) category (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 (CDC 1999).

Scientific name	Common Name	Rank	INPS Category
Aster junciformis	Rush aster	G5 S1	S
*Blechnum spicant**	Deer-fern	G5 S3	S
*Botrychium crenulatum**	Crenulate moonwort	G3 S1	G
Botrychium lanceolatum var. *lanceolatum**	Lance-leaved moonwort	G5T4 S3	2
Botrychium minganense	Mingan moonwort	G4 S3	S
*Botrychium montanum**	Mountain moonwort	G3 S1	G
Botrychium pinnatum	Northern moonwort	G4? S2	2
Botrychium simplex	Least moonwort	G5 S1	2
Carex aenea	Bronze sedge	G5 S2	R
Carex livida	Livid sedge	G5 S2	S
*Carex rostrata**	Beaked sedge	G5 S2	S
Corydalis caseana ssp. *hastata**	Case's corydalis	G5T3 S3	G
*Dodecatheon dentatum**	White shooting-star	G4 S3	M
Epilobium palustre	Swamp willow-weed	G5 S3	M
*Hypericum majus**	Large Canadian St. John's-wort	G5 S3	2
*Ludwigia polycarpa**	Many-fruit false-loosestrife	G4 S1	1
*Lycopodiella inundata**	Northern bog clubmoss	G5 S2	1
Rhynchospora alba	White beakrush	G5 S2	1
Scheuchzeria palustris	Pod grass	G5 S2	2
*Scirpus fluviatilis**	River bulrush	G5 S1	R
Scirpus subterminalis	Water clubrush	G4G5 S3	S
*Tauschia tenuissima**	Leiberg's tauschia	G3 S3	G
*Trientalis latifolia**	Western starflower	G5 S3	M

*Vaccinium oxycoccos**	Bog cranberry	G5	S2		2	
*Vallisneria americana**	Wild celery		G5	S1		S
	Lichens					
*Cladonia transcendens**	Transcending reindeer lichen		G5	S2?		2
*Lobaria hallii**	Hall's lungwort		G4	S1		2
*Pilophorus acicularis**	Nail lichen		G4	S1		2
*Sphaerophorus globosus**	Tuckermann's ball bearing lichen		G5	S1		S

RARE ANIMALS

The Spokane River Basin provides breeding habitat for eighteen wetland and riparian associated vertebrate species of concern. River corridors and forested lake margins provide breeding habitat for bald eagles. The Coeur d'Alene River, St. Joe River, Lake Coeur d'Alene, and Hayden Lake are bald eagle wintering areas. Northern pygmy owls and barred owls prefer dense forests or open woodlands and frequent open meadows for foraging. Large open water bodies of lakes and rivers with shallow water areas supporting emergent vegetation are breeding habitat for western grebes and black terns. Harlequin ducks breed on relatively low gradient, disturbance free mountain streams. The majority of the Idaho breeding population of Harlequin ducks is concentrated on approximately 30 streams in northern Idaho including the upper St. Joe River, upper Coeur d'Alene River, and Marble Creek. Upland sandpipers prefer upland prairies and grasslands, but one occurrence is reported in the Spokane River Basin on gravel bars along a moderate gradient stream.

Four amphibian species of concern and one reptile species of concern are known to occur in the Spokane River Basin: Coeur d'Alene salamander, western toad, northern leopard frog, spotted frog, and northern alligator lizard. The northern leopard frog is one of the most abundant amphibian species in the basin and was observed on several occasions during surveys by CDC staff and Beck et al. (1998). Leopard frogs are known from museum records collected in the basin, but this species was not observed during Beck's 1998 surveys. Western toads were not found to be widely distributed or abundant by Beck with the species only being found at two locations. Nearly half of the known locations for Coeur d'Alene salamanders are within the Spokane River Basin and most of these are in the St. Joe and Coeur d'Alene drainages. The salamanders occur in association with springs or seeps, spray zones of waterfalls, and edges of streams (Groves et al. 1997). The northern alligator lizard is known from the North Fork Coeur d'Alene River, at Carlin Bay on Lake Coeur d'Alene, and on a tributary to the St. Joe River.

Bull trout are documented present in several tributaries of the St. Joe River, a few tributaries of the North Fork Coeur d'Alene River, and Coeur d'Alene Lake. Populations of bull trout are suspected on the mainstem of the St. Joe River.

Five mammal species of concern are known to be occasional users of wetland and riparian habitat in the basin. Mature spruce-fir and cedar-hemlock forests are habitat for fishers. Fishers utilize forested riparian habitat in the spring, summer, and fall. Four bat species of concern are known from single occurrences in the basin. This may reflect the lack of surveys for these species. 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). 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) is included in Appendix F.

Table 5. Rare animals of the Spokane River Basin wetlands.

Species	Common Name	Rank
	Birds	
Bartramia longicauda	Upland sandpiper	G5 S1
Glaucidium gnoma	Northern pygmy owl	G5 S4
Strix varia	Barred owl	G5 S4
Haliaeetus leucocephalus	Bald eagle	G4 S3
Histrionicus histrionicus	Harlequin duck	G4 S1
Aechmorphorus occidentalis	Western grebe	G5 S4
Chlidonias niger	Black tern	G4 S2
	Amphibians	
Bufo boreas	Western Toad	G4 S4
Plethodon idahoensis	Coeur d'Alene salamader	G3 S3
Rana pipiens	Northern leopard frog	G5 S3
Rana pretiosa	Spotted frog	G3G4 S3S4
	Reptiles	
Elgaria coerulea	Northern alligator lizard	G5 S2
	Fish	
Salvelinus confluentus	Bull trout	G5 S3
	Mammals	
Martes pennanti	Fisher	G4G5 S1
Myotis yumanensis	Yuma myotis	G5 S3?
Myotis thysanodes	Fringed myotis	G5 S1?
Myotis volans	Long-legged myotis	G5 S3?
Myotis californicus	California myotis	G5 S1?

WETLAND SITE CLASSIFICATION

A list of potential sites was distributed to key 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 which were overlooked or of local concern. Sites were surveyed during the summer of 1998 following Heritage Network Methodology to assess site condition, catalog community types, and document rare plant and animal occurrences (Bougeron et al. 1992). The 1998 surveys, previous work by Bursik and Moseley (1995), and information on rare species distributions from the Biological and Conservation Database provided a method to allocate sites into four management categories. The categories differentiate wetlands based on the following criteria: richness, rarity, condition, and viability. The purpose is to identify wetlands that are irreplaceable or sensitive to disturbance (Washington Department of Ecology 1991, Bursik and Moseley 1995, Grossman et al. 1994).

Table 6. 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 communities within a single unit of Cowardin's classification ♦ Assemblage of plant communities or ecological features (beaver ponds, peatlands, lakes...) within several units of Cowardin's classification (=high structural diversity)
Rarity	Presence of state rare plant community, plant, or animal species.	♦ High concentrations of state rare plant or animal species ♦ High quality occurrences of state rare plant communities
Condition	Extent which site has been altered from natural conditions.	♦ 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 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 native plant communities. Based on extensive past survey work we are relatively confident that most Class I sites have been identified. The information presented in Table 6 can be summarized for unsurveyed or data poor wetlands by consulting National Wetland Inventory Maps, requesting plant and animal occurrence data from Idaho CDC, 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 rarity of the site. Site summaries for surveyed wetlands are included in Appendix D.

CLASS I SITES

Class I sites represent examples of plant communities 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 community 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 mitigable 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 in excellent condition, however drier, accessible sites are impacted). Good to excellent assemblages of common plant community types or the occurrence of rare community types qualifies a site as Class II. Wetlands with unique biological, geological, or other features may be included here. Impacts and modification to 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 Research Natural Area, Area of Critical Environmental Concern, or Special Interest Area. Private lands should be acquired by conservation organizations or have voluntary or legal protection. Frequently wetland meadows with hydrologic alterations are adjacent to both Class I and Class II sites where significant gains in wetland functions could be made if hydrology was restored.

REFERENCE SITES

Reference sites represent high quality assemblages of common community types 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 communities. 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 plant community types, 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 natural communities. 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.

CONSERVATION OF THE SPOKANE RIVER BASIN 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 Spokane River Basin surveys identified twenty-four wetland sites based on work by Bursik and Moseley (1995) and Pfeifer and Toweill (1992) and consultation with agency personnel (Table 7, Figure 7.). Many of these wetland sites 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 wetland sites meet the richness, rarity, condition, and viability criteria to qualify as Class I sites. The Class I sites include redcedar bottomlands, coniferous forests, and peatlands. Hobo Cedar Grove and Upper Fishhook Creek support old growth redcedar stands. Upper Shoshone Creek and Black Prince Creek include bottomlands with western hemlock dominated stands. While uplands are a significant portion of these sites, high quality wetland and aquatic habitats are represented also. Three of the sites, Hobo Cedar Grove, Upper Shoshone Creek, and Upper Fishhook Creek, are currently designated as Forest Service Botanical Special Interest Areas or Research Natural Areas. Approximately 150 acres of wetlands outside of the boundaries of Fishhook Creek RNA managed by Plum Creek Timber Company are unprotected. The wetlands include expansive meadows of *Calamagrostis canadensis*, *Carex utriculata*, and *Carex nebrascensis*. Black Prince Creek is mostly owned by the U.S. Forest Service and is currently unprotected.

Twin Lakes Fen is the highest quality peatland in the Spokane River Basin. The fen is entirely in private ownership. Impacts are limited to hay pastures up valley along Fish Creek, but the extensive fen remains intact. A bay adjacent to Twin Lakes Fen had a For Sale sign posted in 1998. While the fen and its rare plant populations are currently in good condition, careless development of adjacent wetlands, roads, and uplands could cause irreversible changes to the fen and the rare species it supports in a very short period of time. Fee title acquisition of Twin Lakes Fen should be of high priority for agencies and/or conservation organizations.

CLASS II SITES

The four Class II wetland sites include cottonwood forests, peatlands, and emergent lakeshore wetlands. Spion Kop is the only Class II site that is currently protected. Spion Kop RNA includes a 2.5 mile reach of the North Fork Coeur d'Alene River. In addition to this reach of the North Fork, other patches of intact cottonwood gallery forests on the North Fork should be targeted for protection. Rose Lake and Thompson Lake include Sphagnum dominated peatlands and are partially managed as part of the Idaho Department of Fish and Game's Coeur d'Alene River WMA. The peatlands at Rose Lake are adjacent to several homesites and it is recommended that private landowners be contacted to ensure protection of the fen. Thompson Lake peatlands are isolated from direct impacts, but should be monitored to ensure that cumulative offsite impacts do not negatively impact the fen. Windy Bay is perhaps the least developed bay on Lake Coeur d'Alene. The bay is in private ownership and protection of wetlands with an upland buffer should be pursued.

REFERENCE SITES

The reference sites include old-growth redcedar bottomlands, subalpine lakes and streams, cottonwood forests, and low elevation meadows. Sandhouse Cedar Grove and Settler's Grove of Ancient Cedars are reference sites supporting old growth redcedar stands. Both redcedar groves are designated Special Interest Area-Botanical. Five Lakes Butte, Theriault Lake, and Pond Peak all contain subalpine lakes and moderate to steep gradient streams. All of these areas along with Montford Creek (a drainage containing a low order stream) are established Research Natural Areas. The Mica Creek watershed is managed as an experimental project to determine cumulative effects of forest practices by Potlatch Corporation. The drainage includes low to moderate gradient streams supporting shrublands and stands of conifers. Low elevation meadows that have not been seeded with pasture grasses and support native graminoid species are of rare occurrence. Fernan Creek Bay supports native meadows that remain in good condition in spite of past grazing and water development. Most of the wetlands along the lower St. Joe River were inundated by Post Falls Dam. Remnant strings of cottonwood are present along the naturally raised levees of the St. Joe River channel in lake Coeur d'Alene forming a "River in a Lake". The cottonwood stands are among the most natural stands known in terms of native species presence in the state of Idaho. Fernan Creek Bay and the lower St. Joe River are currently unprotected.

Best Management Practices should be applied to these and similar unprotected sites to maintain wetland plant communities. Private land sites identified as reference areas may be eligible for protection under programs outlined in the following section, acquired by land trusts, or used as potential mitigation sites.

HABITAT SITES

The six Habitat Sites include low quality peatlands, low elevation rivers, subalpine shrublands and meadows, and low elevation lake bays. Hauser Lake and Hidden Lake support peatlands that are

of lowered quality due road development and non-native species, respectively. Hauser Lake is currently unprotected. Hidden Lake is well protected due to difficulties in access. The St. Maries and St. Joe rivers include patches of high quality cottonwood forests and shrublands intermingled with agricultural pasture and occasional houses. Remnant cottonwood and shrub stands should be targeted for protection. Clear Creek supports a rich mosaic of riparian shrubs with patches of emergent vegetation and the channel is habitat for westslope cutthroat trout. The valley bottom burned and historically supported redcedar bottomlands. Cougar Bay is a large emergent wetland on the northwest shore of Lake Coeur d'Alene. The bay is partially protected as a TNC preserve.

As opportunities for conservation easements, management agreements, or restoration projects arise they should be actively 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. Restoration may be as simple as fencing and allowing native vegetation to recover. Revegetation, channel stabilization, weed control, and hydrologic restoration may be necessary and should be evaluated on a site by site basis.

OTHER SITES AND PRIORITIES FOR CONSERVATION

A number of wetland sites in the Spokane River Basin are not summarized in this document. Other wetlands are present representing common vegetation types with significant wetland functions. Regulatory protection for jurisdictional wetlands is provided by the Clean Water Act, however, wetlands that do not meet the regulatory criteria are vulnerable. With less than 5% of wetlands in the survey area currently protected within areas managed to maintain wetland functions, projects which promote the conservation of all intact wetland habitats should be of high priority. Emphasis may be placed on those types which are unprotected (or under-protected), declining, or rare.

Emergent wetland types make up the largest percentage of wetlands in the survey area. This may reflect conversion of forested and scrub-shrub types to emergent types. Slightly over 60% of the protected wetland vegetation types are in the emergent category. The common emergent plant communities *Phalaris arundinacea*, *Carex utriculata (rostrata)*, *Equisetum fluviatile*, and *Typha latifolia* are widespread across the landscape and represented by large occurrences in several managed areas. Many of the peatland associated plant communities occur in small patches within a larger wetland mosaic. The peatland communities, *Carex lasiocarpa* and Poor Fens are represented by high quality stands at Thompson Lake and lower quality occurrences at Hidden Lake. Seasonally flooded wetland meadow vegetation or rich fens have experienced significant declines in areal extant due to pasture development and are unprotected in managed areas in the Spokane River Basin. Native vegetation types at these meadows include *Deschampsia cespitosa*, *Carex cusickii* (Cusick's sedge), *Carex lanuginosa* (woolly sedge), and *Calamagrostis canadensis*. Restoration potential is generally high within and adjacent to the rich fens due to periphery ditches and drains.

Three percent of scrub-shrub wetlands are within managed areas. *Spiraea douglasii* is the most well represented scrub-shrub type in the basin with large stands present at three managed areas. Shrublands dominated by willows and the tall shrubs *Alnus incana, Cornus sericea,* and *Crataegus douglasii* are poorly represented in managed areas.

Comparison of acreage of forested wetlands mapped by NWI and those mapped by the CDC at managed areas revealed discrepancies in acreage in the coniferous forested wetland category. This discrepancy is attributable to three factors: (1) stringer forests, such as those occurring along high gradient streams, are mapped as linear features, from which acreage was not calculated; (2) in forested landscapes coniferous wetland forests are sometimes mapped as inclusions with uplands; and (3) some of the coniferous forest habitat types listed in Table 3 are not restricted to wetland or riparian habitats and may occur on uplands. Coniferous forests occurring along high gradient streams are represented in several Research Natural Areas in the survey area. Wetland forests dominated by conifers on the perimeters of emergent wetlands and in broad valley bottoms are less well represented. Deciduous forested wetlands have seen significant declines in areal extent due to inundation of habitat and land clearing. Cottonwood forests are represented in managed areas by occurrences at Spion Kop RNA and St. Maries WMA. All high quality deciduous forested wetlands, especially those with a relatively intact hydrologic regime, should be of high conservation priority.

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 (RNA), Area of Critical Environmental Concern (ACEC), or Special Interest Area (SIA) is a conservation approach for ecologically significant wetlands on federal lands. The State of Idaho Department of Lands has management responsibility for a significant percentage of wetlands and a number of high quality wetlands. No mechanisms exist for the protection of wetlands managed by the Department of 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.

NOTE: Figure 8 not available in CDC homepage version.

Figure 8. Location of wetland sites in the Spokane River Basin. Site numbers correspond to those used in Table 7.

Table 7. Wetland sites in the Spokane River Basin. Management categories are defined in the text. Ownership: 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. Protection status: +=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, Privately owned with conservation easement in place), and - = Currently no protection.

Wetland Site	Category	Protection status	Ownership	Latitude/Longitude	County
1. Black Prince Creek	Class I	-	PRI,USFS	471937N 1160102W	Shoshone
2. Hobo Cedar Grove	Class I	+	USFS	470520N 1160650W	Shoshone
3. Twin Lakes Fen	Class I	-	PRI	475310N 1165541W	Kootenai
4. Upper Shoshone Creek	Class I	+	USFS	475413N 1155858W	Shoshone
5. Upper Fishhook	Class I	+	USFS	470708N 1155129W	Shoshone
6. Rose Lake	Class II	p	IDFG, PRI,USFS	473242N 1162821W	Kootenai
7. Spion Kop	Class II	+	USFS	475232N 1160718W	Shoshone
8. Thompson Lake	Class II	p	BLM,IDFG, PRI,USFS	472911N 1164355W	Kootenai
9. Windy Bay	Class II	-	PRI	472740N 1165647W	Kootenai
10. Fernan Creek Bay	Reference	-	PRI	474048N 1164200W	Kootenai
11. Five Lakes Butte	Reference	+	USFS	465803N 1151550W	Shoshone
12. Mica Creek	Reference	p	BLM,IDL,PRI,USFS	471130N 1161350W	Shoshone
13. Montford Creek	Reference	+	USFS	474345N 1163051W	Kootenai
14. Pond Peak	Reference	+	USFS	475112N 1160247W	Shoshone
15. River in a Lake	Reference	p	BIA?,IDFG,IDL,	472123N 1164255W	Benewah
16. Sandhouse Cedar Grove	Reference	+	USFS	470745N 1155300W	Shoshone
17. Settler's Grove of Ancient Cedars	Reference	+	USFS	474258N 1154915W	Shoshone
18. Theriault Lake	Reference	+	USFS	470917N 1160133W	Shoshone
19. Clear Creek	Habitat	-	USFS	472040N 1153920W	Shoshone
20. Cougar Bay	Habitat	p	BLM,IDL,PRI,TNC	473940N 1164955W	Kootenai
21. Hauser Lake Fen	Habitat	-	PRI	474640N 1170148W	Kootenai
22. Hidden Lake	Habitat	p	BLM,IDFG	473002N 1163520W	Kootenai
23. St. Maries River	Habitat	p	IDFG,PRI	471400N 1163325W	Benewah
24. St. Joe River	Habitat	-	BLM, IDL, PRI,USFS	471613N 1161040W	Shoshone

HOW TO REQUEST ADDITIONAL INFORMATION

Only part of the information on wetlands in the Spokane River Basin has been summarized in this document. Additional data available for basin wide or site specific projects is housed at IDFG headquarters. Table 8 summarizes the available data and methods of accessing the data.

Table 8. Accessing wetlands related data housed at Idaho Department of Fish and Game. GAP=Gap Analysis Project, NWI=National Wetlands Inventory Maps, BCD=Biological and Conservation Database. Geographic Information System (GIS) data is available in ARCVIEW format.

DATA	FORMAT	WHAT IS AVAILABLE?	HOW DATA IS ACCESSED?
NWI	GIS	♦ United States Fish and Wildlife Service NWI maps at 1:24,000	IDFG GIS Systems Analyst (also available from the National Wetlands Inventory Homepage: http://www.nwi.fws.gov:80/dlgdata)
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 communities ♦ Location and biological significance of currently managed wetland areas ♦ Location and biological significance of wetland conservation sites in need of protection ♦ Community abstracts	IDFG CDC Information Manager

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Appendix A

Key to wetland plant communities in the Spokane River Basin

Instructions for use of this key.

Locate a sample plot which represents the stand as a whole. Avoid ecotones between communities and microsites which represent small scale disturbances. Recommended plot size for forested communities is 1000 m^2 (20x50m), scrub-shrub communities 250 m^2 (25x10 m), and emergent communities 100 m^2 (10x10 m).

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 2) and stand tables to check for the presence of constant and characteristic species (Cooper et al. 1991, Daubenmire 1970, Hansen et al. 1995, Kovalchik 1993, Manning and Padgett 1995, Padgett et al. 1989, Pierce 1986, Steele et al. 1981, Steele et al. 1983, Youngblood et al. 1985).

The community types are from sites sampled by CDC and a summary of agency surveys in the basin. 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.	Conifers including Thuja plicata, Tsuga heterophylla, Tsuga mertensiana, Abies grandis, Abies lasiocarpa, Picea engelmannii, Psudotsuga menziesii, or Pinus ponderosa dominating the overstory with at least 25% cover either collectively or separately.	Needle-leaved evergreen forest types
1.	Not as above.	2
2.	Populus trichocarpa, P. tremuloides, Alnus rubra, or Betula papyrifera present with a canopy cover of at least 15% and not representing a sere to conifer or shrub dominated types.	Broad-leaved deciduous forest types
2.	Trees absent or if present with less than 15% cover or restricted to macrosites.	3
3.	Shrubs present with a canopy cover of at least 10%.	Scrub-shrub types
3.	Not as above.	4
4.	Shrubs and trees contributing minor amounts to composition or restricted to microsites. Herbaceous species growing in less than 1 meter of water with a combined cover of at least 15% or emergent herbaceous species with at least 5% cover.	Emergent types
4.	Not as above.	5
5.	Emergent species in water 1 meter or more in depth.	Aquatic bed (and Lacustrine Littoral) types

5.	Not as above.		6
	6.	Nonvascular (sphagnum, moss) plants dominant. Vascular species may be present but contribute minor cover (5%).	Poor fen
	6.	Not as above.	Unclassified or undocumented types

Key to needle-leaved evergreen forest types

1.	Tsuga heterophylla or Tsuga mertensiana present and successfully reproducing.		Tsuga heterophylla key (p. A-3)
1.	Tsuga heterophylla absent or not reproducing.		2
	2.	Thuja plicata present and successfully reproducing.	Thuja plicata key (p. A-4)
	2.	Thuja plicata absent or not reproducing.	3
3.	Abies lasiocarpa or Picea engelmanii present and reproducing more successfully than any other tree species.		Abies lasiocarpa key (p. A-5)
3.	Not as above.		4
	4.	Other conifer species including Abies grandis, Pinus ponderosa, and Pseudotsuga menziesii present and reproducing more successfully than any other tree species.	Misc. conifer key (p. A-6)
	4.	Not as above.	5
5.	Overstory and understory dominated by native plant species.		Unclassified or undocumented palustrine needle-leaved evergreen forest community type
5.	Overstory or understory dominated by exotic plant species.		Human induced palustrine needle-leaved evergreen forest

Tsuga heterophylla key

1.	Tsuga mertensiana present and reproducing more successfully than any other tree species.		7
1.	Not as above.		2
	2.	Oplopanax horridum with at least 5% cover.	Thuja plicata/Oplopanax horridum
	2.	Not as above.	3
3.	Athyrium felix-femina with at least 5% cover or common if in combination with other mesic forbs.		Thuja plicata/Athyrium felix-femina

a. Athyrium felix-femina well represented. -Athyrium felix-femina phase
b. Adiantum pedatum well represented. -Adiantum pedatum phase

3. Not as above. 4

4. Asarum caudatum with at least 5% cover or common. Tsuga heterophylla/Asaurum caudatum

a. Aralia nudicaulis common. -Aralia nudicaulis phase
b. Menziesia ferruginea well represented. -Menziesia ferruginea (upland) phase
c. Not as above. -Asarum caudatum phase

4. Not as above. 5

5. Gymnocarpium dryopteris with at least 5% cover. Tsuga heterophylla/ Gymnocarpium dryopteris

5. Not as above. 6

6. Clintonia uniflora common with at least 1% cover. Tsuga heterophylla/Clintonia uniflora

a. Aralia nudicaulis present. -Aralia nudicaulis phase
b. Not as above. -Upland phase

6. Not as above. 7

7. Streptopus amplexifolius with at least 5% cover or common. Tsuga mertensiana/Streptopus amplexicaulis

a. Luzula hitchcockii or Phyllodoce empetriformis common. -Luzula hitchcockii phase
b. Not as above. -Menziesii ferruginea phase

7. Not as above. 8

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 forest type

9. Overstory or understory dominated by exotic plant species. Human induced palustrine needle-leaved forest type

Thuja plicata key

1. Oplopanax horridum with at least 5% cover. Thuja plicata/Oplopanax horridum

1. Not as above. 2

2. Athyrium felix-femina with at least 5% cover or common if in combination with other mesic forbs. Thuja plicata/Athyrium felix-femina

a. Adiantum pedatum well represented. -Adiantum pedatum phase
b. Not as above. -Athyrium felix-femina phase

2. Not as above. 3

3. Adiantum pedatum with at least 5% cover. Thuja plicata/Adiantum caudatum

3. Not as above. 4

4. Gymnocarpium dryopteris with at least 5% cover. Thuja plicata/Gymnocarpium dryopteris

4. Not as above. 5

5. Lysichitum americanum common with at least 10% cover. Thuja plicata/Lysichitum americanum

5. Not as above. 6

6. Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology. 7

6. Site without wetland characteristics. Upland site

7. Overstory and understory dominated by native plant species. Unclassified or undocumented palustrine needle-leaved forest type

7. Overstory or understory dominated by exotic plant species. Human induced palustrine needle-leaved forest type

Abies lasiocarpa key

1. Calamagrostis canadensis or Ledum glandulosum with at least 5% cover. Abies lasiocarpa/Calamagrostis canadensis

a. Vaccinium caespitosum common (1% cover). -Vaccinium caespitosum phase
b. Ligusticum canbyi or Trautvetaria caroliniensis common (1% cover). -Ligusticum canbyi phase
c. Not as above, Calamagrostis canadensis clearly dominant. -Calamagrostis canadensis phase

1. Not as above. 2

2. Oplopanax horridum with at least 5% cover. Abies lasiocarpa/Oplopanax horridum

2. Not as above. 3

3. Streptopus amplexifolius alone or in combination with the following

species with Senecio triangularis, Trautvetteria caroliniensis, Ligusticum canbyi, and Mitella species with at least 5% cover. Abies lasiocarpa/Streptopus amplexifolius

a. Menziesia ferruginea with at least 5% cover. -Menziesia ferruginea phase
b. Menziesia ferruginea poorly represented and Ligusticum canbyi with at least 1% cover. -Ligusticum canbyi phase
c. Not as above. -Streptopus amplexifolius phase

3. Not as above. 4

4. Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology. 5

4. Site without wetland characteristics. Upland site

5. Overstory and understory dominated by native plant species. Unclassified or undocumented palustrine needle-leaved forest type

5. Overstory or understory dominated by exotic plant species. Human induced palustrine needle-leaved forest type

Misc. conifer key

1. Abies grandis present and successfully reproducing 2

1. Not as above, other conifers dominant. 3

2. Senecio triangularis, Streptopus amplexifolius, Ligusticum canbyi, Trautvettaria carolinensis, or Athyrium felix-femina alone or in combination with at least 5% cover. Abies grandis/Senecio triangularis

2. Not as above. 11

3. Pseudotsuga menziesii present and successfully reproducing. 4

3. Not as above, other conifers dominant. 5

4. Physcocarpus malvaceus and/or Holodiscus discolor with at least 5% cover. Pseudotsuga menziesii/Physocarus malvaceus

a. Disporum hookeri or Smilacina stellata present; or Larix occidentalis or Galium triflorum common. -Smilacina stellata phase
b. Not as above. -Upland phase

4. Not as above. 11

5. Pinus contorta the dominant tree. 6

5. Not as above. 9

	6.	Calamagrostis canadensis or Ledum glandulosum well represented.	Abies lasiocarpa/Calamagrostis canadensis
		a. Vaccinium caespitosum common (1% cover).	-Vaccinium caespitosum phase
		b. Ligusticum canbyi or Trautvetaria caroliniensis common (1% cover).	-Ligusticum canbyi phase
		c. Not as above, Calamagrostis canadensis clearly dominant.	-Calamagrostis canadensis phase
	6.	Not as above.	7
7.	Streptopus amplexifolius alone or in combination with the following species with Senecio triangularis, Trautvetteria caroliniensis, Ligusticum canbyi, and Mitella species with at least 5% cover.		Abies lasiocarpa/Streptopus amplexifolius
	a. Menziesia ferruginea with at least 5% cover.		-Menziesia ferruginea phase
	b. Menziesia ferruginea poorly represented and Ligusticum canbyi with at least 1% cover.		-Ligusticum canbyi phase
	c. Not as above.		-Streptopus amplexifolius phase
7.	Not as above.		8
	8.	Asaurum caudatum, Clintonia uniflora, Tierella trifoliata, or Coptis occidentalis present or Linnaea borealis common.	see a-d
		a. Within the Tsuga heterophylla zone.	Tsuga heterophylla types
		b. Within the Thuja plicata zone.	Thuja plicata types
		c. Within the Abies grandis zone.	Abies grandis types
		d. Within the Abies lasiocarpa zone.	Abies lasiocarpa types
	8.	Not as above.	11
9.	Pinus ponderosa the dominant tree.		10
9.	Not as above.		11
	10.	Crataegus douglasii with at least 10% cover and often forming impenetrable thickets.	Pinus ponderosa/Crataegus douglasii
	10.	Not as above.	11
11.	Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.		12
11.	Site without wetland characteristics.		Upland site
	12.	Overstory and understory dominated by native plant species.	Unclassified or undocumented palustrine needle-leaved forest type
	12.	Overstory or understory dominated by exotic plant species.	Human induced palustrine needle-leaved forest type

Key to broad-leaved deciduous forest types

1.	Populus tremuloides with greater than 25% cover.		2
1.	Not as above, other deciduous trees dominant.		5
	2.	Spiraea douglasii with at least 25% cover.	Populus tremuloides/Spiraea douglasii
	2.	Not as above.	3
3.	Cornus sericea with at least 25% cover.		Populus tremuloides/Cornus sericea
3.	Not as above.		4
	4.	Calamagrostis canadensis with at least 15% cover.	Populus tremuloides/ Calamagrostis canadensis
	4.	Not as above.	14
5.	Populus trichocarpa with at least 15% cover.		6
5.	Not as above.		11
	6.	Community occurs on recently deposited alluvial bar or island with seedlings and saplings dominating the site.	Populus trichocarpa/Recent alluvial bar
	6.	Not as above.	7
7.	Cornus sericea with at least 25% cover.		Populus trichocarpa/Cornus sericea
7.	Not as above.		8
	8.	Symphoricarpos albus with at least 25% cover.	Populus trichocarpa/ Symphoricarpos albus
	8.	Not as above.	9
9.	Rhamnus alnifolia and/or Rhamnus purshiana with at least 25% cover.		Populus trichocarpa/Rhamnus alnifolia
9.	Not as above.		10
	10.	Crataegus douglasii with at least 25% cover.	Populus trichocarpa/ Crataegus douglasii
	10.	Not as above.	14
11.	Alnus rubra the dominant tree (large and single-stemmed) with at least		

10% cover. Alder stands where Alnus incana and Alnus rubra both are present or where plants have apparently hybridized are treated in the shrub key. 12

11. Not as above. 13

12. Athyrium felix-femina with at least 5% cover or common if in combination with other mesic forbs. Alnus rubra/Athyrium felix femina

12. Not as above. 14

13. Betula papyrifera the dominant tree with at least 10% cover. Betula papyrifera cover type

13. Not as above. 14

14. Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology. 15

14. Site without wetland characteristics. Upland site

15. Overstory and understory dominated by native plant species. Unclassified or undocumented palustrine broad-leaved deciduous forest type

15. Overstory or understory dominated by exotic plant species. Human induced palustrine broad-leaved deciduous forest type

Key to palustrine scrub-shrub types

1. Willows with at least 25% cover. 2

1. Willows absent or with less than 25% cover. Mixed scrub-shrub dominated types

2. Tall willow species such as Salix exigua, S. drummondiana, S. geyeriana, S. sitchensis, or S. bebbiana alone or in combination with at least 25% cover. Tall willow types

2. Low willow species including Salix wolfii, S. farriae, S. commutata, S. candida or S. planifolia var. monica alone or in combination with at least 25% cover. Undocumented or undescribed low willow types

Key to mixed scrub-shrub types

1. Alnus sinuata the dominant shrub with at least 10% cover. Communities typically occur at higher, subalpine elevations. Alnus sinuata cover type

1.	Not as above.		2
	2.	Alnus incana alone or in combination with Alnus rubra with at least 10% cover. Shrubs that exhibit characteristics of both Alnus incana and Alnus rubra are treated as Alnus incana.	3
	2.	Not as above.	9
3.	Spiraea douglasii with at least 10% cover.		Alnus incana/Spiraea douglasii
3.	Not as above.		4
	4.	Carex utriculata and/or Carex vesicaria with at least 25% cover and the dominant graminoid.	Alnus incana/Carex utriculata
	4.	Not as above.	5
5.	Lysichitum americanum with at least 5% cover.		Alnus incana/Lysichitum americanum
5.	Not as above.		6
	6.	Athyrium felix-femina with at least 5% cover.	Alnus incana/Athyrium felix-femina
	6.	Not as above.	7
7.	Senecio triangularis, Aconitum columbianum, Actaea rubra, Smilacina stellata, and other mesic forbs in combination with at least 15% cover.		Alnus incana/Mesic forb
7.	Not as above.		8
	8.	Carex lanuginosa, Glyceria spp., Scirpus spp., and other native graminoids dominate the understory.	Alnus incana/Mesic graminoid
	8.	Not as above.	17
9.	Cornus sericea with at least 25% cover.		10
9.	Not as above.		12
	10.	Heracleum lanatum with at least 5% cover.	Cornus sericea/Heracleum lanatum
	10.	Not as above.	11
11.	Understory barren due to shading, annual scouring, or absence of soil development.		Cornus sericea
11.	Not as above.		17
	12.	Crataegus douglasii with at least 25% cover.	13

	12.	Not as above.	15
13.	Heracleum lanatum with at least 5% cover.		Crataegus douglasii/Heracleum lanatum
13.	Not as above.		14
	14.	Symphoricarpos albus the dominant shrub.	Crataegus douglasii - Symphoricarpos albus/Smilacina stellata
	14.	Not as above.	17
15.	Spiraea douglasii the dominant shrub with at least 25% cover.		Spiraea douglasii
15.	Not as above.		16
	16.	Rhamnus alnifolia with at least 25% cover.	Rhamnus alnifolia
	16.	Not as above.	17
17.	Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.		18
17.	Site without wetland characteristics.		Upland site
	18.	Overstory and understory dominated by native plant species.	Unclassified or undocumented palustrine scrub-shrub type
	18.	Overstory or understory dominated by exotic plant species.	Human induced palustrine scrub-shrub vegetation

Key to tall willow types

1.	S. exigua, Salix melanopsis, or S. bebbiana alone or in combination with at least 25% cover.		2
1.	Not as above.		9
	2.	Salix exigua or Salix melanopsis with greater cover than any other tall willow species.	3
	2.	Not as above.	6
3.	Understory poorly developed or barren due to annual scouring, sediment deposition, or S. exigua (melanopsis) a recent colonizer.		Salix exigua/barren
3.	Not as above.		4
	4.	Equisetum arvense with at least 10% cover or the dominant	

		understory species.	Salix exigua/Equisetum arvense
	4.	Not as above.	5
5.	Mesic forbs including Heracleum lanatum, Senecio triangularis, Smilacina stellata, and Mertensia sp. alone or in combination contribute at least 10% cover to the understory.		Salix exigua/Mesic forb
5.	Not as above.		17
	6.	Salix bebbiana the dominant willow with at least 15% cover.	7
	6.	Not as above.	9
7.	Mesic graminoids including Poa pratensis and Phalaris arundinacea with at least 25% cover.		Salix bebbiana/Mesic graminoid
7.	Not as above.		8
	8.	Understory not dominated by mesic graminoids, forbs or shrubs.	Salix bebbiana
	8.	Not as above	17
9.	Salix drummondiana the dominant willow, alone or in combination with S. geyeriana, or S. sitchensis, with at least 25% cover. Salix drummondiana X Salix sitchensis hybrids may occur and are included with the Salix drummondiana community types.		10
9.	Not as above.		13
	10.	Calamagrostis canadensis with at least 25% cover.	Salix drummondiana/ Calamagrostis canadensis
	10.	Not as above.	11
11.	Carex utriculata (rostrata) with at least 25% cover.		Salix drummondiana/Carex utriculata
11.	Not as above.		12
	12.	Other species dominate the understory.	Salix drummondiana cover type
13.	Salix geyeriana the dominant shrub with at least 10% cover.		14
13.	Not as above.		17
	14.	Carex utriculata with at least 20% cover.	Salix geyeriana/Carex utriculata
	14.	Not as above.	15

15.	Mesic forbs including Heracleum lanatum, Senecio triangularis, Smilacina stellata, and Mertensia sp. alone or in combination contribute at least 10% cover to the understory.		Salix geyeriana/Mesic forb
15.	Not as above.		16
	16.	Mesic graminoids including Carex lanuginoisa, Glyceria spp., and Scirpus spp. alone or in combination with at least 10% cover.	Salix geyeriana/Mesic graminoid
	16.	Not as above.	17
17.	Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.		18
17.	Site without wetland characteristics.		Upland site
	18.	Overstory and understory dominated by native plant species.	Unclassified or undocumented palustrine scrub-shrub type
	18.	Overstory or understory dominated by exotic plant species.	Human induced palustrine scrub-shrub vegetation

Key to Palustrine Emergent vegetation types

1.	Carex species dominant.	Carex community type key
1.	Not as above or grass or forb species dominant.	Non-carex community type key

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 vesicaria with at least 50% cover or the dominant species.	Carex vesicaria
	2.	Not as above.	3
3.	Carex aquatilis with at least 50% cover or the dominant species.		Carex aquatilis
3.	Not as above.		4
	4.	Carex lasiocarpa with at least 25% cover or the dominant species.	Carex lasiocarpa
	4.	Not as above.	5
5.	Carex lanuginosa with at least 25% cover or the dominant species.		Carex lanuginosa

5. Not as above. 6

6. Carex cusickii with at least 25% cover or the dominant species. Carex cusickii

6. Not as above. 7

7. Carex nebraskensis with at least 25% cover or the dominant species. Carex nebraskensis

7. Not as above. 8

8. Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology. 9

8. Site without wetland characteristics. Upland site

9. Community dominated by native plant species. Unclassified or undocumented palustrine emergent vegetation

9. 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. 11

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 15% cover and the dominant species. Deschampsia cespitosa

3. Not as above. 4

4. Glyceria borealis with at least 25% cover or the dominant species. Glyceria borealis

4. Not as above. 5

5. Agropyron smithii with at least 25% cover or the dominant graminoid. Agropyron smithii

5. Not as above. 6

6. Phalaris arundinacea with at least 25% cover or the dominant species. Phalaris arundinacea

	6.	Not as above.	7
7.	Juncus baliticus with at least 25% cover or the dominant species.		Juncus balticus
7.	Not as above.		8
	8.	Scirpus acutus with at least 25% cover or the dominant species.	Scirpus acutus
	8.	Not as above.	9
9.	Scirpus microcarpus with at least 25% cover or the dominant species.		Scirpus microcarpus
9.	Not as above.		10
	10.	Eleocharis palustris with at least 25% cover or the dominant species.	Eleocharis palustris
	10.	Not as above.	11
11.	Typha latifolia and/or Typha angustifolia alone or in combination with at least 50% cover or the dominant species .		Typha latifolia
11.	Not as above.		12
	12.	Equisetum fluviatile the dominant species with at least 25% cover.	Equisetum fluviatile
	12.	Not as above.	13
13.	Sparganium eurycarpum with at least 25% cover or the dominant species.		Sparganium eurycarpum
13.	Not as above.		14
	14.	Site with wetland characteristics including hydric soils, hydrophytic vegetation, or wetland hydrology.	15
	14.	Site without wetland characteristics.	Upland site
15.	Community dominated by native plant species.		Unclassified or undocumented palustrine emergent community type
15.	Native species replaced or nearly replaced by exotic plant species.		Human induced palustrine emergent vegetation

Key to palustrine aquatic bed (and lacustrine littoral) types

1.	Nuphar polysepalum with greater cover than any other plant species.	Nuphar polysepalum

1.	Not as above.	2
	2. Brasenia shreberi with greater cover than any other plant species.	Brasenia shreberi
	2. Not as above.	3
3.	Community dominated by native plant species.	Unclassified or undocumented palustrine aquatic bed vegetation
3.	Native species replaced or nearly replaced by exotic plant species.	Human induced palustrine aquatic bed vegetation

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Appendix B

Characterization abstracts for selected wetland plant communities in the Spokane River Basin

ABIES LASIOCARPA/OPLOPANAX HORRIDUM

COMMON NAME SUBALPINE FIR/DEVILS CLUB

PHYSIOGNOMIC TYPE Forest

SIMILAR COMMUNITIES Sites are similar to those supporting Thuja plicata/Oplopanax horridum habitat types except Abies lasiocarpa typically occurs in colder areas.

RANGE Minor type in Idaho, Montana, British Columbia, and Alberta.

ENVIRONMENTAL DESCRIPTION This habitat type occurs on ravine bottoms and sites near streams, springs, or seepage areas where the water table remains near the surface year round. Surface soils are very acidic, nongravelly loams. The duff layer is thick (7 to 10 centimeters) and mineral soils are not exposed.

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Abies lasiocarpa, Picea spp.
Tree sub-canopy	Larix occidentalis
Short shrub	Oplopanax horridum
Herbaceous	Clintonia Uniflora, Tiarella trifoliata, Athyrium felix-femina, Gymnocarpium dryopteris

VEGETATION DESCRIPTION Old growth stands are codominated by Abies lasiocarpa and Picea species. Minor amounts of Pseudotsuga menziesii, Larix occidentalis, and Pinus monticola occur in nearly all stands. Oploplanax horridum and Taxus brevifolia average 30 percent cover each in the shrub understory. The forbs, Clintonia uniflora, Tiarella trifoliata, Smilacina stellata, and Trautvetteria carolinensis and the ferns, Athyrium filix-femina and Gymnocarpium dryopteris are usually present (Pfister et al. 1977).

WILDLIFE VALUES Forage production for deer and elk is probably low. Many wildlife species such as chestnut back chickadees and goshawks, are partially to strongly dependent on large old growth trees for forage, cover, and nesting sites (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Not identified.

ADJACENT COMMUNITIES Adjacent wetter sites support Carex communities and drier sites may include the Abies lasiocarpa/Calamagrostis canadensis habitat type (Hansen et al. 1995).

CONSERVATION RANK G2 S2

SUCCESSION AND MANAGEMENT Abies lasiocarpa and Picea spp. are typically codominants in seral stands. Other seral tree species may include Pseudotsuga menziesii, Larix occidentalis, and Pinus monticola.

Productivity potential for timber is moderate to high, but sites are generally not suitable for timber production. Shallow rooted species, fine textured soils, and high water tables contribute to a high degree of instability, especially following logging of adjacent stands. This habitat type usually occupies very small areas, often has high recreational and aesthetic values, and has high water tables precluding the use of heavy equipment. Road construction, trails, and site development problems can be minimized by avoiding these sites. Domestic grazing potential is low (Hansen et al. 1995, Pfister et al. 1977).

CLASSIFICATION COMMENTS Classification is based on four stands in Montana. Cooper et al. (1991) includes this as an incidental or rare habitat type in northern Idaho.

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PINUS PONDEROSA/CRATAEGUS DOUGLASII

COMMON NAME PONDEROSA PINE/BLACK HAWTHORN

PHYSIOGNOMIC TYPE Woodland

SIMILAR COMMUNITIES Pinus ponderosa/Crataegus douglasii has a similar shrub and herbaceous species composition as Crataegus douglasii/Symphoricarpos albus/Smilacina stellata which, in some situations, may be an early seral type of this community (Daubenmire and Daubenmire 1968, Crowe and Clausnitzer 1997). Pinus ponderosa/Crataegus douglasii is also similar to the Pinus ponderosa/Symphoricarpos albus floodplain community in eastern Oregon. Some stands from northeastern Oregon have Crataegus douglasii well represented as a long-lived, early seral shrub on some plots (Crowe and Clausnitzer 1997), though those from central Oregon do not (Kovalchik 1987). The Pinus ponderosa/Prunus virginiana community described by Hansen et al. (1995) in Montana has a two-layered, mixed shrub understory with over 10 percent cover of both Crataegus douglasii and Symphoricarpos albus, though neither are dominant species. Hansen et al. (1995) note that Crataegus will become dominant shrub under heavy livestock grazing. Other communities which may have similar structural characteristics or species include the slightly wetter Pinus ponderosa/Cornus sericea community (Hansen et al. 1995) and Pinus ponderosa/Elymus glaucus (Kovalchik 1987).

RANGE The Pinus ponderosa/Crataegus douglasii community occurs in the Great Plains-Palouse Dry Steppe province of northwestern Wyoming, eastern Washington, western Idaho, northeastern Oregon (Kauffman et al. 1985), and possibly Montana. In Idaho it is known

from the Lake Coeur D'Alene basin (Jankovsky-Jones 1998c) and possibly southwest Idaho at the Rocky Comfort Flat Research Natural Area (Moseley 1990). Many floodplain terraces, once supporting Pinus ponderosa communities, have been logged, grazed, converted to cultivation, and invaded by Bromus tectorum, Poa pratensis, and other exotic species (Daubenmire and Daubenmire 1968, Jankovsky-Jones 1998c).

ENVIRONMENTAL DESCRIPTION Similar to the Pinus ponderosa/Symphoricarpos albus community, Pinus ponderosa/Crataegus douglasii occurs in narrow ravines to moderately wide valley bottoms with V-shaped to flat bottomed profiles (Crowe and Clausnitzer 1997). Pinus ponderosa/Crataegus douglasii (within Crowe and Clausnitzer's (1997) Pinus ponderosa/Symphoricarpos albus community) is found on floodplains and stream terraces at low elevations (below 1615 m). Soil texture varies from silt loam to sandy loam with some gravel. Depth to underlying sand, cobbles, and stones is over 38 cm. Depth to the water table is 51 to 81 cm early in season dropping by mid-summer (Kauffman et al. 1985, Crowe and Clausnitzer 1997). There is high cover of pine needle litter (8 to 23 cm thick) on the soil.

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Pinus ponderosa
Tall shrub	Crataegus douglasii, Prunus virginiana, Alnus spp.
Short shrub	Ribes aureum, Symphoricarpos albus, Rosa woodsii, Ribes lacustre
Herbaceous	Poa pratensis, Bromus spp., Achillea millefolium, Smilacina stellata, Galium spp., Heracleum lanatum

VEGETATION DESCRIPTION Pinus ponderosa/Crataegus douglasii (within Crowe and Clausnitzer's (1997) Pinus ponderosa/Symphoricarpos albus community) has an open overstory of Pinus ponderosa (averaging 36 percent cover) with understory Pinus ponderosa also sometimes present. There is a well developed tall shrub understory dominated by Crataegus douglasii (75 percent cover), occasionally with lesser amounts of Alnus species, Ribes aureum, and Prunus virginiana (Kauffman et al. 1985, Crowe and Clausnitzer 1997). In Montana, the similar Pinus ponderosa/Prunus virginiana community also has Amelenchier alnifolia well represented (Hansen et al. 1995). The low shrub layer is typically dominated by Symphoricarpos albus (34 percent cover) with Rosa woodsii and Ribes lacustre occasionally common (Kauffman et al. 1985, Crowe and Clausnitzer 1997). In Montana, Berberis repens and Spiraea betulifolia are also common in the similar Pinus ponderosa/Prunus virginiana community (Hansen et al. 1995). The herbaceous layer is dominated by Poa pratensis (averaging 40 percent cover) and mixed mesic forbs (Kauffman et al. 1985, Crowe and Clausnitzer 1997). Other common graminoids may include Bromus species (Bromus tectorum and native Bromus), Carex geyeri, Festuca rubra, Calamagrostis rubescens, Hordeum pusillum, and Elymus glaucus. Common forbs, all with usually less than 20 percent cover, are Achillea millefolium, Smilacina stellata, Galium species (Galium boreale, G. triflorum, and G. asperrimum), Aster foliaceus, Fragaria virginiana, Heracleum lanatum, and Potentilla gracilis (Kauffman et al. 1985, Crowe and Clausnitzer 1997).

WILDLIFE VALUES Pinus ponderosa communities are commonly used by deer, elk, and porcupine (and other small mammals) for foraging (e.g. needles, cones, buds, twigs, seeds) and shelter (Kauffman et al. 1985, Crowe and Clausnitzer 1997). Fallen Pinus ponderosa logs, snags, and stumps are especially important for cavity nesting birds (e.g. woodpeckers) and mammals. Pinus ponderosa is important for seed foraging birds, such as juncos, evening grosbeaks, varied thrushes, Clark's nutcrackers, sparrows, and chickadees, and provides nesting and roosting for raptors and gamebirds (Crowe and Clausnitzer 1997). Crataegus douglasii is also very good for both mammal and bird nesting and foraging due to its structural diversity and berry production (Hansen et al. 1988). The Pinus ponderosa/Crataegus douglasii community also provides streambank stabilization, shading, and large woody debris important for fish habitat (Crowe and Clausnitzer 1997).

OTHER NOTEWORTHY SPECIES Exotic species including Poa pratensis or Bromus tectorum will eventually dominate sites that are heavily grazed (Daubenmire and Daubenmire 1968, Kauffman et al. 1985, Crowe and Clausnitzer 1997). Other weedy species such as Trifolium repens, Taraxacum officinale, Phalaris arundinacea, Cirsium vulgare, Dipsacus sylvestris, Tanecetum vulgare, and Arctium minus may also be abundant in disturbed stands (Hansen et al. 1988, Jankovsky-Jones 1998c). Adjacent upland vegetation is frequently converted to cultivated cropland.

ADJACENT COMMUNITIES Wetter communities adjacent to Pinus ponderosa/Crataegus douglasii (and the similarly positioned Pinus ponderosa/Symphoricarpos albus and Pinus ponderosa/Prunus virginiana communities) are on streambanks and lower terraces. They include Populus trichocarpa/Alnus incana-Cornus sericea and communities dominated by Equisetum arvense, Alnus incana, Salix exigua, Salix drummondiana, and Populus trichocarpa (Daubenmire and Daubenmire 1968, Hansen et al. 1995, Crowe and Clausnitzer 1997). On the same drier floodplain terraces as Pinus ponderosa/Crataegus douglasii are Crataegus douglasii/Symphoricarpos albus/Smilacina stellata, Pinus ponderosa/Symphoricarpos albus, Pinus ponderosa/Poa pratensis, Pseudotsuga menziesii/Symphoricarpos albus, Poa pratensis or Bromus tectorum grassland, and possibly Abies grandis or Populus tremuloides communities (Kauffman 1985, Crowe and Clausnitzer 1997). On wider floodplains many neighboring terraces have been converted to cultivated cropland (Jankovsky-Jones 1998c). Adjacent upland communities on drier terraces and sideslopes include: Artemisia tridentata steppe; Pinus ponderosa or Pseudotsuga menziesii forest with a variety of understories; Festuca idahoensis-Symphoricarpos albus meadow steppe; and Juniperus occidentalis steppe (Daubenmire and Daubenmire 1968, Kauffman 1985, Crowe and Clausnitzer 1997).

CONSERVATION RANK G1 S1

SUCCESSION AND MANAGEMENT The successional dynamics of the Pinus ponderosa/Crataegus douglasii community are not clear. This community may be early or mid-seral or, alternatively, secondary successional. Crataegus douglasii is an early-seral shrub which establishes on moist sites of the Pinus ponderosa/Symphoricarpos albus habitat type after

the tree overstory is removed by fire, logging, or catastrophic flooding (Daubenmire and Daubenmire 1968, Crowe and Clausnitzer 1997). Crataegus is intolerant of shade, but it may persist for many years, even in stands where trees are closing the overstory. Alternatively, Daubenmire and Daubenmire (1968) note the presence of a stand of even-aged pine with a dense Crataegus understory and hypothesizes that the age of the trees either corresponds to a temporary reduction in shrub density or that Crataegus and other shrubs are recent invaders. For example, Crataegus douglasii is an increaser shrub under moderate to heavy livestock grazing. Thus, Pinus ponderosa/Crataegus douglasii may be a grazing induced phase of Pinus ponderosa/Prunus virginiana, with which it has similarities in structure and species composition (Hansen et al. 1995). If overgrazed, Crataegus may decrease allowing establishment of Pinus ponderosa. Another possibility is that Crataegus douglasii/Symphoricarpos albus/Smilacina stellata may be an early seral type of this community (Daubenmire and Daubenmire 1968, Crowe and Clausnitzer 1997). However, it is not clear how Pinus pondersosa becomes established under a Crataegus overstory. Since Pinus ponderosa/Crataegus douglasii is found on infrequently flooded, old alluvial terraces, it has probably replaced moister terrace communities (such as Alnus incana, Populus trichocarpa, Populus tremuloides with Symphoricarpos albus or mesic forb understories) as sites dried due to stream downcutting. Continued drying will result in the loss of mesic forbs and graminoids from the community.

Pinus ponderosa/Crataegus douglasii is directly affected by logging of mature pines, road construction or other developments (e.g. home building), and livestock grazing. Proper watershed management is also important to the health of this and other riparian communities. Logging, grazing, irrigation and conversion to agriculture, and road construction potentially increase sediment levels and alter the hydrologic system which, in turn, affect plant distribution (Daubenmire and Daubenmire 1968, Kauffman et al. 1985, Jankovsky-Jones 1998c). Though riparian sites have potentially high timber production and tree regeneration, logging of old Pinus ponderosa has dramatic effects on community structure (such as increasing shade intolerant Crataegus douglasii and other shrubs), stream systems, and wildlife habitat (Kauffman et al. 1985, Hansen et al. 1995). Pinus ponderosa, Crataegus douglasii, and Symphoricarpos albus all have extensive root systems and are effective in stabilizing streambanks as well as reducing erosion (Hansen et al. 1988). Thus, decreases in tree or shrub cover, combined with (or caused by) overgrazing, will convert the herbaceous layer to a less stable Poa pratensis and exotic weed understory (Crowe and Clausnitzer 1997). The result will be increased bank erosion, stream overwidening, higher peak flows and lower base flows, and warmer stream temperatures (Kovalchik 1987). Logging of Pinus ponderosa in this community is not recommended for the above reasons and the potential rarity of the community. Though livestock forage is highly variable in Pinus ponderosa communities, livestock do use the tree and shrub cover for shade. Grazing will lead to clumps of Rosa woodsii, Crataegus (which is palatable), Bromus tectorum, and Poa pratensis (Kauffman et al. 1985, Hansen et al. 1995). Though soil compaction is not usually a problem in coarse soils, livestock use can compact some areas, preventing growth and establishment of Symphoricarpos albus and Pinus ponderosa (Kovalchik 1987). Pinus ponderosa resists fire well with its thick bark and deep roots, though moderate to hot fires (and crown fires) may kill them (especially smaller pole trees, saplings, and seedlings). On moist sites, Pinus

ponderosa stands are denser and more likely to carry fire to crowns (Hansen et al. 1988, Hansen et al. 1995). Crataegus douglasii, Symphoricarpos albus, and Prunus virginiana will quickly resprout from root crowns and rhizomes after cool or moderate fires but may be killed by hot fires (Hansen et al. 1988, Hansen et al. 1995, Crowe and Clausnitzer 1997). In addition, insects, such as pine beetle species, and dwarf mistletoe may damage Pinus ponderosa stands (Crowe and Clausnitzer 1997).

CLASSIFICATION COMMENTS Classification of Pinus ponderosa/Crataegus douglasii is based on data from a very limited study area in northeastern Oregon (Kauffman et al. 1985). It is synonymous with Pinus ponderosa/Crataegus douglasii/Poa pratensis/mixed forbs described by Kauffman et al. (1985). The association includes three of Crowe and Clausnitzer's (1997) Pinus ponderosa/Symphoricarpos albus stands that have 75 percent cover of Crataegus douglasii. Pinus ponderosa/Crataegus douglasii is probably successionally related to Pinus ponderosa/Symphoricarpos albus and Crataegus douglasii/Symphoricarpos albus/Smilacina stellata, though, several contrasting hypotheses exist on the exact relationship (Daubenmire and Daubenmire 1968, Crowe and Clausnitzer 1997). It may also be a grazing induced phase of Pinus ponderosa/Prunus virginiana to which it has ecological and floristic similarities (Hansen et al. 1995).

The classification of Pinus ponderosa/Crataegus douglasii is based on data from a very limited study area at Catherine Creek in northeastern Oregon (Kauffman et al. 1985). At this site, at most ten stands (some of which are in grazing exclosures) were sampled and classified as the Pinus ponderosa/Crataegus douglasii/Poa pratensis/mixed forbs community. In addition, three of Crowe and Clausnitzer's (1997) Pinus ponderosa/Symphoricarpos albus stands are considered to be Pinus ponderosa/Crataegus douglasii. The community has been observed in Idaho (Jankovsky-Jones 1998c), northwestern Wyoming, and apparently eastern Washington, though, no plot data was available from these locations.

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THUJA PLICATA/ATHYRIUM FILIX-FEMINA

COMMON NAME WESTERN ARBORVITAE/SUBARCTIC LADY FERN

PHYSIOGNOMIC TYPE Forest

SIMILAR COMMUNITIES Due to the high moisture of its habitat, the vegetation structure and composition of Thuja plicata/Athyrium filix-femina on both riparian and upland locations is similar (Kovalchik 1993). Some stands of Thuja plicata/Oplopanax horridum, also found on similarly wet sites, may have 5 percent or more cover of Athyrium filix-femina and could be classified as Thuja plicata/Athyrium filix-femina though the latter lacks significant amounts of

Oplopanax horridum (Daubenmire and Daubenmire 1968, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995, Lillybridge et al. 1995). Numerous communities are both structurally and floristically similar to Thuja plicata/Athyrium filix-femina, though they are generally found on better drained sites. For example, Thuja plicata/Athyrium filix-femina is similar to Thuja plicata/Asarum caudatum, Thuja plicata/Gymnocarpium dryopteris, Thuja plicata/Clintonia uniflora, and Thuja plicata/Dryopteris species (Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995). Tsuga heterophylla communities (with understories dominated by Athyrium filix-femina, Gymnocarpium dryopteris, Asarum caudatum, and Clintonia uniflora) are also very similar but are found on better drained sites. The Thuja plicata/Adiantum pedatum community is also similar but has lesser importance of Athyrium filix-femina (Cooper et al. 1991). In addition, Thuja plicata/Pachistima myrsinites shares the same suite of understory mesic forbs but lacks a significant fern component (Daubenmire and Daubenmire 1968).

RANGE Thuja plicata/Athyrium filix-femina is widely distributed in northern Idaho, known from the basins of the Priest, Kootenai, Coeur D'Alene, St. Joe, Palouse, North Fork Clearwater, upper Lochsa, Pend Oreille, and Selway rivers (Cooper et al. 1991, Lichthardt and Moseley 1994, Lichthardt 1997 and 1998). It is also found in northwest Montana and Bitterroot mountains of Montana (Hansen et al. 1995). The community is known from the eastern half of the Okanogan Highlands of northeastern Washington (Kovalchik 1993) and the eastslope of the Cascade Mountains (Lillybridge et al. 1995). In southeastern British Columbia, it is found in the southern Monashee, Selkirk, Purcell, and Rocky mountains in valley bottoms and lower to mid-slopes of drainages such as the Columbia, Moyie, and Kootenai rivers (Utzig et al. 1986). Historically, climax or late seral examples of this community were much more common. However, many old growth Thuja plicata/Athyrium filix-femina stands have been lost to clearcutting and many groves altered by selective logging (Lichthardt 1998). Most remaining stands are fragmented and reduced to small areas or riparian stringers.

ENVIRONMENTAL DESCRIPTION Thuja plicata/Athyrium filix-femina is restricted to regions with a maritime influenced climate characterized by warm, wet summers and cold winters with heavy snowfall (Daubenmire and Daubenmire 1968, Utzig et al. 1986). Within this climate zone it is usually found in the low to moderate elevation range of 700 m to 1300 m, but is also known from as low as 460 m (especially the Adiantum pedatum phase) and as high as 1570 m (Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995, Lichthardt and Moseley 1994, Lichthardt 1997 and 1998). The community is found on both wet riparian floodplains, terraces, and streambanks and also mesic upland toe-slopes, alluvial fans, and mid-slopes (Daubenmire and Daubenmire 1968, Utzig et al. 1986, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995, Lichthardt and Moseley 1994, Lichthardt 1997 and 1998). On sloped sites, aspects are northwest to north to east and slopes are usually less than 40 percent. Sites are located in narrow to wide valley bottoms of streams ranging from ephemeral to large rivers (Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995, Lichthardt 1997 and 1998). These valleys are both U-shaped (with less than 3 percent gradient) or V-shaped (over 8 percent gradient) with Rosgen A or B type streams (Kovalchik 1993). Sites are warm for the Thuja plicata series with good cold air drainage. Thuja plicata/Athyrium filix-femina is found on wet,

sometimes subirrigated, soil ranging from subhydric or hygric to mesic (Utzig et al. 1986). Sites may be shallowly flooded during the spring and the water table remains within 1 m of the surface during the growing season (Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995). Rivulets from seepage sometimes flow through stands and, due to the many large, rotted, downed logs, there is often undulating microtopography (Daubenmire and Daubenmire 1968). Soils are acidic (pH 4.2 to 6.0) sand, silt, or clay loams, over coarse alluvium or glacial outwash, with moderate water holding capacity (Daubenmire and Daubenmire 1968, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995). Soil types include Oxyaquic Cryochrepts and Sapric Histosols, mottled at shallow depths, derived from mixed colluvial, alluvial, fluvial, or glacial (outwash or morainal) deposits (Utzig et al. 1986, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995).

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Thuja plicata, Tsuga heterophylla, Abies grandis
Tall shrub	Acer glabrum, Taxus brevifolia, Alnus spp.
Short shrub	Rubus parviflora, Vaccinium membranaceum, Linnaea borealis
Herbaceous	Athyrium filix-femina, Gymnocarpium dryopteris, Circaea alpina, Coptis occidentalis, Trautvetteria caroliniensis, Adiantum pedatum, Tiarella trifoliata

VEGETATION DESCRIPTION Thuja plicata/Athyrium filix-femina is dominated by Thuja plicata with 44 to 90 percent cover and 86 to 100 percent constancy (Daubenmire and Daubenmire 1968, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995, Lichthardt 1998). Stands typically have old growth structure, often composed of well spaced, very large diameter at breast height (over 1 m dbh) Thuja plicata with lesser amounts of younger trees. Stands often have basal area measurements ranging from 213 to 365 feet^2/acre with over twenty 1.5 to over 2.7 m dbh Thuja plicata trees per acre (Daubenmire and Daubenmire 1968, Cooper et al. 1991, Lichthardt 1998). Thuja plicata is typically the only reproducing tree under the canopy with occasional seedlings, saplings, and pole trees propagated by seed or vegetatively from lower branches. Tsuga heterophylla is also sometimes reproducing on downed logs. Mature Tsuga heterophylla may be present with 29 to 35 percent cover and 20 to 76 percent constancy, usually in patches on better drained sites (Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995). Large, old snags and seral trees, mainly Abies grandis and Picea engelmannii (both with less than 20 percent cover and 82 percent constancy), are often present (Daubenmire and Daubenmire 1968, Utzig et al. 1986, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995, Lichthardt 1998). Other seral species include Pseudotsuga menziesii, Pinus monticola, and Abies lasiocarpa, often on drier microsites.

An open or patchy tall shrub layer exists, often in canopy gaps, consisting of Acer glabrum (up to 20 percent cover and 60 percent constancy); Taxus brevifolia (up to 15 percent cover and 45 percent constancy); sometimes locally dense patches of Alnus sinuata (or Alnus incana or A. rubra on disturbed riparian sites); and occasional Cornus sericea and Sambucus species (Daubenmire and Daubenmire 1968, Utzig et al. 1986, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995,

Lichthardt 1997 and 1998). There is also an open low shrub understory composed mainly of Rubus parviflora (up to 30 percent cover and 57 percent constancy) and Vaccinium membranaceum (up to 20 percent cover and 59 percent constancy). Occasionally, Symphoricarpos albus, Pachistima myrsinites, Ribes lacustre, Menziesia ferruginea, and Oplopanax horridum are present with low cover. Two ground layer woody plants, Linnaea borealis and Cornus canadensis, are sometimes present with low cover and constancy.

The herbaceous understory is dominated by ferns with patchy mesic forbs. Athyrium filix-femina, often over 1 m tall, dominates the understory with 14 to 81 percent cover and over 90 percent constancy (Daubenmire and Daubenmire 1968, Utzig et al. 1986, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995, Lichthardt and Moseley 1994, Lichthardt 1997 and 1998). Other common ferns are Gymnocarpium dryopteris (up to 19 percent cover and 88 percent constancy) and, in some stands, Adiantum pedatum (it defines the Adiantum pedatum phase when over 5 percent cover and the Athyrium filix-femina phase when less than that cover). Various Dryopteris species, Pteridium aquilinum, and Polystichum munitum are occasionally present. The graminoid component is depauperate, mainly a few Carex species (e.g. Carex deweyana), Luzula species, and grasses (e.g. Bromus vulgaris, Glyceria elata) with low cover. The forb layer is very diverse and a suite of species ubiquitous across most stands exists. Such species, usually with less than 10 percent cover and constancy 60 to 100 percent, include: Asarum caudatum, Clintonia uniflora, Coptis occidentalis, Galium triflorum, Senecio triangularis, Smilacina stellata, Streptopus amplexicaulis, Tiarella trifoliata, and Trillium ovatum. Other common species, often with higher cover (up to 40 percent) and moderate constancy (up to 75 percent constancy), include: Actaea rubra, Circaea alpina, and Trautvettaria carolinensis. Forbs such as Adenocaulon bicolor, Anemone piperi, Boykinia major, Disporum species, Mitella species, Montia species, Osmorhiza chilensis, and Viola glabella are not as common across stands but may be present with low to moderate cover and low to high constancy (Daubenmire and Daubenmire 1968, Utzig et al. 1986, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995, Lichthardt and Moseley 1994, Lichthardt 1997 and 1998). Moss and lichen ground cover is typically quite low due to the large amount of litter (duff layers average 5 cm thick) and downed wood.

WILDLIFE VALUES Thuja plicata communities provide large amounts of food, cover, and water for a variety of wildlife including deer and elk (Hansen et al. 1995). Though deer feed on Thuja plicata needles and twigs, overall forage amounts for ungulate species is low. However, Thuja plicata/Athyrium filix-femina is highly valuable big-game habitat throughout the year, especially when Taxus brevifolia is present (Cooper et al. 1991). Snowshoe hares are known to browse Thuja plicata seedlings. In addition, many birds, such as Chestnut-backed chickadees and goshawks, and small mammals utilize old growth trees and downed logs for foraging, cover, and nesting (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Thuja plicata/Athyrium filix-femina old growth stands are floristically diverse and support a variety of endemic species, widespread but non-abundant species, and coastal disjuncts in the northern Rocky Mountains, many of which are rare (Lichthardt and Moseley 1994). For example in northern Idaho, this community may be

habitat for the following endemic, rare, or disjunct species: Blechnum spicant, Botrychium lanceolatum, Botrychium minganense, Cardamine constancei, Carex hendersonii, Cornus nuttallii, Corydalis caseana var. hastata, Cypripedium fasciculatum, Polypodium glycyrrhiza, Syntheris platycarpa, Thelypteris nevadensis, Trientalis latifolia, and also invertebrate, moss, and lichen species (Lichthardt and Moseley 1994, Lichthardt 1998). Few exotic species are often observed in the Thuja plicata/Athyrium filix-femina community. Species include Agrostis stolonifera, Chrysathemum leucanthemum, Phalaris arundinacea, Poa palustris, Poa pratensis, Prunella vulgaris, and Taraxacum officinale, (Daubenmire and Daubenmire 1968, Hansen et al. 1995).

ADJACENT COMMUNITIES Thuja plicata/Athyrium filix-femina occurs on wet sites but is often adjacent to other, even wetter Thuja plicata communities. In north Idaho and southeast British Columbia, Thuja plicata communities are in a mosaic along a moisture gradient from wet (floodplains, riparian valley bottoms) to mesic (toeslopes). For example, from wet terraces to drier toeslopes the following community gradient may occur: Thuja plicata/Lysichitum americanum; Thuja plicata/Equisetum arvense (sometimes with Tsuga heterophylla and Cornus species), Thuja plicata/Oplopanax horridum; Thuja plicata/Dryopteris species (sometimes with Tsuga heterophylla and Vaccinium membranaceum); Thuja plicata/Athyrium filix-femina (with Cornus species on wetter sites and Tsuga heterophylla and Rubus parviflora on drier sites); and Thuja plicata/Adiantum pedatum (Utzig et al. 1986, Cooper et al. 1991). Adjacent streambanks support Alnus incana/Athyrium filix-femina, Alnus sinuata/Athyrium filix-femina, or, on cobble bars, Alnus rubra communities (Kovalchik 1993, Lichthardt 1997). Thuja plicata/Oplopanax horridum or Abies lasiocarpa communities are often adjacent on colder and wetter sites while drier Thuja plicata and Tsuga heterophylla types are adjacent on sites with better drainage (Daubenmire and Daubenmire 1968, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995). Drier adjacent terraces support Tsuga heterophylla/Gymnocarpium dryopteris, Thuja plicata/Gymnocarpium dryopteris, and Thuja plicata/Aralia nudicaulis while adjacent drier slopes support Thuja plicata/Clintonia uniflora, Tsuga heterophylla/Clintonia uniflora, and Thuja plicata/Pachistima myrsinites (Daubenmire and Daubenmire 1968, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995). Neighboring upland communities are dominated by Abies grandis, Abies lasiocarpa, Tsuga heterophylla, or Thuja plicata forests. Due to large volumes of wood produced in this and neighboring communities, many Thuja plicata/Athyrium filix-femina communities are fragmented by clearcutting and now adjacent to early-seral mixed conifer species plantations and fields of mixed shrub species (Lichthardt 1998).

CONSERVATION RANK G3G4 S3

SUCCESSION AND MANAGEMENT Thuja plicata/Athyrium filix-femina is a "climax" or "old growth" community representing the potential natural vegetation on its sites. However, on better drained microsites within this community, Tsuga heterophylla may be the climax and dominant tree species (Daubenmire and Daubenmire 1968, Cooper et al. 1991, Kovalchik 1993, Hansen et al. 1995). The common major seral trees are Abies grandis and Picea engelmannii while minor seral species are Pinus monticola, Pseudotsuga menziesii, Abies lasiocarpa, and occasionally Larix occidentalis. On streambanks and terraces, early-seral Thuja plicata/Athyrium

filix-femina communities may be dominated by Alnus rubra with Adiantum pedatum, Circaea alpina, and Mitella caulescens prominent in the understory. Other stands are dominated by Abies lasiocarpa with an understory of Boykinia major, a rich Sphagnum moss ground layer, and lesser amounts of Athyrium filix-femina, Scirpus microcarpus, and Ligusticum canbyi (Lichthardt 1997). Populus trichocarpa and Phalaris arundinacea may also be early-seral in riparian sites (Hansen et al. 1995). Various shrubs and mesic herbs, present in both early-seral and climax stands, respond favorably to increased sunlight in gaps and canopy openings, thus indicating their potential as post-disturbance colonizers (Hansen et al. 1995, Lichthardt 1998).

Productivity of Thuja plicata/Athyrium filix-femina sites is very high and Thuja plicata and Tsuga heterophylla are highly valued timber trees. However, Thuja plicata re-planting success is lower than that of Tsuga heterophylla (Utzig et al. 1986, Hansen et al. 1995), even though Thuja plicata seed production is very high (Cooper et al. 1991). Logging activities should be managed for the maintenance of snags and downed logs which help build soil, act as both seedbeds for Thuja plicata and Tsuga heterophylla, and provide wildlife habitat (Cooper et al. 1991, Hansen et al. 1995). Many old growth Thuja plicata/Athyrium filix-femina stands have been lost to clearcutting and many groves have very large remnant cut stumps (Lichthardt 1998). Though riparian stringer communities are generally off-limits to logging, upland old growth stands are still targeted. However, due to their rarity, old growth Thuja plicata stands should be protected (by designation such as Botanical Special Interest Areas or Research Natural Areas within U. S. National Forests) (Lichthardt and Moseley 1994, Lichthardt 1998). In addition, remaining stands should be protected from the effects of neighboring clearcuts (such as increased windthrow) by leaving a non-logged buffer zone. Logging in this community is limited by the high water table during most of the season which prevents heavy equipment use (Utzig et al. 1986, Cooper et al. 1991, Hansen et al. 1995). Saturated organic soils are very susceptible to compaction and make tree windthrow hazard high. Sandy or gravelly soils are not as compactible but are structurally damaged if disturbed (Hansen et al. 1995). Thuja plicata/Athyrium filix-femina rarely has wildfires. However, Thuja plicata is susceptible to fire mortality due to its thin bark and shallow root system. Older trees, however, can survive fire damage to the bole (especially from cool ground fires) as evidenced by occasional fire scars on old trees (Cooper et al. 1991, Hansen et al. 1995, Lichthardt 1998). Recreation possibilities, such as camping, hiking, bird and wildlife watching, and fishing, are excellent but should be monitored for damage to soil. Recreation impacts are well documented at several known sites of Thuja plicata/Athyrium filix-femina in Idaho (Lichthardt 1998). Recreation, road building, other developments, and livestock grazing should be limited on the wet soils. Forage production for livestock is very low except in early-seral stands with canopies removed (Hansen et al. 1995).

CLASSIFICATION COMMENTS While Thuja plicata/Athyrium filix-femina is classified from a large amount of stand plot data from many locations, several studies have split this community. For example, in southeastern British Columbia Utzig et al. (1986) identified two Thuja plicata-Tsuga heterophylla communities with Athyrium filix-femina in the understory. The understory of one type, located on side-slopes and toeslopes, is characterized by Rubus parviflora and Athyrium filix-femina. The other type, found in wetlands and riparian zones, has an

understory characterized by Cornus species (Cornus sericea and C. canadensis) and Athyrium filix-femina. In addition, the Adiantum pedatum phase of Thuja plicata/Athyrium filix-femina is equivalent to the Athyrium filix-femina phase of Thuja plicata/Adiantum pedatum described by other authors (Cooper et al. 1991). The Thuja plicata/Athyrium filix-femina community also encompasses most stands classified as Thuja plicata/Dryopteris species (Cooper et al. 1991). Some Tsuga heterophylla stands have also been lumped under Thuja plicata/Athyrium filix-femina. For example, Tsuga heterophylla may be climax in some stands included in Thuja plicata/Athyrium filix-femina but due to site wetness Thuja plicata is more competitive in these stands. Sites with better drainage do support Tsuga heterophylla stands with an Athyrium filix-femina understory (Cooper et al. 1991, Hansen et al. 1995). Finally, Thuja plicata/Athyrium filix-femina may be confused with the closely related Thuja plicata/Gymnocarpium dryopteris, Tsuga heterophylla/Gymnocarpium dryopteris, and Thuja plicata/Oplopanax horridum communities when Athyrium filix-femina cover is only 5 to 10 percent (Kovalchik 1993).

Thuja plicata/Athyrium filix-femina is confidently described based on extensive sampling throughout its range. For example, Cooper et al. (1991) sampled 34 plots of the Athyrium filix-femina phase and 14 plots of the Adiantum pedatum phase throughout northern Idaho. In addition, Daubenmire and Daubenmire (1968) sampled four plots in northern Idaho. Lichthardt and Moseley (1994) and Lichthardt (1997 and 1998) have sampled over 33 plots from the Clearwater National Forest of Idaho. The Thuja plicata/Athyrium filix-femina community is known from over 22 sites tracked by the Idaho Conservation Data Center. In northeastern Washington, 17 stands were sampled by Kovalchik (1993) and, in northwestern Montana, 11 stands by Hansen et al. (1995). The community is known from an unknown number of plots from southeastern British Columbia and the Cascade Mountains of Washington (Utzig et al. 1986, Lillybridge et al. 1995).

EDITION 99-02-23

AUTHOR C. Murphy

THUJA PLICATA/LYSICHITUM AMERICANUM

COMMON NAME WESTERN ARBORVITAE/YELLOW SKUNK CABBAGE

PHYSIOGNOMIC TYPE Forest

SIMILAR COMMUNITIES Thuja plicata/Lysichitum americanum is often synonomous with Thuja plicata-Tsuga heterophylla/Lysichitum americanum and Tsuga heterophylla-Thuja plicata/Lysichitum americanum (Utzig et al. 1986, Kunze 1994). These communities vary in cover and density of Thuja plicata and Tsuga heterophylla and either species may be dominant (or co-dominant). Other very similar communities highlight the importance of a moss ground layer such as Thuja plicata-Tsuga heterophylla/Lysichiton americanum/Mnium species in southeast

British Columbia (Utzig et al. 1986) and Tsuga heterophylla-Picea sitchensis-(Thuja plicata)/Lysichiton americanum/Sphagnum recurvum in southeast Alaska (Viereck et al. 1992). In the latter community, Thuja plicata is not usually dominant and, thus, has similarities with Tsuga heterophylla/Lysichitum americanum and Alnus rubra (or Alnus incana)/Lysichitum americanum (Kunze 1994). The latter community may be an early seral type of Thuja plicata/Lysichitum americanum. These communities sometimes intergrade with those with a shrub understory layer such as: Thuja plicata-Tsuga heterophylla/Gaultheria shallon/Lysichitum americanum/Sphagnum species; Thuja plicata/Alnus rubra-Cornus sericea/Lysichitum americanum-Smilacina stellata; Tsuga heterophylla/Acer circinatum/Lysichitum americanum; Tsuga heterophylla-Thuja plicata/Vaccinium species/Lysichiton americanum; and Tsuga heterophylla-Chamaecyparis nootkatensis/Vaccinium species/Lysichiton americanum (at higher elevations) (Viereck et al. 1992, Kunze 1994).

RANGE The Thuja plicata/Lysichitum americanum community is known from Idaho, British Columbia, Oregon, Washington, and possibly southeast Alaska. This coastal community type is disjunct in wet, maritime climate influenced areas of northern Idaho and southeastern British Columbia (Utzig et al. 1986). It is found near the North Fork Clearwater River and in the Selkirk Mountains along the Washington and Idaho border. On the west side of the Cascade Mountains, it was once relatively common in the lowlands of Washington (such as the Puget Sound trough), Oregon (Kunze 1994), and probably British Columbia. However, due to logging, development, agriculture, and wetland destruction, it is now much rarer with few viable occurrences remaining. A similar community (with a mixed conifer canopy) is also known from southeast Alaska (Viereck et al. 1992).

ENVIRONMENTAL DESCRIPTION The Thuja plicata/Lysichitum americanum community is found in wet, maritime climate influenced, valley bottoms and lower mountain slopes. It is found at low elevations in the Selkirk Mountains and North Fork Clearwater River (around 500 to 1000 m) and down to sea level on the coast (Utzig et al. 1986, CDC 1999, Kunze 1994). The maritime influenced climate of inland southeast British Columbia and north Idaho is characterized by warm, rainy summers and cold, heavy snowfall winters. Thuja plicata/Lysichitum americanum is restricted to poorly drained swamps or "bogs" on floodplains, flat ground, and depressions near low gradient streams, seeps, springs, and perched water tables (Utzig et al. 1986, Kunze 1994). The soils often have high organic content (muck or peat) with medium to rich soil nutrients, gleying and mottling, and subhydric moisture regimes (e.g. minerotrophic). Fallen trees, upturned root wads, and soil mounds form hummocks above the saturated or seasonally flooded soil. The water table level varies from slightly above the soil surface to slightly below (Utzig et al. 1986, Kunze 1994).

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Tsuga heterophylla, Thuja plicata
Short shrub	Gaultheria shallon, Vaccinium spp.

Herbaceous	Lysichitum americanum, Athyrium filix-femina, Cornus canadensis

VEGETATION DESCRIPTION The Thuja plicata/Lysichitum americanum community (including Thuja plicata-Tsuga heterophylla/Lysichitum americanum) is dominated by either Tsuga heterophylla (20 to 50 percent cover) or Thuja plicata (5 to 80 percent cover) (Kunze 1994). The canopy is open to closed (60 percent or more cover) and usually composed of old, small diameter trees with occasional large old growth trees and young trees. Other trees, sometimes co-dominant, include Picea sitchensis (coastal) and Abies grandis and Alnus rubra (coastal and possible inland). There is often a shrub layer (to 1.5 m tall) of varying cover composed of species such as Oplopanax horridum, Cornus canadensis, Vaccinium ovalifolium, Menziesia ferruginea, Rhamnus purshiana, and Spiraea douglasii (all with low cover) (Utzig et al. 1986, Kunze 1994). On the coast (and possibly disjunct inland) common species are Gaultheria shallon (20 to 50 percent cover), Vaccinium alaskaense (less than 20 percent cover), Rubus spectabilis (less than 10 percent cover), Acer circinatum, and Vaccinium parvifolium (Kunze 1994). Shrubs tend to grow on downed logs and soil mounds. The herbaceous layer is dominated by Lysichitum americanum (5 to 80 percent cover) with a diverse assemblage of ferns and allies such as Athyrium filix-femina, Blechnum spicant, Gymnocarpium dryopteris, Dryopteris species, and Equisetum species (Utzig et al. 1986, Kunze 1994). A moss layer sometimes covers the soil, mainly composed of Mnium species, Rhizomnium punctatum, and Sphagnum species (e.g. Sphagnum sqarrosum and S. recurvum, on poorer sites) (Utzig et al. 1986, Viereck et al. 1992). There are few common graminoids, mainly a few Carex species with low cover.

WILDLIFE VALUES Thuja plicata communities provide large amounts of food, cover, and water for a variety of wildlife. Though deer feed on Thuja plicata needles and twigs, overall forage amounts for ungulate species is low. Many birds, such as Chestnut-backed chickadees and goshawks, utilize old growth trees for foraging, cover, and nesting (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES In Idaho, though no rare plants are known to be found in the Thuja plicata/Lysichitum americanum community, adjacent communities are habitat for numerous endemic, boreal, and coastal disjunct species considered rare in Idaho (Wellner 1989, Moseley and Wellner 1991). No exotic species are documented from this community.

ADJACENT COMMUNITIES In north Idaho and southeast British Columbia, Thuja plicata/Lysichitum americanum is adjacent to slightly drier communities which fall into a wet (floodplains, riparian valley bottoms) to mesic (toeslopes) gradient. From wet to mesic, communities include: Thuja plicata-Tsuga heterophylla/Cornus sericea/Equisetum arvense; Thuja plicata/Equisetum arvense; Thuja plicata/Oplopanax horridum; Thuja plicata/Athyrium filix-femina; Thuja plicata-Tsuga heterophylla/Rubus parviflora/Athyrium filix-femina; and Thuja plicata/Adiantum pedatum (Utzig et al. 1986, Wellner 1989, Moseley and Wellner 1991). Other adjacent wet communities are riparian, such as various sedge, scrub-shrub, or Alnus rubra communities including Alnus rubra (or Alnus incana)/Lysichitum americanum (Kunze 1994). Thuja plicata/Lysichitum americanum also intergrades with shrubbier communities such as: Thuja

plicata-Tsuga heterophylla/Gaultheria shallon/Lysichitum americanum/Sphagnum species; Thuja plicata/Alnus rubra-Cornus sericea/Lysichitum americanum-Smilacina stellata; Tsuga heterophylla/Acer circinatum/Lysichitum americanum; and Tsuga heterophylla-Thuja plicata/Vaccinium species/Lysichiton americanum (Viereck et al. 1992, Kunze 1994). Adjacent uplands are usually forests of drier community types dominated by Tsuga heterophylla, Thuja plicata drier types, Abies grandis, and Pseudotsuga menziesii.

CONSERVATION RANK G4Q S2

SUCCESSION AND MANAGEMENT Little information on the successional dynamics of Thuja plicata/Lysichitum americanum is available. Thuja plicata/Lysichitum americanum (including Thuja plicata-Tsuga heterophylla/Lysichitum americanum) is a very old potential natural community. It may originate from the early seral Alnus rubra (or Alnus incana)/Lysichitum americanum community (Kunze 1994). In southeast Alaska, clearcut logging of similar communities promotes Tsuga heterophylla and shrub species dominance (Viereck et al. 1992).

Thuja plicata and Tsuga heterophylla are highly valued timber trees; however, Thuja plicata re-planting is not as successful as Tsuga heterophylla. Sites supporting Thuja plicata/Lysichitum americanum vary from highly productive to nutrient poor bogs. However, forage production for livestock is very low. In addition, the water table is too high for any logging, road building, recreation or other development, or livestock grazing (Utzig et al. 1986, Hansen et al. 1988, Hansen et al. 1995). The saturated organic soils are very succeptible to compaction and make tree windthrow hazard high. Undertaking these activities would require complete filling of the wetlands. Thuja plicata/Lysichitum americanum rarely has wildfires though Thuja plicata is succeptible to fire mortality due to its shallow bark and root system. Older trees, however, can survive fire damage to bole.

CLASSIFICATION COMMENTS On many sites Tsuga heterophylla characterizes the potential natural community; however, Thuja plicata is also a late seral co-dominant or dominant species. Thus, the Thuja plicata/Lysichitum americanum community is sometimes included within Thuja plicata-Tsuga heterophylla/Lysichitum americanum [syn. Lysichitum americanum], Tsuga heterophylla/Lysichitum americanum, and Tsuga heterophylla-Thuja plicata/Lysichitum americanum by some authors (Utzig et al. 1986, Kunze 1994). Also virtually synonomous are communities which add a moss layer to the description such as Thuja plicata-Tsuga heterophylla/Lysichiton americanum [syn. Lysichiton americanus]/Mnium species (Utzig et al. 1986).

Classification of the Thuja plicata/Lysichitum americanum community is based on unknown numbers of plots throughout its range. There are two records (without plot data) of the community in Idaho, both in Research Natural Areas (Potholes and Aquarius) (CDC 1999).

EDITION 98-12-04

AUTHOR C. Murphy

TSUGA MERTENSIANA/STREPTOPUS AMPLEXIFOLIUS

COMMON NAME MOUNTAIN HEMLOCK/CLASPING TWISTEDSTALK

PHYSIOGNOMIC TYPE Forest

SIMILAR COMMUNITIES Tsuga mertensiana/Streptopus amplexifolius shares a similar mesic understory and is structurally similar to Abies lasiocarpa/Streptopus amplexifolius (a widespread community type in the northern Rockies); however, the latter community lacks Tsuga mertensiana (Cooper et al. 1991). Tsuga mertensiana/Streptopus amplexifolius is also similar to Tsuga mertensiana/Streptopus roseus from the Washington Cascades and southwestern British Columbia, though it is less diverse (Cooper et al. 1991). The Luzula hitchcockii and Menziesia ferruginea phases of Tsuga mertensiana/Streptopus amplexifolius structurally and floristically resemble Tsuga mertensiana/Luzula hitchcockii, Tsuga mertensiana/Clintonia uniflora-Menziesia ferruginea, and Tsuga mertensiana/Menziesia ferruginea (with Vaccinium species on the eastern crest of Cascade Mountains) communities from northern Idaho, northwestern Montana, Washington, and possibly southeastern British Columbia. These similar communities lack Streptopus amplexifolius, though Cascade stands may have a limited amount of Streptopus roseus in understory (Pfister et al. 1977, Cooper et al. 1991, Lillybridge et al. 1995).

RANGE Tsuga mertensiana/Streptopus amplexifolius is a minor community type sampled only in higher elevation areas of the North Fork Clearwater, St. Joe, and Coeur d'Alene River drainages of northern Idaho (Cooper et al. 1991). A similar Tsuga mertensiana/Streptopus roseus community has been described for the Washington Cascade Mountains and the Coast Range of southwestern British Columbia.

ENVIRONMENTAL DESCRIPTION The Tsuga mertensiana/Streptopus amplexifolius community is the wettest type of the Tsuga mertensiana series found in the mountains of northern Idaho. This area has a strong maritime influenced climate and is characterized by deep, lingering snowpacks and persistent cloudiness during most the year. The Tsuga mertensiana series is generally wetter than the Abies lasiocarpa series (Cooper et al. 1991) and usually absent from limestone (i.e. basic) derived soils (Daubenmire and Daubenmire 1968). Tsuga mertensiana/Streptopus amplexifolius is located at high elevations from 1525 to 1830 m on seasonally saturated toe slopes and as riparian stringers (Cooper et al. 1991). There are two phases of the community: the Luzula hitchcockii phase on sites over 1710 m, with deep and long-lasting snowpacks, and the Menziesia ferruginea phase below 1710 m, on north slopes which have earlier snowpack melting than sites with Luzula hitchcockii. Based on a limited sample size, soils are poorly drained, with a pH of 5.2 to 5.5 and a high water table during the growing season (Cooper et al. 1991). Soils are derived from various metamorphic rocks and are mostly silt loams (occasionally sandy) with high gravel content (over 30 percent throughout all soil profiles). The rooting depth is up to 70 cm.

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Picea engelmannii, Abies lasiocarpa, Tsuga mertensiana
Tall shrub	Alnus spp.
Short shrub	Menziesia ferruginea, Vaccinium globulare
Herbaceous	Arnica latifolia, Trautvettaria caroliniensis, Luzula hitchcockii

VEGETATION DESCRIPTION Tsuga mertensiana/Streptopus amplexifolius is characterized by Tsuga mertensiana as usually the only species successfully reproducing in a mesic forb understory. Tsuga mertensiana has 100 percent constancy and 14 to 65 percent cover, though, older and larger Abies lasiocarpa (100 percent constancy and 44 to 51 percent cover) and Picea engelmannii are also common (Cooper et al. 1991). The mean basal area is 128 to 235 ft^2/ac, with Picea engelmannii's basal area greater than Abies lasiocarpa's, which is greater than Tsuga mertensiana's. Picea engelmannii has high cover and low constancy in the Luzula hitchcockii phase and high constancy and moderate cover in the Menziesia ferruginea phase. Early seral Larix occidentalis, Pinus monticola, and Pseudotsuga menziesii (all with low cover and moderate constancy) are on drier sites (i.e. only in the Menziesia ferruginea phase). There is a sparse tall shrub understory layer composed of Alnus sinuata, with 15 to 55 percent constancy and 8 to 38 percent cover. More importantly is the dense shrub layer under 2 m tall dominated by Menziesia ferruginea (with 61 percent cover in its phase and 44 percent cover in the Luzula hitchcockii phase) and Vaccinium globulare (21 to 33 percent cover), both with 100 percent constancy (Cooper et al. 1991). Lonicera utahense is usually present in low cover and Phyllodoce empetriformis has 15 percent cover in the Luzula hitchcockii phase. The herbaceous layer is diverse but low in total cover. Tsuga mertensiana/Streptopus amplexifolius is recognized by the following mix of mesic forb species (in order of highest to lowest constancy): Arnica latifolia (11 to 21 percent cover), Luzula hitchcockii (24 percent cover in its phase), Trillium ovatum, Xerophyllum tenax, Mitella breweri, Senecio triangularis, Tiarella trifoliata, and Veratrum viride, all with greater than 50 percent constancy averaged between both phases. The diagnostic Streptopus amplexifolius does not have high cover and constancy is only 15 to 55 percent. Other important herbs in the Menziesia ferruginea phase include Coptis occidentalis, Clintonia uniflora (9 percent cover), and Viola glabella. In the Luzula hitchcockii phase, Calamagrostis canadensis (8 percent cover), Trautvettaria caroliniensis (38 percent cover in this phase), Ligusticum canbyi, and Mitella pentandra (8 percent cover) are also important. The Luzula hitchcockii phase is wetter, less diverse, and has less forb cover than Menziesia ferruginea phase (Cooper et al. 1991).

WILDLIFE VALUES Old growth Tsuga mertensiana forests are valuable for wildlife thermal cover. In addition, numerous bird species forage and nest in these forests. In similar Abies lasiocarpa and Picea engelmannii riparian communities, mule deer, elk, moose, and bear summer use is minor due to the lack of forage under dense canopies. However, they do rest and bed in these high elevation forests, and use early successional stands for browsing (Pfister et al. 1977, Crowe and Clausnitzer 1997). Mountain chickadees, red-breasted nuthatches, Williamson's sapsuckers, brown creepers, owls, woodpeckers, flycatchers, kinglets, juncos, thrushes, crossbills,

pine siskins, and grouse all feed and nest in Picea engelmannii and Abies lasiocarpa dominated forests (Crowe and Clausnitzer 1997).

OTHER NOTEWORTHY SPECIES No rare or exotic species are known from this community.

ADJACENT COMMUNITIES The Menziesia ferruginea phase of Tsuga mertensiana/Streptopus amplexifolius grades into Tsuga mertensiana/Clintonia uniflora-Menziesia ferruginea or Tsuga mertensiana/Menziesia ferruginea communities on better drained sites. Adjacent to the Luzula hitchcockii phase, also on better drained soils, are Tsuga mertensiana/Xerophyllum tenax or Tsuga mertensiana/Menziesia ferruginea communities (Cooper et al. 1991). Overall, in habitats of similar elevation and moisture, Tsuga mertensiana forest types are adjacent to Abies lasiocarpa types (or Abies amabilis types in the Cascade Mountains) (Cooper et al. 1991, Lillybridge et al. 1995). These forests, however, may be dominated by early seral species such as Picea engelmannii or Pinus contorta, occasionally mixed with Larix occidentalis, Pinus monticola, or other species on drier or lower sites. Where Tsuga mertensiana forest types grade into high elevation subalpine parklands, Pinus albicaulis may dominate sites. Neighboring forests on lower elevation slopes in northern Idaho are dominated by Tsuga heterophylla or Thuja plicata (Cooper et al. 1991).

CONSERVATION RANK G2 S2

SUCCESSION AND MANAGEMENT Tsuga mertensiana/Streptopus amplexifolius is considered a climax community type. Tsuga mertensiana is the climax tree on asite when its canopy cover is predicted to be 10 percent or more in stable stands (over 300 years old in the Cascade range, probably less inland) (Lillybridge et al. 1995). Since wildfires are infrequent in Tsuga mertensiana habitats, stands are often very old (greater than 120 years in northern Idaho; Cooper et al. 1991). Daubenmire and Daubenmire (1968) proposed that two successional pathways exist within the Abies lasiocarpa series in northern Idaho: one leading to a Abies lasiocarpa climax and the other to Tsuga mertensiana on only soils derived from non-alkaline rock. The latter pathway has Tsuga mertensiana as usually the only successfully reproducing understory tree. Abies lasiocarpa is less shade tolerant than Tsuga mertensiana (Cooper et al. 1991). After a wildfire or other major disturbances, Picea engelmannii, Abies lasiocarpa, and Tsuga mertensiana all quickly recolonize the site, though not as rapidly as understory shrubs which can resprout after fire (Cooper et al. 1991). On better drained sites, other early seral trees may become established such as Pinus contorta, Larix occidentalis, Pinus monticola, and Pseudotsuga menziesii, in decreasing order of importance. For example, Tsuga mertensiana habitat which burned between 1889 and 1919 on the Bitterroot Mountains crest is now dominated by nearly pure stands of Pinus contorta. In addition, Pinus albicaulis can be early seral on the upper edges of Tsuga mertensiana/Streptopus amplexifolius communities, but many trees have died out due to mountain pine beetle kills. However, more often, few of these seral species establish due to extreme wetness of Tsuga mertensiana/Streptopus amplexifolius sites (Cooper et al. 1991).

Timber harvest is precluded from the Tsuga mertensiana/Streptopus amplexifolius community. Though site productivity is moderate to high in this moist community, timber harvest is not advised because of its proximity to streams and high water tables (Cooper et al. 1991). After clearcutting on such sites, the water table will rise further and prevent forest regeneration (Pfister et al. 1977, Cooper et al. 1991). Partial cutting in moist sites will lead to windthrow. These high elevation sites are poor for timber regeneration since clearcutting can create frost pockets and increase evapotranspiration in the summer (Lillybridge et al. 1995). With the short growing season, heavy snowpacks, and shallow soils, tree establishment and silvicultural options are poor (Pfister et al. 1977, Cooper et al. 1991, Lillybridge et al. 1995). In addition, these wet sites are unsuited for road building, campgrounds, or other developments. Since Tsuga mertensiana/Streptopus amplexifolius, and the similarly moist Tsuga mertensiana/Menziesia ferruginea community, are often adjacent to streams or lakes, their value in preventing erosion is high. Tsuga mertensiana/Streptopus amplexifolius is best preserved for aesthetics, recreation, wildlife, erosion control, and watershed/snowpack management (Pfister et al. 1977, Cooper et al. 1991, Lillybridge et al. 1995). Wildfires are intense and stand destroying in Tsuga mertensiana communities, but large fires are infrequent (often over 300 years) due to high moisture and snowpack (Cooper et al. 1991, Lillybridge et al. 1995). Wildfire ignitions are relatively frequent on ridges but most self-extinguish. Tsuga mertensiana, and associated Abies lasiocarpa and Picea engelmannii, are easily killed by fire. Understory shrub species, however, will resprout from roots if fires are not too intense (Crowe and Clausnitzer 1997). While Tsuga mertensiana is effective in resisting snow damage, older Tsuga mertensiana are susceptible to heartrot, especially in moist areas (Cooper et al. 1991, Lillybridge et al. 1995). Stands dominated by early seral species, such as Pinus contorta, may be invaded by mountain pine beetle.

CLASSIFICATION COMMENTS Tsuga mertensiana/Streptopus amplexifolius is not easily confused with other communities within the northern Rockies distribution of Tsuga mertensiana. The presence of the indicator Streptopus amplexifolius (with moderate constancy) distinguishes this community from other Tsuga mertensiana communities in northern Idaho (e.g. those with Xerophyllum tenax, Menziesia ferruginea, Luzula hitchcockii) (Daubenmire and Daubenmire 1968, Pfister et al. 1977, Cooper et al. 1991). Though ecologically comparable, similar Tsuga mertensiana communities from the Cascade Mountains have Streptopus roseus instead of S. amplexifolius (Cooper et al. 1991). In the Cascades, Streptopus roseus is apparently more common than S. amplexifolius (Lillybridge et al. 1995). Prior descriptions for northern Idaho and northwestern Montana described limited Tsuga mertensiana communities under the Abies lasiocarpa series (Daubenmire and Daubenmire 1968, Pfister et al. 1977). The reason for this is because Tsuga mertensiana and Abies lasiocarpa may be co-climax and Tsuga mertensiana types sometimes grade into Abies lasiocarpa types (Cooper et al. 1991). In addition, the Luzula hitchcockii phase of Tsuga mertensiana/Streptopus amplexifolius was formerly named for Ligusticum canbyi's presence (Cooper et al. 1991). The Menziesia ferruginea phase may grade into the Tsuga mertensiana/Clintonia uniflora-Menziesia ferruginea or Tsuga mertensiana/Menziesia ferruginea communities (Cooper et al. 1991).

Classification of Tsuga mertensiana/Streptopus amplexifolius is based on only eight stands sampled in the North Fork Clearwater, St. Joe, and Coeur D'Alene River drainages of northern Idaho (Cooper et al. 1991). Four of the eight stands were the Menziesia ferruginea phase, sampled closer to the crest of the Bitterroot Mountains. The other four stands were the Luzula Hitchcockii phase, sampled in the Clearwater and St. Joe mountains.

EDITION 99-01-27

AUTHOR C. Murphy

POPULUS TREMULOIDES/CALAMAGROSTIS CANADENSIS

COMMON NAME QUAKING ASPEN/BLUEJOINT REEDGRASS

PHYSIOGNOMIC TYPE Forest

SIMILAR COMMUNITIES Similar communities are either structurally or successionally related to Populus tremuloides/Calamagrostis canadensis. They include: Alnus incana/Calamagrostis canadensis, Populus tremuloides/Alnus incana-Symphoricarpos albus, Populus tremuloides/Symphoricarpos albus, or communities dominated by conifer or Salix species with Calamagrostis canadensis 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 aquatils community (Crowe and Clausnitzer 1997). Populus tremuloides/Calamagrostis canadensis is also related to the grazing disclimax Populus tremuloides/Poa pratensis (Hansen et al. 1995, Hall and Hansen 1997).

RANGE The Populus tremuloides/Calamagrostis canadensis community is an incidental type known from eastern Idaho (Hall and Hansen 1997), Montana (Hansen et al. 1995), northeastern Oregon, (Crowe and Clausnitzer 1997), and apparently Colorado and Wyoming. The conservation status of this community, especially in the northern Rockies, is not well known.

ENVIRONMENTAL DESCRIPTION The Populus tremuloides/Calamagrostis canadensis community is found as low as 850 m in Montana (Hansen et al. 1995), but is generally a higher elevation type ranging from 1525 m in northeastern Oregon (Crowe and Clausnitzer 1997) to over 1965 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. The community 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). Based on vegetation composition,

this community is a relatively moist Populus tremuloides type. Sites have surface water tables in spring which may drop to over 1 m deep by mid-summer.

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Populus tremuloides
Short shrub	Symphoricarpos albus
Herbaceous	Calamagrostis canadensis, Carex spp., Equisetum arvense, Aster spp.

VEGETATION DESCRIPTION The Populus tremuloides/Calamagrostis canadensis community is dominated by an overstory of Populus tremuloides with 52 to 63 percent cover and 100 percent constancy (Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). There are sometimes understory trees, mainly Populus tremuloides (34 percent cover), but also Pinus contorta, Picea engelmannii, Abies lasiocarpa, and Abies grandis (Crowe and Clausnitzer 1997). Occasionally, the tall shrub Alnus incana (1 to 20 percent cover and 33 percent constancy) is present. The low shrub layer varies from low to high cover. It is dominated by Symphoricarpos albus (1 to 30 percent cover, 33 percent constancy) and sometimes Rosa woodsii with 20 percent cover (Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). The herbaceous layer is a lush mix of mesic forbs and graminoids, the most common species being Calamagrostis canadensis with 60 to 64 percent cover and 100 percent constancy. Phleum pratense and Deschampsia cespitosa may have constancy up to 67 percent but cover under 20 percent (Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). Other important graminoids, all with about 10 percent cover, include 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 with 15 to 20 percent cover and Aster species (Aster foliaceus or A. occidentalis) with 7 to 11 percent cover (Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). Other forbs with low cover but high constancy include Aconitum columbianum and Fragaria virginiana. Forbs which sometimes have high cover (over 20 percent) with low constancy include Senecio foetidus, Actaea rubra, and Heracleum lanatum. Other forbs with low cover and constancy are Ranunculus uncinatus, Trautvettaria caroliniensis, Smilacina stellata, Angelica arguta, and Geranium species (Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997).

WILDLIFE VALUES Populus tremuloides/Calamagrostis canadensis has 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 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 community because its roots stabilize undercut streambanks and the vegetation overhangs streams.

OTHER NOTEWORTHY SPECIES Exotic species known from the Populus tremuloides/Calamagrostis canadensis community include: Phleum pratense, Poa palustris, Poa pratensis, and Taraxacum officinale (Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997).

ADJACENT COMMUNITIES Wetter communities adjacent to Populus tremuloides/Calamagrostis canadensis may include Alnus incana, Salix drummondiana, Carex utriculata, and Populus trichocarpa types (Hansen et al. 1995, Hall and Hansen 1997). Adjacent upland communities 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).

CONSERVATION RANK G3 S4

SUCCESSION AND MANAGEMENT Populus tremuloides/Calamagrostis canadensis is a stable, self-perpetuating community type unlikely to be seral to conifer dominated communities 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 the community 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, the community may move toward Populus tremuloides/Symphoricarpos albus and eventually a conifer dominated community (Crowe and Clausnitzer 1997).

Populus tremuloides/Calamagrostis canadensis usually provides large amounts of livestock forage and livestock bed in the shade of this community 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 also 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).

CLASSIFICATION COMMENTS Populus tremuloides/Calamagrostis canadensis is not easily confused with other communities unless stands are disturbed or in successional transition. For example, overgrazing by livestock will increase Poa pratensis and move the community toward Populus tremuloides/Poa pratensis (Hansen et al. 1995, Hall and Hansen 1997). If environmental conditions are changing, cover of shrubs or other graminoids may increase in the Populus tremuloides/Calamagrostis canadensis community. Resulting transitional stands may be confused with similar communities such as: Alnus incana/Calamagrostis canadensis, Populus tremuloides/Carex lanuginosa, Populus tremuloides/Carex aquatilis, Populus tremuloides/Symphoricarpos albus, Populus tremuloides/Alnus incana-Symphoricarpos albus, or those dominated by conifer or Salix species with Calamagrostis canandensis understories (Crowe and Clausnitzer 1997).

Populus tremuloides/Calamagrositis canadensis classification is based on three plots in northeastern Oregon (Crowe and Clausnitzer 1997) and six stands in Montana (Hansen et al. 1995). It has been observed in eastern Idaho but plot data is limited (Hall and Hansen 1997). Unknown numbers of stands have been sampled in Colorado or elsewhere.

EDITION 99-01-12

AUTHOR C. Murphy

POPULUS TREMULOIDES/CORNUS SERICEA

COMMON NAME QUAKING ASPEN/RED-OSIER DOGWOOD

PHYSIOGNOMIC TYPE Forest

SIMILAR COMMUNITIES Populus tremuloides/Cornus sericea is similar to many other communities where Cornus sericea is the dominant shrub and Populus tremuloides is usually present but not dominant. These communities include Populus species (Populus trichocarpa, P.

angustifolia, P. deltoides)/Cornus sericea, Populus trichocarpa/Alnus incana-Cornus sericea, and Alnus incana/Cornus sericea (Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). They are usually on sites less favorable to Populus tremuloides dominance such as lower elevations or cobble bars. Conifer species (e.g. Abies lasiocarpa, Picea species, Pinus ponderosa, Pseudotsuga menziesii)/Cornus sericea communities often have noticeable Populus tremuloides cover, indicating its possible prior dominance (Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). Other communities may be successionally related to Populus tremuloides/Cornus sericea including Populus tremuloides/Betula occidentalis, Betula occidentalis/Cornus sericea, and Alnus incana-Cornus sericea/Mesic forb (Manning and Padgett 1995, Crowe and Clausnitzer 1997). Similarly, overgrazing may promote the disclimax Populus tremuloides/Poa pratensis community type (Hansen et al. 1995, Hall and Hansen 1997).

RANGE The Populus tremuloides/Cornus sericea community is a major type known from eastern and southern Idaho, east-central Nevada, Montana, and the Okanogan Highlands of northeastern Washington (Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Hall and Hansen 1997). It may also exist in eastern Oregon, being included with stands of Populus tremuloides/Alnus incana-Cornus sericea (Crowe and Clausnitzer 1997). In Idaho it is known from the Salmon River, Teton River, Henry's Fork, Silver Creek, Portneuf River, and Boise River drainages (Collins 1979, Jankovsky-Jones 1996, Jankovsky-Jones 1997c, Jankovsky-Jones 1998b).

ENVIRONMENTAL DESCRIPTION Populus tremuloides/Cornus sericea is usually on Mollisol soils (Aquolls, Borolls, Haploxerolls) but also sometimes Entisols (shallow Fluvents, Aquic Xerofluvents) (Hansen et al. 1995, Manning and Padgett 1995). These Mollisol soils may have a surface muck layer derived from leaf litter and occasionally have enough organic matter to be Sapric Histisols (Kovalchik 1993, Hall and Hansen 1997). Soils are usually derived from coarse to fine alluvium (occasionally colluvium or ash) overlying river gravels and cobbles. Soil textures are sandy-skeletal, loamy skeletal, fine-loamy, silty loam, or organic loam which have low to high water holding capacity (Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Hall and Hansen 1997).

Populus tremuloides/Cornus sericea is found from low foothills and floodplains to high mountain valleys throughout its range. Elevations are as low as 730 m in Montana, 945 m in northeast Washington, and 940 m in the Boise River area of Idaho (Kovalchik 1993, Hansen et al. 1995, Moseley 1998). Mid-elevation sites are along mountain rivers, ranging from 1085 m on the Salmon River to 1470 m on the Henry's Fork in Idaho (Collins 1979, Jankovsky-Jones 1996). Elevations are as high as 2100 m in Montana, 2200 m in eastern Idaho, and 2300 m in Nevada (Hansen et al. 1995, Manning and Padgett 1995, Hall and Hansen 1997). Populus tremuloides/Cornus sericea is typically in narrow to broad U- or V-shaped valleys, canyons, and floodplains which are seasonally flooded (Hansen et al. 1995, Hall and Hansen 1997). It is often along stable, low to moderate gradient streams (less than 3 percent to 8 percent slope) on alluvial terraces or canyon colluvium, but can also be near seeps and springs (Kovalchik 1993, Manning

and Padgett 1995, Jankovsky-Jones 1996, Moseley 1998). The community is sometimes found away from streams but usually in moist areas (such as depressions or old channels). These areas typically have a near surface water table in the spring which drops up to 2 m by late summer.

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Populus tremuloides
Tall shrub	Cornus sericea
Short shrub	Symphoricarpos spp. Rosa spp.
Herbaceous	Equisetum spp., Actaea rubra, Smilacina spp.

VEGETATION DESCRIPTION Due to its broad geographical range, Populus tremuloides/Cornus sericea has variable vegetation. The dominant species are Populus tremuloides with cover 30 to 85 percent (100 percent constancy) and Cornus sericea cover 15 to 84 percent (constancy 67 to 100 percent) (Collins 1979, Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Jankovsky-Jones 1996, Hall and Hansen 1997, Moseley 1998). In northern areas, sub-dominant trees include Populus trichocarpa and Betula papyrifera while conifers, such as Picea engelmannii or Abies species, may be present elsewhere. Other tall shrubs, sometimes mixed with Cornus sericea (all with cover less than 40 percent and constancy less than 50 percent), include Salix species (usually Salix bebbiana), Betula occidentalis, Alnus incana, Prunus virginiana, and Crataegus douglasii. The low shrub understory is typically dominated by Rosa woodsii (or other Rosa species) (up to 20 percent cover and 100 percent constancy) and Symphoricarpos albus (sometimes Symphoricarpos occidentalis) (up to 20 percent cover and 83 percent constancy) (Collins 1979, Kovalchik 1993, Jankovsky-Jones 1996, Jankovsky-Jones 1997c, Hall and Hansen 1997, Jankovsky-Jones 1998b). The herbaceous understory is dominated by forbs which vary from low to moderate cover depending on the density of Cornus sericea. The most common species, all with cover less than 15 percent but sometimes with high constancy, are Equisetum species (Equisetum arvense and E. hyemale), Actaea rubra, Smilacina species, Galium species (Galium triflorum and G. aparine), and Urtica dioica. Other forbs which are sometimes encountered include Viola species, Taraxacum officinale, Osmorhiza chilensis, Geum macrophyllum, and Thalictrum species (Collins 1979, Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Jankovsky-Jones 1995, Jankovsky-Jones 1996, Hall and Hansen 1997, Jankovsky-Jones 1997, Moseley 1998). The graminoid layer has sparse cover, low diversity, and is dominated by exotic species. The common exotic grasses are Bromus species (usually Bromus inermis with up to 10 percent cover), Agrostis stolonifera, and Poa pratensis. Even less common are native graminoids including Calamagrostis canadensis, Bromus ciliatus, Carex species, and Elymus glaucus. The ground cover is predominantly litter (thickest where not flooded) with less than 5 percent cover of rocks (Kovalchik 1993, Manning and Padgett 1995, Moseley 1998).

WILDLIFE VALUES Populus tremuloides/Cornus sericea has high wildlife cover and forage value during most of the year. Populus tremuloides suckers, buds, and bark are often heavily browsed by beaver, rabbits, moose, deer, small mammals, and elk (Hansen et al. 1995,

Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997, Ogle 1997). Moose also utilize Cornus sericea though its density may reduce use by some species. Numerous bird species nest and feed in aspen including grouse, flickers, red-breasted nuthatches, chickadees, sapsuckers, grosbeaks, crossbills, and woodpeckers (Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). The roots and vegetation of this community often overhang streams providing excellent fish cover.

OTHER NOTEWORTHY SPECIES Exotic species can be common in this community, possibly due to historic livestock grazing, recreation impacts, or flooding disturbance. Commonly encountered species include Poa pratensis, Taraxacum officinale, Agrostis stolonifera, Phleum pratense, Cirsium arvense, Bromus inermis, Phalaris arundinacea, Agropyron repens, Dactylis glomerata, Poa palustris, Arctium minus, and Rumex crispus (Collins 1979, Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Jankovsky-Jones 1996, Hall and Hansen 1997, Moseley 1998).

SUCCESSION AND MANAGEMENT Several shrub communities appear to be early seral or transitional to Populus tremuloides/Cornus sericea. These communities, which colonize sites with less developed soils and recently deposited alluvium, include Alnus incana, Betula occidentalis, Salix species, and Populus trichocarpa or Populus angustifolia dominated types often with a Cornus sericea understory (Hansen et al. 1995, Hall and Hansen 1997). Similarly, the loss of Betula occidentalis from the early seral Populus tremuloides/Betula occidentalis community would likely result in a Populus tremuloides/Cornus sericea community (Collins 1979, Manning and Padgett 1995). Though Populus tremuloides/Cornus sericea is on sites too wet for conifer dominance, changes in hydrology would result in movement toward conifer species (e.g. Abies lasiocarpa, Picea species, Picea engelmannii, Pinus ponderosa, Pseudotsuga menziesii) dominance (Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). For example, overgrazing by livestock and wildlife may reduce Populus tremuloides and shrubs, thus, promoting weedy herbaceous species and resulting in the disclimax Populus tremuloides/Poa pratensis type (Hansen et al. 1995, Hall and Hansen 1997).

ADJACENT COMMUNITIES Communities with similar moisture adjacent to Populus tremuloides/Cornus sericea include other Populus tremuloides, Alnus incana, Salix species, or Populus species dominated communities with Rosa woodsii, Salix lutea, Cornus sericea, Prunus virginiana, and Crataegus douglasii in the understory (Jankovsky-Jones 1995, Manning and Padgett 1995, Hall and Hansen 1997). Wetter sites range from saturated Typha species, Scirpus species, Eleocharis palustris, Carex utriculata, and Phalaris arundinacea communities to Populus tremuloides/Carex lanuginosa, Alnus incana, Cornus sericea, Salix exigua, or Spiraea douglasii communities (Kovalchik 1993, Hansen et al. 1995, Hall and Hansen 1997). Adjacent drier riparian sites include Populus tremuloides/Symphoricarpos albus or Pseudotsuga menziesii/Symphoricarpos albus (Kovalchik 1993). Neighboring upland communities include pinyon-juniper, Abies concolor, Pseudotsuga menziesii, Picea engelmannii, and Pinus contorta, and Artemisia tridentata shrub-steppe communities (Hansen et al. 1995, Manning and Padgett 1995, Moseley 1998).

CONSERVATION RANK G4 S4?

SUCCESSION AND MANAGEMENT Populus tremuloides/Cornus sericea provides low to moderate livestock forage due to shading by overstory shrubs. However, livestock will bed in the shade of this community causing trampling, soil compaction, and weed invasion. Livestock also browse both Populus tremuloides root suckers and Cornus sericea. Overgrazing will lower their vigor, eventually eliminating them from the site (Hansen et al. 1995, Hall and Hansen 1997, Ogle 1997). Populus tremuloides is intolerant of shade and reproduces mainly by clonal root suckers, but also by seeds germinating on moist mineral soil (Crowe and Clausnitzer 1997). Cornus sericea also reproduces from root resprouting. Populus tremuloides suckers grow best and proliferate after moderate intensity fire or overstory tree removal, though, high intensity fires kill the roots. Fires are rare in this moist community, but most young trees die after a fire (though older trees resist some fires). Trunk fire damage, however, allows insect or fungal species into trees which can eventually kill them (Hansen et al. 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). In order for the community to recover after fire or logging, livestock grazing of root suckers must be eliminated for at least three years (Ogle 1997). Though beneficial for Populus tremuloides reproduction, logging for the limited lumber, fenceposts, or fuel wood is often not compatible with wet, compactible soil (Hansen et al. 1995, Hall and Hansen 1997, Ogle 1997). Similarly, recreation values are high but development is not compatible due to site wetness. Both Populus tremuloides and Cornus sericea reduce erosion by slowing overland flow, providing woody debris, and stabilizing streambanks (Manning and Padgett 1995). They are also good for long-term revegetation. Moreover, decomposition of their leaf litter improves soil nitrogen, organic matter, and fertility (Kovalchik 1993).

CLASSIFICATION COMMENTS Populus tremuloides/Cornus sericea is an accepted community with a large amount of supporting data throughout its range. However, Crowe and Clausnitzer (1997) described Populus tremuloides/Alnus incana-Cornus sericea . This community appears to be a variation of the Alnus incana-Cornus sericea/Mesic forb and possibly includes Populus tremuloides/Cornus sericea stands. Many other studies recognize similar communities which sometimes have Populus tremuloides as a co-dominant species. These communities are dominated by Betula occidentalis, various Populus or conifer species, or Alnus incana with a shrub layer dominated by Cornus sericea (Kovalchik 1993, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Hall and Hansen 1997). These communities are successionally related to Populus tremuloides/Cornus sericea and complicate classification.

Classification of Populus tremuloides/Cornus sericea is based on 15 stands in Idaho (Collins 1979, Jankovsky-Jones 1996, Hall and Hansen 1997, Moseley 1998), 75 stands in Montana (Hansen et al. 1995), six stands in northeastern Washington (Kovalchik 1993), and 6 stands in Nevada (Manning and Padgett 1995). There are 6 records of the community tracked by Idaho Conservation Data Center (three with plot data), four of which are in protected areas (Cartier Slough Wildlife Management Area on Henry's Fork River, The Nature Conservancy's Silver Creek Preserve, Boise River Wildlife Management Area, and Portneuf Wildlife Management

Area) (Collins 1979, Jankovsky-Jones 1996, Jankovsky-Jones 1997c, Jankovsky-Jones 1998b, Moseley 1998).

EDITION 1998-12-08

AUTHOR C. Murphy

POPULUS TREMULOIDES/SPIRAEA DOUGLASII

COMMON NAME QUAKING ASPEN/DOUGLAS SPIRAEA

PHYSIOGNOMIC TYPE Forest

SIMILAR COMMUNITIES This association is similar to Kovalchik's (1987) Pinus contorta/Spiraea douglasii/Carex eurycarpa plant association. However, Pinus contorta does not seem to be the climax tree in stands sampled in Idaho.

RANGE Stands are known from northern Idaho.

ENVIRONMENTAL DESCRIPTION The Populus tremuloides/Spiraea douglasii community occurs in floodplains and depressional basins at low to moderate elevations. The sites are only lightly flooded with the water table near or only slightly above the surface in the spring and dropping up to 1 m below the surface later in the growing season.

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Populus tremuloides
Short shrub	Spiraea douglasii
Herbaceous	Carex arcta, Carex lanuginosa, Calamagrostis canadensis

VEGETATION DESCRIPTION Populus tremuloides dominates the overstory with up to 50 percent cover. The understory is dominated by a dense shrub layer of Spiraea douglasii (30 to 60 percent cover). A number of sedge and graminoid species may be present including Agrostis stolonifera, Carex arcta, C. lanuginosa, and Calamagrostis canadensis. Several forb species may be present with low cover (less than 5 percent) with Smilacina stellata being the most common (Jankovsky-Jones 1998c).

WILDLIFE VALUES This community provides forage, browse, cover, water, and calving grounds for deer and elk. Jankovsky-Jones (1998c) noted that deer had browsed extensively on new growth of Spiraea douglasii. Stands may be used by raptors when they are adjacent to open meadows and water. Mature aspen trees may have heartrot and provide habitat for cavity nesting

bird species. Higher order, perennial streams that pass through stands may support trout (Kovalchik 1987).

OTHER NOTEWORTHY SPECIES The non-native graminoids Agrostis stolonifera, Phalaris arundinacea, Poa palustris, and P. pratensis may become established in disturbed openings within this community. Several forb species that tend to increase with disturbance including Fragaria virginiana, Vicia americana, Trifolium longipes, and Pteridium aquilinum may also be present.

ADJACENT COMMUNITIES Adjacent wetter communities may include Populus tremuloides/Calamagrostis canadensis with Carex vesicaria, Carex angustata, or other sedge dominated stands present in moist swales. Stands dominated by Crataegus douglasii or Populus trichocarpa may be present in areas supporting a similar moisture regime.

CONSERVATION RANK GU SU

SUCCESSION AND MANAGEMENT At low elevations Populus tremuloides is the climax overstory tree. Stands have not been sampled in Idaho at middle to upper elevations but in a similar association described in Oregon conifers including lodgepole pine (or potentially ponderosa pine) will dominate at climax. Removal of overstory trees (by fire or other means such as logging) may result in temporary dominance by willow/sedge associations due to reduced evapotranspiration and a raised water table (Kovalchik 1987).

Livestock use is limited throughout the year by density of stands. Early in the growing season moist soils limit livestock use. Trampling by livestock may reduce cover of the dense understory shrub Spiraea douglasi and create openings that are colonized by non-native graminoids. The openings can produce considerable forage. With grazing the tree canopy persists, but aspen suckers are highly palatable and browsing may prevent replacement of dead and dying aspen stands. If these stands are grazed it is recommended that this begin after soils become dry to the surface in late July or August. Fire may have been common in stands as the soils are dry at the surface early in the growing season. Aspen is sensitive to all but the coolest ground fires. Aspen will resprout vigorously from lateral root buds. Willows and spiraea will sprout vigorously from stem bases. Where stands are considered for silviculture, management should consider special constraints associated with windthrow potential, raised water tables, and wildlife (Kovalchik 1987).

CLASSIFICATION COMMENTS Classification is based on plots from two stands in north Idaho (Jankovsky-Jones 1998c).

EDITION 98-12-01

AUTHOR M. Jankovsky-Jones

POPULUS TRICHOCARPA/CORNUS SERICEA

COMMON NAME BLACK COTTONWOOD/RED-OSIER DOGWOOD

PHYSIOGNOMIC TYPE Forest

SIMILAR COMMUNITIES May be the same as Populus trichocarpa/Cornus sericea-Salix in Oregon.

RANGE The Populus trichocarpa/Cornus sericea community type occurs in Montana, Washington, Idaho, and Oregon.

ENVIRONMENTAL DESCRIPTION Populus is a pioneering species that requires moist, barren, newly deposited alluvium exposed to full sunlight for regeneration. Sites occur on point bars, side bars, mid channel bars, delta bars, and islands of major streams and rivers, and occasionally around lakes and ponds.

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 three 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, and Hansen et al. 1995).

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Populus trichocarpa
Tall shrub	Cornus sericea
Short shrub	Rosa spp.
Herbaceous	Smilacina stellata

VEGETATION DESCRIPTION The Populus trichocarpa/Cornus sericea community type is characterized by an overstory dominated by Populus trichocarpa (25-85 percent 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 percent cover). Amelanchier alnifolia, Symphoricarpos oreophilus, Alnus incana, Rosa woodsii, Salix exigua and other Salix species are often present. Smilacina stellata and Equisetum arvense are often present along with graminoids, none of which have high constancy.

WILDLIFE VALUES This community type 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 community type is very important in providing thermal cover, debris recruitment, and streambank stability for fish habitat (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Not identified.

ADJACENT COMMUNITIES Adjacent wetter communities may be dominated by Salix exigua, S.lasiandra, S. drummondiana, S. geyeriana, Carex utriculata, or a variety of Alnus incana or Typha latifolia dominated community types. 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, and Boggs et al. 1990).

CONSERVATION RANK G3? S3

SUCCESSION AND MANAGEMENT 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. 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 community type 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).

Because of 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 Populus trichocarpa dominated community types 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 and Boggs et al. 1990).

Forage production is rated from low to moderate due to the dense nature of the stands which limits the amount of available forage. Timber productivity ranges from low to moderate.

CLASSIFICATION COMMENTS Classification based on 60 stands in Montana, 8 stands in Oregon, and an unknown number of stands in Idaho.

EDITION 95-08-07

AUTHOR L. Williams

POPULUS TRICHOCARPA/CRATAEGUS DOUGLASII

COMMON NAME BLACK COTTONWOOD/DOUGLAS HAWTHORN

PHYSIOGNOMIC TYPE Forest

SIMILAR COMMUNITIES Not identified.

RANGE Has been described from the southwestern portion of the Wallowa Mountains of northeastern Oregon, along tributaries to the Grande Ronde River. May also occur in the adjacent regions of southeastern Washington and west central Idaho, along smaller tributaries of the Snake and Grande Ronde rivers. The community is also known from northern Idaho in the Coeur d'Alene Lake basin.

ENVIRONMENTAL DESCRIPTION The Populus trichocarpa/Crataegus douglasii association is found in the foothills zone of a mountainous region which is physiographically part of the Columbia Plateau. Elevational range is unknown, but probably is between 3000 and 5000 feet. The climate is considered Temperate Continental, with warm, dry summers and cold winters. Marine air masses often move up the Columbia River valley from the Pacific coast, and moderate both summer and winter temperatures. Average annual precipitation is from 15 to 25 inches, most of which occurs as snow from November to May.

This association occurs in riparian zones of moderate-sized streams and rivers. Average discharge along the studied creek (Kauffman et al. 1985) is 119 cfs, with peak flows occurring in late April, May, and early June. Peak flows can commonly be more than 500 cfs.

Soils are derived from stream-deposited alluvium and are shallow and rocky. Typically an A horizon 15 to 30 cm deep (occasionally up to 43 cm) is situated over an aerated horizon composed of coarse sands to larger unconsolidated cobbles. Textures of the surface horizon are silty to sandy loams, and organic matter content is high. Sometimes clay balls are interspersed throughout the coarse textured materials. Depth to the water table is usually less than 60 cm, and during spring averages 18 cm.

MOST ABUNDANT SPECIES

Strata	Species

Tree canopy	Populus trichocarpa
Tall shrub	Crataegus douglasii, Alnus incana
Herbaceous	Elymus glaucus, Senecio pseudaureus, Osmorhiza chilensis

VEGETATION DESCRIPTION The vegetation composition and structure of this association is poorly described, but is apparently structurally diverse. The tree canopy is dominated by the broad-leaved deciduous Populus trichocarpa, with the needle-leaved, evergreen species Abies grandis and Pinus ponderosa occurring as scattered individuals (and probably as emergents from the Populus canopy). There is a tall shrub layer, composed primarily of the broad-leaved, deciduous shrubs Crataegus douglasii and Alnus incana, the later primarily along the immediate streambanks. A shorter shrub layer dominated by Rosa woodsii may be present. The herbaceous layer is species rich and abundant, often with a significant component of introduced species. Common, native graminoids include Elymus glaucus, and Carex spp.; forbs include Osmorhiza chilensis, Ranunculus acris, Senecio pseudaureus, and Montia perfoliata. There is typically a cryptogammic layer.

WILDLIFE VALUES Crataegus douglasii stands are important for nesting/brooding habitat, as well as food, for many bird species. Small mammals also are abundant in association with Crataegus. The structural diversity of this riparian association is important as well.

OTHER NOTEWORTHY SPECIES The introduced grass, Poa pratensis, and the common dandelion (Taraxacum officinale) are abundant in the understory of most stands, due to livestock grazing.

ADJACENT COMMUNITIES Information not available.

CONSERVATION RANK G1 S1

SUCCESSION AND MANAGEMENT Information not available.

CLASSIFICATION COMMENTS This community has been sampled infrequently due to occurrence at lower elevations which are outside project areas of existing classifications.

EDITION 93-11-02

AUTHOR M. Reid

POPULUS TRICHOCARPA/RECENT ALLUVIAL BAR

COMMON NAME BLACK COTTONWOOD/RECENT ALLUVIAL BAR

PHYSIOGNOMIC TYPE Woodland

SIMILAR COMMUNITIES Populus trichocarpa/Recent Alluvial Bar is very similar to other frequently flooded communities such as Populus/Stream Bar (Manning and Padgett et al. 1995), Populus angustifolia/Bar (Padgett et al. 1989), and Populus (either Populus deltoides or P. angustifolia)/Recent Alluvial Bar (Hansen et al. 1995, Hall and Hansen 1997). Slightly higher terraces, that have less frequent flooding, may quickly develop shrubby understories under young Populus trees. However, these early understories are often damaged by floods or ice resulting in stands resembling Populus trichocarpa/Recent Alluvial Bar. These early and mid-seral stands include Populus trichocarpa/Rhamnus species, Populus trichocarpa/Symphoricarpos albus (or Symphoricarpos occidentalis), Populus trichocarpa/Cornus sericea, Populus/Salix species, and other analagous types dominated by Populus angustifolia or P. deltoides (Moseley and Bursik 1994, Hansen et al. 1995, Weixelman et al. 1996, Hall and Hansen 1997).

RANGE Populus trichocarpa/Recent Alluvial Bar is a major community type described from throughout Idaho and western Montana (Hansen et al. 1995, Hall and Hansen 1997). In Idaho the community is known from larger rivers with relatively intact hydrologic processes such as the Big and Little Wood, St. Joe, Salmon, Coeur D'Alene, Big Lost, and St. Maries rivers (Moseley and Bursik 1994, Jankovsky-Jones 1997a, 1997b, 1997c, 1998b, 1998c). The very similar Populus/Stream Bar community type, containing stands dominated by Populus trichocarpa, is described in Nevada (Manning and Padgett 1995). Populus trichocarpa/Recent Alluvial Bar is probably found throughout the tree species range along larger naturally functioning rivers in Washington, Oregon, California, British Columbia, Alaska, and elsewhere. Hydrologic processes which produce alluvial bars are essential for Populus trichocarpa reproduction. This community was historically common but is now much rarer because many rivers have been dammed, diverted, channelized, diked, rip-rapped, dredged, or otherwise altered to prevent frequent flooding, channel migration, and alluvial deposition. When these hydrologic processes are curtailed the community is less likely to persist (Moseley and Bursik 1994). In addition, many older Populus trichocarpa stands have been logged for wood products and conversion of bars and islands to pasture or agriculture.

ENVIRONMENTAL DESCRIPTION Populus trichocarpa/Recent Alluvial Bar is found on narrow to broad valley floodplains of major streams (often meandering, with low to high gradients) at low to mid-elevations. It is found from 550 to 850 m elevation in northern Idaho and western Montana (Moseley and Bursik 1994, Hansen et al. 1995, Jankovsky-Jones 1997b, Jankovsky-Jones 1998c), at 1120 m on Salmon River (Jankovsky-Jones 1998b, and from 1460 m to over 2100 m in Montana, Nevada, and south and east Idaho (Hansen et al. 1995, Manning and Padgett 1995, Hall and Hansen 1997, Jankovsky-Jones 1997a and 1997c). Populus trichocarpa/Recent Alluvial Bar 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, Jankovsky-Jones 1998). 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 (Moseley and Bursik 1994, Jankovsky-Jones 1998). 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).

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Populus trichocarpa
Tall shrub	Alnus incana, Salix spp.
Herbaceous	Phalaris arundinacea, Agrostis stolonifera, Tanacetum vulgare, Chrysanthemum leucanthemum, Centaurea maculosa, Equisetum arvense

VEGETATION DESCRIPTION Populus trichocarpa/Recent Alluvial Bar is an early seral community 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 dbh 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, Jankovsky-Jones 1998c). Populus trichocarpa cover ranges from 40 to 98 percent with constancy over 50 percent. 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 percent cover) with occasional Amelenchier 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, Jankovsky-Jones 1998c). The herbaceous understory usually has low cover. Instead, rock cover is typically over 30 percent with bare soil and gravel over 20 percent cover combined. The understory is dominated by exotic, weedy forbs and grasses which are usually rhizomatous perennials or biennials able to withstand, and thrive with, annual flooding disturbance. Common exotic forbs, all with 10 percent or less cover, include: Centaurea maculosa, Chrysanthemum leucanthemum, Hypericum perforatum, Medicago species, Melilotus species, Prunella vulgaris, Tanacetum vulgare, Taraxacum officinale, Trifolium species, Verbascum species, and Vicia americana (Moseley and Bursik 1994, Hansen et al. 1995, Manning and Padgett 1995, Hall and Hansen 1997, Jankovsky-Jones 1998c). Native forbs, all usually with low cover and constancy, often include Achillea millefolium, Artemisia ludoviciana, Aster species, Castilleja miniata, Epilobium species, Equisetum arvense, Fragaria vesca, Heracleum lanatum, Smilacina stellata, Solidago canadensis, and Thalictrum occidentale. Exotic grass species include Agrostis stolonifera, Phalaris arundinacea (in some locations forming a dense and tall mat with over 90 percent cover), Phleum pratense, Poa palustris, and Poa pratensis (Moseley and Bursik 1994, Hansen et al. 1995, Manning and Padgett 1995, Hall and Hansen 1997, Jankovsky-Jones 1998c). Native grasses have even less cover and include Calamagrostis canadensis, Carex species, Elymus glaucus, and Muhlenbergia richardsonis. Moss is occasionally present.

WILDLIFE VALUES Populus trichocarpa/Recent Alluvial Bar is 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, especially, 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).

OTHER NOTEWORTHY SPECIES Exotic species are relatively common on flood disturbed alluvial bars, though usually with low cover and constancy. They are usually perennial or biennial and include numerous nitrogen-fixing, leguminous species. Exotic species include: Agropyron repens, Agrostis stolonifera, Centaurea maculosa, Chrysanthemum leucanthemum, Cirsium arvense, Euphorbia esula, Hypericum perforatum, Medicago species, Melilotus species, Phalaris arundinacea, Phleum pratense, Poa palustris, Poa pratensis, Prunella vulgaris, Tanacetum vulgare, Taraxacum officinale, Trifolium species, Verbascum species, and Vicia americana (Moseley and Bursik 1994, Hansen et al. 1995, Hall and Hansen 1997, Jankovsky-Jones 1997c, Jankovsky-Jones 1998c).

ADJACENT COMMUNITIES Populus trichocarpa/Recent Alluvial Bar is located between bare cobble/gravel shorelines and other alluvial bar communities such as Salix exigua/Barren, Agropyron smithii (on drier, sandy bars), and Alnus incana patches (Manning and Padgett 1995, Jankovsky-Jones 1997c, Jankovsky-Jones 1998c). Wetter communities, such as Carex (e.g. Carex nebrascensis or C. utriculata), Juncus balticus, Typha species, Eleocharis species, 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 (Hall and Hansen 1997, Jankovsky-Jones 1997c, Jankovsky-Jones 1998c). The neighboring higher alluvial bars, terraces, and islands support drier mid-seral Populus trichocarpa floodplain communities with understories dominated by a Cornus sericea, Rhamnus species, Symphoricarpos albus (or Symphoricarpos occidentalis), Salix species, Rosa woodsii, Poa pratensis, and mesic graminoids or forbs (Moseley and Bursik 1994, Hansen et al. 1995, Manning and Padgett 1995, Weixelman et al. 1996, Hall and Hansen 1997, Jankovsky-Jones 1997c, Jankovsky-Jones 1998c). Other floodplain communities, such as Betula occidentalis, Populus tremuloides, and Sarcobatus vermiculatus (on alkaline benches) types, 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 (Jankovsky-Jones 1997c, Jankovsky-Jones 1998). 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 species, 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 communities may also be adjacent.

CONSERVATION RANK G? S3?

SUCCESSION AND MANAGEMENT The Populus trichocarpa/Recent Alluvial Bar community 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. Moreover, its seeds germinate on the sunny, moist, and barren alluvium forming the early seral Populus trichocarpa/Recent Alluvial Bar community. 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). These older stands, on drier bars, terraces, and islands, are mid-seral Populus trichocarpa communities with understories dominated by Cornus sericea, Rhamnus species, or Salix species (Moseley and Bursik 1994, Hansen et al. 1995, Manning and Padgett 1995, Weixelman et al. 1996, Hall and Hansen 1997, Jankovsky-Jones 1997c, Jankovsky-Jones 1998c). 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 (Manning and Padgett 1995, Jankovsky-Jones 1997c). However, stream channel migration and large-scale floods may remove older communities and replace them with Populus trichocarpa/Recent Alluvial Bar (Moseley and Bursik 1994).

Early seral Populus trichocarpa/Recent Alluvial Bar communities 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 (Moseley and Bursik 1994, Jankovsky-Jones 1997c, Jankovsky-Jones 1998c). Likewise, other watershed activities, such as logging, road building, dredging, and development, can alter sediment inputs and the hydrologic system supporting this community. Elimination of these floodplain communities 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). However, 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.

CLASSIFICATION COMMENTS Populus trichocarpa/Recent Alluvial Bar is sometimes lumped within the broader Populus/Stream Bar community dominated by either Populus trichocarpa or Populus angustifolia (Manning and Padgett 1995). In Montana and elsewhere, a similar situation exists where any one, or combination of, Populus species (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 community classification (Hansen et al. 1995, Hall and Hansen 1997). Populus trichocarpa/Recent Alluvial Bar is recognized by the lack of a well developed understory with consistent composition (the result of nearly annual flooding). However, identification is less clear when this community grades into other early or mid-seral stands (such as Populus trichocarpa/Rhamnus species, Populus trichocarpa/Symphoricarpos albus, or Populus trichocarpa/Cornus sericea) which have slightly less flooding frequency and more understory vegetation (Moseley and Bursik 1994, Hansen et al. 1995, Hall and Hansen 1997).

Classification of Populus trichocarpa/Recent Alluvial Bar is based on at least four stands with plot data in Idaho (Moseley and Bursik 1994, Jankovsky-Jones 1998c) and 21 stands in Montana (Hansen et al. 1995, Hall and Hansen 1997). Manning and Padgett (1995) sampled five stands of the very similar Populus/Stream Bar community (which includes Populus trichocarpa dominated stands) in central Nevada. In Idaho, eight locations (three with stand plot data) of Populus trichocarpa/Recent Alluvial Bar are on record at the Conservation Data Center. Three of these areas are protected (Hideaway Islands Research Natural Area, Spion Kop Research Natural Area, and St. Maries Wildlife Management Area) (Moseley and Bursik 1994, Jankovsky-Jones 1997b, Jankovsky-Jones 1998c).

EDITION 1999

AUTHOR C. Murphy

POPULUS TRICHOCARPA/RHAMNUS ALNIFOLIA

COMMON NAME BLACK COTTONWOOD/ALDER BUCKTHORN

PHYSIOGNOMIC TYPE Forest

SIMILAR COMMUNITIES The Populus trichocarpa/Rhamnus alnifolia community is characterized by a mixed shrub understory. It often has many of the same shrub species as in the understories of Populus trichocarpa/Cornus sericea, Populus trichocarpa/Acer glabrum, Populus trichocarpa/Symphoricarpos albus, Populus trichocarpa/Rosa woodsii, and Populus trichocarpa/Crataegus douglasii communities (Moseley and Bursik 1994, Hansen et al. 1995, Crowe and Clausnitzer 1997, Jankovsky- Jones 1998c). The Populus trichocarpa/Rhamnus alnifolia community is unique, however, with its dominance by Rhamnus alnifolia (and occasional

co-dominance by Rhamnus purshiana). At least four stands of this community have had historic livestock grazing. Rhamnus alnifolia is less palatable to livestock than other shrub species; thus, its dominance may sometimes indicate past heavy grazing (Hansen et al. 1988). With mostly younger trees and high rock and gravel cover, it is also similar to the Populus trichocarpa/Recent Alluvial Bar community (Moseley and Bursik 1994).

RANGE Populus trichocarpa/Rhamnus alnifolia is a minor, and possibly rare, type known from only the Coeur D'Alene and St. Joe river drainages of northern Idaho (Moseley and Bursik 1994, Jankovsky-Jones 1998c).

ENVIRONMENTAL DESCRIPTION Populus trichocarpa/Rhamnus alnifolia occurs on wide valley floodplains of major rivers (e.g. Coeur D'Alene and St. Joe rivers) (Moseley and Bursik 1994, Jankovsky-Jones 1998c). Dynamic hydrologic and fluvial processes, such as erosion, sediment deposition, channel migration, and peak discharge events, are intact (Moseley and Bursik 1994). Elevations are low, ranging from 660 m to 850 m. The community is adjacent to river channels and old meander/side channels on flat or slightly undulating alluvial point bars, side bars, and islands. These alluvial bar sites are flooded either annually or frequently and are characterized by deposition of mostly mixed silt, sand, gravel, and cobble along with coarse woody debri (Moseley and Bursik 1994, Jankovsky-Jones 1998c). Thus, soils are shallow silty loams (e.g. 15 cm deep) or sand and gravel over old river cobbles. In addition to flooding disturbance, stands have often been historically grazed by livestock. Ground cover is typically 10 to 60 percent sand or silt with up to 10 percent gravel, 10 to 20 percent surface cobble, up to 20 percent large woody debris and 40 percent litter, and 10 to 20 percent moss.

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Populus trichocarpa
Tall shrub	Rhamnus purshiana, Amelanchier alnifolia, Acer glabrum
Short shrub	Rhamnus alnifolia, Symphoricarpos albus
Herbaceous	Poa pratensis, Phalaris arundinacea, Cicuta douglasii, Heracleum lanatum, Asarum caudatum

VEGETATION DESCRIPTION Based on cumulative data from the seven plots of both Moseley and Bursik (1994) and Jankovsky-Jones ([in preparation]), Populus trichocarpa/Rhamnus alnifolia is dominated by young and medium aged (15 to 60 years old) Populus trichocarpa up to 34 m tall. Populus trichocarpa averages 49 percent cover with 100 percent constancy. Cover of Populus trichocarpa is highly variable, ranging from 5 to 98 percent, though typically 30 to 80 percent. Understory trees include Abies grandis with (3 percent cover and 57 percent constancy), Tsuga heterophylla, and Pinus monticola. There is a well developed and diverse tall shrub understory dominated by Rhamnus purshiana with 40 percent cover and 57 percent constancy. Other important shrubs include: Amelanchier alnifolia (14 percent cover, 86 percent constancy); Acer glabrum (11 percent cover, 57 percent constancy); Cornus sericea (3 percent cover, 57 percent constancy); and occasionally Crataegus douglasii, Physocarpus

capitatus, and Philadelphus lewisii. The diagnostic Rhamnus alnifolia dominates the short shrub understory with 36 percent average cover and 100 percent constancy. Its cover ranges from 15 to 60 percent. Symphoricarpos albus is sometimes co-dominant with 28 percent cover (ranging from 0 to 60 percent) and 86 percent constancy. Rosa gymnocarpa and Rubus idaeus are sometimes also present. The herbaceous layer is a diverse mixture of mesic forbs and exotic weedy grasses with variable cover. Dominant exotic grasses are Poa pratensis (23 percent cover, 57 percent constancy), Phalaris arundinacea (18 percent cover, 86 percent constancy), and occasionally Agrostis stolonifera. Important native graminoids are Carex species (Carex nebrascensis, C. canescens, and C. disperma) (6 percent cover, 57 percent constancy) and Elymus glaucus (4 percent cover, 57 percent constancy). The most common forbs are: Cicuta douglasii (14 percent cover, 57 percent constancy); Heracleum lanatum (12 percent cover, 57 percent constancy); Asarum caudatum (9 percent cover, 57 percent constancy); Smilacina stellata (4 percent cover, 71 percent constancy); Aster species (4 percent cover, 57 percent constancy); Galium species (Galium boreale and G. triflorum) (3 percent cover, 71 percent constancy); and Equisetum species (1 percent cover, 57 percent constancy). Other common species, usuallly with low cover and constancy include: Trautvettaria caroliniensis, Ranunculus uncinatus and R. repens, Solidago canadensis, Hypericum perforatum, Anemone piperi, Trifolium repens, and Chrysanthemum leucanthemum.

WILDLIFE VALUES Beaver, elk, and black bear are known to utilize Populus trichocarpa/Rhamnus alnifolia stands (Moseley and Bursik 1994; Jankovsky-Jones 1998c). Young Populus trichocarpa stands are less utilized by large, stick-nest building birds and cavity nesting birds and mammals than old stands. However, these stands (especially with their lush shrub understory) still provide excellent cover, nesting, shade, and food for many small mammals, deer, waterfowl, and songbirds (Hansen et al. 1995). In addition, song and gamebirds often feed on the fruits of Rhamnus alnifolia (Hansen et al. 1988).

OTHER NOTEWORTHY SPECIES Weedy exotic species are common in Populus trichocarpa/Rhamnus alnifolia. They include: Agrostis stolonifera, Arctium minus, Centaurea maculosa, Chrysathemum leucanthemum, Cirsium arvense, Dactylis glomerata, Digitalis purpurea, Hypericum perforatum, Phalaris arundinacea, Phleum pratense, Poa palustris, Poa pratensis, Ranunculus repens, Solanum dulcamara, Tanacetum vulgare, Taraxacum officinale, and Trifolium repens (Moseley and Bursik 1994, Jankovsky-Jones 1998c).

ADJACENT COMMUNITIES Adjacent wetter, and more frequently flooded, communities are Populus trichocarpa/Recent Alluvial Bar, patches of Phalaris arundinacea, and graminoid dominated bars (Moseley and Bursik 1994, Jankovsky-Jones 1998c). Adjacent communities with a similar flooding regime are dominated by Populus trichocarpa, Cornus sericea, Salix melanopsis, Salix bebbiana, and Salix drummondiana. Adjacent drier alluvial bar communities are Populus trichocarpa/Symphoricarpos albus, Populus trichocarpa/Poa pratensis (or other exotic grasses), and Populus trichocarpa with mixed conifers (Moseley and Bursik 1994, Jankovsky-Jones 1998c).

CONSERVATION RANK G? S3

SUCCESSION AND MANAGEMENT Populus trichocarpa/Rhamnus alnifolia is a young, mid-seral community in areas disturbed by frequent flooding and sometimes historic livestock grazing (Moseley and Bursik 1994). The successional pattern of Populus trichocarpa communities along rivers with intact fluvial processes is the establishment of Populus trichocarpa on active point bars and other areas where sediment is deposited during floods. This exposed, moist sediment is ideal for Populus trichocarpa reproduction and results in an early seral, even-aged stand with a sparsely vegetated understory (i.e. the Populus trichocarpa/Recent Alluvial Bar community) (Moseley and Bursik 1994, Hansen et al. 1995). With further deposition, some stands will experience less frequent or less intense flooding. Over 15 to 60 years shrub and herbaceous understories develop, such as with the Populus trichocarpa/Rhamnus alnifolia or Populus trichocarpa/Cornus sericea communities (Moseley and Bursik 1994, Hansen et al. 1995). If these mid-seral stands are disturbed by livestock grazing or damaged by floods, a shrub layer dominated by disturbance tolerant shrubs (e.g. Rosa species, Crataegus douglasii, Rhamnus species) and an understory of weedy, exotic grasses (e.g. Phalaris arundinacea, Poa pratensis, and Phleum pratense) will form (Hansen et al. 1995). Stands of Populus trichocarpa/Rhamnus alnifolia may fit into this secondary successional pattern of a mid-seral community. With continued overgrazing, shrub cover will be removed converting the community to Populus trichocarpa/Poa pratensis. With less flooding the community will become a late seral, drier community with older trees such as the Populus trichocarpa/Symphoricarpos albus community (Moseley and Bursik 1994). However, river channels migrate laterally and destroy many older stands, setting the successional sequence back. With further aggradation, or due to alteration of fluvial processes, a river will down cut lowering the water table and flooding frequency of older bars and terraces (Moseley and Bursik 1994, Hansen et al. 1995). Eventually, conifer communities, dominated by Abies grandis, Tsuga heterophylla, or Thuja plicata, or other dry land communities may form on these drier sites.

The Populus trichocarpa/Rhamnus alnifolia community is an important stage in the perpetuation and maintenance of floodplain Populus trichocarpa stands. It increases structural and species diversity, habitat, and soil quality (Moseley and Bursik 1994). Due to the shrub understory, this community does not produce large amounts of forage; however, livestock do browse Poa pratensis and other exotic grasses, Populus trichocarpa, Symphoricarpos albus, and other shrubs. However, Rhamnus alnifolia is less palatable to livestock than other shrub species, and may increase with grazing (Hansen et al. 1988). Though Populus trichocarpa produces many suckers and seedlings after flood disturbance, grazing of young stems and foliage, combined with shading by shrubs, will prevent its reproduction (Hansen et al. 1995). Most important for Populus trichocarpa maintenance is protection of the hydrologic processes which produce new alluvial bars essential for reproduction. Populus trichocarpa communities persist only 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 (Moseley and Bursik 1994, Jankovsky-Jones 1998c). Likewise, other watershed activities, such as logging, road building, dredging, and development, can alter sediment inputs and the hydrologic system supporting this community. Elimination of these floodplain communities destabilizes the erodible streambanks and terrace soils because Populus

trichocarpa and associated shrubs effectively reduce flood erosion (Hansen et al. 1995). While Populus trichocarpa communities, especially younger stands, are easily eliminated by wildfire, Populus trichocarpa and associated shrubs will re-sprout (Moseley and Bursik 1994, Hansen et al. 1995). If rested from grazing for at least five years, stands will reinvade disturbed areas. In addition, Populus trichocarpa cuttings can be planted on alluvial bars for long-term revegetation. Though soils are not easily compacted, frequent flooding precludes many developments in this community's habitat (Hansen et al. 1995).

CLASSIFICATION COMMENTS Populus trichocarpa/Rhamnus alnifolia classification is based on only seven plots from two drainages in northern Idaho. Four plots from the Coeur D'Alene River dominated by Rhamnus alnifolia, with Rhamnus purshiana often co- dominant, were statistically classified as Populus trichocarpa/Rhamnus species by Moseley and Bursik (1994). Populus trichocarpa/Rhamnus species is synonymous with Populus trichocarpa/Rhamnus alnifolia. Three plots from the St. Joe River have not been statistically analyzed (Jankovsky-Jones 1998c). The common presence of other co-dominant shrub species in the understory, such as Symphoricarpos albus, Amelanchier alnifolia, and Acer glabrum, makes classification more difficult. However, other Populus trichocarpa communities with mixed shrub understories usually do not have any Rhamnus alnifolia present (when present, it has low cover and dominance by other species is clear) (Moseley and Bursik 1994, Hansen et al. 1995, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c). Populus trichocarpa/Rhamnus alnifolia is apparently a young mid-seral community on frequently flooded alluvial bars (Moseley and Bursik 1994). It is related to the less vegetated, and annually flooded, Populus trichocarpa/Recent Alluvial Bar community. The dynamic nature of the floodplain may promote the mixing of different shrub species by creating high micro-environmental variation on flood-disturbed bars.

EDITION 99-01-19

AUTHOR C. Murphy

POPULUS TRICHOCARPA/SYMPHORICARPOS ALBUS

COMMON NAME BLACK COTTONWOOD/COMMON SNOWBERRY

PHYSIOGNOMIC TYPE Forest

SIMILAR COMMUNITIES The similar Populus trichocarpa/Symphoricarpos albus/Poa pratensis community type is described for central Oregon as successional to ponderosa pine (Kovalchik 1987).

RANGE This type has been described with plot data from the Blue and Wallowa mountains of northeastern Oregon and the Coeur d'Alene River drainage in northern Idaho (Moseley and Bursik 1994, Crowe and Clausnitzer 1997). One stand has been observed in west-central Idaho.

ENVIRONMENTAL DESCRIPTION This type occurs on mid-elevation, gentle terraces along major rivers and streams in the mountains of central and northern Idaho and adjacent Oregon. Valley widths are usually broad (300-1,000 feet), but can be as narrow as 100 feet wide. Valleys are V-, flat- and trough-shaped with moderate gradients (2-5 percent) and often with steep sideslopes. Sites are on inactive floodplains and are infrequently flooded. The water table is generally deep. Mottling was evident on only one plot from Oregon (Moseley and Bursik 1994, Crowe and Clausnitzer 1997).

MOST ABUNDANT SPECIES

Strata	Species
Tree canopy	Populus trichocarpa
Tall shrub	Symphoricarpos albus, Crataegus douglasii
Herbaceous	Galium triflorum, Phalaris arundinacea, Elymus glaucus, Smilacina stellata, Poa pratensis

VEGETATION DESCRIPTION Populus trichocarpa dominates the overstory, with the potential for conifers to be present in all layers. Although irregular in occurrence, conifer species such as Pinus ponderosa, Abies grandis, Pseudotsuga menziesii, and Picea engelmannii, may indicate community potential on these terrace sites. The shrub component is dominated by Symphoricarpos albus with a diversity of other tall and medium shrubs scattered in the stands, the most prominent being Crataegus douglasii, Amelanchier alnifolia, Cornus sericea, and Philadelphus lewisii. The herbaceous layer is diverse, containing many forbs and perennial grasses, including both rhizomatous and caespitose species (Moseley and Bursik, Crowe and Clausnitzer 1997).

WILDLIFE VALUES The shrub understory of this community type provides nesting habitat and food for both nongame and game birds while the overstory is used by woodpeckers, raptors, and other birds for foraging, nesting, and roosting (Crowe and Clausnitzer 1997).

OTHER NOTEWORTHY SPECIES Not identified.

ADJACENT COMMUNITIES Northern Idaho stands are adjacent to Tsuga heterophylla associations (Moseley and Bursik 1994), while Pseudotsuga menziesii and Purshia tridentata associations are adjacent to stands in west-central Idaho. Pseudotsuga menziesii, Pinus ponderosa, and Abies grandis association occur in the adjacent uplands in Oregon (Crowe and Clausnitzer 1997).

CONSERVATION RANK G3 S2

SUCCESSION AND MANAGEMENT The Populus trichocarpa/Symphoricarpos albus type usually occurs on inactive floodplains, which flood only episodically. This may result in eventual succession to a conifer type, although the terrace may get washed away from lateral movement of the channel before this happens (Moseley and Bursik 1994). Wildfire may also maintain this type,

as has been documented from a 1931 fire in northern Idaho (Bursik and Moseley 1994) and a 1986 fire in west-central Idaho.

Understory cottonwood and shrubs are browsed by both domestic and wild ungulates. Continuous and severe grazing results in a decline in the Symphoricarpos albus component, while Poa pratensis increases in abundance.

CLASSIFICATION COMMENTS Classification is based on five plots throughout the mountains of northeastern Oregon (Crowe and Clausnitzer 1997), 18 plots in Spion Kop RNA along the Coeur d'Alene River (Moseley and Bursik 1994), and one plot in Goodrich Creek RNA.

EDITION 97-12-31

AUTHOR B. Moseley

CORNUS SERICEA

COMMON NAME RED-OSIER DOGWOOD

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES Cornus sericea is a community dominant in several associations. This community, however, lacks the structural diversity of the other types, for example the Alnus incana/Cornus sericea and Cornus sericea-Salix sp. types from Nevada (Manning and Padgett 1995). The relationship of this community with the Cornus sericea/Heracleum lanatum and C. sericea/Galium triflorum types from Utah and eastern Idaho (Youngblood et al. 1985, Padgett et al. 1989) is unclear.

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

ENVIRONMENTAL COMMENTS 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 of this community 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).

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Cornus sericea, Rosa woodsii
Herbaceous	Urtica dioica

VEGETATION DESCRIPTION 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 community, usually in low cover (Manning and Padgett 1995, Hansen et al. 1995, Hall and Hansen 1997, Crowe and Clausnitzer 1997).

WILDLIFE VALUES 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).

OTHER NOTEWORTHY SPECIES Information not available.

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

CONSERVATION RANK G4 S3

SUCCESSION AND MANAGEMENT This is considered an early seral community, 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 community type 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 communities.

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).

CLASSIFICATION COMMENTS Stands of this community type have been sampled in Washington, Oregon, Idaho, Nevada, and Montana.

EDITION 98-01-02

AUTHOR B. Moseley

CORNUS SERICEA/HERACLEUM LANATUM

COMMON NAME RED-OSIER DOGWOOD/COW PARSNIP

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES Youngblood et al. (1985) consider Cornus sericea/Galium triflorum community type to be closely related to Cornus sericea/Heracleum lanatum community type.

RANGE The Cornus sericea/Heracleum lanatum community type is a major type in northern Utah, southern Idaho, and eastern Idaho (Padgett et al. 1989, Youngblood et al. 1985). It is a minor type in southwestern Utah (Padgett et al. 1989).

ENVIRONMENTAL DESCRIPTION A combination of stream order and slope seem to be important in the establishment of the Cornus sericea/Heracleum lanatum community type. The development of a Mollic epipedon indicates that this community type, which occurs adjacent to stream channels, is stable enough for the incorporation of organic matter (Padgett et al. 1989, Youngblood et al. 1985). Many sites on which this community type occurs are currently elevated above the annual flood plain to a degree that annual fluvial action no longer takes place (Padgett et al. 1989).

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Cornus sericea
Herbaceous	Heracleum lanatum

VEGETATION DESCRIPTION Cornus sericea forms a dense shrub layer with 70 percent cover. Salix exigua, S. lutea, and S. drumondiana may be codominants. Other shrubs including Ribes aureum, R. hudsonianum, R. lacustre, R. inerme, Rosa woodsii, and Crataegus douglasii may be present. Heracleum lanatum is diagnostic with 5-20 percent cover. Other common herbaceous species include Galium triflorum, Geum macrophyllum, Smilacina stellata, Mertensia ciliata, and Urtica dioica (Padgett et al. 1989, Youngblood et al. 1985).

WILDLIFE VALUES Small mammals and avian species may seek shelter and food in this type (Youngblood et al. 1985). The dominant shrub is browsed by native ungulates (moose) and livestock when other feed is in short supply or unavailable.

OTHER NOTEWORTHY SPECIES Not identified.

ADJACENT COMMUNITIES Associated riparian communities may include Betula occidentalis, Salix exigua, and other low-elevation community types. Adjacent upland communities may be dominated by Pseudotsuga menziesii, Quercus gambelii, Acer glabrum, and/or Artemisia tridentata ssp. vaseyana (Padgett et al. 1989).

CONSERVATION RANK G3 S2

SUCCESSION AND MANAGEMENT The community type is a relatively stable, early successional type that colonizes stream bars and adjacent areas (Padgett et al. 1989). Youngblood et al. (1985) tentatively suggests that the Cornus sericea community type is seral to the Picea/Cornus sericea community type. Dense shrubs and accumulation of organic matter on soil surfaces may prevent most seedling establishment, but if flooding, and the subsequent deposition of mineral soil occurs, conifer seedlings may become established.

Cornus sericea is an important streambank stabilizer due to its strongly rhizomatous nature, and the ability of above ground stems to slow water movement through the community during high water flows. This is particularly important on the higher gradient stream channels where scouring by seasonal flooding may occur. Some stream shading is provided adjacent to the streambanks. Little forage is available for grazing; the dense shrub stratum limits livestock movement through this community type (Padgett et al. 1989, Youngblood et al. 1985).

Management should emphasize the importance of Cornus sericea for streambank stabilization. Rehabilitation should include fencing to exclude grazing by domestic livestock. In sites with a more open shrub layer, Cornus will readily establish along stream edges by direct seeding or planting nursery grown stock. Its rapid growth will quickly stabilize deteriorating streambanks (Hansen et al. 1995).

CLASSIFICATION COMMENTS Classification based on 6 stands in eastern Idaho and western Wyoming, 11 stands in Utah and southeastern Idaho and an unknown number of stands in Utah.

EDITION 95-09-12

AUTHOR L. Williams

CRATAEGUS DOUGLASII/HERACLEUM LANATUM

COMMON NAME BLACK HAWTHORN/COW PARSNIP

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES This communuty differs from the Crataegus douglasii/Symphoricarpos albus association by occurring adjacent to springs and creeks and being more susceptible to invasion by non-native species.

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

ENVIRONMENTAL DESCRIPTION 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.

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Crataegus douglasii, Prunus virginiana
Herbaceous	Heracleum lanatum, Hydrophyllum fendleri, Urtica dioica, Smilacina stellata

VEGETATION DESCRIPTION This is a dense thicket of the broad-leaved, deciduous shrub Crataegus douglasii 5 to 7 meters in 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. Occasionally Pinus ponderosa may be present as an overstory element.

WILDLIFE VALUES 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.

OTHER NOTEWORTHY SPECIES This type frequently has a floristic component characteristic of the nearby mountains, such as Circaea alpina, Cornus sericea, Elymus glaucus, Geum macrophyllum, Osmorhiza chilensis, and Pteridium aquilinum. It is also very susceptible to degradation by livestock use, which results in an understory of the exotic annual grasses including Bromus tectorum.

ADJACENT COMMUNITIES Adjacent uplands often support Crataegus douglasii/Symphoricarpos albus on north-facing slopes and grasslands on south-facing slopes. Adjacent riparian and/or wetland communty may contain or be dominated by Populus tremuloides, Populus trichocarpa, and Elymus cinereus.

CONSERVATION RANK G2 S1

SUCCESSION AND MANAGEMENT This association is considered a late seral plant association. Disturbance might promote Rosa woodsii and Poa pratensis shifting the community towards Crataegus douglasii/Rosa woodsii or Crataegus douglasii/Poa pratensis (Hansen et al. 1995). If the site becomes drier due to hydrologic changes, Crataegus douglasii stands may become conifer dominated (e.g. Pinus ponderosa/Prunus virginiana, Pinus ponderosa/Symphoricarpos albus) (Crowe and Clausnitzer 1997, Hall and Hansen 1997).

Due to the formation of thorn thickets and low forage production, the Crataegus douglasii/Heracleum lanatum community does not receive heavy livestock use. However, Crataegus douglasii foliage is eaten by livestock (Crowe and Clausnitzer 1997). Crataegus douglasii thorns usually protect it from grazing, though hedging or umbrella-shaped shrubs may result (Hansen et al. 1995). Heracleum lanatum is readily eaten by livestock and the plant is not tolerant of grazing. Cattle will bed under the canopy's shade causing significant soil exposure and compaction. Crataegus douglasii is killed to the ground by low intensity fires but often re-sprouts from its root crown after fire or other disturbance. Prescribed fire is used to reduce its extent. Healthy Crataegus douglasii stands are an excellent soil stabilizers and provide moderate erosion control. Crataegus douglasii is moderately useful for long-term revegetation. This community is not compatible with recreation development but does form a good barrier to human movement.

CLASSIFICATION COMMENTS Classification is based on seven stands in Washington. Additionally, four stands are known in Idaho and two are supported with plot data.

EDITION 93-06-10

AUTHOR M. Reid

CRATAEGUS DOUGLASII-SYMPHORICARPOS ALBUS/SMILACINA STELLATA

COMMON NAME BLACK HAWTHORN-COMMON SNOWBERRY/STARRY SOLOMON'S-SEAL

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES Stands of Crataegus douglasii-Symphoricarpos albus/Smilacina stellata are often lumped within broad Crataegus douglasii or Crataegus succulenta types (Jankovsky-Jones 1998a, Crowe and Clausnitzer 1997, Hall and Hansen 1997, Hansen et al. 1995, Evans 1989, Kovalchik 1987). This association also shares diagnostic species with Daubenmire's (1970) mesic upland Crataegus douglasii-Symphoricarpos albus (Populus tremuloides) plant association, but is at the wet end of a moisture gradient (Jankovsky-Jones 1998a). On drier sites it may grade into similar conifer/Symphoricarpos albus (often Pinus ponderosa) or conifer/Crataegus douglasii associations (Crowe and Clausnitzer 1997). Other similar hawthorne dominated stands are dominated by various understory shrubs or herbaceous species but may have noticeable Symphoricarpos species cover and constancy. They include: Crataegus douglasii-Rosa woodsii, Crataegus douglasii-Prunus virginiana, Crataegus douglasii-Philadelphus lewisii, Crataegus douglasii/Heracleum lanatum, or Crataegus douglasii/Elymus cinereus associations (Daubenmire 1970, Evans 1989, Hansen et al. 1995, Hall and Hansen 1997, Moseley 1998).

RANGE The Crataegus douglasii-Symphoricarpos albus/Smilacina stellata community is known from Idaho, Oregon (Jankovsky-Jones 1998a), Washington (Evans 1989), Montana (Hansen et al. 1995), and California. It is found on a tributary to the Teton River in eastern Idaho, near Coeur D' Alene Lake in northern Idaho, and on Rocking Comfort Flat Research Natural Area near the Wildhorse River in southern Hells Canyon (unconfirmed) (Jankovsky-Jones 1996, Jankovsky-Jones 1998bc. In Oregon, it is probably found on the Metolius River of central Oregon (Kovalchik 1987) and in the Blue Mountains of northeastern Oregon (Crowe and Clausnitzer 1997).

ENVIRONMENTAL DESCRIPTION The Crataegus douglasii-Symphoricarpos albus/Smilacina stellata association is found from about 700 m to 800 m elevation in northern Idaho (Jankovsky-Jones 1998c). In northeastern Oregon, and probably adjacent Idaho, this association and related Crataegus types are found from around 1000 to 1300 m (averaging 1100 m in the Blue Mountains) (Moseley 1998, Crowe and Clausnitzer 1997). In contrast, it is known in eastern Idaho at a high elevation of 1965 m (Jankovsky-Jones 1996). Analogous Crataegus communities are known in Montana, on similar landforms and soils, throughout this elevational range (Hansen et al. 1995, Hall and Hansen 1997). Crataegus douglasii-Symphoricarpos albus/Smilacina stellata is located in narrow to wide valley bottoms (flat-bottomed or V-shaped) on flat sites of floodplains, stream terraces, and basins (Jankovsky-Jones 1996, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c,). This community and similar Crateagus douglasii types can be found along both large perennial streams and small ephemeral streams with low to moderate gradients (usually 3 percent or less). These communities are infrequently flooded but may be in wet sites on islands or banks along old channels or on drier, outer floodplains over 50

meters from water (Hall and Hansen 1997, Evans 1989). Crataegus douglasii-Symphoricarpos albus/Smilacina stellata occurs on a variety of soils including Mollisols, Andisols, Entisols, and Inceptisols over old streambed materials. Soil textures vary from silt-loams and sandy-loams to loamy gravels. Soils often have large amounts of coarse fragments (gravel, cobble, or boulder) and are well drained, with a water table 1 m to 2 m below the surface by mid-summer (Crowe and Clausnitzer 1997).

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Crataegus douglasii
Short shrub	Symphoricarpos albus, Rosa woodsii
Herbaceous	Smilacina stellata, Heracleum lanatum, Equisetum spp., Thalictrum spp., Urtica dioica, Galium spp., Osmorhiza chilensis

VEGETATION DESCRIPTION The Crataegus douglasii-Symphoricarpos albus/Smilacina stellata plant association (including broader Crataegus douglasii and Crataegus succulenta community types and cover types) is dominated by Crataegus douglasii with 20 to 70 percent cover and 75 to 100 percent constancy (Kovalchik 1987, Hansen et al. 1995, Jankovsky-Jones 1996, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c). Tree species, including Populus tremuloides, Populus trichocarpa, Pseudotsuga menziesii, Abies grandis, Picea engelmannii, and Pinus ponderosa, may be present with low cover. Other tall shrubs are rarely important, having less than 20 percent cover and low constancy. They include Amelenchier alnifolia, Cornus sericea, Crataegus succulenta, Prunus virginiana, and Philadelphus lewisii. The low shrub understory is dominated by Symphoricarpos albus with 10 to 50 percent cover and 32 to 78 percent constancy (Kovalchik 1987, Jankovsky-Jones 1996, Hansen et al. 1995, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c). Other understory shrubs, with low cover and constancy, include Rosa woodsii and Physocarpus malvaceus. The herbaceous understory is dominated by a diverse mix of mesic forbs, the most widespread being Smilacina stellata (2 to 40 percent cover, 27 to 50 percent constancy) and Osmorhiza chilensis or O. depauperata (Kovalchik 1987, Jankovsky-Jones 1996, Hansen et al. 1995, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c). Other common associated forbs, usually with less than 10 percent cover, include Heracleum lanatum, Equisetum arvense (sometimes higher cover), Thalictrum species, Urtica dioica, and Galium species. Aconitum columbianum and Actaea rubra are occasionally present. The graminoid layer is noticeably dominated by exotic species with total cover usually less than cover of forbs. Poa pratensis (1 to 31 percent cover) and Bromus species (e.g. Bromus inermis, B. japonicus; 3 to 30 percent cover) are most important with Agrostis stolonifera and Phalaris arundinacea also sometimes present (Kovalchik 1987, Hansen et al. 1995, Jankovsky-Jones 1996, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c). The most common (though rarely important) native graminoid species are Elymus glaucus, Agropyron caninum, and Carex species. Moss and lichen cover is less than 20 percent and bare soil is often significant (30 to 50 percent of ground cover) (Jankovsky-Jones 1998c).

WILDLIFE VALUES The Crataegus douglasii-Symphoricarpos albus/Smilacina stellata association provides excellent cover and forage for a variety of species. Mule and white-tail deer, moose, elk, small mammals, and black bear utilize Crataegus for such resources as thermal cover, nesting or bedding, and forage (e.g. twigs, leaves, and fruit) (Hansen et al. 1995, Hall and Hansen 1997, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c). Communities often have numerous trails and bedding evidence under thick, seemingly impenetrable Crataegus patches. Birds also utilize Crataegus douglasii for food, cover, and nesting. Fruits are eaten by blue and sharp-tailed grouse and other birds. Black-billed magpies, thrushes, long-eared owls, and other species nest in Crataegus communities, utilizing its high structural diversity (Daubenmire 1970, Crowe and Clausnitzer 1997). Symphoricarpos albus also provides nesting cover and food for grouse, quail, pheasant, wild turkey, and songbirds (Crowe and Clausnitzer 1997).

OTHER NOTEWORTHY SPECIES Weedy exotic species are common in the Crataegus douglasii-Symphoricarpos albus/Smilacina stellata association (including broader Crataegus spp. cover and community types) (Hansen et al. 1995, Jankovsky-Jones 1996, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c). Exotic grasses include: Agropyron repens, Agrostis stolonifera, Bromus inermis, Bromus japonicus, Bromus tectorum, Dactylis glomerata, Hordeum jubatum, Phalaris arundinacea, Phleum pratense, Poa palustris, Poa pratensis, and Setaria viridis. Exotic forbs include: Centaurea maculosa, Cirsium arvense, Cirsium vulgare, Lactuca serriola, Medicago species, Nepeta cataria, Plantago species, Ranunculus repens, Rumex crispus, Solanum dulcamara, Taraxacum officinale, Tragopogon dubius, Trifolium repens, and Tanacetum vulgare.

ADJACENT COMMUNITIES Adjacent wetter to slightly wetter vegetation stands include those dominated by Typha species, Phalaris arundinacea, Spiraea douglasii, Alnus spp., Populus spp., Salix spp., and Cornus sericea (Hansen et al. 1995, Hall and Hansen 1997). Adjacent communities with similar moisture requirements are dominated by Physocarpus malvaceus, Betula occidentalis, and Rosa species (Hall and Hansen 1997, Jankovsky-Jones 1998c). Slightly drier communities may be on alluvial terraces and include Abies grandis/Acer glabrum or other conifer communities (Crowe and Clausnitzer 1997). Adjacent uplands are dominated by Pseudotsuga menziesii, Abies grandis, Pinus ponderosa, and Juniperus scopulorum forest types or Artemisia tridentata shrub-steppe (Crowe and Clausnitzer 1997, Hall and Hansen 1997).

CONSERVATION RANK G2 S2

SUCCESSION AND MANAGEMENT Very little information is available on the successional dynamics of Crataegus douglasii-Symphoricarpos albus/Smilacina stellata. Crataegus spp. dominated communities are often considered mid-seral and disturbance-induced (e.g. grazing) based on their patchy nature, exotic species cover, and impenetrable thorn thickets which prevent intense livestock grazing pressure (Crowe and Clausnitzer 1997, Hall and Hansen 1997). However, Crataegus douglasii-Symphoricarpos albus/Smilacina stellata may be a climax community in non-forested areas (Crowe and Clausnitzer 1997). Alternatively, it may be a seral stage for other riparian forest or shrub types including Populus tremuloides, Salix lutea, or Cornus sericea dominated associations. Likewise, Crataegus douglasii/Symphoricarpos albus/Smilacina

stellata may be successionally related to other Crataegus douglasii types such as Crataegus douglasii/Rosa woodsii, Crataegus douglasii-Prunus virginiana, Crataegus douglasii-Philadelphus lewisii, or Crataegus douglasii/Heracleum lanatum (Daubenmire 1970, Evans 1989, Hansen et al. 1995, Hall and Hansen 1997, Jankovsky-Jones 1998a, Moseley 1998). For example, increased disturbance might promote Rosa woodsii and Poa pratensis shifting the community towards Crataegus douglasii/Rosa woodsii or Crataegus douglasii/Poa pratensis (Hansen et al. 1995). If the site becomes drier due to hydrologic changes, Crataegus douglasii stands may become conifer dominated (e.g. Pinus ponderosa/Prunus virginiana, Pinus ponderosa/Symphoricarpos albus) (Crowe and Clausnitzer 1997, Hall and Hansen 1997).

Due to the formation of thorn thickets and low forage production, the Crataegus douglasii-Symphoricarpos albus/Smilacina stellata community does not receive heavy livestock use. However, Crataegus douglasii and Symphoricarpos albus foliage is eaten by livestock (Crowe and Clausnitzer 1997). Crataegus douglasii thorns usually protect it from grazing, though hedging or umbrella-shaped shrubs may result (Hansen et al. 1995). Cattle also bed under the canopy's shade causing significant soil exposure and compaction. Symphoricarpos albus sustains the least damage from spring grazing, but it may decrease with grazing in other seasons (Crowe and Clausnitzer 1997). Overgrazing in this community will promote Rosa woodsii and Poa pratensis or other exotic species (Hansen et al. 1995, Hall and Hansen 1997). Crataegus douglasii is killed to the ground by low intensity fires but often re-sprouts from its root crown after fire or other disturbance. Prescribed fire is used to reduce its extent. Symphoricarpos albus also re-sprouts vigorously from its rhizomes after all but the most severe fires (Crowe and Clausnitzer 1997). A healthy Crataegus douglasii-Symphoricarpos albus/Smilacina stellata community is an excellent soil stabilizer and provides moderate erosion control. Both Crataegus douglasii and Symphoricarpos albus are moderately useful for long-term revegetation, though the latter is a better species due to its faster growth (Hansen et al. 1995, Hall and Hansen 1997). This community is not compatible with recreation development but does form a good barrier to human movement.

CLASSIFICATION COMMENTS The Crataegus douglasii-Symphoricarpos albus habitat type is recognized as an upland type. The habitat type sometimes has a Populus tremuloides overstory phase and shares a similar herbaceous understory with the Festuca idahoensis/Symphoricarpos albus association (Daubenmire 1970). In riparian zones, a broad Crataegus douglasii type has been described which includes stands that are also characterized by a Symphoricarpos albus dominated understory (Kovalchik 1987, Evans 1989, Crowe and Clausnitzer 1997). In Montana and eastern Idaho, a similar riparian Crataegus succulenta cover type has been described which is dominated by either Crataegus succulenta or Crataegus douglasii with Symphoricarpos species or Rosa woodsii as the dominant understory shrubs (Hansen et al. 1995, Hall and Hansen 1997). Based on consultation with Heritage ecologists from Washington and Oregon, it is recommended that a riparian Crataegus douglasii-Symphoricarpos albus association should be recognized (Jankovsky-Jones 1998a) and potentially named the Crataegus douglasii-Symphoricarpos albus/Smilacina stellata plant association. This name is used for the purpose of this description. More riparian plot data is needed to increase confidence of the

proposed name and to determine if there is another species that is less of a generalist that has high affinity with the association.

Classification of the Crataegus douglasii-Symphoricarpos albus/Smilacina stellata association is based on four plots from Idaho (three near Coeur D' Alene Lake, one near the Teton River; Jankovsky-Jones 1998b, Jankovsky-Jones 1996). Ten plots from eastern Oregon (Crowe and Clausnitzer 1997, Kovalchik 1987) and 22 stands from central Montana (Hansen et al. 1995), which are lumped into broader Crataegus spp. cover and community types, are also used in this description based on similar species composition (it is possible, though, that some stands may fit better in other Crataegus douglasii associtions).

EDITION 98-12-14

AUTHOR C. Murphy, M. Jankovsky-Jones

ALNUS INCANA/ATHYRIUM FILIX-FEMINA

COMMON NAME SPECKLED ALDER/SUBARCTIC LADYFERN

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES The broad Alnus incana community type of Hansen et al. (1995) has a similar mixed shrub and mesic forb understory including noticeable Athyrium filix-femina cover. More specifically, the Alnus incana/Athyrium filix-femina community is a lower elevation version of Alnus sinuata/Athyrium filix-femina described by Crowe and Clausnitzer (1997). It also resembles Alnus incana/Cornus stolonifer and Alnus incana/Equisetum sp. since all have similar mixed shrub species, mesic forbs species, and Athyrium filix-femina in their understories. Alnus incana/Lysichitum americanum also shares Athyrium filix-femina but is in more poorly drained sites (Kovalchik 1993). Similarly, Alnus incana/Carex deweyana and Alnus sinuata/Cinna latifolia also share similar mixed shrubs, mesic forbs, graminoids, and Athyrium filix-femina with Alnus incana/Athyrium filix-femina (Crowe and Clausnitzer 1997).

RANGE Alnus incana/Athyrium filix-femina is a locally common community type found in maritime influenced areas of Idaho, Washington, Oregon, and possibly British Columbia, Montana, and California. In Idaho, it is known from the Purcell and Selkirk mountains, and the North Fork Clearwater, Lochsa, and St. Joe River drainages (Jankovsky-Jones 1998c, Rust et al. 1997, Bursik and Moseley 1995). In Washington it is known from the Okanogan Highlands and possibly Cascades (Kovalchik 1993). It has also been recorded in the Blue Mountains of Washington and Oregon (Crowe and Clausnitzer 1997).

ENVIRONMENTAL DESCRIPTION The Alnus incana/Athyrium filix-femina

community is found in cool, moist sites often with a maritime influenced climate. Elevations range from 700 to about 1350 m. In north Idaho, it is found in lower elevation valleys between 750 and 1050 m (Jankovsky-Jones 1998c, Rust et al. 1997, Bursik and Moseley 1995) while in the Blue Mountains Crowe and Clausnitzer (1997) found it at about 1275 m mean elevation. The community is located on wet streambanks, floodplains, overflow channels and pools, large oxbows, sediment-filled beaver ponds, and springs which are often flooded during peak runoff (Crowe and Clausnitzer 1997, Rust et al. 1997, Kovalchik 1993). Rust et al. (1997) and Kovalchik (1993) often found it in gentler, wider stream valleys (both U and V-shaped) with less than 5 percent slope. Jankovsky-Jones (1998) and Crowe and Clausnitzer (1997), however, recorded it more often in narrower, steep gradient valleys between 4 and 10 percent slope. Soils are variable and include Mollisols (Endoaqualls), Entisols, Inceptisols (Endoaquepts, Humaquepts), and occasionally Sapric Histisols. Textures are usually silty to sandy loams (rarely with coarse fragments) over old streambeds of rounded cobble and gravel (Crowe and Clausnitzer 1997, Kovalchik 1993). Soils have moderate to low available water capacity and the water table is 15 to 60 cm below the surface. On these poorly developed alluvial soils, alder improves fertility with its nitrogen-fixing root nodules and nitrogen rich litter (Hansen et al. 1995, Kovalchik 1993).

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Alnus incana, Cornus sericea
Short shrub	Ribes lacustre, Rubus parviflora
Herbaceous	Athyrium filix-femina, Cinna latifolia, Equisetum arvense, Carex spp., Glyceria spp., Senecio triangularis, Geum macrophyllum

VEGETATION DESCRIPTION Alnus incana forms a canopy to 5 m tall with 100 percent constancy and cover from 30 to 53 percent (Jankovsky-Jones 1998c, Crowe and Clausnitzer 1997, Kovalchik 1993). There are occasional conifer trees mixed in this community, the most common being Thuja plicata (about 5 percent cover). There is a mixed shrub understory dominated by either Cornus sericea (about 10 percent cover, high constancy), Ribes lacustre (70 to 80 percent constancy, 10 to 17 percent cover) or other species including Salix species (S. bebbiana and S. sitchensis) and Ribes hudsonianum (Jankovsky- Jones 1998c, Crowe and Clausnitzer 1997, Kovalchik 1993). Rubus parviflora is also often present with low cover. The graminoid layer is often dominated by Cinna latifolia (to 20 percent cover) associated with Glyceria species (less than 5 percent cover, including G. grandis, G. striata, G. elata) and Carex species including Carex deweyana and C. disperma. Scirpis microcarpus and Agrostis stolonifera may also be noticeable (Jankovsky-Jones 1998c). Athyrium filix-femina forms a lush layer, 0.6 to 1.0 m tall with 100 percent constancy and more than 20 percent cover. Kovalchik (1993) notes that Athyrium disentifolium may also be common. Other mesic forbs, commonly with more than 5 percent cover, include Equisetum arvense, Mitella pentandra, Dryopteris arguta, Gymnocarpium dryopteris, Circaea alpina, Montia cordifolia, and Angelica arguta (Jankovsky-Jones 1998, Crowe and Clausnitzer 1997, and Kovalchik 1993). Common forbs with less than 5 percent cover include Senecio triangularis, Galium aparine, Epilobium watsonii, Geum macrophyllum, Urtica

dioica, and Streptopus amplexicaulis. Moss, lichen, and liverwort cover often exceeds 25 percent in this community.

WILDLIFE VALUES The young shoots and leaves of Alnus incana are browse for ungulates, beaver, and rabbits but associated shrubs and graminoids provide more forage (Crowe and Clausnitzer 1997). Alnus incana communities provide good cover for elk, whitetail, mule deer, and songbirds (which also eat large numbers of seeds). They also stabilize and overhang streambanks, providing cover for trout and other salmonids (Hansen et al. 1995). While overall wildlife palability of Alnus incana is poor to fair, ungulates do occasionally feed on fronds of Athyrium filix-femina in this community (Crowe and Clausnitzer 1997).

OTHER NOTEWORTHY SPECIES Exotic species known to occur in Alnus incana/Athyrium filix-femina, all with low cover and constancy, are Agrostis stolonifera, Phleum pratense, and Cirsium arvense (Jankovsky-Jones 1998c, Kovalchik 1993).

ADJACENT COMMUNITIES Adjacent wetter communities might include Carex utriculata, Alnus incana/Carex utriculata, Spiraea douglasii, Picea engelmannii/Equisetum arvense, or Alnus incana/Equisetum arvense types (Rust et al. 1997, Kovalchik 1993). Communities of similar moisture levels include Abies grandis/Acer glabrum, Alnus incana-Ribes/Mesic forb, and Alnus sinuata/Athyrium filix-femina (at higher elevations, colder sites) (Crowe and Clausnitzer 1997). Drier riparian communities are Thuja plicata/Athyrium filix-femina, Abies lasiocarpa/Athyrium filix-femina, Abies grandis/Athyrium filix-femina, and other types of these conifer series. Neighboring uplands are typically Thuja plicata, Abies lasiocarpa, Picea engelmannii, Tsuga heterophylla, or Abies grandis associations, often with Clintonia uniflora in the understory (Crowe and Clausnitzer 1997, Kovalchik 1993).

CONSERVATION RANK G3 S2

SUCCESSION AND MANAGEMENT Very little is known about the successional dynamics of Alnus incana/Athyrium filix-femina. This community is most likely a persistent mid-seral type requiring regular flood scouring and deposition for maintenance (Crowe and Clausnitzer 1997, Kovalchik 1993). For example, both Alnus incana and Athyrium filix-femina are quick to recolonize ground disturbed by fire or flood (scouring and alluvial deposition) and might form a stable community until stream dynamics change. If the stream channel becomes sinuous and entrenched (e.g. Rosgen E channel), Salix species may invade (Crowe and Clausnitzer 1997). More likely, downcutting and floodplain widening may dry out alluvial terraces and allow conifer invasion (Hansen et al. 1995, Hansen et al. 1988). This change may lead toward Abies grandis/Athyrium filix-femina in the Blue Mountains (Crowe and Clausnitzer 1997) and Thuja plicata/Athyrium filix-femina or Abies lasiocarpa/Athyrium filix-femina in northern Washington and Idaho (Kovalchik 1993).

Alnus incana is a good streambank stabilizer with long-term potential as a revegetation species. However, Alnus incana is decreased by overgrazing and trampling which reduces its ability to

stabilize streambanks, allowing overwidening of the channel, thus, changing the hydrologic regime necessary to support the diagnostic shrub (Hansen et al. 1988, Hansen et al. 1995). The reduction of Alnus incana will allow invasion by other species which alter the community. Fortunately, Alnus incana has poor to fair palability for livestock and livestock may be poisoned by filicic acid in Athyrium filix-femina (Crowe and Clausnitzer 1997). Both Alnus incana and Athyrium filix-femina can re-sprout after light burns but are killed by intense or repeated fire (Hansen et al. 1988). The ability of Alnus incana to re-colonize disturbed ground is further enhanced by the production of numerous wind and water dispersed seeds which germinate on mineral substrates. It also improves soil fertility with nitrogen-fixing root nodules and nitrogen rich leaf litter. Alnus incana re-sprouts from cutting which results in rapid shoot production. The life of Alnus incana is reduced by several fungi species infections and insect and caterpillar infestations (Crowe and Clausnitzer 1997).

CLASSIFICATION COMMENTS The Alnus incana/Athyrium filix-femina community may have been included in a broader Alnus incana dominance type in Montana (Hansen et al. 1995). The classification of Alnus incana/Athyrium filix-femina is based on at least five stands in Idaho (Jankovsky- Jones 1998c, Rust et al. 1997, Bursik and Moseley 1995), 20 stands in northeastern Washington (Kovalchik 1993), and 10 stands in northeastern Oregon (Crowe and Clausnitzer 1997). There are five records of the community in Idaho including Mica Creek with plot data (Jankovsky-Jones 1998c). The other four records are in Research Natural Areas: Three Ponds (Bursik and Moseley 1995), Upper Priest River (Rust et al. 1997), Chateau Falls, and Dutch Creek.

EDITION 98-11-19

AUTHOR C. Murphy

ALNUS INCANA/MESIC FORB

COMMON NAME MOUNTAIN ALDER/MESIC FORB

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES Kovalchik et al.'s (1993) Washington stands have shrub and tree composition similar to Idaho, Utah, and Nevada stands. The understory is somewhat distinct with Cinna latifolia, Streptopus amplexifolius, and Athyrium spp. having high constancy. Additionally, Kovalchik may have included some stands treated by Youngblood et al. (1989) as Alnus incana/Cornus sericea in the Alnus incana/Mesic forb type. Nevada stands are similar to Utah and southeastern Idaho stands (Manning and Padgett 1992). Hansen et al. (1995) treats all stands with Alnus incana as the dominant shrub within the Alnus incana dominance type.

RANGE Minor type in Montana, eastern Washington, Idaho, Nevada, Utah, Wyoming, and Colorado.

ENVIRONMENTAL DESCRIPTION The Alnus incana/Mesic forb community type occurs on terraces and floodplains adjacent to streams with bedloads of boulders, cobble, and gravel (Kovalchik 1993). 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, Kovalchik 1993).

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Alnus incana
Herbaceous	Heracleum lanatum, Geranium richardsonii, Equisetum arvense, Aconitum columbianum, Galium triflorum

VEGETATION DESCRIPTION Alnus incana clearly dominates the tall shrub overstory with over 40 percent cover. Conifers, including Abies lasiocarpa, Picea engelmannii, and Pinus contorta, are sometimes present. 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 percent cover in combination. A somewhat sparse low shrub layer is often present and may include Lonicera involucrata, Ribes spp., and Rosa spp. The graminoids Glyceria elata, Agrostis stolonifera, Elymus glaucus, and Poa pratensis may contribute a combined cover of up to 50 percent.

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

OTHER NOTEWORTHY SPECIES Information not available.

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 et al. 1992, Kovalchik 1993).

CONSERVATION RANK G3G4 S1

SUCCESSION AND MANAGEMENT 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 (at least in southeast Idaho and northern Utah). In Montana, the Alnus incana community type 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 community type may persist for a long time before finally being replaced by Salix geyeriana or Salix lutea types, depending upon elevation. Other areas may see a gradual

conversion to Pseudotsuga menziesii/Cornus sericea habitat type (Hansen et al. 1995). Grazing may result in the type being replaced by the Alnus incana/Mesic graminoid community type (Padgett et al. 1989).

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 community type is more likely to be impacted by livestock grazing. Alnus incana community types generally occur immediately adjacent to stream channels, and therefore, provide stability to streambanks and shade to 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).

CLASSIFICATION COMMENTS Classification based on 50 stands in Colorado, 15 stands in Utah, 10 stands in Nevada, 22 stands in eastern Washington (may include some A. incana/Cornus sericea), and an unknown number of stands in Montana (classified as a dominance type).

EDITION 1990s

AUTHOR L. Williams

ALNUS INCANA/MESIC GRAMINOID

COMMON NAME MOUNTAIN ALDER/MESIC GRAMINOID

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES There are many communities ecologically similar to Alnus incana/Mesic graminoid. For example, it is similar to the Alnus incana/mixed grasslike plants and forbs community of Kauffman et al. (1985) and the Alnus incana dominance type of Hansen et al. (1995). These two communities have high cover of exotic weedy grasses and a diverse mixture of mesic forbs, though graminoid cover exceeds that of forbs. Alnus incana also forms communities which share a tall shrub-herbaceous structure with Alnus incana/Mesic graminoid, but differ by their clear dominance by a single diagnostic graminoid species. These diagnostic graminoids include: Poa pratensis, Carex amplifolia, Carex utriculata, Glyceria elata, Carex deweyana, Carex luzulina, Carex aquatilis, Carex lanuginosa, Calamagrostis canadensis, Scirpus microcarpus, and Carex lenticularis var. lenticularis (Kauffman et al. 1985, Evenden 1989, Crowe and Clausnitzer 1997). Alnus incana/Mesic graminoid shares many species with Alnus incana-Cornus stolonifera [syn. Cornus sericea]/Mesic forb (Crowe and Clausnitzer 1997) and

Alnus incana/Cornus sericea (Padgett et al. 1989, Manning and Padgett 1995) but has much lower cover of Cornus sericea.

RANGE Alnus incana/Mesic graminoid is a widespread but minor community type. It is found in northern Idaho, specifically in the Priest River, Lake Pend Oreille/Pend Oreille River, and St. Joe River basins (Jankovsky-Jones 1997a, 1998c), and also in the mountains of southeast Idaho; central and eastern Utah; western and central Colorado; and northwest and south-central Wyoming (Padgett et al. 1989, Walford et al. 1997). In addition, Manning and Padgett (1995) sampled it in northeastern Nevada (e.g. in the Jarbidge Mountains vicinity). Kauffman et al. (1985) sampled a very similar Alnus incana/mixed grasslike plants and forbs community in northeastern Oregon.

ENVIRONMENTAL DESCRIPTION The Alnus incana/Mesic graminoid community is found on narrow to wide valley floodplains of meandering streams (Padgett et al. 1989, Manning and Padgett 1995, Jankovsky-Jones 1998c). These streams have very low to moderate gradients but seasonally fluctuate causing spring flooding (Kauffman et al. 1985). The community forms stringers immediately adjacent to streams or abandoned meanders, 0.5 to 2 m above the active stream channel (Kauffman et al. 1985, Walford et al. 1997). It is also found along the back water sloughs of Lake Pend Oreille, Idaho (Jankovsky-Jones 1997a). Alnus incana/Mesic graminoid is found over a wide elevation range, from 627 m to 1050 m in northern Idaho (Jankovsky-Jones 1997a, 1998c) to moderate elevations of 1710 m to 2195 m in Nevada, Utah, and Wyoming (Padgett et al. 1989, Manning and Padgett 1995, Walford et al. 1997). It is as high as 2745 m in Utah. The ground cover of this community is usually 20 percent bare soil and gravel with 40 to 50 percent litter, duff, and wood (Walford et al. 1997, Jankovsky-Jones 1998c). Soils are commonly Entisols and Mollisols; mostly Fluvents (e.g. Aquic Udifluvents, Mollic Cryofluvents) and Aquolls (e.g. Cumulic Haplaquolls, Histic Cryaquolls formed over old stream alluvium. However, Cryochrepts, Cryoborolls, and Haploxerolls) have also been sampled (Padgett et al. 1989, Manning and Padgett 1995, Walford et al. 1997). The alluvial derived soils are fine loamy to organic, with zero to 35 percent coarse fragments, and low to high water-holding capacity. The water table, as indicated by soil mottling, is often within 1 m of the surface, with the mean depth ranging from 28 to 51 cm (Kauffman et al. 1985, Padgett et al. 1989, Manning and Padgett 1995, Walford et al. 1997).

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Alnus incana, Salix spp., Cornus sericea
Herbaceous	Agrostis stolonifera, Poa pratensis, Poa palustris, Phalaris arundinacea, Glyceria species, Carex utriculata, Carex spp., Galium spp., Geum macrophyllum

VEGETATION DESCRIPTION The Alnus incana/Mesic graminoid community has a tall shrub overstory (total cover over 50 percent) dominated by Alnus incana with 20 to 66 percent cover and 100 percent constancy. Other tall shrubs, usually with low constancy and less than 33

percent cover, include: Salix species (Salix lasiandra, S. lutea, S. bebbiana, S. geyeriana, and S. exigua); Betula occidentalis (at lower elevations); and Cornus sericea (5 to 10 percent cover) (Padgett et al. 1989, Manning and Padgett 1995, Walford et al. 1997, Jankovsky- Jones 1998c). Trees are sometimes present (with low cover and constancy), including Picea engelmannii, Populus trichocarpa, and Populus tremuloides (Padgett et al. 1989, Manning and Padgett 1995). There is an open, low shrub understory characterized by shrubs (with low cover and moderate constancy) such as Ribes species (e.g. Ribes inerme), Rosa woodsii, and Rubus species (e.g. Rubus parviflorus). The herbaceous understory is dominated by graminoids with over 50 percent total cover. Exotic grasses are commonly dominant including Agrostis stolonifera (15 to 60 percent cover, up to 50 percent constancy), Poa pratensis (up to 34 percent cover and 83 percent constancy), Poa palustris (up to 18 percent cover with low to high constancy), and Phalaris arundinacea (Padgett et al. 1989, Manning and Padgett 1995, Jankovsky-Jones 1997a, 1998c). Native species diversity is high; however, species rarely have more than 20 percent cover and/or 50 percent constancy. Common species are Glyceria species (Glyceria striata and G. grandis), Carex utriculata, Calamagrostis canadensis, Elymus glaucus, and Scirpus microcarpus (Kauffman et al. 1985, Padgett et al. 1989, Manning and Padgett 1995, Walford et al. 1997, Jankovsky-Jones1998c). Less common species are Carex aquatilis and other Carex species, Deschampsia elongata, Deschampsia cespitosa, Agrostis exarata, and Juncus mertensianus. Cover of mesic forbs is typically sparse (less than that of graminoids). Species diversity is high, but species usually have low cover but moderate constancy. Common species include: Geranium richardsonii, Taraxacum officinale, Trifolium species, Thalictrum fendleri, Equisetum arvense, Aconitum columbianum, Galium species, Geum macrophyllum, Mimulus guttatus, Taraxacum officinale, Veronica americana, Aster occidentale, Rudbeckia occidentalis, Angelica arguta, and Epilobium watsonii (Kauffman et al. 1985, Padgett et al. 1989, Manning and Padgett 1995, Walford et al. 1997, Jankovsky-Jones 1998c). Moss, lichen, and liverwort cover is often high (up to 50 percent).

WILDLIFE VALUES Alnus incana/Mesic graminoid provides cover and forage for many wildlife species. Though Alnus incana palatabilty and nutrition is poor to fair for elk and deer, ungulates do use Alnus incana for thermal cover (Kauffman et al. 1985, Hansen et al. 1995, Crowe and Clausnitzer 1997). Alnus incana forms structurally diverse foraging and nesting habitat for small mammals, beaver, and birds which utilize its cover, bark, leaves, buds, twigs, and seeds (Kauffman et al. 1985, Hansen et al. 1995, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c). The understory grasses are superior to Alnus incana for ungulate forage. For example, Agrostis stolonifera is good mule deer forage, Poa palustris is good spring and summer elk forage, and Poa pratensis is highly palatable to elk, mule deer, and white-tailed deer, especially in spring (Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997). The Alnus incana/Mesic graminoid community forms excellent fish habitat with its overhanging vegetation shading streams while also supplying nutrients and woody debris. In addition, the root masses of shrubs and graminoids stabilize undercut streambanks (Kauffman et al. 1985, Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Exotic species, especially grasses, are common in the Alnus incana/Mesic graminoid community. Exotic species include: Agrostis stolonifera, Phalaris arundinacea, Phleum pratense, Poa palustris, Poa pratensis, Taraxacum officinale, and Trifolium repens (Kauffman et al. 1985, Padgett et al. 1989, Manning and Padgett 1995, Jankovsky-Jones 1997, 1998c).

SUCCESSION AND MANAGEMENT The understory of Alnus incana/Mesic graminoid is sometimes dominated by, or co-dominated by, exotic weedy grasses (such as Agrostis stolonifera, Poa pratensis, Phalaris arundinacea, and Poa palustris) which are mixed with mesic forbs that have low cover. Thus, it is hypothesized that Alnus incana/Mesic graminoid may be a grazing induced sere of Alnus incana/Mesic forb where palatable forbs and native graminoids have been replaced by exotic grasses (Padgett et al. 1989, Manning and Padgett 1995). Alnus incana may naturally form communities dominated by native graminoids, either with a clearly dominant species (e.g. Carex lanuginosa and others; Evenden 1989, Crowe and Clausnitzer 1997) or as a mesic graminoid group (Walford et al. 1997). With overgrazing by livestock, exotic grasses, such as Poa pratensis, and less palatable shrubs, such as Rosa woodsii, may invade, converting these communities to Alnus incana/Poa pratensis or Alnus incana/Rosa woodsii (Evenden 1989, Crowe and Clausnitzer 1997). Exclusion of grazing allows re-invasion by native graminoids, such as Carex lanuginosa, into some stands (Evenden 1989). Alnus incana communities are usually early seral, establishing on bare and moist banks after disturbances such as floods (Evenden 1989, Kauffman et al. 1985, Hansen et al. 1995). They may be stable and long-lived or successional to Salix (e.g. Salix geyeriana or Salix lutea with graminoids) or conifer (e.g. Picea engelmannii) dominated communities (especially if hydrologic changes make the site more xeric for conifers) (Kauffman et al. 1985, Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995).

ADJACENT COMMUNITIES Wetter communities, associated with hillside seeps or floodplains, adjacent to Alnus incana/Mesic graminoid are dominated by Spiraea douglasii, Salix spp., mesic graminoid meadow, Phalaris arundinacea, Eleocharis palustris, Scirpus microcarpus, Carex vesicaria, Carex utriculata, Carex amplifolia, and Carex cusickii (Jankovsky-Jones 1997a, 1998c). Adjacent alluvial terrace communities with similar, or slightly drier, moisture regimes are Salix species, Prunus virginiana, Populus trichocarpa, Crataegus douglasii/Poa pratensis, Poa pratensis (with Bromus tectorum and mesic forbs), Symphoricarpos albus, and Pinus ponderosa/Crataegus douglasii (Kauffman et al. 1985, Jankovsky-Jones 1997a). In eastern Oregon and Montana, similar Alnus incana communities (e.g. Alnus incana/Poa pratensis, Alnus incana with various Carex species) are neighbored by Populus trichocarpa or Populus angustifolia terrace communities or riparian conifer types such as Picea engelmannii/Equisetum arvense and Abies grandis or Pinus contorta floodplain types (Hansen et al. 1995, Crowe and Clausnitzer 1997). Uplands adjacent to Alnus incana communities are dominated by Abies lasiocarpa, Abies grandis, Pinus contorta, Pinus ponderosa, Pseudotsuga menziesii, Populus tremuloides, pinyon-juniper woodland, Artemisia tridentata ssp. vaseyana steppe, and Quercus gambelii (Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997).

CONSERVATION RANK G2G3? S3

SUCCESSION AND MANAGEMENT Alnus incana/Mesic graminoid, with Alnus incana's nitrogen-fixing root nodules and nitrogen rich leaf litter and thick mesic graminoid cover, is an important early seral community for improving young alluvial soils. For seedling establishment Alnus incana requires bare, moist mineral soil, such as those found after flood deposition or fire (Crowe and Clausnitzer 1997). It also reproduces by vigorous root sprouting following cutting or light fire which remove the above ground vegetation. However, cutting or burning should not occur more than once every four or five years and recovery is best in spring (Hansen et al. 1995). Hot fires are not tolerated by Alnus incana nor most mesic graminoid species, such as Poa pratensis, since the protective organic duff layer is burnt away exposing roots (Crowe and Clausnitzer 1997). Poa pratensis production is stimulated by light fire. Fire is infrequent in Alnus incana communities, however, due to the high moisture content of vegetation and cool temperature locations (Crowe and Clausnitzer 1997). Removal of vegetation by hot fires can negatively affect the Alnus incana community's ability to stabilize streambanks (Hansen et al. 1995). In addition to fire, Alnus incana and native mesic graminoids can be damaged by livestock trampling and associated soil compaction. Similar plant and soil compaction is done by heavy machinery used for logging, mining, road building, recreational camping, and off-road vehicle use (Crowe and Clausnitzer 1997). Recreation access (e.g. for fishing), however, may be limited by dense stands and camping prevented by wet conditions (Hansen et al. 1995). Nevertheless, these human-caused impacts lead to a decrease in native species cover and an increase in exotic grasses, especially Poa pratensis and Agrostis stolonifera (Hansen et al. 1995, Crowe and Clausnitzer 1997). As Alnus incana cover is broken and weak-rooted exotic grasses replace strong, sod-forming Carex and other native graminoids, streambank erosion from seasonal flooding is more likely. Livestock will further erode banks and cause creek overwidening or downcutting, thus, lowering the water table and drying riparian areas (Hansen et al. 1995, Crowe and Clausnitzer 1997). Alnus incana is not the first choice of browse for livestock with its poor to fair palatability and nutrition and its dense stands. Carex species and other native mesic graminoids are usually moderate to excellent livestock forage and are susceptible to reduction by overgrazing (Hansen et al. 1995, Crowe and Clausnitzer 1997). Though Poa pratensis is more palatable than Agrostis stolonifera, both are good spring livestock forage well adapted to grazing.

CLASSIFICATION COMMENTS The Alnus incana/Mesic graminoid community is a variable community with an understory dominated by native graminoids (Walford et al. 1997), a mix of native and exotic species of similar importance (Padgett et al. 1989, Jankovsky-Jones 1998c), or primarily exotic grasses (Manning and Padgett 1995, Jankovsky-Jones 1997a). In the latter two situations, exotic weedy grasses (such as Agrostis stolonifera, Poa pratensis, Phalaris arundinacea, and Poa palustris) are mixed with low cover of mesic forbs. Thus, it is possible that Alnus incana/Mesic graminoid may be a grazing induced sere of Alnus incana/Mesic forb (Padgett et al. 1989). Alnus incana/Mesic graminoid is characterized by its lack of a clearly dominant graminoid, though species composition is often similar to many other Alnus incana communities. These communities may have understories dominated by exotic species understories (e.g. Poa

pratensis) or native species (e.g. Carex amplifolia, Carex utriculata [syn. Carex rostrata], Carex aquatilis, Carex lanuginosa, Calamagrostis canadensis, Scirpus microcarpus, and Carex lenticularis var. lenticularis) (Kauffman et al. 1985, Evenden 1989, Crowe and Clausnitzer 1997). Alnus incana/Mesic graminoid could be confused with other Alnus incana communities, especially if grazing or other disturbances have occurred.

Classification of Alnus incana/Mesic graminoid is based on five plots from Nevada (Manning and Padgett 1995), three plots from Utah, two plots from Idaho, and an unknown number of plots from Colorado (Padgett et al. 1989, Jankovsky- Jones 1998c). In Idaho there is one plot from southeastern Idaho and one plot from the Mica Creek experimental watershed in the St. Joe River basin of northern Idaho. In addition, up to five stands were sampled at the Catherine Creek reasearch area in northeastern Oregon (Kauffman et al. 1985) and at least two stands were sampled in western Wyoming (Walford et al. 1997).

EDITION 99-01-22

AUTHOR C. Murphy

ALNUS INCANA/SPIRAEA DOUGLASII

COMMON NAME MOUNTAIN ALDER/PINK SPIRAEA

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES Alnus incana/Spiraea douglasii is structurally similar to Alnus incana/Ribes hudsonianum and Alnus incana/Cornus sericea [syn. Cornus stolonifera] with which it also shares Smilacina stellata, Calamagrostis canadensis, Senecio triangularis, Glyceria elata, Galium triflorum, and other understory herbs (Youngblood et al. 1985, Padgett et al. 1989, Manning and Padgett 1995, Crowe and Clausnitzer 1997). Alnus incana/Spiraea douglasii occasionally has moderate cover of Symphoricarpos albus in the understory, as well as a mix of mesic forbs and graminoids, which makes it resemble Alnus incana/Symphoricarpos albus (though this community is clearly distinguished by its lack of Spiraea douglasii) (Kovalchik 1993). Other Alnus incana communities share similar understory shrubs such as Ribes lacustre, Rubus species, and Salix species. The broader Alnus incana community type from western Washington and Montana has Spiraea douglasii present along with several other common species such as Athyrium filix-femina, Cornus sericea, and Glyceria elata (Kunze 1994, Hansen et al. 1995). Likewise, other Alnus incana communities also have similar understory herbs and include: Alnus incana/Athyrium filix-femina, Alnus incana/Equisetum arvense, Alnus incana/Glyceria elata, Alnus incana/Calamagrostis canadensis, and Alnus incana/Poa pratensis (Padgett et al. 1989, Kovalchik 1993, Crowe and Clausnitzer 1997). In addition, Spiraea douglasii communities sometimes have Alnus incana with low cover and constancy (Kovalchik 1993, Hansen et al. 1995). Forested communities, such as Pinus contorta/Spiraea douglasii/forb,

Pinus contorta/Spiraea douglasii/Carex eurycarpa, and Populus tremuloides/Spiraea douglasii/Carex eurycarpa, also resemble Alnus incana/Spiraea douglasii (Kovalchik 1993).

RANGE The Alnus incana/Spiraea douglasii community is locally common, known from the east slope of the Cascade Mountains of both Oregon (Kovalchik 1987) and Washington (Kovalchik 1993), the Priest River (Jankovsky-Jones 1997a) and Coeur D'Alene River (Jankovsky-Jones 1998c) basins of Idaho, and the Okanogan Highlands of northeastern Washington (Kovalchik 1993). It is possibly found in the Puget Sound lowlands (Kunze 1994) and apparently California.

ENVIRONMENTAL DESCRIPTION Sites supporting Alnus incana/Spiraea douglasii have highly variable environmental conditions but are typified by highly fluctuating water tables. This community is found at elevations from 670 to 1740 m in the Cascades and northeastern Washington (Kovalchik 1987, 1993) and from 650 to 815 m in northern Idaho (Jankovsky-Jones 1997a, 1998c). Alnus incana/Spiraea douglasii is restricted to maritime climate influenced areas characterized by relatively high precipitation during fall, winter, and spring. The community is found on both active and inactive fluvial surfaces and floodplains, such as streambanks and terraces. It is located adjacent to lakes, streams, rivers, oxbows, and small localized channels or pools (Kovalchik 1987, 1993, Jankovsky-Jones 1997a, 1998c). Sites vary from narrow, V-shaped canyons and deeply incised streams (moderate to steep gradient) to wide, flat (less than 3 percent gradient) U-shaped valleys, lakes, or fens. Streams are often Rosgen C types with moderate sinuosity, entrenchment, and confinement (Kovalchik 1993). Soils are typically thick, well-aerated alluvium classified as loam or sandy loam grading into old streambed cobbles and gravel (Kovalchik 1987, 1993). These soils are usually Entisols and Inceptisols. However, wetter sites may have organic (peat or muck) soils with Sphagnum moss (Kunze 1994, Jankovsky-Jones 1997a, 1998c). Overall, these sites have low to moderate water holding capacity, and thus, have high seasonal water fluctuation. For example, sites are usually flooded during spring runoff and may be saturated for a long time, but by late summer the water table may drop over 1 m below the surface (Kovalchik 1987, 1993, Kunze 1994, Jankovsky-Jones 1997a, 1998c). Though the soil usually remains moist all year, the moisture regime is drier than other Alnus incana communities.

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Alnus incana
Short shrub	Spiraea douglasii, Symphoricarpos albus
Herbaceous	Smilacina stellata, Galium triflorum

VEGETATION DESCRIPTION The vegetation of Alnus incana/Spiraea douglasii has been described by only two classifications, Kovalchik (1987) and Kovalchik (1993). Based on these classifications, the community is characterized by a tall shrub overstory of Alnus incana with 42 to 51 percent cover and 100 percent constancy. Other tall shrubs may be present with low cover and low to moderate constancy, including Cornus sericea, Ribes hudsonianum, and Salix species. Conifer species, usually Abies lasiocarpa, Picea engelmannii, and Pinus contorta, can be present in

the community, with low cover and constancy. The low shrub understory is dominated by Spiraea douglasii with 18 to 64 percent cover and 100 percent constancy. Various other shrubs are scattered in the understory. The most common shrubs include Symphoricarpos albus (up to 23 percent cover and 29 percent constancy), Ribes lacustre (up to 3 percent cover), Crataegus douglasii (up to 20 percent cover), and Rubus idaeus. The herbaceous understory is noticeably sparse (total cover under 50 percent) due to the dense shrub overstory. Forb species are diverse and their cover is usually greater than that of graminoids. The most commonly encountered mesic forbs are Smilacina stellata (71 to 90 percent constancy; 2 to 4 percent cover) and Equisetum arvense (50 to 55 percent constancy; 1 to 2 percent cover). Other common forb species, with low cover and moderate constancy, include Achillea millefolium, Aconitum columbianum, Athyrium filix-femina, Galium triflorum, Geum macrophyllum, Osmorhiza species, Senecio triangularis, Thalictrum species, Veronica americana, and Viola spp. The most commonly sampled graminoids (with cover less than 5 percent and moderate constancy) are Calamagrostis canadensis, Carex eurycarpa, Elymus glaucus, and Glyceria elata. Moss cover is also noticeable (5 to 8 percent).

WILDLIFE VALUES The Alnus incana/Spiraea douglasii community provides good bank stability and helps form overhanging streambanks and deep, narrow channels resulting in excellent cover for salmonids (Kovalchik1987, Hansen et al. 1995). The community's high structural diversity creates good thermal cover for ungulates and good nesting and foraging habitat for many bird species. In addition, deer, beaver, small mammals, and elk browse young Alnus incana twigs, leaves, and sprouts, though use varies from low to high (Kovalchik 1987). In contrast, Spiraea douglasii is not usually browsed by elk and wildlife use is low to moderate (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Few exotic species are known from the Alnus incana/Spiraea douglasii community. Only Poa pratensis (Kovalchik 1987) and possibly Phalaris arundinaceae (Jankovsky-Jones 1998c) have been documented. The poor fens sometimes adjacent or associated with this community support a variety of rare plant species, though no rare plants are known from within the community (Jankovsky-Jones 1997a).

ADJACENT COMMUNITIES Alnus incana/Spiraea douglasii is sometimes adjacent to wetter Phalaris arundinaceae, Spiraea douglasii, Cornus sericea, Alnus incana/Carex utriculata, Alnus incana/Calamagrostis canadensis, Alnus incana/Glyceria elata, and Carex utriculata communities (Kovalchik 1993, Jankovsky-Jones 1997a, 1998c). It is also adjacent to the drier Alnus incana/Symphoricarpos albus and Alnus incana Athyrium filix-femina communities. On drier alluvial terraces adjacent communities include: Athyrium filix-femina; Picea engelmannii/Clintonia uniflora, Picea engelmannii/Cornus canadensis, Pinus ponderosa/Symphoricarpos albus, Thuja plicata/Asarum caudatum, Thuja plicata/Athyrium filix-femina, and Thuja plicata/Oplopanax horridum (Kovalchik 1987 and 1993, Jankovsky-Jones 1997a). Surrounding upland forests range from Pinus contorta to old growth Thuja plicata stands.

CONSERVATION RANK G3 S3

SUCCESSION AND MANAGEMENT Little is known about the successional dynamics of Alnus incana/Spiraea douglasii. Alnus incana is generally an early seral species on moist alluvium though the Alnus incana/Spiraea douglasii community is considered a late seral type (Kovalchik 1987). Alnus incana communities may persist but will eventually be replaced by Salix or conifer species if site conditions become drier (Hansen et al. 1995). Overgrazing and trampling will reduce the competitive ability of Spireaa douglasii and convert the Alnus incana understory to Poa pratensis (Kovalchik 1987). Both Alnus incana and Spiraea douglasii have strong roots, high seed production, and the ability to re-sprout after disturbance. These characteristics make them well adapted to surviving (or colonizing after) frequent flood scouring, alluvial deposition, and fire (Kovalchik 1987, Hansen et al. 1995, Crowe and Clausnitzer 1997). However, if stream downcutting or floodplain widening reduces flooding frequency and dries alluvial terraces, conifers may replace Alnus incana (Hansen et al. 1995). Such conifer communities might include Pinus contorta/Spiraea douglasii/forb, Pinus contorta/Spiraea douglasii/Carex eurycarpa, and Populus tremuloides/Spiraea douglasii/Carex eurycarpa (Kovalchik 1987).

Due to the density of shrubs, high water table, and low available forage, livestock use of Alnus incana/Spiraea douglasii is generally low. Alnus incana has poor to fair palability for livestock (Crowe and Clausnitzer 1997) and livestock use of Spiraea douglasii is minor, mainly in the fall (Hansen et al. 1995). Overuse by livestock disrupts the shrub canopy and reduces the vigor of Alnus incana. Continued overgrazing and trampling will also reduce the competitive ability of Spireaa douglasii and favor invasion by Poa pratensis (Kovalchik 1987). Alnus incana is a good streambank stabilizer with long-term potential as a revegetation species. However, overgrazing and trampling reduces its ability to stabilize streambanks. The reduction of Alnus incana cover allows overwidening of the channel, changes the hydrologic regime necessary to support Alnus incana, and allows invasion by species tolerant of drier conditions (Hansen et al. 1995). Though fire is infrequent, both Alnus incana and Spiraea douglasii can re-sprout after burns. However, Alnus incana is killed by intense or repeated fire (Hansen et al. 1995). The ability of Alnus incana to re-colonize disturbed ground is further enhanced by the production of numerous wind and water dispersed seeds which germinate on moist, well-aerated mineral substrates (Kovalchik 1987). It also improves soil fertility with nitrogen-fixing root nodules and nitrogen rich leaf litter (Kovalchik 1993). Alnus incana re-sprouts after cutting which results in rapid shoot production (Hansen et al. 1995). The life of Alnus incana is reduced by several fungi species infections and insect and caterpillar infestations (Crowe and Clausnitzer 1997).

CLASSIFICATION COMMENTS Because few other Alnus incana communities have Spiraea douglasii present (when present, its cover and constancy are low), Alnus incana/Spiraea douglasii is not easily confused with other types. However, the broader Alnus incana type from western Washington and Montana sometimes has Spiraea douglasii present (with low constancy and up to 40 percent cover) and may share other shrub and herbaceous species with Alnus incana/Spiraea douglasii (Kunze 1994, Hansen et al. 1995). Other communities with high cover of Spiraea douglasii may have Alnus incana (with low cover and constancy) and share similar understory shrub and herbaceous species. These communities include Spiraea douglasii and forested types, such as Pinus contorta/Spiraea douglasii/forb, Pinus contorta/Spiraea

douglasii/Carex eurycarpa, and Populus tremuloides/Spiraea douglasii/Carex eurycarpa (Kovalchik 1993, Hansen et al. 1995). These communities are possibly successionally related to Alnus incana/Spiraea douglasii but have slightly different environmental requirements.

Classification of Alnus incana/Spiraea douglasii is based on 5 plots from the Okanogan Highlands (Kovalchik 1993) and 15 plots from the east slope of the Cascade Mountains of Oregon and Washington (Kovalchik 1987 and 1993). Though plot data from Idaho is lacking, the community is known from four locations, one being within the proposed Upper Priest River Research Natural Area (Jankovsky-Jones 1997a, 1998c).

EDITION 99-02-17

AUTHOR C. Murphy

SALIX BEBBIANA/MESIC GRAMINOID

COMMON NAME GRAY WILLOW/MESIC GRAMINOID

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES Salix bebbiana/Mesic gGraminoid is similar to several other communities in structure and understory composition. These communities are dominated by species such as Salix boothii, Salix lutea, Salix geyeriana, Salix exigua, Salix lasiolepis, Salix lasiandra, and Salix 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 communities 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).

RANGE Salix bebbiana/Mesic graminoid is a potentially rare type known from southern Utah (Padgett et al. 1989) and where the Pack River enters Lake Pend Oreille in northern Idaho (Jankovsky-Jones 1997a). 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 Wyoming, Arizona, and New Mexico (Hansen et al. 1995, Hall and Hansen 1997).

ENVIRONMENTAL DESCRIPTION Salix bebbiana/Mesic graminoid and the similar Salix bebbiana dominance type are found at variable elevations ranging from as low as 630 to 1000 m in

northern Idaho and Montana (Jankovsky-Jones 1997) to over 1950 m in Montana, eastern Idaho, and southern Utah (where Salix bebbiana/Mesic graminoid is as high as 2805 m) (Padgett et al. 1989, Hansen et al. 1985, Hall and Hansen 1997). Salix bebbiana/Mesic graminoid is located in meadows of both small, intermittent stream valleys or broad valley floodplains and deltas of major rivers. It is found on alluvial terraces, sub-irrigated lower slopes, and abandoned oxbows (Padgett et al. 1989, Jankovsky-Jones 1997a). 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 percent (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 percent 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.

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Salix bebbiana, Salix boothii
Short shrub	Ribes inerme, Rosa woodsii
Herbaceous	Trifolium spp., Galium triflorum, Poa pratensis, Equisetum arvense, Carex nebrascensis, Actaea rubra, Carex praegracilis, Agrostis stolonifera, Eleocharis palustris, Juncus balticus, Scirpus microcarpus

VEGETATION DESCRIPTION Padgett et al. (1989) found Salix bebbiana/Mesic graminoid dominated by Salix bebbiana with 79 percent cover and 100 percent constancy. This compares with 32 to 75 percent cover for the general Salix bebbiana dominance type (Hansen et al. 1995, Hall and Hansen 1997) and 85 percent cover in mixed Salix/Mesic graminoid community (Manning and Padgett 1995). Other tall willows commonly associated with Salix bebbiana are Salix boothii (less than 20 percent cover and 15 percent constancy), Salix lutea (less than 40 percent cover and variable constancy), and Salix exigua (low to high cover and constancy). However, Salix lasiandra, Salix drummondiana, Salix lasiolepis, and Salix 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 (less than 19 percent cover and up to 100 percent constancy) 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 (26 percent cover, 100 percent constancy), Carex nebrascensis (21 percent cover, 25 percent constancy), Carex praegracilis (13 percent cover, 25 percent constancy), and Phalaris arundinacea (Padgett et al. 1989, Jankovsky-Jones 1997a). 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 (though cover of these species is rarely more than 10 percent). 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).

WILDLIFE VALUES The Salix bebbiana/Mesic graminoid community provides good forage and cover for elk, moose, mule and whitetail 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).

OTHER NOTEWORTHY SPECIES Exotic species, especially grasses, sometimes have high cover in the Salix bebbiana/Mesic graminoid community. Such species include Agrostis stolonifera, Phalaris arundinacea, Poa pratensis, and Taraxacum officinale (Padgett et al. 1989, Jankovsky-Jones 1997a). Other exotic species found in similiar Salix bebbiana or Salix/Mesic graminoid communities include Cirsium arvense, Phleum pratense, and Poa palustris (Hansen et al. 1995, Manning and Padgett 1995, Hall and Hansen 1997).

ADJACENT COMMUNITIES Wetter communities adjacent to Salix bebbiana/Mesic graminoid (and the broader Salix bebbiana community) are dominated by graminoids (such as Carex aquatilis, Carex utriculata, or Carex 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 communities 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).

CONSERVATION RANK G3? S3

SUCCESSION AND MANAGEMENT Salix bebbiana/Mesic graminoid is apparently a stable community (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 ebbiana 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, Salix lutea, Salix boothii, or Salix 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, Populus tremuloides, or Picea engelmannii dominated communities may replace Salix bebbiana/Mesic graminoid (Padgett et al. 1989, Manning and Padgett 1995).

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).

CLASSIFICATION COMMENTS Stands of Salix bebbiana/Mesic graminoid 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, Salix drummondiana, Salix exigua, Salix lutea, Salix lasiandra, and/or Salix 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 Salix lutea sometimes have moderate cover (Hansen et al. 1995, Hall and Hansen 1997). However, it is unlikely that Salix bebbiana/Mesic graminoid would be confused with Salix boothii/Mesic graminoid or Salix lutea/Mesic graminoid communities because these two types rarely have Salix bebbiana present (Padgett et al. 1989, Manning and Padgett 1995, Weixelman et al. 1996).

Classification of Salix bebbiana/Mesic graminoid is based on only eight stands sampled in Utah (Padgett et al. 1989) and one stand in the protected Pack River Wildlife Management Area of northern Idaho (Jankovsky-Jones 1997a). Similar, but broader Salix bebbiana communities are common in Montana (27 stands sampled by Hansen et al. 1995) but rarer in eastern Idaho (2 stands sampled by Hall and Hansen 1997). In addition, Manning and Padgett (1995) noted one Salix/Mesic graminoid stand dominated by Salix bebbiana in central Nevada.

EDITION 99-01-05

AUTHOR C. Murphy

SALIX EXIGUA/BARREN

COMMON NAME SANDBAR WILLOW/BARREN

SIMILAR COMMUNITIES Manning and Padgett (1995) described the Salix exigua/Bench community type from Nevada that is considered the same as the Salix 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) Salix exigua types may be included within the variation of this one.

RANGE Stands occur in Idaho, Nevada, Utah, and probably elsewhere.

ENVIRONMENTAL DESCRIPTION This community type occurs along active streambanks or on nearby stream terraces. Flooding in this community 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 that be narrow to very wide. Elevations are mostly below 5,500 feet (Padgett et al. 1989, Manning and Padgett 1995, Moseley 1998).

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).

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Salix exigua
Herbaceous	Solanum dulcamera, Epilobium spp.

VEGETATION DESCRIPTION A dense stand of Salix exigua dominates the overstory of this otherwise depauperate community. 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).

WILDLIFE VALUES Stands of this community 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 Salix exigua (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Information not available

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

CONSERVATION RANK G3? S4

SUCCESSION AND MANAGEMENT The Salix exigua/Barren type is an early successional type that has had 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 community 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).

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

CLASSIFICATION COMMENTS Classification is based on seven stands in Utah, eight stands in Nevada (for the Salix exigua/Bench community), and several plots in Idaho.

EDITION 97-12-31

AUTHOR B. Moseley

SALIX EXIGUA/EQUISETUM ARVENSE

COMMON NAME SANDBAR WILLOW/FIELD HORSETAIL

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES The presence of Calamagrostis canadensis and Equisetum arvense should be considered diagnostic. This type is moister than the Salix exigua/Mesic graminoid type.

RANGE Major type in the middle Rocky Mountains.

ENVIRONMENTAL DESCRIPTION Stands are generally below 7,100 feet in elevation. Type is found on alluvial terraces along major streams or rivers where little or no recent fluvial scouring or deposition has taken place (Youngblood et al. 1985), and in narrow bands near the low water line on boulder strewn river banks, with dense patches of Equisetum spp. present on moist sand bars (Huschle 1975). Slopes are gentle to 5 percent, and surface topography is smooth or undulating. Most soils are fine-loamy or finer; some soils contain more than 35 percent rock fragments. Water tables are near the surface (10 inches in depth), and most soils contain distinct mottles in the upper 12 inches (Youngblood et al. 1985).

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Salix exigua, S. drummondiana, S. boothii
Herbaceous	Equisetum arvense, Carex utriculata, Calamagrostis canadensis

VEGETATION DESCRIPTION Salix exigua dominates the dense shrub layer (30-60 percent cover). Small amounts of Salix drummondiana, Salix boothii, Salix monticola, Salix lutea, Lonicera involucrata, and Ribes lacustre are often present with up to 12 percent cover individually. Calamagrostis canadensis (ca. 15 percent cover) and Equisetum arvense (ca. 25 percent cover) may be abundant in the undergrowth. Other species with high constancy include Carex utriculata and small amounts of Poa palustris, Poa pratensis and Geum macrophyllum.

WILDLIFE VALUES Stands of this community 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 Salix exigua (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Information not available.

ADJACENT COMMUNITIES Adjacent communities may be dominated by Populus spp., Picea engelmannii, Cornus sericea, or Alnus incana.

CONSERVATION RANK G3 S2

SUCCESSION AND MANAGEMENT The Salix exigua/Equisetum arvense community type represents communities that apparently have had little recent fluvial action other than occasional and shallow deposition of silts. The presence of abundant rock at depths between 12 and 44 inches and the presence of Cornus sericea on about half the sites suggest the development of the community type following a reduction in fluvial action. Once Salix exigua has stabilized the

soils, other species such as S. boothii, S. drummondiana, Lonicera involucrata, and Ribes lacustre may become established. Given time, this community type is conceivably seral to the S. boothii/Equisetum arvense community type (Youngblood et al. 1985).

Salix exigua is a pioneering species commonly found along irrigation ditches, cutbanks, and wet areas adjacent to roads. This capacity may prove useful in streambank stabilization and revegetation projects at mid- to lower elevations. Limited data indicate moderate to high annual production. High water tables limit access for livestock (Youngblood et al. 1985).

CLASSIFICATION COMMENTS Classification is based on eight stands in eastern Idaho and southwest Wyoming and one stand on the Snake River.

EDITION 96-11-04

AUTHOR L. Williams

SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS

COMMON NAME DRUMMOND'S WILLOW/BLUEJOINT REEDGRASS

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES Includes Tuhy's (1981) Salix drummondiana/Ribes lacustre/Thalictrum occidentale, Mutz's (1983) Salix drummondiana-Salix boothii/Calamagrostis canadensis, and Baker's (1989) Salix drummondiana-Salix monticola/Calamagrostis canadensis-Carex utriculata types.

RANGE Minor type in the middle Rocky Mountains.

ENVIRONMENTAL DESCRIPTION Elevation ranges from 2,320 to 8,200 feet. Type occurs on low gradient slopes adjacent to beaver ponds, lakes, marshes, rivers and streams, or on toeslopes below upland sites. Soils are coarse to fragmented loams or grass peat over deep, erosive, moderately fine textured alluvium (Kovalchik 1993, Tuhy et al. 1982). Hansen et al. (1995) notes soil textures range from silt to clay loam; mottling and gleyed soils are common. Type 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.

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Salix drummondiana, Alnus incana
Low shrub	Lonicera involucrata, Ribes spp., Potentilla fruticosa
Herbaceous	Calamagrostis canadensis

VEGETATION DESCRIPTION Salix drummondiana dominates the tall shrub layer (25-60 percent cover). Salix geyeriana, Salix boothii, and Salix 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 percent cover individually. Calamagrostis canadensis contributes at least 5 percent and up to 60 percent cover to the understory. Other species with high constancy include Carex microptera, C. utriculata, C. aquatilis, Deschampsia cespitosa, Aster foliaceus, and Fragaria virginiana.

WILDLIFE VALUES Provides habitat for elk, moose, beaver, and a number of songbirds.

OTHER NOTEWORTHY SPECIES Information not available.

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).

CONSERVATION RANK G2 S2

SUCCESSION AND MANAGEMENT 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 et al. 1982, Hansen et al. 1995).

The vigor of Salix spp. in these communities appears directly related to streambank stability and rate of sedimentation into stream systems (Tuhy et al. 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).

CLASSIFICATION COMMENTS Classification is based on 25 stands in Montana, 83 stands in Idaho, 6 stands in eastern Washington, and an unknown number of stands in Colorado.

EDITION 96-06-13

AUTHOR L. Williams

SALIX DRUMMONDIANA/CAREX UTRICULATA

COMMON NAME DRUMMOND'S WILLOW/BLADDER SEDGE

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES 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 Salix drummondiana) include Salix drummondiana-Salix boothii/Carex utriculata-Carex aquatilis, Salix boothii/Carex utriculata, Salix geyeriana/Carex utriculata, and Salix lutea/Carex utriculata (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. Salix drummondiana is sometimes present in short willow communities such as: Salix candida/Carex utriculata, Salix farriae/Carex utriculata, and Salix wolfii/Carex utriculata (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 Carex utriculata in similar communities due to variations in seral status or other factors. These include Salix boothii/Carex aquatilis, Salix geyeriana/Carex aquatilis, and Salix drummondiana/Carex scopulorum var. prionophylla (Youngblood et al. 1985, Padgett et al. 1989, Kovalchik 1993, Hansen et al. 1995, Hall and Hansen 1997).

RANGE The Salix drummondiana/Carex utriculata community type is known from Montana, Idaho, Washington, and probably western 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 1998c), and the Priest River area (Jankovsky-Jones 1997a,1998c). 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).

ENVIRONMENTAL DESCRIPTION The Salix drummondiana/Carex utriculata community type is found from 700 to 1025 m elevation in northern Idaho, northeastern Washington and northwest Montana (Kovalchik 1993, Hansen et al. 1995, Jankovsky-Jones 1998c). Elevations in central Idaho average around 1900 m (Moseley et al. 1994, Moseley 1996) while in southwestern Montana and eastern Idaho it is found as high as 2400 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 streambanks (Hansen et al. 1995).

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Salix drummondiana, Salix geyeriana, Salix boothii, Salix sitchensis, Salix spp.
Short shrub	Betula glandulosa, Salix spp.
Herbaceous	Carex utriculata, Carex aquatilis, Carex vesicaria, Phalaris arundinacea, Calamagrostis canadensis, Scirpus microcarpus, Equisetum arvense, Epilobium ciliatum, Geum macrophyllum

VEGETATION DESCRIPTION The Salix drummondiana/Carex utriculata community type is variable, often having mixed Salix and Carex species present. Salix drummondiana is usually dominant with 30 to 55 percent cover and 70 to 100 percent constancy (Kovalchik 1993, Hansen et al. 1995, Jankovsky-Jones 1998c). Other tall willow species, such as Salix geyeriana, S. boothii, S. sitchensis, S. lasiandra, S. bebbiana, and S. pseudomonticola, usually have less than 40 percent cover and less than 30 percent constancy. While these species form a tall shrub canopy (to 4 m), shorter species, such as Salix farriae or Salix 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 percent 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 percent cover, about 80 percent constancy) and Carex aquatilis (less than 34 percent cover, less than 80 percent constancy) with Carex vesicaria also common. Other associated Carex, having low cover and constancy, include Carex lanuginosa, C. lasiocarpa, C. lenticularis, and C. nebrascensis. Other common graminoid species, with low constancy but occasionally moderate cover (less than 40 percent), 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 1998c). 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 1998c). Moss cover is often high.

WILDLIFE VALUES In the winter, Salix drummondiana shoots are heavily browsed by moose. Throughout the year Salix 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 utriculata and Carex 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).

OTHER NOTEWORTHY SPECIES Exotic species known to occur in the Salix drummondiana/Carex utriculata community include Agrostis tenuis, Alopecurus pratensis, Iris pseudacorus, Phalaris arundinacea, Poa palustris, Poa pratensis, and Rumex crispus (Hansen et al. 1995, Jankovsky-Jones 1998c). In the Sawtooth Valley of Idaho, Moseley et al. (1994) found the Salix drummondiana/Carex utriculata community associated with rare, disjunct peatland species such as Carex buxbaumii, Carex livida, Drosera intermedia, Epilobium palustre, and Scirpus caespitosus.

ADJACENT COMMUNITIES Communities adjacent to Salix drummondiana/Carex utriculata include other Salix drummondiana types with slightly drier moisture regimes. Examples are Salix drummondiana/Calamagrostis canadensis, Salix drummondiana/Carex scopulorum var. prionophylla, and Salix 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 Salix geyeriana/Carex utriculata, Salix boothii/Carex utriculata, Salix

farriae/Carex scopulorum var. prionophylla, and Salix 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, Carex aquatilis, or Carex lasiocarpa dominated) and Salix farriae/Carex 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).

CONSERVATION RANK G3 S3

SUCCESSION AND MANAGEMENT The successional origin of Salix drummondiana/Carex utriculata is not well known. Both Salix drummondiana and Carex 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, Carex 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 Salix boothii/Carex 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 Carex utriculata to invade, and Salix rejuvenated later (Youngblood et al. 1985, Padgett et al. 1989). Whatever the origin, stability of the Salix drummondiana/Carex utriculata community is indicated by a thick accumulation of organic matter (Kovalchik 1993). Disturbance by livestock or beaver will reduce Salix 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 Salix drummondiana/Calamagrostis canadensis or Abies lasiocarpa type (Hansen et al. 1988, Hansen et al. 1995).

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 utriculata but only if ungrazed before and after the fire (Hansen et al. 1995). Both Salix drummondiana and Carex utriculata (and Carex aquatilis and C. vesicaria) are excellent for re-vegetation over the long-term and provide good erosion control (Hansen et al. 1995).

CLASSIFICATION COMMENTS Earlier studies lumped this community within broader Salix/Carex rostrata [syn. Carex utriculata], Salix drummondiana-Salix boothii/Carex rostrata-Carex aquatilis, and Salix/Carex rostrata-Carex 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 Salix boothii/Carex rostrata or Salix geyeriana/Carex rostrata community types (Youngblood et al. 1985, Padgett et al. 1989). These communities often have high cover and constancy of Salix drummondiana (to the level of co-dominance) making lumping of types seem logical (Hansen et al. 1995, Hall and Hansen 1997). Salix drummondiana communities, with their mixed Salix species composition, may be transitional

to other community types (Kovalchik 1993). In addition, Salix sitchensis is easily confused with Salix drummondiana (with which it may hybridize). Salix sitchensis sometimes co-dominates stands making community identification difficult (Jankovsky-Jones 1998c).

Classification of Salix drummondiana/Carex utriculata is based on 43 stands in Montana (Hansen et al. 1995), 20 plots in eastern Washington (Kovalchik 1993), and one stand with plot data in Idaho (Jankovsky-Jones 1998c). The community has also been reported in central and eastern Idaho (Mutz and Queiroz 1983, Hall and Hansen 1997). It has also been observed in the Sawtooth Valley of Idaho at Vat Creek wetland, Huckleberry Creek Fen, Bull Moose Fen, and Alturas Lake Creek (Moseley et al. 1994). The Idaho Conservation Data Center has seven field records of the community: Moss Spring Beaver Ponds, Hotel Creek, and Fish Creek Springs in the greater Yellowstone region (Jankovsky-Jones 1996); Burgdorf Meadows/Lake Creek of central Idaho (Moseley 1996); and Gleason Meadow, Twin Lakes Fen, and Clear Creek/North Fork St. Joe River in northern Idaho (Jankovsky-Jones 1997, Jankovsky-Jones 1998c).

EDITION 98-11-25

AUTHOR C. Murphy

SALIX GEYERIANA/CAREX UTRICULATA

COMMON NAME GEYER'S WILLOW/BLADDER SEDGE

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES See discussion in Classification Comments section on the treatment of Salix boothii and Carex aquatilis within the S. geyeriana/C. utriculata community type. The community described here is a narrow one, that is Salix boothii-dominated sites are treated as different associations (sensu Padgett et al. 1989, Walford et al. 1997, and others) and Carex aquatilis-dominated understory similarly defines a separate type (sensu Padgett et al. 1989 and others).

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), Wyoming (Norton et al. 1981, Chadde et al. 1988, Walford et al. 1997), and Montana (Hansen et al. 1995).

ENVIRONMENTAL DESCRIPTION Throughout its distribution, this community occurs in mountains and high valleys at elevations ranging from 4,300 to 9,000 feet. This type is most common on broad, level flood plains, 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.

This community 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).

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Salix geyeriana, Salix drummondiana, Salix boothii
Short shrub	Betula glandulosa, Potentilla fruticosa
Herbaceous	Carex utriculata

VEGETATION DESCRIPTION Salix geyeriana dominates the open overstory and characteristically appears in large, often widely-spaced clumps. Salix 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, Salix boothii, Salix 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 Carex aquatilis, Carex 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.

WILDLIFE VALUES 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 community. Beaver may provide a vital role in the maintenance of this community in many places by maintaining high water tables (Hall and Hansen 1997).

OTHER NOTEWORTHY SPECIES Information not available.

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

CONSERVATION RANK G5 S4

SUCCESSION AND MANAGEMENT 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 community type. 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).

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. Carex utriculata provides a very high level of streambank stabilization.

CLASSIFICATION COMMENTS This type has been defined and described by numerous quantitative studies.

EDITION 98-12-04

AUTHOR B. Moseley

SALIX GEYERIANA/MESIC FORB

COMMON NAME GEYER'S WILLOW/MESIC FORB

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES Salix geyeriana /Mesic Forb has physiognomic, floristic, and ecologic similarities with many different communities (some of which are successionally related). For example, the understory species composition is similar to Cold Willow/Mesic forb, Willow/Mesic forb, Mesic Forb Meadow, Salix boothii/Smilacina stellata, Salix boothii/Mesic forb, Salix lutea/Mesic forb, Salix lasiandra/Mesic forb, Salix geyeriana/Geum macrophyllum, and Salix geyeriana/Fragaria virginiana (Tuhy 1981, Mattson 1984, Youngblood et. al. 1985, Padgett et al. 1989, Weixelman et al. 1996, Crowe and Clausnitzer 1997). Salix geyeriana/Mesic forb is structurally, and often floristically, similar to broader Salix boothii, Salix drummondiana, and Salix geyeriana community types (Weixelman et al. 1996, Hall and Hansen 1997). Under different hydrologic conditions or grazing disturbance, the understory of the Salix geyeriana/Mesic forb community often moves toward dominance by graminoids. These communities, such as Salix geyeriana/Deschampsia cespitosa, Salix geyeriana/Calamagrostis canadensis, and Salix

geyeriana/Poa pratensis may have similar soils and physiogomy as Salix geyeriana/Mesic forb (Youngblood et. al. 1985, Padgett et al. 1989, Walford et al. 1997).

RANGE The Salix geyeriana/Mesic forb community is a widely scattered, minor type known from southern and eastern Idaho, western Wyoming, Utah (Uinta, Wasatch, and southern mountains), and Colorado (Youngblood et. al. 1985, Padgett et al. 1989, Walford et al. 1997). In Idaho it is found in the Owyhee Mountains, Salmon Falls Highlands, the Centennial Mountains, and around the Teton Range (Youngblood et al. 1985, Jankovsky-Jones 1996, Moseley and Murphy 1998). Very similar Willow/Mesic forb communities are known from central Nevada and northeastern Oregon (Weixelman et al. 1996, Crowe and Clausnitzer 1997). Other similar communties, including Salix geyeriana/Geum macrophyllum (Tuhy 1981) and Salix geyeriana/Fragaria virginiana (Mattson 1984), are found in the Sawtooth Valley, Idaho and Yellowstone National Park respectively.

ENVIRONMENTAL DESCRIPTION The Salix geyeriana/Mesic forb community is found in narrow to wide valleys of rolling highlands and mountains. In Idaho, elevations range from 1720 m to 2035 m in the southwest to over 2600 m in the east (Padgett et al. 1989, Jankovsky-Jones 1996, Hall and Hansen 1997, Moseley 1998). In western Wyoming it is found up to 2465 m (Youngblood et al. 1985, Walford et al. 1997) while in Utah as high as 3050 m (Padgett et al. 1989). The community is found both on terraces adjacent to small creeks or braided rivers and near the drier margins of wetland floodplains. Sites include headwaters of small, rocky, and shallow spring-fed creeks (only 1 m wide) and larger mountain rivers. Valley gradients range from less than 2 percent to 5 percent. The community is located on undulating or concave ground both at creek bankfull level or much higher above it, though often within the seasonal flooding zone (Youngblood et al. 1985, Padgett et al. 1989, Jankovsky-Jones 1996, Hall and Hansen 1997, Walford et al. 1997, Moseley and Murphy 1998). Salix geyeriana/Mesic forb is on drier or better drained sites than other Salix geyeriana communities. These sites are characterized by rocky alluvium (often volcanic in origin) evidenced by the large amount of coarse fragments in the fine textured soils (up to 50 percent). Soil textures are loamy skeletal, fine-loamy, clayey-skeletal, and sandy with moderate available water capacity (Youngblood et al. 1985, Padgett et al. 1989, Walford et al. 1997). Soils are often Cryoborolls (Aquic, Pachic, or Cumulic) but also include Cryofluvents or Cumulic Cryaquolls. The water table is seasonally within 50 cm of the surface (as evidenced by mottling) but drops to over 1 m deep by late summer (Youngblood et al. 1985, Padgett et al. 1989, Walford et al. 1997).

MOST ABUNDANT SPECIES

Strata	Species
Tall Shrub	Salix geyeriana, Salix boothii
Short Shrub	Ribes inerme
Herbaceous	Aconitum columbianum, Geum macrophyllum, Fragaria virginiana

VEGETATION DESCRIPTION Salix geyeriana/Mesic forb is clearly dominated by Salix geyeriana (60 to 90 percent cover, 100 percent constancy) with Salix boothii sometimes also

present (with less than 30 percent cover and only 40 to 50 percent constancy) (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997, Moseley 1998). Salix geyeriana tends to grow in clumps separated by corridors. Other tall willows, such as Salix drummondiana and Salix lutea, occasionally occur with moderate cover, but are not dominant. A few trees may be present with low cover, including Pinus contorta, Populus tremuloides, and Picea pungens. There is a low shrub layer often dominated by Ribes inerme (less than 10 percent cover, 40 to 50 percent constancy) and Potentilla fruticosa (less than 15 percent cover and 25 percent constancy). In addition, several other shrubs are occasionally present with low cover including Lonicera involucrata, Ribes aureum, and Ribes lacustre (Youngblood et al. 1985, Padgett et al. 1989, Jankovsky-Jones 1996, Hall and Hansen 1997, Walford et al. 1997, Moseley and Murphy 1998). There is a diverse, but variable, mixture of mesic forbs forming multiple height layers in the understory. The most common and widespread forbs are Aconitum columbianum (less than 20 percent cover), Fragaria virginiana (less than 12 percent cover), and Geum macrophyllum (less than 10 percent cover) (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997, Moseley 1998). Other common forbs, usually with less than 15 percent cover, are Smilacina stellata, Aster foliaceus, Geranium species (Geranium richardsonii and G. viscosissimum), and Equisetum arvense. Other forb species, sometimes with moderate to high cover but lower constancy throughout the community's range are Mertensia species, Polemonium occidentale, Urtica dioica, Thalictrum species, Heracleum lanatum, Potentilla gracilis, Epilobium ciliatum, Mimulus guttatus, and Angelica arguta (Youngblood et al. 1985, Padgett et al. 1989, Jankovsky-Jones 1996, Hall and Hansen 1997, Walford et al. 1997, Moseley 1998). The graminoid layer is poorly developed, tending to be dominated by weedy exotic species such as Agrostis stolonifera (less than 15 percent cover), Poa pratensis, and Phleum pratense. The most common native graminoids are Carex species, mainly Carex microptera. Moss and lichen cover is variable, ranging from zero to 40 percent of ground cover.

WILDLIFE VALUES The Salix geyeriana/Mesic forb community 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. 1988, Hall and Hansen 1997). Salix geyeriana is apparently more palatible than Salix boothii to ungulates. Songbirds also use this community for nesting and foraging. The dense root network of Salix geyeriana both shades and stabilizes streambanks, thus, creating excellent fish habitat (Hansen et al. 1988, Hall and Hansen 1997).

OTHER NOTEWORTHY SPECIES Exotic species, especially grasses, are occasionally present in the Salix geyeriana/Mesic forb community, though usually with low to moderate cover. Exotic species include: Agrostis stolonifera, Arctium minus, Cirsium arvense, Phleum pratense, Poa palustris, Poa pratensis, and Taraxacum officinale (Youngblood et al. 1985, Padgett et al. 1989, Moseley 1998).

ADJACENT COMMUNITIES Wetter types adjacent to Salix geyeriana/Mesic forb include Carex utriculata, Carex nebrascensis, Eleocharis species, Phalaris arundinacea, Puccinellia pauciflora, Hordeum brachyantherum, and Salix geyeriana/Carex utriculata or Carex aquatilis communities (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997). Salix

geyeriana is more tolerant of drier soil than Salix boothii or Salix drummondiana, thus, communities dominated by the latter two willows may be adjacent on wetter ground. Adjacent on sites with a similar, or slightly drier, moisture regime, are Salix geyeriana/Poa pratensis, Salix geyeriana/Calamagrostis canadensis, Salix geyeriana/Deschampsia cespitosa, and other Salix dominated communities (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997). Other adjacent communities include those with high cover of Prunus virginiana, Cornus sericea, Betula occidentalis, or Populus tremuloides. Adjacent drier valley bottom sites are meadow communities dominated by Deschampsia cespitosa, Poa pratensis, and Potentilla fruticosa (Youngblood et al. 1985, Padgett et al. 1989). Adjacent uplands are usually forests dominated by Pinus contorta, Pseudotsuga menziesii, Juniperus occidentalis, Abies lasiocarpa, Picea species, or Populus tremuloides. Artemisia tridentata var. vaseyana steppe may also be adjacent (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997, Moseley 1998).

CONSERVATION RANK G3 S3

SUCCESSION AND MANAGEMENT Little information exists on the successional dynamics of the Salix geyeriana/Mesic forb community. However, it is hypothesized that under heavy livestock grazing the community will move toward Salix geyeriana/Poa pratensis with which it shares a similar forb understory composition (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997, Walford et al. 1997). Salix geyeriana may be less tolerant of browsing pressure than Salix boothii; thus, moderate grazing may move the community toward Salix boothii dominated communities. Continued overgrazing may directly or indirectly eliminate Salix geyeriana, such as by decreasing its vigor or altering hydrologic conditions (Hall and Hansen 1997). The resulting communities may be drier types such as Mesic forb Meadow, conifer or Populus tremuloides communities, or one with a graminoid dominated understory (Youngblood et al. 1985). Similarly, understory shrub and forb composition may be the result of disturbances (e.g. some species, such as Rosa woodsii, increase under livestock grazing while others decrease) (Weixelman et al. 1996, Hall and Hansen 1997). The origins of Salix geyeriana/Mesic forb are unclear, though, it appears to be a stable type on younger and drier alluvial surfaces (Walford et al. 1997). Thus, it is less likely to form on organic soil sites (formerly wet and occupied by Salix geyeriana/Carex utriculata or Carex aquatilis) and more related to Salix geyeriana/Deschampsia cespitosa sites (Padgett et al. 1989).

Salix geyeriana/Mesic forb is a moderately productive community for livestock and Salix geyeriana is more palatable to livestock than associated Salix boothii (Crowe and Clausnitzer 1997). This community has many corridors between willow clumps which allow livestock access; thus, impacts from grazing must be closely monitored (Hall and Hansen 1997). For example, overgrazing of Salix geyeriana causes lost vigor, decreased stand density, and eventual elimination. After overgrazing, Salix geyeriana stands regain vigor if rested for at least three to six years (Crowe and Clausnitzer 1997). The mesic forb understory, however, will become dominated by Poa pratensis or other weedy species that increase with grazing (Youngblood et al. 1985, Padgett et al. 1989, Hall and Hansen 1997, Walford et al. 1997). Livestock grazing, as well as human developments (e.g. roads, recreation sites, etc.), compact the Mollisol soils of Salix

geyeriana/Mesic forb and are not usually compatible (especially under wet conditions). Moreover, when the community converts to Poa pratensis dominance, streambank stability decreases and cattle trampling causes bank sloughing, creek overwidening, and water table alterations (Padgett et al. 1989, Hall and Hansen 1997). Though the mesic forb understory does not have significant soil stabilizing ability, Poa pratensis roots are even poorer soil binders. Salix 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. 1988, Hall and Hansen 1997). Salix geyeriana, though more difficult to root than Salix boothii or Salix drummondiana, is valuable for revegetation of streambanks. It has high value for stabilizing streambanks, trapping debris, and creating pools, thus, reducing erosional energy (Hansen et al. 1988, Hall and Hansen 1997).

CLASSIFICATION COMMENTS The Salix geyeriana/Mesic forb community is sometimes lumped within broader community types when dominance by Salix geyeriana is not obvious. For example, Weixelman et al. (1996) described a Cold willow/Mesic forb community in central Nevada while Crowe and Clausnitzer (1997) described a Willow/Mesic forb type for northeastern Oregon, both of which may have high cover of Salix geyeriana, Salix boothii, or hybrids. Similarly, a general Salix geyeriana community type described in eastern Idaho may include stands with mesic forb understories (Hall and Hansen 1997). In contrast, older studies may have split Salix geyeriana/Mesic forb into communities such as Salix geyeriana/Geum macrophyllum (Tuhy 1981) and Salix geyeriana/Fragaria virginiana (Mattson 1984). These two communities may represent grazing induced variants of Salix geyeriana/Mesic forb. Several other communities, such as Mesic Forb meadow, Salix boothii/Smilacina stellata, and Salix boothii/Mesic forb, may floristically resemble Salix geyeriana/Mesic forb. However, when undisturbed, Salix geyeriana/Mesic forb is defined by obvious dominance by Salix geyeriana (Youngblood et al. 1985, Padgett et al. 1989).

This community 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, Salix drummondiana, and Carex aquatilis. Salix geyeriana and S. boothii have been treated differently in different classifications. For example, Hansen et al. (1995) in Montana include in their Salix 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 percent cover of S. boothii into their S. boothii community types, 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 Salix 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 community type. 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/Carex 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 represent a different community type.

Classification of Salix geyeriana/Mesic forb is based on at least seven stands in Idaho, three stands in Utah, two stands in western Wyoming, and unknown numbers of plots in Colorado (Youngblood et al. 1985, Padgett et al. 1989, Walford et al. 1997, Moseley 1998). One stand, without plot data, was observed on Trail Creek, Idaho (in the Teton Range) (Jankovsky-Jones 1996).

EDITION 1998-12-16

AUTHOR C. Murphy

SALIX GEYERIANA/MESIC GRAMINOID

COMMON NAME GEYER'S WILLOW/MESIC GRAMINOID

PHYSIOGNOMIC TYPE Shrubland

SIMILAR COMMUNITIES Salix geyeriana/Mesic graminoid may result from grazing disturbance which creates a mixed understory of both increaser and late-seral graminoid species. As a result, the community resembles other Salix geyeriana communities from which it may have originated such as: Salix geyeriana/Calamagrostis canadensis, Salix geyeriana/Carex aquatilis, Salix geyeriana/Carex utriculata, and Salix 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). Salix geyeriana/Poa palustris and Salix geyeriana/Poa pratensis have a similar mix of graminoid species but are clearly more disturbed by overgrazing which promotes dominance by these single species (Mutz and Queiroz 1983, Youngblood et al. 1985, Padgett et al. 1989). Other similar communities, dominated by a mix of Salix species (often Salix boothii and Salix drummoniana) with dominance by mesic graminoids and high cover and constancy of Salix geyeriana include: Salix/Calamagrostis canadensis, Salix/Carex aquatilis, Salix/Carex eurycarpa, Salix/Carex lanuginosa, Salix/Carex sitchensis, Salix/Carex utriculata, and Salix/Poa pratensis (Kovalchik 1987, Manning and Padgett 1995, Crowe and Clausnitzer 1997). The broader Salix geyeriana community type 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 Salix geyeriana type and Evenden (1989) described a Salix geyeriana/Mesic graminoid-forb community, which both represent overgrazed, degraded communities with similar amounts of both understory mesic graminoids and forbs. In

addition many Salix boothii (and sometimes Salix drummondiana) communities (e.g. Salix boothii/Mesic graminoid), with very similar mesic graminoid dominated understories and sub-dominance by Salix geyeriana, resemble the aforementioned Salix geyeriana communities (Mutz and Queiroz 1983, Youngblood et al. 1985, Padgett et al. 1989, Walford et al. 1997).

RANGE Salix geyeriana/Mesic graminoid is a widely distributed major community 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 1997). 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 1998b). Walford et al. (1997) sampled Salix geyeriana/Mesic graminoid in or near the Absaroka, Bighorn, and Wind River Mountains of northwest Wyoming. The community 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 community in the eastern Sierra Nevada Mountains and surrounding areas of California and Nevada. It is also found in the Santa Rosa Range of northern 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 community in the Trout Creek Mountains of southeastern Oregon and Hansen et al. (1995) described a broader Salix geyeriana community type in Montana. Both of these communities may encompass some stands of Salix geyeriana/Mesic graminoid.

ENVIRONMENTAL DESCRIPTION Salix geyeriana/Mesic graminoid is 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 community 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). The community is found at elevations ranging from 1800 m to 2425 m (typically around 1975 m) in eastern Idaho (Jankovsky-Jones 1997b,1998b) to between 2320 to 2560 m in northwest Wyoming and Utah (Padgett et al. 1989, Walford et al. 1997). In Nevada, it ranges from 1820 m to over 2685 m (Manning and Padgett 1995, Weixelman et al. 1996). Soils are cold and moist with organic horizons, usually catagorized 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 percent 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 percent).

MOST ABUNDANT SPECIES

Strata	Species
Tall shrub	Salix geyeriana, Salix boothii
Short shrub	Ribes inerme
Herbaceous	Poa pratensis, Carex lanuginosa, Carex praegracilis, Juncus balticus, Deschampsia cespitosa, Carex microptera, Taraxacum officinale

VEGETATION DESCRIPTION The Salix geyeriana/Mesic graminoid community is characterized by an open canopy of clumped, 2-3 m tall, Salix geyeriana with 21 to 71 percent cover and 100 percent constancy (Padgett et al. 1989, Manning and Padgett 1995, Weixelman et al. 1996, Walford et al. 1997). Salix boothii is occasionally (less than 14 percent constancy) mixed with Salix geyeriana, but is usually shorter and has less than 20 percent cover. Scattered around the bases of these willows are lower shrubs, usually Ribes inerme (less than 19 percent cover and 43 to 85 percent constancy), but also Ribes aureum (less than 25 percent cover, low constancy), Rosa woodsii (less than 5 percent cover and 42 percent constancy, especially in disturbed stands), Pentaphylloides floribunda, Salix lemmonii, and Salix 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 percent in higher quality stands (Manning and Padgett 1995, Weixelman et al. 1996, Walford et al. 1997) to 44 percent in disturbed stands (Padgett et al. 1989). In mid or late-seral stands, the most common graminoids are Carex lanuginosa (up to 34 percent cover and 85 percent constancy), Deschampsia cespitosa (low cover, variable constancy), Carex microptera (up to 19 percent cover and 100 percent constancy), and occasionally Carex nebrascensis (Manning and Padgett 1995, Weixelman et al. 1996, Walford et al. 1997). Other graminoids in less disturbed stands, occasionally with moderate cover and constancy, include Calamagrostis canadensis, Carex aquatilis, Carex simulata, Carex subnigricans, Carex utriculata, Glyceria species (e.g. Glyceria 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, 1997b). Carex praegracilis (up to 73 percent cover but low constancy), Juncus balticus (up to 21 percent cover and 71 percent constancy), and Carex praticola are common native species which may increase with disturbance (Padgett et al. 1989, Manning and Padgett 1995, Weixelman et al. 1996, Walford et al. 1997). The cover of mesic forbs is less than that of graminoids. The most common species, usually with low cover and variable constancy (low to 100 percent), are often

indicative of some disturbance. Forb species include: Taraxacum officinale (up to 17 percent cover and 86 percent constancy), Achillea millefolium, Trifolium species, Thalictrum species, 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). Moss cover can be high but its constancy is low.

WILDLIFE VALUES The Salix geyeriana/Mesic graminoid community 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). Salix geyeriana has moderate to high value as ungulate and beaver forage and is apparently more palatible than Salix boothii (Manning and Padgett 1995, Crowe and Clausnitzer 1997). Songbirds, upland gamebirds, and other birds use this community for nesting and foraging (Crowe and Clausnitzer 1997, Hall and Hansen 1997). The dense root network of Salix geyeriana and understory Carex species stabilizes streambanks, allowing streambank undercutting which creates excellent fish habitat (Hansen et al. 1995, Hall and Hansen 1997). Beaver ponds, often associated with Salix geyeriana communities, also provide excellent fish and waterfowl habitat.

OTHER NOTEWORTHY SPECIES Exotic species, especially grasses, are relatively common components of the understory of Salix geyeriana/Mesic graminoid. Exotic species known from this community include: Agrostis stolonifera, Bromus inermis, Cirsium arvense, Phalaris arundinacea, Phleum pratense, Poa palustris, and Taraxacum officinale (Padgett et al. 1989, Manning and Padgett 1995, Weixelman et al. 1996, Jankovsky-Jones 1996, 1997b, Walford et al. 1997).

ADJACENT COMMUNITIES Wetter communities adjacent to Salix geyeriana/Mesic graminoid include communities in springs or seeps dominated by Carex aquatilis, Carex utriculata, or Carex nebrascensis. (Manning and Padgett 1995, Weixelman et al. 1996). Adjacent riparian communities with similar moisture regimes are Salix wolfii/Deschampsia cespitosa, Salix boothii/Mesic graminoid, various other Salix types (e.g. those dominated by Salix 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 community type in Montana were Salix geyeriana/Carex utriculata and Salix geyeriana/Calamagrostis canadensis on wetter sites and Populus tremuloides/Cornus sericea, Pentaphylloides floribunda/Deschampsia cespitosa, and Juncus balticus communities on drier sites (Hansen et al. 1995). Uplands adjacent to Salix geyeriana/Mesic graminoid are dominated by Picea species, Pinus contorta, Pinus jeffreyi (Sierra Nevada Mountains), Populus tremuloides, and Artemisia tridentata var. vaseyana steppe (Padgett et al. 1989, Manning and Padgett 1995).

CONSERVATION RANK G2G3Q S5

SUCCESSION AND MANAGEMENT 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, Carex nebrascensis, and other native species), it more often reflects disturbance by livestock grazing (with understories dominated by Poa pratensis, other exotic grasses, and native increasers such as Carex praegracilis, Juncus balticus, and Carex praticola) (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 community will move toward Salix geyeriana/Poa pratensis, Salix geyeriana/Poa palustris, Salix geyeriana/Mesic graminoid-forb, or Salix geyeriana/Mesic forb (Youngblood et al. 1985, Evenden 1989, Padgett et al. 1989, Walford et al. 1997). Salix geyeriana may be less tolerant of browsing pressure than Salix boothii; thus, grazing may move the community toward Salix boothii dominated communities (Hansen et al. 1995, Walford et al. 1997). Continued overgrazing may directly or indirectly eliminate Salix geyeriana, such as by decreasing its vigor or altering hydrologic conditions (Hall and Hansen 1997). The resulting communities may be drier types such as Poa pratensis meadows, mesic graminoid or forb meadows, conifer types, or Populus tremuloides communities. The community 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 Salix geyeriana/Calamagrostis canadensis, Salix geyeriana/Carex aquatilis, Salix geyeriana/Carex utriculata, or Salix geyeriana/Deschampsia cespitosa communities 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).

The high cover of grasses and sedges makes Salix geyeriana/Mesic graminoid highly productive for livestock forage. Salix geyeriana may be more palatable to livestock and less tolerant of grazing than Salix boothii (Hansen et al. 1995, Crowe and Clausnitzer 1997, Walford et al. 1997). In addition, this community 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 Salix geyeriana/Mesic graminoid susceptible to overgrazing and conversion of the understory from native species to exotic grasses. Overgrazing of Salix geyeriana causes lost vigor, decreased stand density, and eventual elimination. After overgrazing, Salix geyeriana stands regain vigor if rested for at least three to six 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). Poa 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 Salix geyeriana/Mesic graminoid and are not usually compatible. When the community converts to Poa 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, Poa pratensis roots are poor soil binders. Salix 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). Poa pratensis and other graminoids resprout better after cooler fires (Hansen et al. 1995, Kovalchik 1987). Salix geyeriana, though more difficult to root than Salix boothii or Salix 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). Re-establishment of willows may help raise the water table and allow reinvasion by native species such as Carex lanuginosa (Kovalchik 1987).

CLASSIFICATION COMMENTS Salix geyeriana/Mesic graminoid is a broad community type which may encompass Salix geyeriana/Poa pratensis and other Salix geyeriana communities with no clearly dominant understory graminoid species. When ecological conditions are good, it has higher cover and constancy of Calamagrostis canadensis, Carex aquatilis, Carex lanuginosa, Carex rostrata [syn. Carex utriculata], and Deschampsia cespitosa, possibly causing confusion with Salix geyeriana communities named for dominance of any one of these 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). More often, however, the Salix geyeriana/Mesic graminoid community is a grazing induced disclimax with high cover and constancy of increasers such as Agrostis stolonifera, Bromus inermis, Carex praticola, Carex praegracilis, Juncus balticus, Phalaris arundinacea, Phleum pratense, Poa palustris, and Poa pratensis (Padgett et al. 1989, Kovalchik 1987, Manning and Padgett 1995, Jankovsky-Jones 1996, Weixelman et al. 1996, Jankovsky-Jones 1997b, Walford et al. 1997). Thus, communities such as Salix geyeriana/Poa palustris and Salix geyeriana/Poa pratensis can be confused with Salix geyeriana/Mesic graminoid (Mutz and Queiroz 1983, Youngblood et al. 1985, Padgett et al. 1989). The broader Salix geyeriana community type of Hansen et al. (1995) is characterized by more cover of mesic graminoids than mesic forbs and likely encompasses stands of Salix geyeriana/Mesic graminoid. In addition, Salix geyeriana/Mesic graminoid can be confused with mixed Salix communities and Salix boothii communities which share similar mesic graminoid understories (Mutz and Queiroz 1983, Youngblood et al. 1985, Kovalchik 1987, Padgett et al. 1989, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Walford et al. 1997). Youngblood et al. (1985) and Hansen et al. (1995), for example, lump stands co-dominated by Salix boothii within their Salix geyeriana community types.

Salix geyeriana/Mesic graminoid is an extensively sampled community. In southeastern Idaho, it is known from at least five sites and two plots (Padgett et al. 1989, Jankovsky-Jones 1997b). It is also known from at least six sites ranging from the greater Yellowstone region in eastern Idaho to the mountains of central Idaho (Jankovsky-Jones 1996, 1998b). Walford et al. (1997) sampled six Salix geyeriana/Mesic graminoid plots in northwestern Wyoming and Padgett et al. (1989) sampled five stands throughout Utah. Manning and Padgett (1995) sampled seven plots in areas near the eastern Sierra Nevada Mountains and two plots in northern Nevada. In addition,

Weixelman et al. (1996) sampled seven plots in central Nevada. Evenden (1989) sampled 3 Salix geyeriana/Mesic graminoid-forb plots in southeastern Oregon and Hansen et al. (1995) sampled 71 plots of a broader Salix geyeriana community type in Montana. Both of these authors likely included some stands of Salix geyeriana/Mesic graminoid within their types.

EDITION 99-03-01

AUTHOR C. Murphy

CAREX LANUGINOSA

COMMON NAME WOOLLY SEDGE COMMUNITY TYPE

PHYSIOGNOMIC TYPE Herbaceous

SIMILAR COMMUNITIES Classified as a dominance type in Montana (Hansen et al. 1988), and may be part of Youngblood et al's. (1985) Kentucky bluegrass community type (Kovalchik 1987).

RANGE The Carex lanuginosa community type is a minor type in Utah, Wyoming, Idaho, Montana, and Oregon.

ENVIRONMENTAL DESCRIPTION The community usually occupies former active fluvial surfaces along low to moderate elevation floodplains, seeps, and headwater basins. Basin soils supporting this type are most commonly mineral with large amounts of organic matter, or more rarely, organic with thick accumulations of partially decomposed sedges (Hansen et al. 1988).

Kovalchik (1987) states surface textures range from fine sandy to sandy clay loams on floodplains to organic loam in the basins. Water tables of the Carex lanuginosa community type are typically within 60 cm (24 in) of the soil surface (Padgett et al. 1989). Floodplain soils are often flooded during spring runoff and the water table is well down in the rooting zone (within 50 inches of the surface) by mid summer. The basin sites have higher water tables and are moist through most summers (Kovalchik 1987).

MOST ABUNDANT SPECIES

Strata	Species
Herbaceous	Carex lanuginosa

VEGETATION DESCRIPTION Carex lanuginosa clearly dominates with 30-80 percent cover. Low species diversity, with few associates having high constancy, is characteristic. Deschampsia cespitosa, Carex nebraskensis, Juncus balticus, and Poa pratensis are occasionally present. Hansen et al. (1988) reports that Carex lasiocarpa may be co-dominant in some stands.

The community usually occupies former active fluvial surfaces along low to moderate elevation floodplains, seeps, and headwater basins.

WILDLIFE VALUES Landforms containing woolly sedge provide important habitat for raptors, deer, and elk (Kovalchik, 1987). Wet stands of the type may provide nesting and feeding areas for waterfowl (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Information not available.

ADJACENT COMMUNITIES Wetter communities include Carex utriculata and Carex nebraskensis. Drier sites may have the Deschampsia cespitosa and Carex buxbaumii community types. Uplands are typically dominated by Artemisia tridentata spp. vaseyana or Artemisia cana at lower elevations and Pinus contorta, Abies lasiocarpa, or Populus tremuloides at higher elevations (Hansen et al. 1995).

CONSERVATION RANK G3? S2

SUCCESSION AND MANAGEMENT The Carex lanuginosa community type appears to be a fairly stable type because of its strongly rhizomatous nature and occurrence on well developed soils. The type may replace the Deschampsia cespitosa community type under moderate to heavy grazing pressures (Padgett et al. 1989), or an increase in species such as Agrostis stolonifera, Poa pratensis, or Juncus balticus may be evident.

Woolly sedge produces moderate to high amounts of herbage, and is palatable to domestic livestock. Grazing occurs in both the mesic basins and floodplain sites as they become surface dry. (Kovalchik 1987, Hansen 1988). On drier floodplain landforms, overgrazing changes the site potential towards the Kentucky bluegrass community type. Kovalchik (1987) reports that on sites where streambed downcutting has occurred, lowered water tables have changed the site potential to the sagebrush/Cusick bluegrass association. Hansen et al. (1988) states that on drier streambanks, this type may be in a disclimax state due to past grazing; and the potential for these sites may be a shrub community dominated by Salix spp.

Carex lanuginosa appears able to withstand moderate grazing pressures, though overuse of stands may increase the presence of invasive exotics such as Agrostis stolonifera, Poa pratensis, or Juncus balticus. Trampling by livestock as well as heavy machinery use may result in compaction or displacement of soils. (Padgett et al. 1989). Vegetation composition and structure can be altered due to impacts such as water development, recreational activities, or agriculture. With management intervention such as grazing schedules, fencing, education, and stream rehabilitation to elevate water tables, moderately disturbed stands recover rapidly due to the rhizomatous habit of the sedge (Kovalchik 1987, Hansen et al. 1988). Prescribed fire is a useful tool on this type. Fire can be used in spring or late summer to help reduce litter accumulation and competitors. Woolly sedge should be very resistant to damage by ground fire. (Kovalchik 1987, Hansen et al. 1988). This species is useful for improving degraded riparian sites. Its long, creeping rhizomes

form a dense mat, effectively stabilizing streambank soils (Hansen et al. 1988). Streams passing through the floodplain landform have good fisheries potential, but may be in degraded condition. Revegetation with woolly sedge and other species, over time, can stabilize streambanks and improve fish habitat (Kovalchik 1987).

CLASSIFICATION COMMENTS Hansen et al. (1995) included all combinations of Carex lanuginosa, Carex lasiocarpa, and Carex buxbaumii in the Carex lasiocarpa habitat type. Classification is based on five stands in Utah and western Wyoming, eight stands in Oregon and an unknown number of stands in Montana.

EDITION 95-12-27

AUTHOR L. Williams

CAREX LASIOCARPA

COMMON NAME SLENDER SEDGE

PHYSIOGNOMIC TYPE Herbaceous

SIMILAR COMMUNITIES Carex lasiocarpa/Sphagnum communities are treated as Poor fens, a distinct type in Idaho. Central Oregon (Kovalchik 1987) and Montana (Hansen et al. 1988 and 1990, Boggs et al. 1990) classifications include some stands which may fit in the Carex buxbaumii community type.

RANGE The Carex lasiocarpa community type 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, southeastern Idaho, throughout much of Montana, and in central Yellowstone National Park.

ENVIRONMENTAL DESCRIPTION Carex lasiocarpa communities usually occupy former lake basins, glacial depressions (kettles), abandoned beaver ponds, and lake and stream margins which favor the accumulation of sedge peat (Hansen et al. 1995). This community type is associated with pond and lake margins, or headwater basins, and often occurs as floating or quaking mats on fluid peat subsoils. Soils are poorly to very poorly drained, sites are often flooded into mid-summer, and water tables remain within the root zone throughout the growing season (Hansen et al. 1995).

MOST ABUNDANT SPECIES

Strata	Species
Herbaceous	Carex lasiocarpa, C. buxbamii, C. utriculata

VEGETATION DESCRIPTION Carex lasiocarpa dominates the intermediate to rich fen with 30-80 percent cover. Moss species and Carex utriculata are often the only other species with high constancy. Open water is often present.

WILDLIFE VALUES This habitat type is generally flooded long enough to provide nesting habitat for waterfowl. However, it has limited use by songbirds and small mammals because of the lack of diversity and flooded soils. Otters, beaver, sandhill cranes, and waterfowl use this habitat type for bedding and foraging areas. It is important habitat for raptors, deer, and elk. Deer may use the drier margins of this community type for fawning (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Information not available.

ADJACENT COMMUNITIES Adjacent wetter sites may be dominated by either the Carex utriculata or C. aquatilus community types, or the C. nebrascensis community type. Drier sites may be dominated by Deschampsia cespitosa or Artemisia cana/Festuca idahoensis habitat type, or the Juncus balticus community type. Adjacent uplands are typically dominated by Artemisia tridentata at lower elevations and by Abies lasiocarpa at higher elevations (Hansen et al. 1995).

CONSERVATION RANK G4 S2

SUCCESSION AND MANAGEMENT This is a stable long-lived community as long as water levels are maintained. However, 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.

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. 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 type are resistant to damage by fire except where hot fires penetrate the peat soil. It has often been the policy of land managers to trap and kill beaver because they are considered a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen et al. 1995).

CLASSIFICATION COMMENTS Classification is based on 6 stands in Utah, 9 stands in Washington, 6 stands in Oregon, and 29 stands in Montana.

EDITION 95-07-11

AUTHOR L. Williams

CAREX NEBRASCENSIS

COMMON NAME NEBRASKA SEDGE

PHYSIOGNOMIC TYPE HERBACEOUS

SIMILAR COMMUNITIES Other communities for which Carex nebrascensis is a community dominant or codominant 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).

RANGE The Carex nebrascensis community type has been documented in every western State, with the possible exception of New Mexico and Washington (Manning and Padgett 1995, Anderson et al. 1998).

ENVIRONMENTAL DESCRIPTION This community typically occurs at low to mid-elevations in the mountains, approximately 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).

The Carex nebrascensis community type 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).

MOST ABUNDANT SPECIES

Strata	Species
Herbaceous	Carex nebrascensis

VEGETATION DESCRIPTION Stands of the Carex nebrascensis community type are generally small and widely scattered on the landscape. Carex 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. Forbs species present in the community 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).

WILDLIFE VALUES Carex nebrascensis is palatable to elk and provides food and cover for waterfowl (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Information not available.

ADJACENT COMMUNITIES Because of the wide elevational and geographical distribution, adjacent upland communities can range from sagebrush-steppe at the lower elevations to a diversity of montane and subalpine coniferous forest types. Adjacent riparian communities are equally diverse and include coniferous forest, deciduous forest, tall shrub, low shrub, and herbaceous communities.

CONSERVATION RANK G4 S3

SUCCESSION AND MANAGEMENT Some studies consider all stands of the Carex nebrascensis community type 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 codominated 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).

Carex nebrascensis, although an increaser in some communities, is very palatable to livestock and an excellent soil binder in wet meadows. Several studies suggest that management of this community 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).

CLASSIFICATION COMMENTS Classification of this community is based on many plots from many studies in Oregon, Nevada, Idaho, California, Montana, Wyoming, Utah, and Colorado, at least.

EDITION 98-12-08

AUTHOR B. Moseley

CAREX UTRICULATA

COMMON NAME BLADDER SEDGE

PHYSIOGNOMIC TYPE Herbaceous

SIMILAR COMMUNITIES This sedge species was previously thought to be Carex rostrata, which was included in many community type names throughout the west. We now know this species as C. utriculata.

RANGE This community occurs in the following states: Washington, Oregon, Nevada, Idaho, Montana, Wyoming, Utah, New Mexico, and Colorado.

ENVIRONMENTAL DESCRIPTION This community is widespread at moderate to high elevations in the mountains; it is rarely present 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 are classified as Histisols, Mollisols, 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).

MOST ABUNDANT SPECIES

Strata	Species
Herbaceous	Carex utriculata

VEGETATION DESCRIPTION Carex utriculata typically exhibits monospecific dominance in this community, with dense cover. Carex nebraskensis, C. simulata, C. aquatilis, and/or Juncus balticus may be abundant in this species-poor community. Litter often accumulates and few

species can establish on these organic, permanently saturated or inundated soils. This is why willows are rarely present in this community (Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997).

WILDLIFE VALUES This community performs a vital role in maintaining water quality and aquatic health in headwater streams. Past beaver activity is often evident in this community type, 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 Carex nebraskensis or C. aquatilis (Padgett et al. 1989). Carex 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 community (Crowe and Clausnitzer 1997).

OTHER NOTEWORTHY SPECIES Information not available.

ADJACENT COMMUNITIES Because of the wide elevational and geographical distribution, adjacent upland communities can range from sagebrush-steppe at the lower elevations (rare) to a diversity of montane and subalpine coniferous forest types.

CONSERVATION RANK G5 S4

SUCCESSION AND MANAGEMENT Carex utriculata is a widespread species that occupies mineral or organic soils with seasonably high water tables. This community 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; communities 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).

Though C. 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.

CLASSIFICATION COMMENTS Classification of this community is based on many plots from Washington, Oregon, Nevada, Idaho, Montana, Wyoming, Utah, New Mexico, and Colorado.

EDITION 98-01-02

AUTHOR B. Moseley

CAREX VESICARIA

COMMON NAME INFLATED SEDGE

PHYSIOGNOMIC TYPE Herbaceous

SIMILAR COMMUNITIES The Carex vesicaria community type is most similar to the Carex utriculata community, though, some similarities to the Carex aquatilis community also exist. For example, Carex vesicaria has moderate to high cover in some Carex aquatilis and Carex utriculata communities, sometimes being codominant with those and other Carex species (Kovalchik 1987, Kovalchik 1993, Hansen et al. 1995, Hall and Hansen 1997, Crowe and Clausnitzer 1997). When Carex vesicaria stands are located in deeper, standing water they are very similar to the Carex 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 utriculata, Eleocharis palustris, or Deschampsia cespitosa, become more common than Carex vesicaria (Youngblood et al. 1985, Hansen et al. 1988, Padgett et al. 1989, Crowe and Clausnitzer 1997).

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 Henry's Fork basin of eastern Idaho (Youngblood et al. 1985, Jankovsky-Jones 1996) and northern Idaho (Jankovsky-Jones 1997a, 1998c); 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 Carex vesicaria community is probably circumboreal in distribution (Mattson 1984).

ENVIRONMENTAL DESCRIPTION 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 1997a. 1998c); up to 1830 m in eastern Oregon (Kovalchik 1987, Crowe and Clausnitzer 1997); and from 1800 to 2560 m in the Sierra Nevada Mountains, western Wyoming, and eastern Idaho (Mattson 1984, Manning and Padgett 1995, Jankovsky-Jones 1996). The Carex 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 1998c). 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 1997a, 1998c). 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 1998c). 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.

MOST ABUNDANT SPECIES

Strata	Species
Herbaceous	Carex vesicaria, Carex aquatilis, Carex nebrascensis, Eleocharis palustris, Deschampsia cespitosa, Aster foliaceus, Juncus balticus, Carex utriculata

VEGETATION DESCRIPTION Species diversity is relatively low in the Carex vesicaria community. Carex vesicaria is clearly dominant, forming dense stands 35 to 60 cm tall, with 40 to 80 percent cover and 100 percent constancy (Mattson 1984, Kovalchik 1987, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c). 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 Carex vesicaria stand (Mattson 1984). For example, the wettest phase of the Carex vesicaria community, where standing water is over 30 cm in the spring, has low diversity and is composed of mainly Carex vesicaria with low cover of other species such as Carex utriculata (Mattson 1984, Kovalchik 1987). Sites with less spring standing water, which may dry only in the fall, have higher cover of Carex aquatilis (less than 7 percent cover and 23 percent 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 percent cover and 45 percent constancy), Juncus balticus (less than 8 percent cover and 42 percent constancy), Glyceria borealis, Sparganium species (e.g., Sparganium 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 1998c. Better drained sites, which are flooded in spring but dry in summer, are co-dominated by Deschampsia cespitosa (less than 12 percent cover and 75 percent constancy) or Aster foliaceus (less than 12 percent cover and 23 percent constancy) (Mattson 1984, Kovalchik 1987, Crowe and Clausnitzer 1997). Other species commonly associated with Carex vesicaria in

these stands include Carex nebrascensis (less than 31 percent cover and 42 percent constancy), Carex 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 1998c). 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).

WILDLIFE VALUES 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 1998c). Grizzly bear also forage for roots in this community (Mattson 1984). Depending on water levels, Carex vesicaria stands are important feeding and nesting areas for waterfowl, small mammals, and other birds (Kovalchik 1987, Crowe and Clausnitzer 1997). Carex vesicaria root mats form a thick sod which stabilizes undercut streambanks and creates deep, narrow channels with overhanging cover for fish (Kovalchik 1987, Hanson et al. 1988).

OTHER NOTEWORTHY SPECIES Exotic species known from the Carex vesicaria community include Phalaris arundinacea, Phleum pratense, Poa pratensis, Taraxacum officinale, and Zizania aquatica (Mattson 1984, Kovalchik 1987, Hansen et al. 1988, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c).

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 Carex utriculata, Phalaris arundinacea, Eleocharis palustris, Carex aquatilis, Juncus nevadensis, Carex lasiocarpa, and Deschampsia cespitosa (Mattson 1984, Kovalchik 1987, Hansen et al. 1988, Crowe and Clausnitzer 1997, Jankovsky-Jones 1998c). 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 1998c). 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).

CONSERVATION RANK GU S3

SUCCESSION AND MANAGEMENT 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 Carex 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 Carex 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 Carex vesicaria are overgrazed, the community may move toward dominance by mesic forbs, Carex nebrascensis, Poa pratensis, Phalaris arundinacea, Phleum pratense, or other graminoids (Kovalchik 1987, Crowe and Clausnitzer 1997).

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 Carex vesicaria can occur (Kovalchik 1987, Crowe and Clausnitzer 1997). Carex vesicaria is moderately to highly palatable and can be important in late summer when other forage is less available. It is more palatable than Carex 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 Carex vesicaria resists grazing and trampling damage (Hansen et al. 1988), overuse will damage soils, reduce Carex 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 Carex nebrascensis or exotic species such as Phalaris arundinacea. However, if the community is in mid-seral condition and rested for at least 30 days, Carex 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 can not function as a sediment filter. Carex 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 Carex 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 Carex vesicaria rhizomes (Kovalchik 1987, Crowe and Clausnitzer 1997).

CLASSIFICATION COMMENTS The Carex vesicaria community type is sometimes included within the Carex utriculata [syn. Carex rostrata] community (Kovalchik 1993, Hansen et al. 1995, Hall and Hansen 1997). Reasons for lumping are that Carex utriculata and Carex 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) sub-divided the Carex vesicaria community into phases based on co-dominance by other species: Aster foliaceus, Deschampsia cespitosa, and Carex 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 Carex 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).

Classification of the Carex vesicaria community is based on a relatively large number sampled stands. For example, there are 13 plots from northeastern Oregon (Crowe and Clausnitzer 1997), 20 plots from central Oregon (Kovalchik 1987), and two stands from the Sierra Nevada Mountains (Manning and Padgett 1995). There are eight stands tracked in the Idaho Department of Fish and Game, Conservation Data Center database, two of which (from northern Idaho) have associated plot data (Jankovsky-Jones 1996, 1997a, 1998c). Two of the eight stands are protected in Research Natural Areas (Pond Peak and Upper Priest River, both in northern Idaho). Carex vesicaria has also been described from an unknown number of plots in Montana (Hansen et al. 1988) and Yellowstone National Park, Wyoming (Mattson 1984).

EDITION 98-01-09

AUTHOR C. Murphy

AGROPYRON SMITHII

COMMON NAME WESTERN WHEATGRASS

PHYSIOGNOMIC TYPE Herbaceous

SIMILAR COMMUNITIES This community is similar to several others that are dominated or co-dominated by Agropyron smithii. Further work needs to be done to refine the differences in composition and environmental characteristics.

RANGE Minor type at lower elevations in Montana, Idaho, Colorado, Utah, Nebraska, Saskatchewan, and possibly North Dakota.

ENVIRONMENTAL DESCRIPTION This community occurs on flat to gently sloping topography. The soils are deep (40-100 cm) and well developed clay, clay loam, and silt loam. Soil texture ranges from poorly drained to very poorly drained clay to silt loams. Soils vary widely from neutral to moderately akali (Hansen et al. 1995). It is sometimes found on alluvial fans of small streams or in swales where either overland flow or fine textured soils allow for wetter, moisture regimes.

MOST ABUNDANT SPECIES

Strata	Species
Herbaceous	Agropyron smithii

VEGETATION DESCRIPTION Agropyron smithii occurs in nearly pure stands (80 percent cover) with few associates. Species such as Koeleria macrantha and Poa spp. may be locally abundant. Artemisia leudoviciana, Bouteloua gricilis, Stipa viridula, and Stipa comata may also be present. The type occurs in swales and nearly level alluvial terraces where either overland flow or fine textured soils allow for a wetter, moisture regime (Hansen et al. 1995).

WILDLIFE VALUES Agropyron smithii community types may be used by waterfowl for nesting sites. The dominant graminoid is preferred by antelope and deer during the spring.

OTHER NOTEWORTHY SPECIES The nonnative species Tanecetum vulgare and Centaurea maculosa may colonize alluvial substrates where this community occurs and potentially can outcompete the diagnostic graminoid.

ADJACENT COMMUNITIES Adjacent wetter sites may include Spartina gracilis, Phragmites australis, or Phalaris aurundinacea. Drier sites are typically occupied by upland species (Hansen et al. 1995).

CONSERVATION RANK G3G5 S1

SUCCESSION AND MANAGEMENT Overgrazing of this type will reduce the vigor of the dominant graminoid and may eventually result into coversion to a type dominated by the exotics Poa pratensis or Agrostis stolonifera. When grazing is removed Symphoricarpos occidentalis, Glycyrrhiza lepidota, and Cirsium arvense may invade (Hansen et al. 1995).

Forage production is moderate to high with the diagnostic species preferred by livestock in the spring. This type is tolerant of grazing pressure and drought. Overgrazing in May and June may decrease its productivity. Following drought or managment of overgrazed areas the dominant species will rapidly colonize areas it previously occupied (Hansen et al. 1995). Agropyron smithii is tolerant of fire during the dormant state. During the growing season recovery from fire may be delayed.

Agropyron smithii has potential for revegetating disturbed or degraded wetland sites. Transplants are desirable since seedlings may be slow growing. Once the species becomes established, the plants are able to spread quickly by rhizomes (Hansen et al. 1995).

CLASSIFICATION COMMENTS Classification is based on 32 stands in Montana and an unknown number of stands in eastern Idaho.

EDITION 96-02-05

AUTHOR M. Jankovsky-Jones

ELEOCHARIS PALUSTRIS

COMMON NAME COMMON SPIKERUSH

PHYSIOGNOMIC TYPE Herbaceous

SIMILAR COMMUNITIES In some cases, the Eleocharis palustris community 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.

RANGE Eleocharis palustris is a common type in California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming, and Saskatchewan. Essentially it has been documented from every western state except Arizona and New Mexico (Bourgeron and Engelking 1994, Anderson et al. 1998).

ENVIRONMENTAL DESCRIPTION The Eleocharis palustris community type 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 of this community type 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).

MOST ABUNDANT SPECIES

Strata	Species
Herbaceous	Eleocharis palustris, Alopecurus aequalis, Mentha arvense, Rumex crispus, Eleocharis acicularis, Carex utriculata, Glyceria spp.

VEGETATION DESCRIPTION Eleocharis palustris is an aggressive, rhizomatous species that nearly excludes all other species from establishing any significant cover. Common associates in high quality sites include Alopecurus aequalis, Mentha 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.

WILDLIFE VALUES 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).

OTHER NOTEWORTHY SPECIES Information not available.

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.

CONSERVATION RANK G5 S3

SUCCESSION AND MANAGEMENT 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 utriculata, may replace it. However, due to the continual saturated conditions and dense growth of Eleocharis 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.

Seasonally wet conditions and low palatability of Eleocharis palustris limit the grazing value of this type for livestock, even during drought years when upland forage dries early and dies back (Kovalchik 1987). Sites occupied by this type are typically inundated or at least saturated for much of the year so as to preclude most development. Trampling damage and soil churning occurs readily with livestock use and may result in a shift toward more disturbance tolerant species such as Hordeum jubatum, Carex nebrascensis, and Juncus balticus (Hall and Hansen 1997).

CLASSIFICATION COMMENTS This type has been quantitatively defined and described by numerous studies throughout the western United States and Canada (Bourgeron and Engelking 1994, Anderson et al. 1998).

EDITION 98-12-08

AUTHOR B. Moseley

GLYCERIA BOREALIS

COMMON NAME NORTHERN MANNAGRASS HABITAT TYPE

PHYSIOGNOMIC TYPE Herbaceous

SIMILAR COMMUNITIES The diagnostic graminoid is quite distinct and few other species could be confused with it.

RANGE The Glyceria borealis community type is distributed globally throughout the northern hemisphere; in the west it is a minor type in Montana, Idaho and Ontario, Canada.

ENVIRONMENTAL DESCRIPTION Glyceria borealis communities occupy pond and lake margins, low-gradient streams, and occurs in association with wet meadows. Soils vary widely from mineral to organic. Soil reaction varies little from slightly acid to neutral (pH 6.0 to 7.0).

MOST ABUNDANT SPECIES

Strata	Species
Herbaceous	Glyceria borealis, Eleocharis palustris

VEGETATION DESCRIPTION Sites are generally monotypic in nature and are dominated by Glyceria borealis. Other associates are Eleocharis palustris; sometimes E. acicularis and Glyceria elata are present (Hansen et al. 1995).

WILDLIFE VALUES This habitat type provides valuable habitat for waterfowl. The seeds of Glyceria borealis provide good forage for ducks. Elk, moose, and deer may make moderate use of the habitat type (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Information not available.

ADJACENT COMMUNITIES Adjacent wetter communities are typically open water, while adjacent drier communities are often dominated by the Carex utriculata h.t. Adjacent uplands are dominated by a variety of communities.

CONSERVATION RANK G4 S1

SUCCESSION AND MANAGEMENT The sites are so wet as to preclude most types of disturbances. Cattle and horses will consume both flowering stalks and leaves. Sheep tend to use only the leaves. Wet conditions tend to delay grazing until late in the season at which time the soils are normally drier and the forage is less succulent. Wildfire is rare in this h.t. These sites are generally so wet as to preclude most development activities; fishing is the main recreational use (Hansen et al. 1995).

CLASSIFICATION COMMENTS Classification is based on five stands in Montana, and a similar type has been described in Ontario, Canada by Jeglum et al. (1974). Type has been documented at nine locations in Idaho.

EDITION 95-07-12

AUTHOR L. Williams

JUNCUS BALTICUS

COMMON NAME BALTIC RUSH

PHYSIOGNOMIC TYPE Herbaceous

SIMILAR COMMUNITIES This appears to be a distinctive type. Eleocharis palustris - Juncus balticus and J. balticus-Carex rossii community types have been described from central and southern Utah (Bourgeron and Engelking 1994), that may relate to the J. balticus community type described here. Similarly, Mattson's (1984) Deschampsia cespitosa-Juncus balticus from the Yellowstone Plateau is rich in J. balticus.

RANGE The Juncus balticus community type 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).

ENVIRONMENTAL DESCRIPTION The elevational range occupied by the Juncus balticus type 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).

This community type typically occurs on fine-textured surface soils. Textures range from silt to sandy-loam. The water table ranged 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 ranged from low to high. 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).

MOST ABUNDANT SPECIES

Strata	Species

Herbaceous Juncus balticus, Poa pratensis

VEGETATION DESCRIPTION Baltic rush dominates the stands with canopy cover generally over 50 percent, usually higher. Cover by other graminoids is usually low, although Poa pratensis appears to be a common associate over the range of this type. Hordeum jubatum has high constancy in Montana stands. There is a wide diversity of other graminoids and forbs, both native and exotic, that occur in Juncus balticus stands throughout its range, generally at low cover (Padgett et al. 1989, Hansen et al. 1995, Manning and Padgett 1995, Crowe and Clausnitzer 1997, Walford et al. 1997).

WILDLIFE VALUES This type provides early season forage for wildlife (Hansen et al. 1995).

OTHER NOTEWORTHY SPECIES Information not available.

ADJACENT COMMUNITIES As would be expected with a community distributed over the western United States and having at least a 6,000-foot elevational range, the adjacent upland and riparian communities are diverse. Upland communities range from steppe and shrub-steppe at the lower elevations to alpine communities at the higher.

CONSERVATION RANK G5 S4

SUCCESSION AND MANAGEMENT Some studies state unequivocally that the Juncus balticus community type 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, being protected by insurmountable cliff bands. They contain extensive near-monocultures of Juncus balticus and have significant hummocking (Jankovsky-Jones 1998b). 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 the Carex nebrascensis, Deschampsia cespitosa, Calamagrostis canadensis, and possibly others. It is an increaser because it has a high tolerance for 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).

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. Juncus 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).

CLASSIFICATION COMMENTS This type has been quantitatively defined and described by numerous studies throughout the western United States (refer to Bourgeron and Engelking 1994 and Manning and Padgett 1995 for references).

EDITION 98-12-09

AUTHOR B. Moseley

SCIRPUS ACUTUS

COMMON NAME HARDSTEM BULRUSH

PHYSIOGNOMIC TYPE Herbaceous

SIMILAR COMMUNITIES 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. Scirpus validus is often treated as a separate alliance in the Western Regional Vegetation Classification (Bourgeron and Engelking 1994). 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 this description encompasses enough compositional and structural variation to include Cole's types.

RANGE Stands are known from Oregon, Washington, Nevada, California, Idaho, and Montana.

ENVIRONMENTAL DESCRIPTION Stands of this community type 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 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).

MOST ABUNDANT SPECIES

Strata	Species
Herbaceous	Scirpus acutus, Typha latifolia, Lemna sp., Solanum dulcamara

VEGETATION DESCRIPTION The Scirpus acutus type 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 on 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).

WILDLIFE VALUES Scirpus acutus provides valuable nesting and roosting cover for a variety of songbirds and waterfowl, notably redwinged blackbirds, yellow-headed blackbirds, and wrens. Scirpus 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).

OTHER NOTEWORTHY SPECIES A vascular plant species rare in Idaho, Teucrium canadense, occurs in the ecotone between this community and the Sarcobatus vermiculatus/Distichilis stricta type at one site.

ADJACENT COMMUNITIES Adjacent wetland communities may include Typha latifolia, Carex utriculata, Equisetum fluviatile, and Nuphar polysepalum. This is a wide ranging community and upland vegetation may range from coniferous forests to sagebrush steppe.

CONSERVATION RANK G5 S4

SUCCESSION AND MANAGEMENT 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, Scirpus acutus is regularly accompanied by other hydrophytes, such as Sparganium emersum and Typha latifolia. The reasons for the distribution of these species is 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 Scirpus acutus types.

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. Vegetation can also be damaged by trampling. This community will burn in either late fall or early spring if the water levels have dropped sufficiently (Hansen et al. 1995).

CLASSIFICATION COMMENTS Classification is based on sampling of 58 stands in Montana (Hansen et al. 1995); an unknown number of stands in Washington (Evans 1989); 6 stands in eastern Idaho (Hall and Hansen 1997); and at least 22 stands in Idaho (Cole 1995).

EDITION 98-01-05

AUTHOR B. Moseley

SPARGANIUM EURYCARPUM

COMMON NAME GIANT BUR-REED

PHYSIOGNOMIC TYPE Herbaceous

SIMILAR COMMUNITIES Stands of Sparganium eurycarpum superficially look like Typha latifolia, especially early in the growing season, when the plants are not in flower. Sparganium euryucarpum may reach heights of up to 1.5 m. and through binoculars appear as stands of cattails within the emergent vegetation mosaic. The leaves of cattail are generally darker green than S. eurycarpum. Wetlands dominated by Sparganium angustifolium have been described in Colorado and it is unknown if these are similar environmentally. Stands and small patches of Sparganium emersum have been described at low elevations in Montana and observed in Idaho. Stands of S. emersum observed in Idaho are typically small (less than 1 m. square) and treated as an inclusion with other wetland types.

RANGE Stands of Sparganium eurycarpum are known from Washington, northern Idaho, and possibly Oregon.

ENVIRONMENTAL DESCRIPTION This community occupies lake bays and shorelines, river shorelines, and abandoned oxbows at lower elevations. Sites are flooded early in the growing season and may remain so throughout the summer months. Evans (1989) noted that stands lacked standing water, but may be wet in other years. Soils are soft silt or organic muck over fine textured mineral soils or sand.

MOST ABUNDANT SPECIES

Strata	Species

Herbaceous	Sparganium eurycarpum, Carex vesicaria, Eleocharis palustris, Equisetum fluviatile, Glyceria borealis, Lemna minor, Polygonum spp., Sagitaria latifolia,

VEGETATION DESCRIPTION Stands of Sparganium eurycarpum may occur as shallow marshes adjacent to lakes and rivers. Cover of Sparganium eurycarpum is high ranging from 20 percent to more than 50 percent. Carex vesicaria, Eleocharis palustris, Equisetum fluviatilis, Glyceria borealis, Lemna minor, and Sagitaria latifolia are sometimes present with low cover (1 percent). Occassionally associated species may contribute up to 10 percent cover.

WILDLIFE VALUES Wildlife values are poorly described for Sparganium eurycarpum, though this community is probably used by waterfowl for shade, hiding cover, and nesting if stands are not too dense. Achenes of Sparganium spp. are eaten by ducks and other waterfowl. Additionally, great blue herons and other marsh species are reportedly attracted to stands of bur-reeds (Guard 1995).

OTHER NOTEWORTHY SPECIES The exotic species Zizinia aquatica (wild rice) is abundant in and adjacent to stands of this community in lakes of the Coeur d'Alene system in northern Idaho.

ADJACENT COMMUNITIES Adjacent communities with a similar hydrologic regime include those dominated by Typha latifolia and Equisetum fluviatile. Open water is often adjacent supporting Nuphar polysepalum or submerged aquatic species including Potamogeton robbinsii, Potamogeton spp., and Cerataphyllum demersum. Drier communities may be dominated by Carex lenticularis, Carex vesicaria, and Eleocharis palustris (Jankovsky-Jones 1998c).

CONSERVATION RANK GU SU

SUCCESSION AND MANAGEMENT Little is known about the successional dynamics of this community. It is appears to be somewhat stable and perhaps even tolerant of water level fluctuations given that stands are known to occur in wetlands with standing water throughout the growing season as well as from areas that drawdown annually.

Information on management of this community is not available. Management guidelines for communities with similar hydrologic regimes such as Typha latifolia may be appropriate. It is unknown if this species can be planted from seed or plugs.

CLASSIFICATION COMMENTS This community is described from observations in western Washington (Kunze 1994), a single plot in and observations in eastern Washington (Crawford 1999, Evans 1989), and plots and observations in northern Idaho (Jankovsky-Jones 1998c, Haigler-Bailly 1994). This is a distinct communty with Sparganium eurycarpum forming dense stands with few other species present.

This community is based on less than ten plots in western Washington and northern Idaho as well as additional observations of this type. This community has been poorly sampled due in part to problems with access. The shallowness of water may prohibit boat travel and unstable substrates often cannot be traversed by foot.

EDITION 99-03-22

AUTHOR M. Jankovsky-Jones

POOR FEN

COMMON NAME POOR FEN

PHYSIOGNOMIC TYPE Non-vascular

SIMILAR COMMUNITIES Includes a number of communities treated by Kunze (1994) as (Vascular species)/Sphagnum as well as the former Idaho type, Carex lasiocarpa/Sphagnum.

RANGE Minor type throughout northern latitudes of North America and Europe.

ENVIRONMENTAL DESCRIPTION Poor fens occur in glacial scours, kettle holes, isolated oxbows, old lake beds, and at or near the heads of drainages where inflow is limited. Thick layers of Sphagnum peat have accumulated since the last retreat of the continental glaciers. The pH values range from 4-6.

MOST ABUNDANT SPECIES

Strata	Species
Herbaceous	Carex lasiocarpa, Carex limosa, Dulichium arundinaceum, Potentilla palustris, Lycopus uniflorus
Non-vascular	Sphagnum subsecundum, Sphagnum fuscum, Sphagnum angustifolium, Calliergon stramineum, Aulacomnium palustre

VEGETATION DESCRIPTION Poor fens are characterized by a solid mat of Sphagnum and scattered stems of vascular plants. The Sphagnum species, Sphagnum subsecundum, S. fuscum, S. angustifolium, along with the brown mosses, Calliergon stramineum and Aulacomnium palustre, dominate the surface. Vascular plant species such as Scheuchzeria palustris, Vaccinium oxycoccos, Carex limosa, Carex lasiocarpa, Dulichium arundinaceum, Scheuchzeria palustris, Potentilla palustris, and Lycopus uniflorus occur as scattered individuals. The fens may occur on a fixed or floating mat.

WILDLIFE VALUES Open water adjacent to poor fens provides important habitat for numerous invertebrate and vertebrate animal species. The macroinvertebrate fauna has been

studied by Dr. Fred Rabe and is summarized in Chadde et al. (1998). The northern bog lemming often occupies relatively open wetlands, such as poor fens, lacking a shrub component. Grizzly bears have been sighted at peatlands in northern Idaho.

OTHER NOTEWORTHY SPECIES The non-native cranberry, Vaccinium macrocarpon, has been introduced to Poor Fens in northern Idaho and seem to displace native graminoids. Several plant species of concern are known to occur in Poor Fen habitat and include Carex leptalea, Carex paupercula, Epilobium palustre, Lycopodiella inundata, Rhynchospora alba, Salix pedicellaris, Scheuchzeria palustris, Trientalis arctica, and Vaccinium oxycoccos. Synaptomys borealis (northern bog lemming) is also known to use this habitat.

ADJACENT COMMUNITIES Poor fens typically form a mosiac with rich fen and shrub vegetation and open water. Adjacent communities are frequently dominated by Typha latifolia, Carex cusickii, Carex utriculata, Carex lasiocarpa, and other sedge species. A moat is often present on wetland margins and is bordered by shrubs such as Spiraea douglasii and Alnus incana.

CONSERVATION RANK G4 S1

SUCCESSION AND MANAGEMENT Poor fen vegetation develops from lake fill processes. Terrestrialization occurs in lake basins, kettle holes, and ponds as the peat edge expands toward the center of the water body (Chadde et al. 1998). Long periods of drought may dry the surfaces of the peat soils, starting a trend where decomposition exceeds buildup or where fire drastically lowers the soil surface. In the long run, however, the association is self perpetuating. The eventual climax is likely a larger, deeper peatland and not forests as some ecologists suggest (Kovalchik 1993).

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. Activities altering hydrology or introducing sediments to these systems should be avoided. The abrupt, large scale, and often irreversible nature of changes in hydrology and nutrient concentrations resulting directly or indirectly from human activities may be beyond the tolerance level of Poor Fen communities.

CLASSIFICATION COMMENTS Classification based on an unknown number of stands in Washington and Oregon and description of type in Idaho.

EDITION 97-01-07

AUTHOR Mabel Jankovsky-Jones

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Appendix C.

Summary of State Element Ranks**:** With the substitution of globally for statewide this table can be used for global rankings.

S1 Critically imperiled statewide (typically 5 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 six to twenty-five 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 twenty-six to fifty percent of native range currently occupied by high quality occurrences of type).

S4 Apparently secure statewide (many occurrences, fifty-one to seventy-five percent of native range currently occupied by high quality occurrences of type).

S5 Demonstrably secure statewide and essentially ineradicable under present conditions (seventy-six to one hundred 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 listed by the MRA as occurring in the basin whose conservation status needs to be analyzed prior to assigning a rank. This information (stand tables and community descriptions) is currently unavailable.

Appendix D
Site summaries for wetlands in the Spokane River Basin

BLACK PRINCE CREEK

Directions:

The Black Prince Creek drainage is a tributary to the St. Joe River about 26 air miles east of St. Maries. It is the largest watershed on the north side of the St. Joe between the Big Creek and Slate Creek drainages. Access to the Black Prince Creek area is via FS Roads 1907, 1215, and 307 from the town of Herrick, Idaho.

Richness:

The Black Prince Creek watershed is the last undisturbed tributary to the St. Joe River downstream from Avery. The majority of the drainage is covered by montane forest and includes old growth and mid successional stages of development as a result of the fire of 1910, the principal disturbance in the forest's history. A well-developed riparian zone is primarily limited to the canyon bottom and harbors groves of very large western red cedar (Thuja plicata), hemlock (Tsuga heterophylla), and white pine (Pinus monticola). Black Prince Creek supports moderate to high densities of native cutthroat trout (Oncorhynchus clarki) and may provide suitable habitat for bull trout (Salvelinus confluentus) as well. The creek has a mix of deep pools, riffles, and a large amount of woody debris, creating a diversity of aquatic habitats and supporting invertebrate indicators of excellent water quality. The watershed provides prime winter and summer range for elk. It is also known to support other large animals such as deer (Odocoileus virginianus), black bear (Ursus americanus), bobcat (Lynx rufus), lynx (Lynx canadensis), and mountain lion (Felis concolor). Observed bird species include pileated woodpecker (Dryocopus pileatus), northern goshawk (Accipiter gentilis), wild turkey (Meleagris gallopavo), and red-tailed hawks (Buteo jamaicensis). And, although no surveys have been conducted, optimal habitat exists for the Coeur d'Alene salamander (Plethodon idahoensis), a sensitive species which is known from both Slate Creek and Big Creek just to the east and west respectively.

Rarity:

Four tracked plant species have been documented from the drainage: Mimulus clivicola, Mimulus alsinoides, Dodecatheon dentatum, and Cypripedium fasciculatum. Three others that have not yet been documented but are reported to occur include: Cardamine constancei, Eburophyton austiniae, and Blechnum spicant. Plant communities have not yet been identified, but a wide range of habitats and successional stages exist throughout the drainage indicating that a diverse list of communities may be developed. Surveys to document animal species have not been performed, but observations indicate that the northern goshawk is at least occasionally present and excellent habitat exists for bull trout and the Coeur d'Alene salamander.

Condition:

Approximately 75 percent of the entire Black Prince Creek drainage lies on land managed by Idaho Panhandle National Forest, Avery Ranger District. The Muddy-Fran timber sale will impact approximately 310 acres in the drainage and include the construction of about 12,400 feet of new road.

Noxious weeds such as spotted knapweed (Centaurea maculosa) and meadow hawkweed (Hieracium pratense) are currently limited to the existing roadsides. This may be due to the relatively few roads and the lack of trails within the watershed. Root rot is also limited to small patches of infected areas.

Viability:

Adjacent lands in private, state, and federal ownership have been primarily managed for timber production creating a fragmented landscape of habitats. This may put increased biological, social, and economic demand on the remaining undisturbed portions of the landscape.

Other values:

Black Prince Creek is the last undisturbed tributary to the St. Joe River below Avery. As such, the drainage could be invaluable as a reference area for ecosystem management activities. Past management of the region for timber harvest has left the area an island in a landscape of fragmented habitats that is important for many species of plants and animals.

Conservation intent:

Conservation intentions include possible designation of the land managed by the Forest Service as a Special Interest Area or Research Natural Area (RNA).

Management needs:

Potential management activities may include construction of sediment control structures, eradication of noxious weeds along roadways, and prescribed burns.

Information needs:

Plant associations present within the site and their seral and structural status need to be identified to fully assess the potential contribution of the site to conservation objectives. Basic terrestrial vertebrate, aquatic, fisheries, and floristic inventories also need to be completed although some initial work has begun on the aquatic and terrestrial environments. Three rare plants; Blechnum spicant, Eburophyton austiniae, and Cardamine constancei, have been reported to occur in the drainage but have not been officially documented. The exact location of the Muddy-Fran timber sale needs to be identified and monitoring activities need to be initiated to determine the impact of disturbance that is threatening the drainage.

Plant community occurrences:
Not identified

Rare plant occurrences:

Dodecatheon dentatum	G4	S3
Mimulus alsinoides	G5	S1
Mimulus clivicola	G4	S3
Cypripedium fasciculatum	G4	S3

Author:
A. H. Pitner

HOBO CEDAR GROVE

Directions:

The Hobo Cedar Grove Botanical Area is located on the West Fork Hobo Creek, in the Marble Creek drainage of the St. Joe National Forest, about 42 miles southeast of St. Maries, Idaho, or about 12 miles northeast of Clarkia, Idaho. From St. Maries, Idaho, take State Route 30 southeast for about 30 miles to Clarkia. From Clarkia, take FS Road 321 northeast for about 10 miles to the intersection with FS Road 3357 at Hobo Pass. Turn right and travel east on FS Road 3357 for about 2 miles to the Hobo Cedar Grove Botanical Area.

Richness:

Hobo Cedar Grove Botanical Area contains a grove of old-growth western redcedar (Thuja plicata) in pristine condition. Individual trees reach up to 5 to 8 feet in diameter. Minor amounts of grand fir (Abies grandis), western white pine (Pinus monticola), and western hemlock (Tsuga heterophylla) also occur in the grove. Elevations in the area range from 3,920 feet (1188 m) where the West Fork Hobo Creek leaves the area to about 4,520 feet (1370 m).

Rarity:

The site contains one of the best old-growth western redcedar stands in the Northern Rocky Mountains. Cypripedium fasciculatum, a Forest Service Sensitive species, occurs in the area.

Condition:

The site is allocated to Management Area 13 (special areas managed for natural, scenic, and historic values) in the Idaho Panhandle National Forests Plan. An interpretive trail was built through the area to lessen the impact of human trampling of ferns in the area.

Viability:

The site is surrounded by Forest Service lands within Managment Area 1 - lands managed for timber production.

Other values:

Not identified

Conservation intent:

The site has been protected by designation as Special Interest Area - Botanical.

Management needs:

Not identified.

Information needs:
Not identified.

Plant community occurrences:

Thuja plicata/Athyrium filix femina	G3G4 S3
Thuja plicata/Clintonia uniflora, Taxus brevifolia	G3 S3

Rare plant occurrences:

Cypripedium fasciculatum	G4 S3

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TWIN LAKES FEN

Directions:

Twin Lakes Fen is located on the southwest end of the western lake in the Twin Lakes tandem of lakes. The fen is surrounded by private land with no access, so access must be made by boat. From Rathdrum, Idaho head north on Hwy 41 approximately 6 miles to Twin Lakes Road (?), which skirts the northern edge of the two lakes. Go to the western-most Idaho Fish and Game boat launch. Land your boat and paddle/row/motor to the southwest end of the lake where the extensive, open fen runs along the lake margin.

Richness:

Twin Lakes Fen contains extensive poor fen communities on a raised Sphagnum centrale and S. angustifolium-dominated lawn that supports stems of Carex lasiocarpa, C. chordorrhiza (the rare string-root sedge), C. rostrata, C. muricata, C. limosa, Scheuchzeria palustris, Potentilla palustris, Lycopus uniflorus, Dulichium arundinaceum, Lysimachia thyrsiflora, Viola macloskeyi, Eriophorum gracile, E. chamissonis, and Drosera rotundifolia. This Sphagnum lawn is separated from the lake by a strip of rich fen vegetation approximately 10 meters wide that is dominated by Typha latifolia, Sphagnum teres, S. squarosum, Spiraea douglasii, Dulichium arundinaceum, and Carex lasiocarpa. This rich fen is a bit more buoyant than the area covered by Sphagnum lawn. Further back from the lake is a stand of scattered Pinus contorta (to 12 inches DBH). This area has distinct hummock-hollow topography. The hummocks are covered by Sphagnum centrale and support the lodgepole pines plus Carex muricata, Dulichium arundinaceum, Spiraea douglasii, Equisetum fluviatile, Lycopus uniflorus, and two rare species: Carex livida (pale sedge) and Rhynchospora alba (white beakrush). Slightly inundated hollows between the hummocks mostly lack moss cover and are characterized by C. livida, R. alba, E. fluviatile, D. arundinaceum, and Scheuchzeria palustris (the rare podgrass). A sometimes inundated moat occurs between the fen and upland to the south. It is characterized by Spiraea douglasii, Phalaris arundinacea, Eleocharis palustris, E. acicularis, E. ovata, Sparganium emersum, Bidens cernua, Potamogeton natans, Salix drummondiana, Alisma plantago-aquatica, Juncus filiformis, Dulichium arundinaceum, Menyanthes trifoliata, and Carex lasiocarpa. The western end of the fen, near the mouth of Fish Creek, was drained in the past and pastured. It is no longer successfully drained (at least for pasturing). It is covered by an intermediate fen dominated by C. lasiocarpa, Spiraea douglasii, Sphagnum subsecundum, Potentilla palustris, Menyanthes trifoliata, and Dulichium arundinaceum. The western end of Twin Lakes is an extensive shallow bay, which is 0.5 to 2.0 meters deep and supports stands of Carex vesicaria and Eleocharis palustris which grade into aquatic beds with Potamogeton amplifolius, P. berchtoldii, Elodea canadensis, Ceratophyllum demersum, and Nuphar polysepalum. Several small patches of the rare Scirpus

subterminalis (water clubrush) are found in small, protected areas around the edges of the fen. Fish Creek supports an active beaver population and stands of Salix drummondiana and Alnus species are present. Portions of the Fish Creek channel have been straightened and support a fringe of tall mesic graminoids (mostly Scirpus macrocarpos) along the channel. The extensive wetlands west of the lake were not surveyed and most areas appear to be dominated by Phalaris arundinacea and Agrostis stolonifera.

Rarity:

Twin Lakes Fen supports more than 70 vascular and bryophyte species. Surveys were restricted to the best of the fen communities on the southwest end of the lake. None of the meadows due west of the lake which are part of a large cattle ranch, were surveyed. The poor fen community at Twin Lales is one of the most extensive found in any peatland in Idaho.

The raised Sphagnum lawn covers nearly 20 acres. The hummock-hollow area with scattered trees of lodgepole pine on Sphagnum centrale hummocks with shallowly inundated mud tracks in between is also very unique. The only other area with a similar hummock-hollow fen is Mosquito Bay Fen, on the northeastern end of Priest Lake. Interestingly, that is the only other fen that has formed in a shallow bay of a large lake. Carex livida, Scheuchzeria palustris, and Rhynchospora alba are three rare species that are prominent in the hummock-hollow fen at both sites. Seven rare plant populations occur at Twin Lakes Fen: Carex livida (pale sedge), Carex chordorrhiza (string-root sedge), Epilobium palustre (swamp willow-weed), Rhynchospora alba (white beakrush), Vaccinium oxycoccus (small cranberry), and Scirpus subterminalis (water clubrush). Additionally, Vallisneria americana (water celery) is found in the shallow bay between the Twin Lakes.

Condition:

Palettes and pieces of plywood have been placed in a small (5x5m) area on the banks of the fen to provide a stable platform for recreationalists. This type of activity should be discouraged as it could eventually lead to trampling of the sensitive fen communities. Portions of Twin Lakes Fen to the west along Fish Creek have been drained and cleared for hay production and cattle pasture. While some portions appear to support peatland and marsh communities, much of them remain highly altered and heavily grazed. Much of the lakefront property on the north shore of Twin Lakes has been developed, mostly for vacation homes. There are, however, no homes around the margins of the fen and no housing developments (aside from a ranch) upstream along Fish Creek. Surrounding forested lands to the north and south of the fen and upstream along Fish Creek are privately-owned and managed for timber production. Logging in adjacent uplands could enhance eutrophication in the fen communities, resulting in changes in species

composition which could ultimately threaten rare poor fen communities and rare plant populations at this site. Further housing developments on the southwestern shore area of Twin Lakes adjacent to the fen could similarly threaten plant communities and rare plant populations.

Viability:

Logging, road construction and maintenance, and possible housing developments in uplands surrounding Twin Lakes present offsite threats that could lead to enhanced eutrophication and changes in the composition of the fen, shrub carr, and aquatic plant communities within the site. Enhanced eutrophication could ultimately also threaten the viability of rare plant populations at the fen.

Other values:

Twin Lakes is one of the more popular recreational lakes in the Panhandle region. Numerous summer homes ring the margins of the lake. It is a very popular fishing and recreational boating lake. The fens are very valuable wildlife habitat. Big game sign was abundant. Extensive moat areas are inundated seasonally and are heavily vegetated, therefore providing excellent waterfowl nesting habitat. Numerous cattle forage on wetland plants in the western portion of Twin Lakes Fen along Fish Creek.

Conservation intent:

This site is a high-priority peatland in the Idaho Panhandle, which should be protected in its natural state in the interests of preserving the range of conditions and species known to occur in these rare habitats in the region. Full protection of Twin Lakes Fen should be a priority through land acquisition by conservation organizations intent on preserving critical habitats or by establishment of conservation easements.

Management needs:

This site, like other peatland sites in northern Idaho, should be left alone as much as possible. Ground disturbance within the site boundaries should not occur or should be minimized. Uplands immediately adjacent to the fen should be protected from potentially harmful logging activites. If this privately owned site is acquired by state or federal agencies or private conservation groups, the ditches in along Fish Creek should be plugged with weirs to reestablish natural hydrology to allow the native plant communities to recolonize the area. Monitoring of plant communities, aquatic invertebrates, and water chemistries should begin as soon as possible, if permission to do so is granted by the owner.

Information needs:

Floristic inventory was rather intensive in 1994, but it was limited to the area along the southwestern shore of the lake, which may be the only largely

unaltered portion of this site. Further inventory of meadows on the actively managed portions of the ranch upstream along Fish Creek will likely reveal the presence of more plant species and possibly more rare plant species. No work has been done on the aquatic or terrestrial invertebrate populations, the small vertebrate populations, or the water chemistry of the fen. All should be inventoried and monitored periodically in the future. As with other priority Panhandle peatlands, Bursik and Moseley (1995) recommended placing two or more 10x10 meter permanent vegetation monitoring plots in the various plant communities at this site to detect changes that may occur over time due to human activities or natural phenomena. They recommended following methods established for peatland monitoring in the Sawtooth Valley of Idaho (Moseley et al. 1994).

Plant community occurrences:

Spiraea douglasii	G5 S4
Phalaris arundinacea	G4 S5
Carex lasiocarpa	G4 S2
Eleocharis palustris	G5 S3
Nuphar polysepalum	G5 S4
Typha latifolia	G5 S4
Salix drummondiana/Carex utriculata	G3 S3
Poor fen	G4 S1
Carex vesicaria	GU S3

Rare plant occurrences:

Vaccinium oxycoccos	G5 S2
Epilobium palustre	G5 S3
Carex chordorrhiza	G5 S2
Carex livida	G5 S2
Rhynchospora alba	G5 S2
Scirpus subterminalis	G4G5 S3
Scheuchzeria palustris	G5 S2

Rare animal occurrences:

Haliaeetus leucocephalus	G4 S3B

Author:

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UPPER SHOSHONE CREEK

Directions:

Upper Shoshone Creek RNA is located on the Idaho/Montana border, north and west of Ulm Peak, and about 45.5 road miles northeast of US Interstate 90 at Kingston, Idaho. From Interstate 90 at Kingston, Idaho, take FS Road 9 up the Coeur d'Alene River for 23 miles to Prichard. Follow FS Road 208 up the Coeur d'Alene River for 6 miles to Shoshone Camp. At Shoshone Camp take FS Road 412 up Shoshone Creek for 16.5 miles to its junction with FS Road 974. Park here and walk the short distance to the southwestern boundary of the RNA. To access the upper end of the RNA, continue on FS Road 412 for 1.5 miles to Jordan Saddle. Turn onto FS Road 992 and proceed for about 3 miles to the junction with FS Road 430 on the Idaho-Montana border. Proceed south on FS Road 430 for about 2 miles to the northern edge of the RNA.

Richness:

Upper Shoshone Creek RNA encompasses an undisturbed watershed in the upper Shoshone Creek drainage on the crest of the Bitterroot Range. The RNA contains a diversity of aquatic features including a moderate to steep gradient stream with a waterfall and cold springs. Elevations range from 3,618 feet (1102.7 m) where the creek exits the RNA to 6,444 feet (1964 m) on Ulm Peak. Both western hemlock (Tsuga heterophylla) and mountain hemlock (Tsuga mertensiana) habitat types occur in the area, including old-growth stands of each. Two undescribed western hemlock dominated communities occur on wet sites: western hemlock/devil's club (Oplopanax horridum) and western hemlock/lady-fern (Athyrium filix-femina). The RNA contains two undescribed western yew (Taxus brevifolia) phases of dryer western hemlock types which occur on lower north slopes and two subalpine fir (Abies lasiocarpa) habitat types. Also included is a subalpine bald dominated by green fescue (Festuca viridula), elk sedge (Carex geyeri), and bluebunch wheatgrass (Agropyron spicatum).

Rarity:

Upper Shoshone Creek RNA is a high quality drainage ecosystem supporting a diversity of forest vegetation as well as aquatic features.

Condition:

Upper Shoshone Creek RNA is allotted to Management Area 14 (RNAs and Experimental Forests) in the Idaho Panhandle National Forests Plan (August 1987). FS Road 430, which runs along the Idaho-Montana border, traverses the RNA near the northern and eastern boundaries. This road will probably be maintained.

Viability:

The RNA is surrounded entirely by Forest Service lands. Lands to the east and

north of the RNA are in Montana and are administered by the Kootenai National Forest. A portion of that area is Ulm Peak RNA. The lands to the northwest of the RNA are in Management Area 9- -lands unsuited for timber production. The remainder of the boundary is adjacent to Management Area 1--lands managed for timber production.

Other values:

The RNA protects almost an entire drainage basin, thus maintaining the high watershed values of the area.

Conservation intent:

The site has been protected by designation as a Forest Service RNA.

Management needs:

Not identified.

Information needs:

Not identified.

Plant community occurrences:

Abies lasiocarpa/Menziesia ferruginea		G5 S5
Abies lasiocarpa/Xerophyllum tenax		G5 S5
Thuja plicata/Oplopanax horridum		G3 S3
Tsuga heterophylla/Gymnocarpium dryopteris		G3G4 S3
Abies grandis/Clintonia uniflora, Clintonia uniflora	G4 S3	
Thuja plicata/Athyrium filix femina, Athyrium filix femina	G3 S3	
Tsuga heterophylla/Asarum caudatum, Asarum caudatum		G3 S3
Tsuga heterophylla/Clintonia uniflora, Clintonia uniflora		G5 S4
Tsuga mertensiana/Menziesia ferruginea, Luzula hitchcockii		G3 S2?
Tsuga mertensiana/Xerophyllum tenax, Luzula hitchcockii		G4 S2?
Tsuga mertensiana/Xerophyllum tenax, Vaccinium scoparium		G4 S2?
Tsuga mertensiana/Xerophyllum tenax, Xerophyllum tenax		G4 S2?
Festuca viridula		G? S3

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UPPER FISHHOOK

Directions:

Upper Fishhook RNA is located at the head of the East Fork Fishhook Creek in the St. Joe River drainage. The RNA is at the base of Roundtop Mountain on the northwest side, about 15 miles south of Avery, Idaho. From Avery, on the south side of the St. Joe River, travel west on the St. Joe River Road (FH50) for roughly 2 miles to the intersection with the Fishhook Creek Road (FS Road 301). Travel south on the Fishhook Creek Road for about 9.25 miles to the junction with FS Road 201. Travel eastward on FS Road 201 for about 3 miles to the junction with FS Road 217, then south-southwest for about 1 mile to a point just east of the southeastern corner of the RNA.

Richness:

Upper Fishhook RNA is located in the upper basin of the East Fork Fishhook Creek. The area occurs on granitics of the Idaho Batholith and is characterized by broken and rolling topography, rushing streams, beaver ponds, and fens. Elevations in the RNA range from 4,280 feet (1305 m) on the northern boundary where the East Fork Fishhook Creek leaves the RNA to 4,880 feet (1487 m) on the southern boundary. The RNA contains one of the few remaining areas of climax western redcedar (Thuja plicata) in the St. Joe River drainage. The cedars are greater than 200 years old, averaging 4 feet dbh, with several trees greater than 7 feet dbh. Mature western white pine (Pinus monticoloa), western larch (Larix occidentalis), Douglas-fir (Pseudotsuga menziesii), and grand fir (Abies grandis) occur with western redcedar toward the south edge of the area. The western white pine have a high incidence of heartrot and white pine blister rust (Cronartium ribicola).

Rarity:

The RNA supports a stand of old-growth western redcedar in an area that has been heavily logged.

Condition:

Upper Fishhook RNA is allocated to Management Area 14 (established and candidate RNAs and experimental forests) in the Idaho Panhandle National Forests Plan (1987). Recreational use of the area is limited to big game hunting.

Viability:

The RNA is bordered on the east, west, and north by private land owned by Plum Creek Timber Company. The area adjacent to the southern boundary is adjacent to Forest Service land within Management Area 1- -lands managed for timber production.

Other values:

The RNA provides cover and habitat for several large mammals including elk (Cervus elaphus), deer (Odocoileus sp.), moose (Alces alces), and black bear (Ursus americanus). The area is used intensively by beaver (Castor canadensis), as evidenced by the number of old beaver dams along the main stream.

Conservation intent:

The site has been protected by designation as a Forest Service RNA.

Management needs:

Not identified.

Information needs:

Idaho Panhandle National Forest staff conducted vegetation inventories in 1998. This information needs to be acquired by the Conservation Data Center to update community occurrence records.

Plant community occurrences:

Abies grandis/Clintonia uniflora	G5 S3
Thuja plicata/Asarum caudatum	G5 S4
Thuja plicata/Athyrium filix femina	G3G4 S3
Thuja plicata/Clintonia uniflora	G4 S5
Thuja plicata/Gymnocarpium dryopteris	G3 S2

Author:

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ROSE LAKE

Directions:

From Coeur d'Alene, Idaho travel east on Interstate 90, cross 4th of July Summit. Several miles past the summit take the Rose Lake exit (Hwy 3). Travel south on Hwy 3 approximately 3 miles to the Rose Lake Sportsman's Access (boat launch) on the east side of Rose Lake. From the boat launch you can access the fen communities to the south, along the east side of the lake, on foot. Access to fen communities on the south and west sides of the lake and to most of the aquatic communities is by boat.

Richness:

Three high-priority Panhandle peatlands are found in the Coeur d'Alene River drainage: Rose Lake, Hidden Lake, and Thompson Lake. All are similar with extensive floating and fixed mats along the lake margins covered by a mosaic of: 1) Sphagnum-dominated poor fens (the least extensive community), 2) Sphagnum spp./Carex lasiocarpa/Spiraea douglasii dominated intermediate fen, 3) rich fen dominated by Typha latifolia, Carex lasiocarpa, C. utriculata, Potentilla palustris, and Eleocharis palustris, and 4) rich and intermediate fen shrub carrs and shrub swamps supporting Spiraea douglasii, Alnus incana, Salix geyeriana, S. bebbiana, S. lutea, Pinus contorta, and Betula occidentalis with and without Sphagnum spp.-covered substrate. Characteristic species of the wetlands include Carex lasiocarpa, C. muricata, C. utriculata, C. canescens, Dulichium arundinaceum, Drosera rotundifolia, Impatiens aurella, Agrostis scabra, Sphagnum subsecundum, S. centrale, S. teres, S. angustifolium, Calliergon stramineum, and Aulocomnium palustre. Marsh vegetation dominated by Sparganium emersum, Carex vesicaria, and Phalaris arundinacea is found on the northern margins of Rose Lake. Shrub swamps with the Alnus incana/Lysichitum americanum and Alnus incana/Spiraea douglasii communities are present on the north and southwest sides of Rose Lake. Shallow littoral aquatic communities in the lake are dominated by Nuphar polysepalum, Brasenia schreberi, Ceratophyllum demersum, Myriophyllum sibericum, Potamogeton natans, P. robbinsii, and Elodea canadensis. Deeper littoral and limnetic zones (1.5-3.0 meters) are dominated by Potamogeton amplifolius, P. praelongus, Elodea canadensis, and Myriophyllum sibericum.

Rarity:

Rose Lake contains the full range of aquatic, marsh, and fen communities found in the lower Coeur d'Alene River drainage. Rose Lake provides habitat for four special status plant species. Epilobium palustre, Carex rostrata, and Ludwigia polycarpa occur in the fen, and Scirpus subterminalis is present in the shallow littoral zone. Rose Lake is exceptionally diverse floristically with more than 100 species having been identified

from the various wetland and aquatic habitats at the lake (Bursik and Henderson 1994, Bursik unpublished data).

Condition:

Grazing is a threat to some portions of the Rose Lake wetland complex, particularly in the northwestern portion of the area where a cattle ranch has cows grazing in pastures along Rose Creek. Further housing development around the lake margins could threaten some of the fen and marsh communities. All communities could be threatened by enhanced eutrophication as a result of logging and road building and maintenance in the surrounding Rose Lake watershed. Development surrounding the lake continues and one area was noted where an individual attempted to mow a path through the fen with a brush hog.

The presence of a few scattered plants of Lythrum salicaria (purple loosestrife) were noted around the lake margins, and were most common on areas of bare soil piled up by beaver.

Viability:

Logging, road construction and maintenance, and possible housing developments in uplands surrounding Rose Lake present offsite threats that could lead to enhanced eutrophication and changes in the composition of the fen, shrub carr, and aquatic plant communities within the site. Enhanced eutrophication could ultimately also threaten the viability of peatland communities at the site which are sensitive to subtle changes in the nutrient concentrations of incoming groundwaters.

Other values:

Rose Lake is a popular fishing and boating lake. The surrounding wetland complex (part of which is included in the Lower Coeur d'Alene Wildlife Management Area) is excellent big game and waterfowl habitat.

Conservation intent:

This site is a high-priority peatland in the Idaho Panhandle, which should be protected in its natural state in the interests of preserving the range of conditions and species known to occur in these rare habitats in the region. The Rose Lake wetland complex so well-represents the range of wetland and aquatic habitat conditions found in the lower Coeur d'Alene drainage that it has been nominated as a Research Natural Area (Bursik and Moseley 1994). Establishment of an RNA, however, will require further habitat acquisitions within the proposed site boundaries by agencies or private conservation groups.

Management needs:

This site, like other peatland sites in northern Idaho, should be left alone as

much as possible. Ground disturbance within the site boundaries should not occur or should be minimized. All septic systems of houses adjacent to the lake should be upgraded to meet current landuse planning codes. Uplands immediately adjacent to Rose Lake and up the tributary streams to the north should be protected from potentially harmful logging or development activites. Establishment of Rose Lake as a RNA is probably only possible with more acquisition of privately-owned lands within the site by a state or federal agency or private conservation group interested in preserving critical habitats. Monitoring of plant communities, aquatic invertebrates, and water chemistries should begin as soon as possible on lands owned by the State of Idaho, Department of Fish and Game and the U.S. Forest Service. It is critical to determine rare plant population and community trends in Rose Lake because there are a number of potential threats to this site. Monitoring should also proceed on the privately owned fen communities on the east side of the lake, south of the Idaho Fish and Game boat launch. Bursik met the owner in 1992 and he seemed interested in protecting the site and may be willing in participating in a formal protection plan for the area. He should at least allow some monitoring to occur on his lands. Purple loosestrife is present on areas of bare ground piled up by beaver. Idaho Department of Fish and Game WMA staff have an active loosestrife control plan which should be continued.

Information needs:

Floristic inventory of Rose Lake Fen has been intensive, with several field visits having been made by Bursik and Moseley between 1988 and 1994, and is largely complete. Some data was collected on macroinvertebrates, the zooplankton, and water chemistries of Rose Lake in 1988 by Fred Rabe. No follow-up work has been done, however. No work has been done on the terrestrial invertebrate populations or the small vertebrate populations of fen and marsh habitats at Rose Lake. Both should be inventoried and monitored periodically in the future. As with other priority peatlands, Bursik and Moseley (1994) recommended placing two or more 10x10 meter permanent vegetation monitoring plots in the various plant communities at this site to detect changes that may occur over time due to human activities or natural phenomena.

Plant community occurrences:

Spiraea douglasii	G5	S4
Alnus incana/Spiraea douglasii	G3	S3
Carex utriculata	G5	S4
Carex lasiocarpa	G4	S2
Nuphar polysepalum	G5	S4
Typha latifolia	G5	S4
Alnus incana/Lysichitum americanum	G3	S3
Poor fen	G4	S1

Rare plant occurrences:

Epilobium palustre	G5 S3
Ludwigia polycarpa	G4 S1
Carex rostrata	G5 S2
Scirpus subterminalis	G4G5 S3

Rare animal occurrences:

Haliaeetus leucocephalus	G4 S3B
Chlidonias niger	G4 S2B

Author:
A. H. Pitner

SPION KOP

Directions:

Spion Kop is located along the Coeur d'Alene River, approximately 46 miles northeast of the Kingston Interchange on US Interstate 90, or approximately 21 miles northwest of Prichard, Idaho. The easiest access to Spion Kop RNA is to leave U.S. Interstate 90 at the Kingston Interchange and follow FS Road 9 up the Coeur d'Alene River to Prichard and then FS Road 208 to the RNA. Total distance from the Kingston Interchange to the RNA is approximately 46 miles.

Richness:

Spion Kop RNA is located on the floodplain of the Coeur d'Alene River and contains a section of the river that is undisturbed by man. Channels of the river and Tepee Creek, a large tributary, have changed over the years due to flooding, resulting in a number of dry channels and sloughs. Some of the sloughs, supplied with water from small side streams, have been dammed by beavers, resulting in ponds and small marshes. Elevations in the area range from 2,755 feet (840 m) to 3,490 feet (1064 m). The RNA contains stands and scattered individual trees of northern black cottonwood (Populus trichocarpa). Various age classes for the black cottonwood are present, including the former record specimen for the state with a dbh of 60.5 inches (154 cm) and height of 150 feet (45.7 m). The area was severly burned in the Independence Creek Fire of 1931, although most of the valley bottom escaped due to moist conditions. Stands of mixed coniferous species on the slopes adjacent to the valley bottom originated after the 1931 fire. The slopes are primarily potential western hemlock (Tsuga heterophylla) climax; western white pine (Pinus monticola), western larch (Larix occidentalis), Douglas-fir (Pseudotsuga menziesii), lodgepole pine (Pinus contorta), planted Ponderosa pine (Pinus ponderosa), grand fir (Abies grandis), western hemlock (Tsuga heterophylla), western redcedar (Thuja plicata), subalpine fir (Abies lasiocarpa), and Engelmann spruce (Picea engelmannii) occur in various mixtures. Western white pine planted in the mid-1930s once dominated many of the slopes, but white pine blister rust (Cronartium ribicola) has decimated the trees with the result that other native species that seeded in naturally dominate the stands.

Rarity:

The site contains a relatively undisturbed example of a river channel with associated riparian vegetation. Extensive stands of black cottonwood on unregulated stream systems are of rare occurrence in Idaho. Slopes adjacent to the river valley support mixed conifer stands that regenerated following a 1931 fire and are potentially western hemlock and grand fir climax.

Condition:

Spion Kop RNA has been allocated to Management Area 14 (RNAs and Experimental Forests) in the Idaho Panhandle National Forests Plan (August 1987). The RNA receives little use since most of it is across the river from the highway.

Viability:

The northwestern boundary of the RNA is adjacent to private land. The Forest Service lands southwest of the RNA and a small area northeast of the RNA are in Management Area 1--lands managed for timber production. The lands east of the RNA are in Management Area 4--lands designated for timber production within big game winter range. These lands are managed to provide winter forage to support existing and projected big game populations through scheduled timber harvest and permanent forage areas.

Other values:

The site is in a relatively heavy precipitation area and watershed values are high. Aesthetic values of the area are high due to its proximity to the river road. The cottonwood trees are a brilliant yellow in the fall. Recreational values include sightseeing from the river road, fishing, and hunting.

Conservation intent:

The site has been protected by designation as a Forest Service RNA.

Management needs:

The area along the Coeur d'Alene River, just north of the RNA, should be set aside as a scenic area due to its outstanding riparian features.

Information needs:

Not identified.

Plant community occurrences:

Abies grandis/Clintonia uniflora	G5	S3
Tsuga heterophylla/Asarum caudatum	G4	S3
Tsuga heterophylla/Clintonia uniflora	G4	S5
Populus trichocarpa/Symphoricarpos albus	G3	S2
Phalaris arundinacea	G4	S5
Populus trichocarpa/Recent alluvial bar	G?	SP
Populus trichocarpa/Rhamnus alnifolia	G?	S3

Rare plant occurrences:

Lobaria hallii	G4	S1

Author:
J. H. Kaltenecker

THOMPSON LAKE

Directions:

From Harrison, Idaho travel north on Highway 97 for one mile. Just after crossing the Coeur d'Alene River take a right on the Blue Lake Road. Follow the road approximately 3 miles to Thompson Lake, which will be on the north side of the road. It can be accessed via boat by landing at the Coeur d'Alene River boat launch adjacent to the lake. A navigable channel will take you from the boat launch into Thompson Lake. Fen communities on the south and east sides of the lake can be accessed on foot as well.

Richness:

Three high-priority Panhandle peatlands are found in the Lower Coeur d'Alene River drainage: Rose Lake, Hidden Lake, and Thompson Lake. All are similar with extensive floating and fixed mats along the lake margins covered by a mosaic of: 1) Sphagnum-dominated poor fens (the least extensive community), 2) Sphagnum spp./Carex lasiocarpa/Spiraea douglasii dominated intermediate fen, 3) rich fen dominated by Typha latifolia, Carex utriculata, Potentilla palustris, Eleocharis palustris, and Equisetum fluviatile, and 4) rich and intermediate fen shrub carrs characterized by Spiraea douglasii with scattered Alnus incana, Salix geyeriana, Pinus monticola, P. contorta, and Betula occidentalis with and without Sphagnum spp.(mostly S. centrale)-covered substrate. All of the fen communities grade freely into one another and support many species including Carex lasiocarpa, C. muricata, C. utriculata, C. canescens, Dulichium arundinaceum, Drosera rotundifolia, Impatiens aurella, Agrostis scabra, Sphagnum subsecundum, S. centrale, S. teres, S. angustifolium, Calliergon stramineum, and Aulocomnium palustre. Extensive marsh communities are also found on the margins of Thompson Lake. These marsh habitats are dominated by Sparganium eurycarpum, Sagittaria latifolia, Carex vesicaria, Equisetum fluviatile, Eleocharis palustris, Glyceria borealis, Scirpus acutus, Bidens cernua, and Polygonum hydropiperoides. Two rare species: Epilobium palustre (swamp willow-weed) and Ludwigia polycarpa (many-fruit false loosestrife) are found in the fen and marsh habitats at Thompson Lake. Shallow littoral aquatic communities in the lake are dominated by Nuphar polysepalum, Brasenia schreberi, Ceratophyllum demersum, Myriophyllum sibericum, Potamogeton natans, P. epihydrus, Ranunculus aquatilis, and Elodea canadensis. Deeper littoral and limnetic zones (1.5-2.5 meters) are dominated by Potamogeton amplifolius, P. zosteriformis, P. richardsonis, Elodea canadensis, Myriophyllum sibericum, and the rare Vallisneria americana (water celery).

Rarity:

Thompson Lake contains most of aquatic, marsh, and fen communities found in the lower Coeur d'Alene River drainage. Three rare plant populations are known from

Thompson Lake: Epilobium palustre (swamp willow-weed), which is scattered throughout the floating mat fen communities; Ludwigia polycarpa (many-fruit false loosestrife) which is found mostly in marsh habitats on the southwest end of Thompson Lake; and Vallisneria americana (water celery) which is found in deep littoral and limnetic zones (1.5-3.0 m deep) in the lake. More than 50 vascular and bryophyte species were identified at this site.

Condition:

The northeastern end of Thompson Lake where Thompson Creek enters the lake is pastured for cattle. Upland areas to the north and west have been roaded and mostly logged over during the 20th century. Ownership of these uplands includes the U.S. Forest Service, timber companies, and various private owners. Most of the uplands are managed for timber production. Roads have been built around the entire lake margin. No houses are found immediately adjacent to the lake. Some cattle grazing occurs along the Thompson Creek mouth. The diking of the Coeur d'Alene River has had unknown effects on the hydrologic dynamics and wetland plant communities within Thompson Lake.

Vaccinium macrocarpon (bog cranberry) has been introduced to Thompson Lake. This species has the potential to replace native poor fen species (this has occurred at nearby Hidden Lake). Lythrum salicaria (purple loosestrife) is present. The Idaho Department of Fish and Game is using both beetles and chemicals to control this species. Zizinia palustre (wild rice) has been introduced and has replaced some of the native emergent marsh communities.

Viability:

Logging and road construction and maintenance in the adjacent uplands to the north and west of Thompson Lake present off-site threats that could lead to enhanced eutrophication and changes in the composition of the fen, shrub carr, marsh, and aquatic plant communities within the site.

Other values:

Thompson Lake contains excellent big game and waterfowl habitat. Big game activity may be somewhat limited due to the open nature of the wetlands and the presence of scattered housing around the lake. It is a popular lake for bass and northern pike anglers as well.

Conservation intent:

This site is a high-priority peatland in the Idaho Panhandle, which should be protected in its natural state in the interests of preserving the range of conditions and species known to occur in these rare habitats in the region.

Management needs:

This site, like other peatland sites in northern Idaho, should be left alone as much as possible. Ground disturbance within the site boundaries should not occur. Uplands to the north and west of Thompson Lake should be protected from potentially harmful logging or development activites. Monitoring of plant communities, which focuses on the effects of exotic plant species (Vaccinium macrocarpon) and invasive plant species (Potentilla palustris and Juncus effusus), aquatic invertebrates, and water chemistries should begin as soon as possible at Thompson Lake.

Information needs:

The 1994 floristic inventory of Thompson Lake by Bursik was rather cursory but likely accounted for most of the floristic diversity of the site. No work has been done on the aquatic or terrestrial invertebrate populations, small vertebrate populations, or the water chemistries of Thompson Lake. All should be inventoried and monitored periodically in the future. As with other priority Panhandle peatlands, Bursik and Moseley recommended placing two or more 10x10 meter permanent vegetation monitoring plots in the various plant communities at this site to detect changes that may occur over time due to human activities or natural phenomena. They recommended following methods established for peatland monitoring in the Sawtooth Valley of Idaho.

Plant community occurrences:

Spiraea douglasii	G5	S4
Carex utriculata	G5	S4
Carex lasiocarpa	G4	S2
Eleocharis palustris	G5	S3
Equisetum fluviatile	G4	S3
Nuphar polysepalum	G5	S4
Typha latifolia	G5	S4
Poor fen	G4	S1

Rare plant occurrences:

Epilobium palustre	G5	S3
Ludwigia polycarpa	G4	S1
Vallisneria americana	G5	S1

Rare animal occurrences:

Chlidonias niger	G4	S2B

Author:

A. H. Pitner

WINDY BAY

Directions:

Windy Bay is located on the southwest side of Lake Coeur d'Alene, about 4 miles north-northwest of Worley, Idaho. While some skid roads traverse the slopes above the bay, the best access is via motor boat from Sun Up Bay, or potentially by canoe from Camp Four Echoes, if the Girl Scouts will permit access. The channel through the bay via Lake Creek is navigable for a considerable distance (estimated 0.5 linear mile).

Richness:

Lake Creek flows through a narrow basalt canyon before entering Lake Coeur d'Alene. Sediments deposited by Lake Creek in the valley bottom support a mix of forested, shrub, and emergent wetland habitats. Lake Creek forms a very sinuous, deep channel that supports a band of Cornus sericea (red-osier dogwood), with lesser amounts of Physocarpus capitatus (Pacific ninebark), Salix drummondiana (Drummond's willow), and Phalaris arundinacea (reed canarygrass). The floodplain supports stands of Typha latifolia (common cattail), shrublands dominated by Salix drummondiana, Spiraea douglasii (hard hack), and small patches of forested Populus trichocarpa (black cottonwood) and P. tremuloides (quaking aspen) wetlands. Windy Bay supports extensive emergent vegetation including stands of Typha latifolia (common cattail), Equisetum fluviatile (water horsetail) in shallower water, and Scirpus acutus (hardstem bulrush) and Alisma gramineum (narrow-leaved water-plantain) in deeper water.

Rarity:

Lake Creek provides habitat for westslope cutthroat trout. The bay and associated high quality wetlands are structurally diverse. Four distinct emergent habitats along with large expanses of willow and dogwood shrublands, cottonwood forests, and open water are present.

Condition:

Activities within the wetland are likely limited to occasional canoeists, bird watchers, and waterfowl hunters. Only minor development has occurred.

Reed canarygrass is well established in the bay and monocultures occupy higher terraces. Tanecetum vulgare is also present on these terraces. Surveys for Lythrum salicaria (purple loosestrife) and Myriophyllum spicatum (Eurasian watermilfoil) should be conducted periodically and populations should be controlled while they are small and manageable.

Viability:

Adjacent uplands have been logged. The watershed has also been subject to land use practices contributing sediment such as grazing, logging, and agricultural conversion.

Other values:

The bay is home to waterfowl, osprey, numerous songbirds, and large mammals including bear (scat observed) and most likely, deer.

Conservation intent:

Conservation easements or voluntary protection of private lands within Windy Bay should be sought to maintain wetland functions.

Management needs:

Lake Creek feeds Windy Bay and is the focus of a watershed restoration project. A watershed assessment has been completed and Best Management Practices to improve water quality are being applied. Private lands in the bay should be managed to maintain wetland functions.

Information needs:

Inventories in 1998 were somewhat cursory, but likely accounted for most of the community diversity at Windy Bay. Additional data on composition of willow and cottonwood stands may reveal additional communities. Deep littoral habitats have not been surveyed.

Plant community occurrences:

Populus trichocarpa/Crataegus douglasii	G1 S1
Spiraea douglasii	G5 S4
Cornus sericea	G4Q S3
Salix drummondiana/Calamagrostis canadensis	G2 S2
Phalaris arundinacea	G4 S5
Scirpus acutus	G5 S4
Equisetum fluviatile	G4 S3
Typha latifolia	G5 S4

Author:

M. Jankovsky-Jones

FERNAN CREEK BAY

Directions:

Fernan Creek Bay is located on the east shore of Fernan Lake, about 1.5 miles east of Coeur d'Alene, Idaho. Access is via the Fernan Lake Road.

Richness:

Fernan Creek Bay includes temporarily flooded grasslands, saturated emergent habitat, and shrub swamps. Grassland vegetation includes stands of Deschampsia cespitosa and Carex cusickii. Emergent habitats are dominated by Carex utriculata, C. vesicaria, and Typha latifolia. The emergent habitats form a mosaic with stands of Salix geyeriana. At the lake edge the stands of S. geyeriana occur on unconsolidated muck and have a barren understory. Nuphar polysepalum with significant amounts of Nymphae tetragona is present in shallow littoral habitat.

Rarity:

Temporarily flooded meadows still support native species. This is very uncommon in the basin as most meadows have been plowed, reseeded, or invaded by canarygrass or bentgrass.

Condition:

Land has been grazed in the past. The current owner is conservation oriented and is an Idaho Department of Fish and Game cooperator. Fernan Creek has been channelled through most of the site.

Some stands of Phalaris arundinacea and Agrostis stolonifera are present. Stems of Chrysanthemum leucanthemum, Phleum pratense, and Alopecurus pratense are also found. Dalmation toadflax and Canada thistle are present in a seep on the east side of the site. Many exotics including Tanecetum vulgare and Centaurea maculosa are present on road sides, but pose a minimal threat to wetlands.

Viability:

No threats to viability were noted.

Other values:

The bay serves as a trap for sediment from the upland watershed. The bay also has high waterfowl values. Many neotropical migrants were observed in the hawthornes and shrubs along the stream.

Conservation intent:

Voluntary protection or conservation easements should be sought for lands within Fernan Creek Bay.

Management needs:

There may be potential to reroute Fernan Creek into a more natural channel.

Information needs:

Shrubs in the seep on the southeast side of the site are unsurveyed, as well as the shrubland on the unconsolidated muck at the lake edge.

Plant community occurrences:

Spiraea douglasii	G5 S4
Salix geyeriana/Carex utriculata	G5 S4
Phalaris arundinacea	G4 S5
Carex utriculata	G5 S4
Deschampsia cespitosa	G4? S3
Nuphar polysepalum	G5 S4
Typha latifolia	G5 S4
Carex cusickii	GQ S3
Carex vesicaria	GU S3

Rare plant occurrences:

Ludwigia polycarpa	G4 S1

Author:

M. Jankovsky-Jones

FIVE LAKES BUTTE

Directions:

Five Lakes Butte RNA is located in the remote southeast corner of the St. Joe National Forest, in the upper St. Joe River drainage of northern Idaho. The trailhead to the RNA is located approximately 130 miles northeast of Orofino, Idaho; 110 miles west of Missoula, Montana; 50 miles southwest of Superior, Montana; and 180 miles northeast of Moscow, Idaho. From Superior, Montana (on US Interstate 90) take FS Road 250 southward over Hoodoo Pass and down to the Cedars. Take FS Road 720 westward to Fly Hill and then FS Road 715 northward to the trail going westward to Five Lakes Butte. Park here and follow the trail about 2 miles between Tin Lake and Gold Lake. Leave the trail and go northward across the basin to the ridge and follow it to the head of Bacon Creek. The RNA is the basin at the head of Bacon Creek. The trailhead can also be reached from the west from Orofino (on US Route 12) by State Route 11 to Pierce, Idaho, and then by FS Road 250 to the Cedars.

Richness:

Five Lakes Butte RNA is a subalpine, glaciated basin containing two lakes, moderate to steep gradient streams, and forest stands dominated by mountain hemlock (Tsuga mertensiana). The stands also contain whitebark pine (Pinus albicaulis), Engelmann spruce (Picea engelmannii), subalpine fir (Abies lasiocarpa), lodgepole pine (Pinus contorta), and an occasional western white pine (Pinus monticola). Bacon Lake, the larger of the two lakes, contains fish; the smaller lake does not. Much of the basin burned in 1910 and perhaps later; stands of trees of various ages are present. Elevations in the RNA range from 5,700 feet (1738 m) where Bacon Creek flows from the basin to 6,859 feet (2091 m), the highest point on the ridge at the head of the basin.

Rarity:

The RNA contains three mountain hemlock habitat types, plus a number of phases within those types. The area is within designated recovery habitat for the gray wolf (Canis lupus), an endangered species.

Condition:

The RNA is within the proposed Mallard-Larkins Wilderness, which is allocated to Management Area 11 in the Idaho Panhandle National Forests Plan (1987). The area is not grazed by livestock with the exception of light use by recreational pack stock and it is not in a grazing allotment. Bacon Lake receives some recreational use.

Viability:

The RNA is surrounded by Forest Service lands within proposed wilderness. The

lands adjacent to the western, northern, and eastern boundaries are managed by the Idaho Panhandle National Forests and are within Management Area 11. The lands adjacent to the southern boundary are managed by the Clearwater National Forest and are within Management Area B2. All surrounding lands are managed to protect wilderness characteristics and provide for primitive recreation.

Other values:

The RNA is within a high precipitation belt and has high watershed values. Bacon Lake supports rainbow trout (Oncorhynchus mykiss) and possibly cutthroat trout (Salmo clarkii).

Conservation intent:

The site has been protected by designation as a Forest Service RNA.

Management needs:

Not identified.

Information needs:

Not identified.

Plant community occurrences:

Tsuga mertensiana/Menziesia ferruginea, Xerophyllum tenax	G3	S3?
Tsuga mertensiana/Xerophyllum tenax, Luzula hitchcockii	G4	S2?
Tsuga mertensiana/Xerophyllum tenax, Vaccinium scoparium	G4	S2?
Tsuga mertensiana/Xerophyllum tenax, Xerophyllum tenax	G4	S2?
Tsuga Mertensiana/Phyllodoce empetriformis	G?	S3

Author:

J. H. Kaltenecker

MICA CREEK

Directions:

Mica Creek is a tributary to the St. Joe River, located about 17 miles southeast of the town of St. Maries and south of Calder, Idaho. The area can be reached from Calder by travelling south for about 9 miles on FS Road 345 to Mica Meadows.

Richness:

Mica Creek lies within the Wallace formation of the Belt super-group that is typical of mountainous lands in northern Idaho. The dominant rock is the Wallace gneiss with some areas of qurtzite and granofels (coarse-grained calcic metamorphics). The vegetation on the uplands consists of 55 to 65 year-old, mixed conifer stands. Remnant old growth is scattered through the study area and along some reaches of the study streams. The vegetation pattern is typical of much of northern Idaho, where stand replacement due to fire and logging have occurred over most of the area since 1900. In 1998, riparian shrublands and sloped wetlands along Mica Creek and the West Fork Mica Creek were surveyed. Shrub stands are mostly dominated by Alnus incana with occasional patches of Cornus sericea. Along high gradient reaches the Alnus incana/Athyrium filix-femina community is found. Where gradient lessens and valleys broaden, the wide riparian zone supports alder and a mix of tall mesic graminoids. Many sloped wetlands are fed by sidehill seeps and classified as the Scirpus microcarpos community type. Scirpus microcarpos is always present, but Carex utriculata, C. cusickii, C. nebraskensis, or Boykinia major may be locally dominant.

Rarity:

Mica Creek is of general biodiversity interest for its value as a reference area.

Condition:

M. Jankovsky-Jones (1998) noted that Agrostis stolonifera is the main non-native species which has become established. A couple of increasers (Rudbeckia sp. and Galium aparine) are well established in portions of the riparian area.

Viability:

Not identified.

Other values:

Not identified.

Conservation intent:

The Mica Creek project was initiated in 1990 by Potlatch Corporation, and is currently in the calibration data collection phase. The project was designed to measure cumulative effects as well as treatment versus control effects of modern forest practices on stream resources. The study uses a nested network of stream gages so that the effects of forest practices can be traced downstream.

Management needs:

Not identified.

Information needs:

The uplands and forested riparian areas have not been surveyed.

Plant community occurrences:

Alnus incana/Mesic graminoid	G2G3QS5
Alnus incana/Athyrium filix femina	G3 S2
Scirpus microcarpus	GU SU

Author:

Potlatch Corporation

MONTFORD CREEK

Directions:

Montford Creek RNA is located in the North Fork Coeur d'Alene River drainage in the Idaho Panhandle, approximately 20 road miles east of Coeur d'Alene at the confluence of Montford Creek with Deception Creek.

From Fernan Lake on the eastern side of Coeur d'Alene, travel northeast on FS Road 268 up Fernan Creek to Fernan Saddle. Travel eastward on FS Road 612 along Windy Ridge to Five Fingers Saddle, then down to Deception Creek and about 1 mile further to Montford Creek. The RNA is on the south side of the road. The southern end of the RNA can be accessed via the Wolf Lodge Road which connects to Interstate 90 at an

interchange at the east end of Wolf Lodge Bay.

Richness:

Montford Creek RNA is a typical small drainage on the Coeur d'Alene National Forest. The RNA contains Montford Creek, a small, perennial, riffle-pool, spring-fed stream. Ridges, V-shaped valleys, and steep to moderate mountain slopes characterize the topography of the area. Elevations in the RNA range from 3,050 feet (930 m) at Deception Creek to 4,400 feet (1341 m) in the southwest corner of the RNA. The area is underlain by Precambrian sediments. All of Montford Creek RNA is forested with old-growth stands made up of relatively pure stands or various mixtures of western hemlock (Tsuga heterophylla), grand fir (Abies grandis), western white pine (Pinus monticola), western larch (Larix occidentalis), Douglas-fir (Pseudotsuga menziesii), and an occasional Engelmann spruce (Picea engelmannii) and subalpine fir (Abies lasiocarpa). Western hemlock is potentially the climax tree species over almost all of the RNA. At least five habitat types and additional phases within these types are represented. Understory shrub, forb, grass-like, and grass vegetation is rich and diverse. The RNA was originally established for its climax western white pine stands. During the 1970s there occurred a very heavy mortality of the species due to infestation by the mountain pine beetle (Dendroctonus ponderosae) and white pine blister rust (Cronartium ribicola). Today very little western white pine type remains.

Rarity:

At least five western hemlock habitat types occur within the area.

Condition:

Montford Creek RNA is allocated to Management Area 14 (RNAs and Experimental Forests) in the Idaho Panhandle National Forests Plan (August 1987). Despite prohibitive signs, some camping and picnicking have occurred on a small area at

the north end of the RNA immediately adjacent to the road. In recent years, a few dead trees have been cut for firewood along the Wolf Lodge Road at the southern boundary of the RNA.

Viability:

The site is within the Deception Creek Experimental Forest (Management Area 14).

Other values:

The boundaries encompass almost all of the drainage basin of Montford Creek, a small, spring-fed, free-flowing stream. The basin is typical of the productive, mountainous, forested lands of the Coeur d'Alene National Forest. Montford Creek RNA has been used since the 1930s as a reference area to study the ecological processes of undisturbed (by man) forests of old-growth western white pine and habitat types of western hemlock. The RNA is part of an experimental forest and provides an example of undisturbed forest to compare with manipulated tracts. The area is valuable as a baseline for monitoring similar areas managed for timber production.

Conservation intent:

The site has been protected by designation as a Forest Service RNA.

Management needs:

Planting of resistant western white pine might be worth considering. Signing and, perhaps, barriers, should be used to discourage camping and picnicking at the north end of the RNA.

Information needs:

Not identified.

Plant community occurrences:

Thuja plicata/Athyrium filix femina	G3G4 S3
Thuja plicata/Oplopanax horridum	G3 S3
Tsuga heterophylla/Asarum caudatum	G4 S3
Tsuga heterophylla/Clintonia uniflora	G4 S5
Tsuga heterophylla/Gymnocarpium dryopteris	G3G4 S3

Author:

J. H. Kaltenecker

POND PEAK

Directions:

Pond Peak RNA is located in the Shoshone Range in the Idaho Panhandle, northeast of Interstate 90 at Kingston. From Interstate 90 at Kingston, take FS Road 9 up the Coeur d'Alene River for 23 miles to Prichard. Follow FS Road 208 up the Coeur d'Alene River for 6 miles to Shoshone Camp. At Shoshone Camp take FS Road 151, then FS Road 412 up Shoshone Creek for 18 miles to the divide between Shoshone Creek and Jordan Creek. Take FS Road 992 southward along the ridge. From the end of FS Road 992 near the top of Little Lost Fork drainage, walk south on an old road until the road crosses to the west side of the divide. Follow the north ridge of Pond Peak until the final steep pitch. A small pond can be seen from the ridge to the east. Follow the talus fields to the pond.

Richness:

Pond Peak RNA is an upper elevation, watershed basin supporting old-growth, near pure stands of mountain hemlock (Tsuga mertensiana) in the climax stage of succession. Elevations in the RNA range from 4,880 feet (1487 m) to 6,136 feet (1870 m) on Pond Peak. Sapling to pole size mixed stands of mountain hemlock, lodgepole pine (Pinus contorta), subalpine fir (Abies lasiocarpa), and occasional whitebark pine (Pinus albicaulis), western larch (Larix occidentalis), Douglas-fir (Pseudotsuga menziesii), and western white pine (Pinus monticola) are also present and resulted from a large and severe fire in 1931. A small pond without an outlet is fed by springs and melting snowbanks that accumulate during the winter to considerable depths along the western boundary of the area, especially on the east side on Pond Peak. The pond is fringed with Sitka alder (Alnus sinuata) and sedges (Carex spp). The area also contains talus slopes of very old sedimentary rocks, with a variety of ripple marks showing on cleavage faces.

Rarity:

Pond Peak RNA contains near-climax stands of old-growth mountain hemlock in two habitat types: mountain hemlock/menziesia (Menziesia ferruginea) and mountain hemlock/beargrass (Xerophyllum tenax).

Condition:

Pond Peak RNA has been allocated to Management Area 14 (RNAs and Experimental Forests) in the Idaho Panhandle National Forests Plan (August 1987). Recreational use of the RNA is minimal-some hunting and sight-seeing occur along the road to Pond Peak.

Viability:

The RNA is completely surrounded by Forest Service lands. The lands adjacent to

the western boundary are in Management Area 6--lands designated for timber production within important elk summer range. Logging has occurred below the RNA but probably has had little effect on the RNA. The remaining boundaries are adjacent to Management Area 9--lands unsuitable for timber production. These lands are managed to maintain and protect existing improvements and resource productive potential within minimum investments.

Other values:

The site is within a high precipitation belt and protects the headwaters of the Little Lost Fork of Shoshone Creek. The small pond in the area is a rare occurrence on the Coeur d'Alene National Forest. The mixed forest stands of mountain hemlock, lodgepole pine, subalpine fir, whitebark pine, western larch, Douglas-fir, and western white pine that regenerated following a 1931 fire are in early successional stages and provide excellent opportunities for comparison with the near-climax mountain hemlock stands.

Conservation intent:

The site has been protected by designation as a Forest Service RNA.

Management needs:

Not identified.

Information needs:

Not identified.

Plant community occurrences:

Alnus sinuata	G2Q	S?
Carex vesicaria	GU	S3
Tsuga mertensiana/Menziesia ferruginea, Luzula hitchcockii	G3	S2?
Tsuga mertensiana/Menziesia ferruginea, Xerophyllum tenax	G3	S3?
Tsuga mertensiana/Xerophyllum tenax, Luzula hitchcockii	G4	S2?
Tsuga mertensiana/Xerophyllum tenax, Vaccinium scoparium	G4	S2?
Tsuga mertensiana/Xerophyllum tenax, Xerophyllum tenax	G4	S2?

Author:

J. H. Kaltenecker

RIVER IN A LAKE

Directions:

The St Joe River levees, or "River in a Lake," is located mostly in Benewah County, with a small portion of one levee extending into Kootenai County. The levees are located about 5.5 miles northwest (downstream) of the town of St. Maries, Idaho. Access is via boat, or by canoe on a calm day from Rocky Point Marina.

Richness:

Natural levees along the St. Joe River create a "River in a Lake" at the south end of Lake Coeur d'Alene. The St. Joe River flows through its channel and is surrounded by the open water of Round Lake and Chatcolet Lake. The levees support extensive deciduous forests dominated by both Populus trichocarpa (black cottonwood) and Populus tremuloides (quaking aspen). Stands of trees frequently have a native graminoid understory dominated by Calamagrostis canadensis (bluejoint reedgrass), Carex arcta (bear sedge), C. lanuginosa (woolly sedge), and C. vesicaria (inflated sedge). Some shrub stands are present with small stands of Salix bebbiana (Bebb's willow) and more extensive stands of Spiraea douglasii (hardhack). Emergent habitats along the river channel and on the lake fringe are dominated by Scirpus acutus (hardstem bulrush), Alisma gramineum (narrowleaf water plantain), with lesser amounts of Nuphar polysepalum (yellow pondlily). Potamogeton pectinatus (sago pondweed) and P. amplifolius (largeleaf pondweed) are abundant in shallow littoral habitat.

Rarity:

Even though the system is somewhat artificially created, the condition of the gallery forests is outstanding. Native graminoid diversity is high which is extremely unusual at low elevations.

Condition:

Exotic species are a minor component of gallery forests along the levees. This is quite unusual on this river and in the region.

Viability:

Post Falls Dam is located upstream of the site and the water surrounding the levees is maintained by Post Falls Dam. Annual flooding and deposition are largely responsible for the formation of the levees.

Other values:

The cottonwood forests are refuges for heron, whitetail deer, osprey, owls, and songbirds.

Conservation intent:

The levees are owned by State of Idaho and/or the Coeur d'Alene Tribe, and could potentially be designated as a Special Interest Area for riparian and wildlife values.

Management needs:

Activities which result in erosion of levees and channel banks should be minimized. Perhaps a wake-free zone could be established through the corridor.

Information needs:

Not identified.

Plant community occurrences:

Populus trichocarpa/Cornus sericea	G3? S3
Spiraea douglasii	G5 S4
Scirpus acutus	G5 S4
Typha latifolia	G5 S4
Populus tremuloides/Spiraea douglasii	GU SU

Author:

M. Jankovsky-Jones

SANDHOUSE CEDAR GROVE

Directions:

About 10 miles south of Avery, Idaho, adjacent to the Gold Center Road #301 along the West Fork of Fishhook Creek.

Richness:

Sandhouse Cedar Grove contains a near climax stand of old-growth western red-cedar (Thuja plicata) and other tree species. A first order and second order stream flow east through the grove and into the West Fork of Fishhook Creek. Topography is gentle with slopes ranging from 12 to 24 percent with an easterly aspect. Soils are stable and composed of a moderately deep loess cap with underlying gravelly and sandy loams. The grove is in a state of natural succession and has been virtually untouched by major fire activity. Some of the grove's western red cedar (Thuja plicata) trees are over 500 years old and have a diameter of 6 to 10 feet. Other trees in the grove are Picea sp. (spruce), Abies grandis (grand fir), A. lasiocarpa (subalpine fir), Pinus monticola (western white pine), and Taxus brevifolia (Pacific yew). The understory consists mostly of ferns and other forbs. Sandhouse Cedar Grove was named as such because next to the cedar grove, at the junction of the Gold Center Road #301 and Avery-Timber Creek Road #201, was the site of a sandhouse which was a stock pile area for sanding the roads for winter logging truck traffic.

Rarity:

Of biodiversity interest for old-growth values.

Condition:

Former trail #139 passes through the grove and an old wooden trail bridge is still located along the grove’s southern boundary. In the stream that comprises the grove’s northern boundary can be found a small dam and 2-inch pipe extending down the stream. This system is thought to have supplied water to an equipment maintenance area just north of the grove.

Viability:

Just 0.5 mile south of the grove is the site of a former seasonally occupied logging camp. During the 1950s, this camp had facilities to house nearly 200 loggers and their families.

Other values:

Sandhouse Cedar Grove is inhabited by many species of small birds and mammals, some of which may depend on the old growth habitat. The area provides habitat to some of the few moose remaining on the Avery District as well as mule and white tail deer, elk, and black bear.

Conservation intent:
Protected by designation as a Forest Service Special Interest Area - Botanical.

Management needs:
Not identified.

Information needs:
Not identified.

Plant community occurrences:
Not identified.

Rare plant occurrences:

Botrychium minganense	G4	S3

Author:
L. Williams

SETTLER'S GROVE OF ANCIENT CEDARS

Directions:

The Settler's Grove of Ancient Cedars Botanical Area is located at the confluence of Cottonwood Creek and the West Fork Eagle Creek in the Coeur d'Alene River drainage, near the Idaho/Montana border. The grove is accessible via FS Road 805, about 5 miles northeast of Eagle and about 9 miles northeast of Pritchard, Idaho.

Richness:

Settler's Grove of Ancient Cedars Botanical Area is dominated by old-growth western redcedar (Thuja plicata) trees, some of which are up to 30 feet in circumference. Western white pine (Pinus monticola), Engelmann spruce (Picea engelmannii), grand fir (Abies grandis), and western hemlock (Tsuga heterophylla) are associated with the cedars; the understory consists of mountain maple (Acer glabrum), bracken fern (Pteridium aquilinum), devil's club (Oplopanax horridum), and wild ginger (Asarum caudatum). Elevations in the area range from about 3,280 feet (994 m) to about 4,500 feet (1364 m) on the slope west of the creek.

Rarity:

Of biodiversity interest for old growth values.

Condition:

The site is allocated to Management Area 13 (special areas managed for natural, scenic, and historic values) in the Idaho Panhandle National Forest Plan.

Viability:

The site is entirely surrounded by Forest Service lands. The area adjacent to the western and northern boundaries and the north half of the eastern boundary is within Management Area 10 - lands managed for semi-primitive recreation. The area adjacent to the southern boundary and the southern half of the eastern boundary is within Management Area 1 - lands managed for timber production. Mining activities occur on either side of the Botanical Area.

Other values:

Not identified.

Conservation intent:

Protected by designation as a Forest Service Special Interest Area - Botanical.

Management needs:

Future plans for the area include additional improvements to the trail system

and installation of interpretive signs.

Information needs:
Not identified.

Plant community occurrences:

Thuja plicata/Clintonia uniflora	G4	S5
Thuja plicata/Oplopanax horridum	G3	S3
Tsuga heterophylla/Clintonia uniflora	G4	S5

Author:
J. H. Kaltenecker

THERIAULT LAKE

Directions:

Theriault Lake RNA is located in the St. Joe River drainage of northern Idaho, at the headwaters of a tributary to Marble Creek. The RNA lies in the cirque basin on the north side of Marble Mountain. The trailhead to the RNA is about 29.5 miles northeast of Clarkia, Idaho. From Moscow, Idaho, take State Route 8 eastward for about 35 miles to Bovill, Idaho. Then go north for 15 miles on State Route 3 to Clarkia. Take FS Road 301 eastward for 1 mile and then FS Road 321 northward over Hobo Pass and down to Marble Creek. Proceed down Marble Creek to the junction with FS Road 216, approximately 16 miles from Clarkia. Take FS Road 216 eastward for about 9 miles to its junction with FS Road 1936. Take FS Road 1936 northwesterly for approximately 2 miles to the junction with FS Road 1988. Take FS Road 1988 to its end near Marble Mountain, about 2.5 miles. Climb the trail from the end of the road to the northwest peak of Marble Mountain. The RNA is in the cirque basin to the north of Marble Mountain.

Richness:

Theriault Lake RNA consists of a small lake surrounded by mountain hemlock (Tsuga mertensiana) forests within four habitat types. Old growth forests in the RNA are predominantly mountain hemlock, but also contain subalpine fir (Abies lasiocarpa) and Engelmann spruce (Picea engelmannii). Adjacent to the lake are two meadows, one at the inlet of the lake and the other at the outlet, each dominated by a different species of Carex. Elevations in the RNA range from 5,700 feet (1737 m) where the boundary crosses the stream draining Theriault Lake to 6,500 feet (1981 m) on the northwestern high point on Marble Mountain.

Rarity:

The RNA supports mountain hemlock climax forests in four habitat types plus three aquatic types.

Condition:

Theriault Lake RNA is allocated to Management Area 14 (existing and proposed RNAs and experimental forests) in the Idaho Panhandle National Forests Plan (August 1987). The area receives very little recreational use, as Theriault Lake does not contain fish.

Viability:

The RNA is completely surrounded by Forest Service lands. The area to the west and north of the RNA is within Management Area 6--lands managed for timber production and to provide high quality elk summer habitat. The area to the east and south of the RNA is within Management Area 9--lands unsuitable for timber

production that are managed to maintain and protect existing improvements and resource productive potential with minimal investment.

Other values:

The area receives considerable snowfall and has high watershed values. The area is used by whitetail deer (Odocoileus virginianus), elk (Cervus canadensis), moose (Alces alces), and other wildlife.

Conservation intent:

The site has been protected by designation as a Forest Service RNA.

Management needs:

Not identified.

Information needs:

Not identified.

Plant community occurrences:

Tsuga mertensiana/Luzula hitchcockii	G4	S2
Carex utriculata	G5	S4
Carex aquatilis	G5	S4
Tsuga mertensiana/Menziesia ferruginea, Luzula hitchcockii	G3	S2?
Tsuga mertensiana/Menziesia ferruginea, Xerophyllum tenax	G3	S3?
Tsuga mertensiana/Streptopus amplexifolius, Menziesii ferrugina	G2?	S1?
Tsuga mertensiana/Xerophyllum tenax, Luzula hitchcockii	G4	S2?
Tsuga mertensiana/Xerophyllum tenax, Xerophyllum tenax	G4	S2?

Author:

J. H. Kaltenecker

CLEAR CREEK

Directions:

Clear Creek is about 10 air miles northeast of Avery, Idaho in the St. Joe River drainage. Clear Creek is a tributary to Loop Creek which flows into the North Fork of the St. Joe River. From the North Fork St. Joe River/Loop Creek confluence, travel (south side of Loop Creek) for about 5 miles east on the Loop Creek Road (FS Road 3440). An abandoned road crosses Loop Creek Road near Clear Creek. Follow this road by foot to the south to access the Clear Creek valley bottom (this road turns into FS Trail 194 shortly off Loop Creek Road).

Richness:

Clear Creek lies in an alpine glaciated valley that drains the north side of Shefoot Mountain. Communities are mostly shrub dominated with emergent habitat associated with former beaver activity. Shrub stands are a complex mosaic of several species including Cornus sericea, Lonicera involucrata, Alnus incana, Salix exigua melanopsis, S. drummondiana, S. bebbiana, S. sitchensis, and Symphoricarpos albus. Emergent habitat is rich in graminoid diversity with the Carex lanuginosa, C. utriculata, C. nebraskensis, and Calamagrostis canadensis communities present. Equisetum arvense contributes significant cover in some of the graminoid stands. Portions of the site historically supported cedar forests. These stands burned in the distant past and conifers have not reestablished.

Rarity:

There are many large stands of the Carex lanuginosa community type. Clear Creek provides habitat for westslope cutthroat trout.

Condition:

An old road runs through the valley bottom and appears to be used mostly by ATVs and foot travelers.

Exotics are abundant and include Centaurea maculosa, Hieracium pratense, and H. aurantiacum. Orange hawksbeard (H. aurantiacum) appears to pose the greatest threat to emergent communities.

Viability:

No threats to viability were noted.

Other values:

Spotted frogs were observed.

Conservation intent:

The area should be managed to maintain wetland functions. Adequate buffers where

ground disturbing activities are avoided should be maintained.

Management needs:

Populations of exotic species should be monitored and controlled while small.

Information needs:

The shrub stands are a very complex mosaic of wet site shrub species. Inventories likely accounted for most of the shrub community diversity, but vegetation mapping with aerial photos and ground truthing may help reveal the patterns.

Plant community occurrences:

Cornus sericea	G4Q S3
Salix drummondiana	G3Q S3
Salix exigua/Mesic forb	G2? S2?
Calamagrostis canadensis	G4Q S4
Carex utriculata	G5 S4
Carex lanuginosa	G3? S2
Carex nebrascensis	G4 S3
Salix drummondiana/Carex utriculata	G3 S3

Author:

M. Jankovsky-Jones

COUGAR BAY

Directions:

Cougar Bay is located approximately 2 miles southwest of Coeur d'Alene, Idaho on the northwest side of Lake Coeur d'Alene in Kootenai County, Idaho. Access to the bay and emergent habitats requires a canoe or kayak.

Richness:

Cougar Bay is supported by the Cougar Creek watershed which drains northeast from Blossom Mountain, Shasta Butte, and Mica Peak. The site is mostly flat wetlands with some gradually sloping upland areas associated with minor tributaries that feed the wetland. Cougar Bay supports four main habitats: wetland, aquatic, shoreline, and forest. Emergent communities include Equisetum spp. (horsetail), Typha latifolia (cattail), Scirpus microcarpus (small fruited bulrush), and Phalaris arundinacea (reed canarygrass). The dominant aquatic vegetation includes Lemna spp. (duckweed), Utricularia spp. (bladderwort), Potamogeton spp. (pondweed), and Ceratophyllum demersum (coontail). The dominant shoreline vegetation includes Spiraea douglasii (spiraea) and Holodiscus discolor (oceanspray). Forest overstories are dominated by Pinus ponderosa (ponderosa pine), Pseudotsuga menziesii (Douglas fir), and Larix occidentalis (western larch). The dominant forest understory vegetation includes Symphoricarpos albus (common snowberry), Berberis repens (creeping Oregon grape), and Physocarpus malvaceus (ninebark). Bordered by coniferous forests and lush fields, the wetland complexes form a shallow bay rich with aquatic vegetation that attracts an abundance of wildlife including migrating and nesting waterfowl, numerous shore and song birds, raptors, elk, deer, coyote, and bear.

Rarity:

Cougar Bay contains extensive wetlands and may provide habitat for several animal species of concern. Lake Coeur d'Alene is known as a wintering area for bald eagles and the bay is recognized as a bald eagle foraging area. Probable nesting areas for pygmy nuthatches are reported on adjacent uplands. Hackworthy (1998) reported 17 animal species of special concern at Cougar Bay; however, it is unknown whether these are incidental sightings or occurrences. The rare plant Valisneria americana was reported at Cougar Bay but location and occurrence data are unavailable.

Condition:

There is a moderate degree of disturbance to this site from surrounding development, historic and current timber harvest activities, recreational use, and proximity to U.S. Highway 95. The surrounding land is zoned agricultural and suburban residential. The timber bordering the east side of the site was

recently harvested and logging roads were constructed. Recreational use (fisherman, boaters, hikers, and hunters) is relatively high due to the proximity of the site to the city of Coeur d'Alene. The marina on Blackwell Island across the bay supports two private yacht clubs. Also located across the bay is the Crown Pacific Mill. Logs for the mill have historically been stored in the water at the northern end of Cougar Bay. At any one time, thousands of logs are seen floating in the water. The booms that contain the logs isolate Cougar Bay from the rest of Lake Coeur d'Alene, and are in part responsible for the maintenance of the wetland habitat through dampening of wave action from the lake to the bay. Mining activities in the lake's watershed have deposited metals and other toxic substances in the sediments of the lake bottom. These toxins may be taken up by the aquatic vegetation and there is the possibility that they could be transferred up through the food chain to wildlife species. It appears that this is not a noticeable problem unless the sediments are disturbed and resuspended.

Four noxious weed species are known to occur on site: Myriophyllum spicatum (Eurasian water milfoil), Carduus nutans (musk thistle), Centaurea maculosa (spotted knapweed), and Cirsium arvense (Canada thistle). The exotic grass Phalaris arundinacea is the dominant graminoid in meadows upstream of Cougar Bay.

Viability:

Northern Idaho, especially the area around Coeur d'Alene, is experiencing rapid development. Many new housing developments are being proposed in the watershed and concerns include contamination of the water system through septic developments and surface water contamination.

Other values:

Waterfowl, osprey, songbirds, and beaver have been identified as conservation targets at Cougar Bay. Mud flats at Cougar Bay support large populations of Canada geese during the winter months. Numerous osprey utilize habitat at Cougar Bay and nest on top of pilings near the log booms within the bay. At least three occupied beaver huts constructed of cattail are present in Cougar Bay wetlands. The spotted frog is known to occur at Cougar Bay also.

Conservation intent:

The Nature Conservancy currently owns tracts at Cougar Bay that are being managed to maintain wetland functions. Lands are also owned by the Bureau of Land Management and State Department of Lands. Additional parcels in private ownership should be high priority for acquisition or conservation easements to protect from development activities. Lands managed by the Bureau of Land Management should be given special designation such as Area of Critical Environmental Concern for wetland values.

Management needs:

The following conservation strategies for Cougar Bay have been identified: (1) increase community support for the project; (2) continue site restoration including removal of debris and old structures; (3) eradicate noxious weeds; (4) reduce human impacts to the site; (5) restrict hunting within the site; 6) preserve natural features including rocky outcrops, wetland, aquatic, shoreline, and forest plant associations; (7) allow succession to proceed naturally; (8) protect woody debris and wildlife trees (including perch and roost trees); (9) protect waterfowl and migratory songbird nests; (10) develop waterfowl and songbird viewing areas; (11) encourage use by Canada geese as winter range; (12) encourage osprey nesting; (13) preserve beaver colonies; (14) protect plant and animal species of concern; and (15) minimize introduction of exotic plants and animals.

Information needs:

The wetlands should be tested for the presence of toxic materials to see if this could be affecting wildlife. In addition, the location of noxious weeds should be identified.

Plant community occurrences:

Spiraea douglasii	G5 S4
Phalaris arundinacea	G4 S5
Equisetum fluviatile	G4 S3
Typha latifolia	G5 S4
Scirpus microcarpus	GU SU

Author:

K.J. Hackworthy, M. Jankovsky-Jones

HAUSER LAKE FEN

Directions:

Hauser Lake Fen is located along the southern and southwestern shores of Hauser Lake. Hauser Lake is less than 1 mile from the Idaho/Washington border. From Post Falls, Idaho, travel north to Highway 53. Depending on which road taken to get to 53, either travel west or east to the unincorporated village of Hauser Lake. Take the Hauser Lake Road north to Hauser Lake. Travel along the southern shore to the Idaho Fish and Game boat launch. The eastern portion of the fen is found to the east and west of the boat launch and can be accessed on foot. To access the western end of the fen, follow Hauser Lake Road to the west. After you go by the western end of the lake, you will come to North Hauser Lake Road (or Hauser Lake Loop Road?) which heads toward the north and loops around the lake. The road crosses Hauser Lake Fen immediately. Park on the road and walk east toward the lake into the fen.

Richness:

Hauser Lake is a drainage lake that receives water from several small, apparently ephemeral streams from the northwest and the northeast. Hauser Creek is dammed at the outlet to maintain high water levels. It flows out into the Rathdrum Prairie to the south where it is channellized and highly modified as it flows through the farmfields toward the Spokane River. An extensive fen community formed in the shallow bay/seepy inlet on the southwestern end of the lake. This fen, just east of the North Hauser Lake Road, contains extensive intermediate and rich fen communities characterized by Sphagnum subsecundum (in the intermediate fen habitats), Carex lasiocarpa, C. oederi, Spiraea douglasii, Menyanthes trifoliata, Potentilla palustris, Dulichium arundinaceum, Lycopus uniflorus, Drosera rotundifolia, Viola macloskeyi, Carex muricata, and the rare Lycopodiella inundata (bog clubmoss). Aquatic communities prevail in a small pond near the road and in ditches along the road. Common aquatic species include Nuphar polysepalum, Eleocharis palustris, Potamogeton gramineus, P. berchtoldii, and Utricularia vulgaris. The margins of the fen are covered with a dense shrub carr dominated almost exclusively by Spiraea douglasii. Toward the lake the fen becomes strictly rich fen dominated by monocultural stands of Carex utriculata, Phalaris arundinacea, Typha latifolia, Scirpus acutus with some S. douglasii shrub carrs scattered about. This southwestern portion of the fen also extends west of North Hauser Lake Road. Just west of the road it appears to be rich/intermediate fen similar to east of the road. Further west it is heavily grazed horse pasture. Just east of the Fish and Game boat launch on the south end of Hauser Lake is a marshy fen covered by Spiraea douglasii shrub carr and Phalaris arundinacea marsh on the seasonally saturated margins with extensive rhizomatous stands of Scirpus acutus and Typha latifolia. One large stand of the extremely rare Scirpus fluviatilus (river bulrush) occurs in the seasonally

inundated marsh/fen habitats that extend nearly 200 meters south of the lake margin. The southern margin of Hauser Lake is dominated by Scirpus acutus, S. validus, Typha latifolia, C. lasiocarpa, and Eleocharis palustris in shallow standing water. The shallow littoral zones around the eutrophic lake are densely vegetated with Nuphar polysepalum, Potamogeton gramineus, P. robbinsii, P. berchtoldii, Brasenia schreberi, Utricularia vulgaris, and Elodea canadensis. Deeper vegetated limnetic zones (2.0-3.0 m deep) are characterized by Potamogeton amplifolius, P. robbinsii, and E. canadensis. Along the western lake margin, the fen is a floating mat characterized by C. lasiocarpa, C. utriculata, Dulichium arundinaceum, Potentilla palustris, Spiraea douglasii, Alnus incana, and Sphagnum subsecundum in a narrow strip that gives away quickly to dense stands of Scirpus acutus and T. latifolia to the west. Meadows along the two ephemeral inlets on the northwest and northeast ends of the lake have been ditched, drained, and highly altered for agricultural purposes. Most of the habitat along the inlets is now dominated by extensive monocultures of Phalaris arundinacea.

Rarity:

Hauser Lake Fen along with Twin Lakes Fen greatly extends the southern range of known peatland occurrence in the western portion of the Panhandle region of northern Idaho. The spatial extension is interesting in itself, but also because of the lower precipitation that likely falls at these sites compared with sites further north in the Pend Orielle or Priest River drainages. The rich and intermediate fen communities on the western end of HLF are very similar to those found elsewhere in northern Idaho. The prominence of Carex oederi is unique. C. oederi is much more common in rich fens of east central Idaho. In northern Idaho it is known from only one other high-priority Panhandle peatland: Hoodoo Lake, several miles to the northeast. The seasonally inundated marshy fen that covers the south end of the lake is very interesting because of the presence of a large stand of Scirpus fluviatilus, which is known from only one other site in Idaho (Anderson Lake near the mouth of the Coeur d'Alene River on Lake Coeur d'Alene).

Condition:

Grazing is a threat to portions of wetlands at Hauser Lake. Further housing development in areas adjacent to the fen may be direct and indirect threats to fen communities. Logging in the surrounding watershed could lead to enhanced eutrophication of the lake and surrounding fen communities. Manipulation of water levels from construction of an outlet dam on Hauser Creek has caused unknown change in Hauser Lake. Boat wakes from speed boats can also damage the floating mats along the lake margin and keep them from expanding when water levels drop. North Hauser Lake Road was improved and resurfaced in 1998 where it crosses HLF. The road construction resulted in inundation and death of Spiraea stands upstream of the road. Since hydrology has been impacted by the road improvements, it may lead to

drying in the fen, but this is yet to be seen.

Several plants of Lythrum salicaria (purple loosestrife) were seen in the fen and marsh communities surrounding the lake in 1994. Bull frogs are abundant at Hauser Lake.

Viability:

Logging, road construction and maintenance, and possible housing developments in uplands surrounding Hauser Lake and HLF present offsite threats that could lead to enhanced eutrophication and changes in the composition of the fen, shrub carr, and aquatic plant communities within the site. Enhanced eutrophication could ultimately also threaten the viability of rare plant populations at Hauser Lake as well.

Other values:

Hauser Lake is one of the more popular recreational lakes in the Panhandle region. Numerous summer homes ring the margins of the lake. It is a very popular fishing and recreational boating lake. The fens are very valuable wildlife habitat, although due to their open nature and the abundance of surrounding houses, they are probably underused. Deer and moose sign, however, were present. Extensive seasonally indundated fen and marsh habitat that is densely vegetated provides excellent waterfowl nesting habitat.

Conservation intent:

This site is a high-priority peatland in the Idaho Panhandle, which should be protected in its natural state in the interests of preserving the range of conditions and species known to occur in these rare habitats in the region. Establishment of Hauser Lake Fen as a Special Interest Area would be ideal, but establishment is only possible if more of the fen habitats are acquired by an agency, private conservation group, or individuals intent on preserving critical habitats. Currently only an area (of unknown size) around the boat launch is publicly-owned (State of Idaho, Department of Fish and Game).

Management needs:

This site, like other peatland sites in northern Idaho should be left alone as much as possible. Ground disturbance within the site boundaries should not occur or should be minimized. Uplands immediately adjacent to HLF (included within the proposed site boundaries) should be protected from potentially harmful logging or development activites.Monitoring of plant communities, aquatic invertebrates, and water chemistries should begin as soon as possible on lands owned by Idaho Fish and Game near the boat launch. It is critical to determine rare plant population and community trends at Hauser Lake because there are a number of potential threats to this site and what remains may be a vestige of the original extent of high quality and unique

communities or much degraded versions of formerly higher quality fen communites. Monitoring should also proceed on the west end of HLF, if permission to do so is granted the owner.

Information needs:

Floristic inventory of Hauser Lake HLF was rather intensive in 1994 and is largely complete. No work has been done on the aquatic or terrestrial invertebrate populations, the small vertebrate populations, or the water chemistry of HLF. All should be inventoried and monitored periodically in the future. As with other priority Panhandle peatlands, Bursik and Moseley (1994) recommended placing two or more 10x10 meter permanent vegetation monitoring plots in the various plant communities at this site to detect changes that may occur over time due to human activities or natural phenomena. They recommended following methods established for peatland monitoring in the Sawtooth Valley of Idaho (Moseley et al. 1994).

Plant community occurrences:

Spiraea douglasii	G5	S4
Phalaris arundinacea	G4	S5
Carex utriculata	G5	S4
Carex lasiocarpa	G4	S2
Scirpus acutus	G5	S4
Nuphar polysepalum	G5	S4
Typha latifolia	G5	S4

Rare plant occurrences:

Aster junciformis	G5	S1
Hypericum majus	G5	S3
Scirpus fluviatilis	G5	S1
Lycopodiella inundata	G5	S2

Author:

A. H. Pitner

HIDDEN LAKE

Directions:

From Coeur d'Alene, Idaho travel east on Interstate 90 and cross 4th of July Summit. Several miles past the summit take the Rose Lake exit (Hwy 3). Travel south on Hwy 3 approximately 8 miles to Killarney Lake Road. Take this road to the west to the Killarney Lake boat launch. Access to Hidden Lake is through a series of channels that must be navigated by canoe. Better yet, call John Nigh, the Idaho Fish and Game habitat biologist who oversees the Lower Coeur d'Alene Wildlife Management Area, and beg him to take you there with his airboat. Hidden Lake is approximately 2 miles southwest of Killarney Lake.

Richness:

Three high-priority Panhandle peatlands are found in the Lower Coeur d'Alene River drainage: Rose Lake, Hidden Lake, and Thompson Lake. All are similar with extensive floating and fixed mats along the lake margins covered by a mosaic of: 1) Sphagnum-dominated poor fens with significant amounts of Vaccinium macrocarpon, 2) Sphagnum spp./Carex lasiocarpa/Spiraea douglasii dominated intermediate fen, 3) rich fen dominated by Typha latifolia, Carex spp., Potentilla palustris, Eleocharis palustris, and Equisetum fluviatile, and 4) rich and intermediate fen shrub carrs characterized by Spiraea douglasii, Alnus incana, Salix geyeriana, Pinus contorta, and Betula occidentalis with and without Sphagnum spp.-covered substrate. All of these fen communities grade freely into one another and support many species, including Carex lasiocarpa, C. muricata, C. utriculata, C. canescens, Dulichium arundinaceum, Drosera rotundifolia, Impatiens aurella, Sagittaria latifolia, Agrostis scabra, Sphagnum subsecundum, S. centrale, S. teres, S. angustifolium, Calliergon stramineum, and Aulocomnium palustre. The poor fen community on the south side of Hidden Lake is unique in that it is dominated by Vaccinium macrocarpon (cranberry), which was apparently introduced in the 1930s by the landowner. An extensive wild rice (Zizania palustris)-dominated emergent marsh is found in the area between Killarney Lake and Hidden Lake. Shallow littoral aquatic communities in the lake are dominated by Nuphar polysepalum, Brasenia schreberi, Ceratophyllum demersum, Myriophyllum sibericum, Potamogeton natans, and Elodea canadensis. Deeper littoral zones (1.5-2.0 meters) are dominated by Potamogeton amplifolius, Elodea canadensis, and Myriophyllum sibericum. The island on the southeast end of the site supports Ponderosa pine (Pinus ponderosa) forests and some extensive stands of paper birch (Betula papyrifera).

Rarity:

Hidden Lake contains most of the aquatic, marsh, and fen communities found in the lower Coeur d'Alene River drainage. Two rare plants are known from Hidden

Island (the floating island that supports an extensive poor fen dominated by the introduced species Vaccinium macrocarpon). Epilobium palustre (swamp willow-weed), is scattered throughout the floating mat fen communities, and Scirpus subterminalis (water clubrush) is found in a couple of scattered patches in shallow littoral habitats around the lake.

Condition:

Vaccinium macrocarpon is the dominant species in poor fen habitats and has replaced native species such as Carex lasiocarpa and Drosera rotundifolia. Lythrum salicaria (purple loosestrife) is present around the lake margins and control measures undertaken by Idaho Department of Fish and Game include beetles and chemicals. Wild rice is actually an exotic species that has displaced native species in the extensive emergent marshes surrounding Hidden Lake.

Viability:

Logging and road construction and maintenance in the Hogback Ridge area to the west of Hidden Lake present offsite threats that could lead to enhanced eutrophication and changes in the composition of the fen, shrub carr, and aquatic plant communities within the site.

Other values:

Hidden Lake has abundant littoral vegetation and dense surrounding fen vegetation which makes excellent waterfowl habitat. Some fishermen and hunters use the lake too.

Conservation intent:

This site is a high-priority peatland in the Idaho Panhandle, which should be protected in its natural state in the interests of preserving the range of conditions and species known to occur in these rare habitats in the region. Establishment of Hidden Lake as a SIA-B can proceed immediately because most of the site is owned by the State of Idaho and is incorporated into the Lower Coeur d'Alene River Wildlife Management Area. Monitoring of plant communities, aquatic invertebrates, and water chemistries should begin as soon as possible at Hidden Lake.

Management needs:

This site, like other peatland sites in northern Idaho, should be left alone as much as possible. Ground disturbance within the site boundaries should not occur. Uplands in the adjacent Hog Ridge area to the west of Hidden Lake should be protected from potentially harmful logging or development activites.

Information needs:

No work has been done on the aquatic or terrestrial invertebrate populations, small

vertebrate populations, or the water chemistries of Hidden Lake. All should be inventoried and monitored periodically in the future. As with other priority Panhandle peatlands, Bursik and Moseley (1994) recommended placing two or more 10x10 meter permanent vegetation monitoring plots in the various plant communities at this site to detect changes that may occur over time due to human activities or natural phenomena. They recommended following methods established for peatland monitoring in the Sawtooth Valley of Idaho (Moseley et al. 1994). Upland forest vegetation on the island in the southeast portion of the site has not been surveyed.

Plant community occurrences:

Spiraea douglasii	G5 S4
Carex utriculata	G5 S4
Carex lasiocarpa	G4 S2
Equisetum fluviatile	G4 S3
Nuphar polysepalum	G5 S4
Typha latifolia	G5 S4
Poor fen	G4 S1

Rare plant occurrences:

Epilobium palustre	G5 S3
Scirpus subterminalis	G4G5 S3

Author:
A. H. Pitner

ST. MARIES RIVER

Directions:

St. Maries WMA is located 5 miles south of St. Maries in Benewah County, Idaho. It is enclosed within the curve of the St. Maries River on the south, west, and north, and the range line between 1 and 2 West, Township 45 North, on the east.

Richness:

St. Maries WMA is dominated by 4,695 foot Lindstrom Peak near the center of the area. The land to the north and west of the peak slopes steeply to the St. Maries River at 2,130 feet elevation. Lands to the south and east are more gradually sloped, but are interspersed with abrupt rolling hills. There are three permanent drainages on the WMA: Smoke Chaser and Flat Creeks flow south; Syringa Creek flows north. The lowlands within the site are primarily in the cedar-hemlock habitat zone. Most of the uplands and mid-elevation wetter areas are in the highly productive Douglas fir-grand fir zone. Ponderosa pine is the predominant species of the dry southwest slopes and along the bluffs above the river. Alder, bog birch, and sedges are found along the wet meadows adjacent to the streams with western red cedar frequently growing in the more stable stream bottoms. Dry grassy meadows are common above the river bluffs where soils are shallow. Shrub species found within the site are: Holodiscus discolor (ocean spray), Physocarpus malvaceous (ninebark), Symphoricarpos albus (snowberry), Ceanothus species (ceanothus), Salix species (willow), and Pachistima myrsinites (boxwood). Soil types within the site are generally moderately deep, well-drained sedimentary loam with a high volume of volcanic ash, and are subject to erosion.

Rarity:

Two of the three known Idaho populations of the plant species of concern, Grindelia howellia, are found on slopes with shallow soils overlying basalt. The area is also of general biodiversity interest for wildlife.

Condition:

The highest use period for hunting is during the first two weeks of the big game season, and then immediately following the first snow. Fishing is good in early summer and fall when water temperatures are cooler. Other major uses include sightseeing, snowmobiling, picnicking, camping, hiking, trail riding (horses), and logging access from adjacent public and private lands. The latter users greatly outnumber those hunting and fishing.

Centaurea maculosa, Tanacetum vulgare, and Phalaris arundinacea are the major weedy species impacting the riparian habitat. Knapweed and tansy are abundant on recent alluvial deposits and may displace species such as cottonwood and

bluebunch wheatgrass. Reed canarygrass is abundant in the understory of all riparian associations and forms monocultures in nearly half of the floodplain acreage.

Viability:

Exotic plant species seem to be the largest threat to viability at the site.

Other values:

The area provides habitat for big game, blue grouse, and beaver. The St. Maries River supports rainbow, brook, cutthroat, and brown trout. The site provides other non-game public recreational opportunities such as hiking and sightseeing.

Conservation intent:

The lower St. Maries River is within an established Wildlife Management Area.

Management needs:

Management has been directed toward opening the dense overstory by small commercial clearcuts, and then broadcast burning the slash to promote regeneration of desirable browse plants for wintering deer and elk. Since this program was initiated in 1967, 10 clearcuts totaling 105 acres have been made. In 1982, 1983, and 1984, four high voltage electric fences were constructed around small clearcuts to exclude big game usage and allow young browse plants to accumulate greater growth. The fences will be rotated to other clearcuts when browse growth objectives are attained. Secondary management goals are to improve access road for hunting. Best Practices should be applied to lessen sediment inputs to the river when logging and road building.

Information needs:

Tributary streams to the St. Maries River are unsurveyed.

Plant community occurrences:

Populus trichocarpa/Cornus sericea	G3? S3
Populus trichocarpa/Symphoricarpos albus	G3 S2
Crataegus douglasii/Heracleum lanatum	G2 S1
Cornus sericea	G4Q S3
Phalaris arundinacea	G4 S5
Agropyron smithii	G3G5QS1
Populus trichocarpa/Recent alluvial bar	G? SP

Rare plant occurrences:

Grindelia howellii	G3 S1

Author: Unknown

ST. JOE RIVER

Directions:

The "Shadowy St. Joe" includes mid reaches of the St. Joe River from River Mile 35 to 55. The floodplain can be accessed by foot (roads are present on both sides of the river), or by canoe or inflatable raft.

Richness:

The floodplain of the St. Joe River narrows and gradient increases approximately 3 miles upstream of St. Joe (townsite) creating a riparian corridor dominated by cottonwoods rather than emergent vegetation. This corridor extends upstream for approximately 20 river miles, to where the canyon narrows. The corridor supports stands of Populus trichocarpa with an understory dominated by Symphoricarpos albus, Rhamnus alnifolia, and Cornus sericea. Cobble bars and islands are common with stands of Populus trichocarpa and Salix exigua melanopsis. Emergent habitats dominated by native species are uncommon and small. Most emergent habitats encountered are dominated by the exotic grasses Phalaris arundinacea and Agrostis stolonifera.

Rarity:

This reach of the St. Joe River is a nearly continuous cottonwood corridor in a watershed without impoundments. The site includes bald eagle wintering areas, and Coeur d'Alene Salamander habitat. Special status plants, Dodecatheon dentatum, Mimulus clivicola, and Cardamine constancei, are known to occur in the area, as well as the lichen, Lobaria hallii.

Condition:

The St. Joe watershed has a long history of logging activity. In addition to the cumulative effects of logging, the river was used to transport the logs, which created a wide, shallow channel.

The exotics Phalaris arundinacea, Agrostis stolonifera, Centaurea maculosa, and Tanecetum vulgare are present in areas without a cottonwood or shrub overstory, and on drier benches.

Viability:

Logging and road building in the watershed is the major off-site threat.

Other values:

Not identified.

Conservation intent:

Voluntary protection or conservation easements should be encouraged on private lands along the river. Emphasis should be placed on those areas dominated by native species with high structural diversity.

Management needs:

Camp and RV sites are quite common along the floodplain of the St. Joe River. Development of additional sites within currently undeveloped forests should be discouraged.

Information needs:

Not all riparian forests were surveyed; a map indicating 1998 surveyed areas is available in the CDC site file.

Plant community occurrences:

Populus trichocarpa/symphoricarpos albus	G3 S2
Salix exigua/Barren	G3? S4
Populus trichocarpa/Recent alluvial bar	G? SP
Populus trichocarpa/Rhamnus alnifolia	G? S3

Rare plant occurrences:

Cardamine constancei	G3 S3
Dodecatheon dentatum	G4 S3
Lobaria hallii	G4 S3
Mimulus clivicola	G4 S3

Rare animal occurrences:

Plethodon idahoensis	G3 S3
Haliaeetus leucocephalus	G4 S3B
Bartramia longicauda	G5 S1B
Salvelinus confluentus	G3 S3

Author:

L. Williams

SURVEY NOTES ON OTHER SITES

Coeur d'Alene Watershed

Blue Creek Bay

Plant community occurrences (codes in parentheses refer to survey plots)
Scirpus microcarpus 98MJ036
Carex vesicaria
Equisetum fluviatilis
Glyceria borealis
Typha latifolia
Phalaris arundinacea
Alnus incana/Phalaris arundinacea
Salix geyeriana/Phalaris arundinacea (w/ Cornus inclusion)
Spiraea douglasii

Blue Creek Bay, for the most part, has been converted to pastureland. Native vegetation is restricted to shrublands along channels and a wetland fringe approximately 25 meters wide along the northeastern shoreline. Shrublands are dominated by Salix geyeriana and Alnus sp. with lesser amounts of Salix bebbiana, S. planifolia, Spiraea douglasii, and Cornus sericea. Emergent habitat includes patches of Scirpus microcarpus, Carex vesicaria, and Glyceria borealis with lesser amounts of Carex lanuginosa, C. arcta, C. stipata, and Juncus sp.

Chain Lakes

Plant community occurrences
Brasenia shreberi
Carex lasiocarpa
Carex utriculata
Carex vesicaria
Glyceria borealis
Eleocharis palustris
Equisetum fluviatile
Nuphar polysepalum
Phalaris arundinacea
Scirpus acutus
Scirpus microcarpos
Sparganium eurycarpum
Typha latifolia
Spiraea douglasii

The Coeur d'Alene River enters a broad floodplain at Mission Flats. Downstream of Mission Flats 12 shallow lakes are present in the valley bottom. The lakes range in size from approximately 100 acres to over 600 acres. During the spring the entire valley may be flooded

from snow melt from the surrounding mountains. The lakes remain full throughout the summer as water levels are maintained by Post Falls Dam. Some of the most extensive wetlands in Idaho are present along the lower Coeur d'Alene River. The wetlands are typically a mosaic of monocultures of emergent and submerged plants. Large expanses of Equisetum fluviatile, Phalaris arundinacea, Agrostis stolonifera, and Zizania aquatica are common. The latter three species are non-native species that have displaced native wetland vegetation. Phalaris arundinacea and Agrostis stolonifera are widespread in drained wetlands and on drier margins of wetlands. Zizinia aquatica (wild rice) has been planted both as a food crop for waterfowl and for commercial production. The following native plant communities are present as less extensive patches along the lower Coeur d'Alene River: Carex vesicaria, Carex utriculata, Carex lasiocarpa, Eleocharis palustris, Brasenia shreberi, Nuphar polysepalum, Scirpus acutus, Scirpus microcarpos, Sparganium eurycarpum, and Typha latifolia. Woody species including Spiraea douglasii, Alnus incana, Salix spp., Physocarpus malvaceus, and Populus trichocarpa are sometimes present on the perimeter of wetlands.

Tailings containing heavy metals from the Bunker Hill Superfund site in Kellogg have been transported into the lower watershed by flood flows and wind. Near Cataldo sediments are nearly void of vegetation with the exception of stands of the tall reed, Phragmites australis. This species along with Agrostis stolonifera is one of a few plants that can withstand extremely contaminated soils. Death of waterfowl, fish, and livestock have been attributed to lead poisoning in the lower watershed. Toxic hotspots have been identified on the lower river, but little cleanup work has taken place.

Coeur d'Alene River

Plant community occurrences (codes in parentheses refer to survey plots)
Thuja plicata/Athyrium felix-femina
Populus trichocrpa/Symphoricarpos albus
Cornus sericea/Heracleum lanatum 98MJ040
Salix exigua ssp. melanopsis/Recent bar (with Populus trichocarpa inclusion)

The Coeur d'Alene River floodplain was surveyed from Grizzly Creek (downstream of Pritchard) to Avery Creek Bend. On the west side of the river near the confluence with Grizzly Creek giant cedar stumps are present. Some second growth Thuja plicata/Athyrium felix-femina stands are present. The Populus trichocarpa/Symphoricarpos albus community is also present here.

Near the confluence with Cedar Creek floodplain vegetation has been impacted by past land use including livestock grazing with drier areas being dominated by Tanecetum vulgare, Chrysanthemum leucanthemum, Pteridium aquilinum, Hypericum perforatum, Centaurea maculosa, and Agrostis stoloniferea. Stands of Salix sitchensis are present and associated with sand deposition, backwater sloughs, and side channels. Some stands of Populus trichocarpa are present with mostly a Phalaris arundinacea understory.

One of the highlights of the surveys was a bar just upstream of Pritchard on the west side of the river. The well developed channel bar is isolated on the downstream end by a band of scree, the upstream end does grade into disturbed areas dominated by Phalaris arundinacea and Tanecetum vulgare. The floodplain has undulating topography due to numerous overflow channels. Historically the channel bottom supported stands of Thuja plicata in addition to stands of cottonwoods and shrubs. The cedar stands have been logged, but second growth stands of Thuja plicata/Athyrium felix-femina are present. Stands of cottonwood are also present and mostly include the Populus trichocarpa/Symphoricarpos albus community type. A significant amount of Acer glabrum was present in all Populus trichocarpa/Symphoricarpos albus stands. Canopy gaps support a rich mosaic of wet site forbs and the Cornus sericea community is also present. Physocarpus capitatus is present as a narrow stringer along several overflow channel banks and at the ecotone to the uplands. Cobble deposits at the rivers edge support stands of Salix exigua ssp. melanopsis and Populus trichocarpa. Cobble bars also have bands of Phalaris arundinacea and Tanecetum vulgare.

A small point bar and island were surveyed on the west side of the river upstream of Avery Creek. The cottonwood cohort appears to be scoured annually and supports an understory of Phalaris arundinacea.

Many of the floodplain forests along the Coeur d'Alene River are fragmented by campsites (both primitive and developed), RV sites, or home sites. Small patches such as the one upstream of Pritchard are present and campsite and primitive road development should be avoided due to the value of the area for dissipating energy and providing flood storage during flood events and providing relatively unfragemented habitat.

Loff's Bay

Plant community occurrences
Spiraea douglasii
Carex vesicaria
Equisetum fluviatile

Loff's Bay is mostly an emergent wetland with small cottonwood, alder and water birch stands. Emergent wetlands include Agrostis stolonifera pasture, Carex vesicaria, Glyceria borealis, and Equisetum fluviatile on dry to wet gradient. Sedge diversity is high in the meadows at Loff's Bay and cursory surveys revealed the following species: Carex arcta, C. feta, C. lenticularis, C. retrorsa, C. stipata, C. vesicaria, Dulichium arundinaceum, and Scirpus microcarpus. A grebe (species unknown) was nesting in the bay in the spring of 1998.

McGinnis Creek

Plant community occurrences (codes in parentheses refer to survey plots)
Alnus rubra/Athyrium felix-femina 98MJ020
Spiraea douglasii

McGinnis Creek is on the southwest side of Killarney Lake. The creek forms a broad alluvial fan that supports dense stands of Alnus rubra. The shaded understory of stands supports Athyrium felix-femina and Lysichiton americanum. Patches of Phalaris arundinacea and Cirsium arvense are present in the valley bottom.

Rockford Bay

Plant community occurrences
Populus trichocarpa/Crategus douglasii
Cornus sericea
Salix drummondiana
Alsima gramineum
Sparganium eurycarpum
Typha latifolia

Surveys at Rockford Bay were very cursory from boat and from land with binoculars. Emergent wetlands are mostly dominated by Alisma gramineum, Equisetum fluviatile, Sparganium eurycarpum, and Typha latifolia. Banks along Rockford Creek have overhanging vegetation dominated by Cornus sericea. Stands of alder, willow, and cottonwood are also present.

Teepee Creek

Plant community occurrences (codes in parentheses refer to survey plots)	
Salix drummondiana/Calamagrostis canadensis	98MJ007
Salix drummondiana/Phalaris arundinacea Lonicera involucrata	98MJ006
Carex utriculata Phalaris arundinacea	

Teepee Creek is in the headwaters of the Coeur d'Alene watershed. Teepee Creek flows through a broad U-shaped calley that has had a variety of impacts including dozing of shrublands to reduce Ribes cover and construction of an airport runway. In spite of past management scattered shrub stands dominated by Salix spp., Alnus incana, Lonicera involucrata, and Crataegus douglasii are present in the valley bottom. Beaver activity has created saturated areas supporting stands of Carex utriculata and stands of Salix drummondiana with Calamagrostis canadensis and Scirpus microcarpus in the understory.

Dry openings in the valley bottom have a number of exotic plant species including Agrostis stolonifera, Chrysanthemum leucanthemum, Phleum pratensis and Hypericum perfoliatum.

St. Joe Watershed

Cedar Graveyard

Plant community occurrences (codes in parentheses refer to survey plots)	
Salix drummondiana/Mesic forb	98MJ013

Salix drummondiana/Carex utriculata (beaver maintained)
Alnus incana/Mesic forb 98MJ014
Cornus sericea
Salix exigua ssp. melanopsis/Recent bar (Equisetum arvense)
Carex utriculata
Undescribed Mixed Shrublands (Lonicera involucrata, Salix drummondiana, Salix sitchensis, Salix melanopsis, Alnus incana, Cornus sericea, Sambucus caerula)

The Cedar Graveyard is along the North Fork of the St. Joe River about 13 miles upstream of Avery. The moderately wide valley bottom historically supported moist cedar (possibly cedar/lady fern) forests, however these burned in the early 1900's and mixed shrub stands are currently present. No cedar regeneration was noted on the brief walk through. Shrub stands include those dominated by Salix drummondiana, Salix exigua ssp. melanopsis, Cornus sericea, Alnus incana, and an undescribed mixed shrub community. Willow stands are best developed in areas with high water tables related to beaver activity. Alder stands seem to be mostly associated with banks of the main channel and beaver channels. Somewhat drier benches support a mix of riparian and wetland shrubs. Spotted frogs were observed in the stream channel. The bottom is comprised of mostly native species with only small patches of Cirsium arvense and Phalaris arundincacea noted.

East Fork Fishhook Creek

Plant community occurrences (codes in parentheses refer to survey plots)
Abies lasiocarpa/Calamagrostis canadensis (with PIEN/EQAR inclusion) 98MJ041
Calamagrostis canadensis 98MJ042
Carex nebraskensis
Carex utriculata

A mosaic of emergent and forested wetlands are present along the East Fork of Fishhook Creek. Forested swamps have an understory dominated by Equisetum arvense and/or Calamagrostis canadensis. The forest has a complex microtopography created by fallen trees and root wells with holes up to 1 meter deep. Extensive stands of Calamagrostis canadensis are also present along with smaller stands of Carex utriculata and Carex nebraskensis. The meadows have had past beaver activity and many deep beaver runs are present in addition to the main channel. The watershed has been logged extensively with the exception of Upper Fishhook Creek RNA in the north half of section 32.

Goosehaven

Plant community occurrences
Carex lasiocarpa
Equisetum fluviatile
Typha latifolia
Sparganium eurycarpum

Surveys at Goosehaven were very cursory as most areas are in non-native pasture or wild rice. Saturated native wetlands are present and support monocultures of Typha latifolia, Sparganium eurycarpum, Equisetum fluviatile, and Carex lasiocarpa.

Mica Meadows

Plant community occurrences
Carex nebraskensis
Carex utriculata
Alnus sinuata

All but the wettest meadow communities dominated by Carex species have been impacted by past land use at Mica Meadows. Most of the meadow has high cover of Rudbeckia occidentalis, indicative of past disturbance.

St. Maries Watershed

St. Maries River

Plant community occurrences (codes in parentheses refer to survey plots)	
Sparganium eurycarpum	98MJ001
Phalaris arundinacea	

Area surveyed is approximately 1 mile upstream of St. Maries at the public access area. The stand of Sparganium occurs in a depression on the floodplain of the St. Maries River that has been isolated from flood waters of the river by a levee. Adjacent drier areas are dominated by Phalaris arundinacea with some Carex lanuginosa and Carex lenticularis. Levees and road grades support Salix lasiandra, S. bebbiana, and Cornus sericea.

Spokane Watershed

Chilco Lake

Plant community occurrences (codes in parentheses refer to survey plots)	
Phalaris arundinacea	
Alnus incana/Spiraea douglasii	
Populus tremuloides/Spiraea douglasii	96MJ030

Chilco Lake is lined by steep granitic rimrock to the east and rolling morains on the south, west, and north shores. Lakeshore margins are generally a narrow fringe dominated by Phalaris arundinacea with patches of Eleocharis palustris and Typha latifolia. Shrubby margins are dominated by Alnus incana with lesser amounts of Acer glabrum, Amelanchier alnifolia, Salix lutea, and Symphoricarpos albus. Seasonally saturated wetlands occur on the east side of the lake in small depressions and have an overstory of Populus tremuloides and a dense Spiraea douglasii understory. Uplands are dominated by Psuedotsuga menziesii with a Physocarpus malvaceus

understory. Significant amounts of the native grasses Agropyron spicatum and Festuca idahoensis are present on uplands.

Hayden Lake-Mokins Bay

Plant community occurrences (codes in parentheses refer to survey plots)	
Alnus incana./Mesic forb	98MJ039
Salix geyeriana/Barren	

Mokins Creek supports a relatively wide floodplain near its entry into Hayden Lake. The valley bottom is filled with a dense shrub thicket dominated by Alnus sp. and Cornus sericea. A small stand of Salix geyeriana that is inundated is present near the road. The hydrology of the willow stand is likely altered by the road bed.

Lake Creek

Plant community occurrences (codes in parentheses refer to survey plots)
Populus trichocarpa/Symphoricarpos albus
Crataegus douglasii

Hawthorne stands were surveyed on Lake Creek near the Highway 95 bridge and along an intermittent drainage flowing from the north into Lake Creek. Shrublands extend across the valley bottom near the Highway 95 bridge. Stands are somewhat patchy and interupted by open areas with Tanecetum vulgare, Centaurea maculosa, and Phalaris arundinacea. The shrublands are mostly Crataegus douglasiii with Symphoricarpos albus in the understory. Small patches of Heracleum lanatum are associated with what seem to be moister microsites (swales and side channels). Further upstream of the bridge hawthorne stands are more patchy and fragmented and Alnus incana is the dominant shrub with mostly a canary grass understory. Stands of hawthorne are present on a tributary to Lake Creek where the drainages widen to approximately 20 meters. The stands are a dense thicket with some Cornus sericea and symphoricarpos albus. Forbs and graminoids are abundant and many of the species are considered increasers or exotics and include Osmorhiza chiliensis, Urtica dioca, and Poa pratensis. Where the drainage narrows Phalaris arundinacea and Symphoricarpos albus are dominant along with scattered stems of Crataegus.

North Fork Rock Creek

Plant community occurrences (codes in parentheses refer to survey plots)
Populus tremuloides/Spiraea douglasii
Populus trichocarpa/Spiraea douglasii
Populus trichocarpa/Symphoricarpos albus
Crataegus douglasii/Symphoricarpos albus

North Fork Rock Creek, upstream of Worley, occupies a moderately wide valley bottom and contains riparian forests and shrublands. Both black cottonwood and quaking aspen are present as overstory forest dominants. Extensive stands of Spiraea douglasii are present as a community and

in the understory of unshaded cottonwood and aspen stands. Stands of cottonwood with a Symphoricarpos understory seem to have a denser canopy than the Populus trichocarpa/Spiraea douglasii stands. Stands of Crataegus douglasii are also present and occasionally have cottonwood and/or aspen in the overstory.

Appendix E.
Wetland and deepwater habitat data for Hydrologic Units and counties

Wetland and deepwater habitat summaries for digitized quad maps in Hydrologic Unit 17010301 (North Fork Coeur d'Alene drainage).			
COWARDIN TYPE	FREQUENCY	ACRES	PERCENT
PAB3Hh	1	1.32	0.03
PAB4H	2	1.68	0.03
PABH	1	0.55	0.01
PEM/FO1A	1	13.40	0.27
PEM1A	34	231.10	4.67
PEM1C	122	303.35	6.13
PEM1Cb	1	2.51	0.05
PEM1F	7	3.36	0.07
PEM2H	1	1.98	0.04
PFO1A	77	600.53	12.13
PFO1C	115	554.15	11.20
PFO4/SS1A	1	13.41	0.27
PFO4A	33	247.45	5.00
PFO4C	8	41.68	0.84
POWH	26	44.81	0.91
POWHb	2	5.47	0.11
POWHh	1	0.25	0.01
POWHx	1	0.26	0.01
PSS/US1C	1	2.43	0.05
PSS1A	54	251.78	5.09
PSS1B	1	1.13	0.02
PSS1C	442	2129.96	43.04
PSS1Cb	3	21.09	0.43
PUBF	1	0.34	0.01
PUBH	1	0.37	0.01
PUBHb	1	0.20	0.00
PUBHh	3	2.87	0.06
PUBHx	1	0.16	0.00
PSS/EMIC	1	3.95	0.08
PSS1/USC	4	8.43	0.17
R2OWH	1	1.84	0.04
R3OWH	49	253.17	5.12
R3USA	5	14.03	0.28
R3USC	199	189.87	3.84
TOTAL	1201	4948.88	100.00

Wetland and deepwater habitat summaries for digitized quad maps in Hydrologic Unit 17010302 (South Fork Coeur d'Alene drainage).			
COWARDIN TYPE	FREQUENCY	ACRES	PERCENT
L2UBKh	1	181.82	15.77
PEM1A	3	5.88	0.51

PEM1C	27	93.73	8.13
PEM1F	3	12.29	1.07
PEM1Fx	1	0.98	0.09
PFO1A	7	22.06	1.91
PFO1C	38	212.81	18.45
POWFx	1	2.00	0.17
POWH	4	0.79	0.07
POWHh	2	4.29	0.37
POWHx	11	11.24	0.97
POWKx	6	32.07	2.78
PSS1/AB3F	1	3.37	0.29
PSS1A	7	64.38	5.58
PSS1C	19	94.81	8.22
PUBH	4	18.42	1.60
R2OWHx	1	33.76	2.93
R3OWH	10	23.27	2.02
R3UBH	3	1.76	0.15
R3USA	3	15.92	1.38
R3USAs	2	5.43	0.47
R3USC	38	174.89	15.17
R3USCs	44	119.65	10.38
TOTAL	240	1153.20	100.00

Wetland and deepwater habitat summaries for Hydrologic Unit 17010303 (Coeur d'Alene Lake).

COWARDIN TYPE	FREQUENCY	ACRES	PERCENT
L1UBH	126	7880.81	16.49
L1UBHh	7	46.11	0.10
L2AB3H	113	1374.38	2.88
L2AB4H	43	321.97	0.67
L2OWH	2	21.10	0.04
L2USC	1	1.18	0.00
PAB3F	1	2.13	0.00
PAB3H	25	183.06	0.38
PAB4/OWH	5	11.93	0.02
PAB4Fx	1	0.10	0.00
PAB4H	26	59.28	0.12
PABHx	1	0.18	0.00
PABC	1	1.11	0.00
PEM/SS1As	7	63.31	0.13
PEM/SS1C	2	5.75	0.01
PEM1/AB3H	2	41.23	0.09
PEM1A	46	368.28	0.77
PEM1Ad	8	774.80	1.62
PEM1Ads	2	203.82	0.43

PEM1As	19	343.50	0.72
PEM1B	4	1.94	0.00
PEM1C	441	3147.27	6.59
PEM1Cd	19	1316.10	2.75
PEM1Ch	3	1.05	0.00
PEM1Cs	25	402.14	0.84
PEM1Es	1	1.70	0.00
PEM1F	139	851.35	1.78
PEM1Fh	1	0.37	0.00
PEM1Fx	1	0.28	0.00
PEM1H	40	380.69	0.80
PEM2/AB3H	10	127.24	0.27
PEM2Fd	1	62.25	0.13
PEM2H	177	1846.18	3.86
PEMIF	1	2.79	0.01
PFO1A	55	271.53	0.57
PFO1Ah	2	1.70	0.00
PFO1As	5	13.39	0.03
PFO1B	1	0.83	0.00
PFO1C	191	770.81	1.61
PFO1Ch	1	0.99	0.00
PFO1Cs	2	5.52	0.01
POF1A	5	35.15	0.07
POW/AB4H	1	2.53	0.01
POWF	1	0.20	0.00
POWFb	1	0.87	0.00
POWFh	1	0.15	0.00
POWFx	1	0.12	0.00
POWH	66	80.81	0.17
POWHb	3	0.58	0.00
POWHh	37	16.06	0.03
POWHx	57	20.17	0.04
PSS/EM1C	2	17.98	0.04
PSS1A	13	54.59	0.11
PSS1As	13	25.14	0.05
PSS1B	1	0.21	0.00
PSS1C	409	2433.67	5.09
PSS1Cb	1	6.39	0.01
PSS1Cs	6	5.30	0.01
PSS1F	5	22.39	0.05
PUBFb	2	0.93	0.00
PUBFh	2	0.49	0.00
PUBH	11	6.00	0.01

PUBHh	45	14.25	0.03
PUBHx	26	6.83	0.01
PUSC	1	0.61	0.00
PUSCh	2	0.53	0.00
PUSCx	1	0.20	0.00
R2AB3H	1	19.56	0.04
R2OWH	1	4.01	0.01
R2OWHx	3	6.41	0.01
R2USC	47	136.69	0.29
R3OWH	2	1.49	0.00
R3UBF	1	1.56	0.00
R3UBH	1	1.05	0.00
R3USA	38	183.70	0.38
R3USC	20	72.17	0.15
R4SBC	1	1.35	0.00
TOTAL	2790	47783.66	100.00

Wetland and deepwater habitat summaries for digitized quad maps in Hydrologic Unit 17010304 (St. Joe and St. Maries drainages).

COWARDIN TYPE	FREQUENCY	ACRES	PERCENT
L1OWHx	6	27.34	0.16
L1UBHx	5	8.32	0.05
L2AB4H	4	18.50	0.11
PAB3/4H	3	3.68	0.02
PAB3H	8	17.67	0.10
PAB4F	1	1.94	0.01
PAB4Fh	1	0.21	0.00
PAB4H	40	135.00	0.79
PAB4Hh	2	0.53	0.00
PEM/SS1C	2	11.65	0.07
PEM1/2H	19	160.56	0.94
PEM1/OWFb	1	9.28	0.05
PEM1/SS1Cb	1	6.35	0.04
PEM1A	126	1670.31	9.80
PEM1B	7	8.85	0.05
PEM1C	509	4763.94	27.96
PEM1Cd	3	36.12	0.21
PEM1F	86	355.06	2.08
PEM1Fb	3	1.45	0.01
PEM1H	11	55.18	0.32
PEM1K	5	69.78	0.41
PEM2H	39	192.44	1.13
PEM2K	1	53.41	0.31
PEMCh	1	0.28	0.00

PFO1A	55	143.85	0.84
PFO1C	456	1858.51	10.91
PFO4A	3	27.63	0.16
PFO4C	3	18.89	0.11
POWF	6	2.38	0.01
POWFb	10	4.61	0.03
POWFh	1	0.25	0.00
POWH	19	49.99	0.29
POWHb	19	11.71	0.07
POWHh	15	4.52	0.03
POWHx	59	25.60	0.15
PSS1A	42	103.29	0.61
PSS1B	6	3.75	0.02
PSS1C	431	2356.60	13.83
PSS1Cx	3	6.43	0.04
PSS1F	1	6.24	0.04
PSS1Fb	1	0.46	0.00
PUBF	3	0.80	0.00
PUBFb	1	0.16	0.00
PUBFx	3	3.86	0.02
PUBH	26	22.85	0.13
PUBHb	46	13.44	0.08
PUBHd	1	0.31	0.00
PUBHh	4	1.49	0.01
PUBHx	30	21.26	0.12
PUSAx	3	2.16	0.01
PUSC	1	0.08	0.00
PUSCx	3	1.45	0.01
R2OWH	6	14.81	0.09
R2OWHx	1	2.48	0.01
R3OWH	1	4.05	0.02
R3UBH	233	1097.04	6.44
R3USA	1	1.55	0.01
R3USC	144	149.88	0.88
TOTAL	2587	17039.08	100.00

Wetland and deepwater habitat summaries for Hydrologic Unit 17010305 (Upper Spokane drainage).

COWARDIN TYPE	FREQUENCY	ACRES	PERCENT
L1UBHh	86	801.49	8.73
L2AB3H	40	147.38	1.60
L2AB4H	6	1.61	0.02
L2UBF	10	9.10	0.10
L2UBFh	3	3.46	0.04
L2USC	1	0.58	0.01

PAB3H	12	10.24	0.11
PAB3Hx	1	3.24	0.04
PABHh	1	0.33	0.00
PEM1A	19	76.09	0.83
PEM1Ad	1	38.52	0.42
PEM1B	5	2.92	0.03
PEM1C	123	874.29	9.52
PEM1CD	6	414.47	4.51
PEM1Cd	3	285.03	3.10
PEM1Ch	10	11.25	0.12
PEM1F	27	213.69	2.33
PEM1Fh	7	4.95	0.05
PEM1Fx	1	1.69	0.02
PEM1H	6	4.00	0.04
PEM2H	3	5.20	0.06
PFO1A	19	70.07	0.76
PFO1Ah	4	3.34	0.04
PFO1B	2	0.90	0.01
PFO1C	77	252.32	2.75
POWHH	3	5.05	0.06
POWHX	2	0.69	0.01
PSS1A	4	43.17	0.47
PSS1B	1	0.49	0.01
PSS1C	69	269.11	2.93
PSS1Ch	4	2.51	0.03
PSS1F	1	0.30	0.00
PSS4C	2	8.56	0.09
PUB/AB4H	2	2.55	0.03
PUB/AB4Hx	1	0.33	0.00
PUBFH	1	1.68	0.02
PUBH	29	16.43	0.18
PUBHh	28	12.03	0.13
PUBHx	34	18.08	0.20
PUSCx	1	0.27	0.00
R2UBH	1	0.99	0.01
R3UBH	40	186.47	2.03
R3USC	9	4.46	0.05
TOTAL	921	9184.90	100.00

Wetland and deepwater habitat summaries for Hydrologic Unit 17010306 (Middle Spokane drainage).

COWARDIN TYPE	FREQUENCY	ACRES	PERCENT
PAB4Fx	2	1.64	0.10
PAB4H	1	0.22	0.01
PEM1A	42	149.23	9.29

PEM1Ad	3	29.76	1.85
PEM1C	89	486.65	30.30
PEM1Cd	1	49.37	3.07
PEM1Ch	2	2.15	0.13
PEM1F	9	2.93	0.18
PFO1A	34	156.21	9.73
PFO1C	27	163.58	10.19
PFO4A	11	89.95	5.60
POW/AB4Fh	1	0.20	0.01
POW/AB4Hh	1	0.94	0.06
POWH	13	2.90	0.18
POWHb	5	2.11	0.13
POWHh	18	6.73	0.42
POWHx	68	30.38	1.89
PSS1A	22	81.18	5.06
PSS1C	47	343.96	21.42
R2OWH	1	5.39	0.34
TOTAL	398	1605.94	100.00

Wetland and deepwater habitat summaries for Benewah County.

COWARDIN TYPE	FREQUENCY	ACRES	PERCENT
L1OWH	64	3292.92	24.06
L1OWHx	6	27.34	0.20
L1UBHx	5	8.32	0.06
L2AB4H	4	18.50	0.14
PAB3Fx	1	0.45	0.00
PAB3H	5	12.76	0.09
PAB4F	1	1.94	0.01
PAB4Fh	1	0.21	0.00
PAB4Fx	2	1.64	0.01
PAB4H	39	129.14	0.94
PEM/SS1C	2	11.65	0.09
PEM1/2H	19	160.56	1.17
PEM1/OWFb	1	9.28	0.07
PEM1/SS1Cb	1	6.35	0.05
PEM1A	88	640.67	4.68
PEM1Ad	1	3.45	0.03
PEM1B	6	8.06	0.06
PEM1C	434	4237.25	30.96
PEM1Cd	2	35.77	0.26
PEM1Ch	2	2.15	0.02
PEM1F	88	344.00	2.51
PEM1Fb	3	1.45	0.01
PEM1H	11	55.18	0.40

PEM1K	5	69.78	0.51
PEM2H	39	192.44	1.41
PEM2K	1	53.41	0.39
PEMCh	1	0.28	0.00
PFO1A	46	197.50	1.44
PFO1C	295	1258.64	9.20
PFO4A	7	58.16	0.42
POW/AB4Fh	1	0.20	0.00
POW/AB4Hh	1	0.94	0.01
POWF	6	2.38	0.02
POWFb	10	4.61	0.03
POWH	32	62.80	0.46
POWHb	24	13.82	0.10
POWHh	26	8.28	0.06
POWHx	103	45.77	0.33
PSS1A	27	91.65	0.67
PSS1B	3	1.26	0.01
PSS1C	336	2075.20	15.16
PSS1Cx	3	6.43	0.05
PSS1F	1	6.24	0.05
PUBF	2	0.49	0.00
PUBFx	3	3.82	0.03
PUBH	12	9.43	0.07
PUBHb	17	5.80	0.04
PUBHd	1	0.31	0.00
PUBHh	4	1.49	0.01
PUBHx	27	15.55	0.11
PUSAx	3	2.16	0.02
PUSC	1	0.08	0.00
PUSCx	3	1.45	0.01
R2OWH	7	20.20	0.15
R2OWHx	1	2.48	0.02
R3OWH	1	4.05	0.03
R3UBH	56	437.93	3.20
R3USA	1	1.55	0.01
R3USC	12	19.75	0.14
TOTAL	1904	13685.37	100.00

Wetland and deepwater habitat summaries for Kootenai County.

COWARDIN TYPE	FREQUENCY	ACRES	PERCENT
L1UBH	342	13256.34	22.54
L1UBHh	93	847.59	1.44
L2AB3H	153	1521.75	2.59
L2AB4H	49	323.57	0.55

L2OWH	2	21.10	0.04
L2UBF	10	9.10	0.02
L2UBFh	3	3.46	0.01
L2USC	2	1.76	0.00
PAB3F	1	2.13	0.00
PAB3H	37	193.30	0.33
PAB3Hx	1	3.24	0.01
PAB4/OWH	5	11.93	0.02
PAB4Fx	1	0.10	0.00
PAB4H	26	59.28	0.10
PABHh	1	0.33	0.00
PABHx	1	0.18	0.00
PARC	1	1.11	0.00
PEM/SS1As	7	63.31	0.11
PEM/SS1C	2	5.75	0.01
PEM1/AB3H	2	41.23	0.07
PEM1A	67	451.58	0.77
PEM1Ad	11	839.63	1.43
PEM1Ads	2	203.82	0.35
PEM1As	19	343.50	0.58
PEM1B	9	4.87	0.01
PEM1C	594	4274.36	7.27
PEM1CD	6	414.47	0.70
PEM1Cd	23	1650.50	2.81
PEM1Ch	13	12.29	0.02
PEM1Cs	25	402.14	0.68
PEM1Es	1	1.70	0.00
PEM1F	169	1058.85	1.80
PEM1Fh	8	5.32	0.01
PEM1Fx	2	1.98	0.00
PEM1H	46	384.69	0.65
PEM2/AB3H	10	127.24	0.22
PEM2Fd	1	62.25	0.11
PEM2H	180	1851.38	3.15
PEMIF	1	2.79	0.00
PFO1A	84	405.40	0.69
PFO1Ah	6	5.05	0.01
PFO1As	5	13.39	0.02
PFO1B	3	1.74	0.00
PFO1C	286	1170.97	1.99
PFO1Ch	1	0.99	0.00
PFO1Cs	2	5.52	0.01
PFO4/SS1A	1	13.41	0.02

PFO4A	26	185.84	0.32
POF1A	5	35.15	0.06
POWF	1	0.20	0.00
POWFb	1	0.87	0.00
POWFh	2	0.40	0.00
POWFx	1	0.12	0.00
POWH	59	59.80	0.10
POWHH	3	5.05	0.01
POWHX	2	0.69	0.00
POWHb	3	0.58	0.00
POWHh	45	19.28	0.03
POWHx	81	30.37	0.05
PSS/EM1C	2	17.98	0.03
PSS1A	32	141.84	0.24
PSS1As	13	25.14	0.04
PSS1B	2	0.70	0.00
PSS1C	612	3721.55	6.33
PSS1Cb	4	27.48	0.05
PSS1Ch	4	2.51	0.00
PSS1Cs	6	5.30	0.01
PSS1F	6	22.69	0.04
PSS4C	2	8.56	0.01
PUB/AB4H	2	2.55	0.00
PUB/AB4Hx	1	0.33	0.00
PUBFH	1	1.68	0.00
PUBFb	2	0.93	0.00
PUBFh	2	0.49	0.00
PUBH	40	22.43	0.04
PUBHh	76	29.15	0.05
PUBHx	60	24.91	0.04
PUSC	1	0.61	0.00
PUSCh	2	0.53	0.00
PUSCx	2	0.48	0.00
R2AB3H	1	19.56	0.03
R2OWH	1	4.01	0.01
R2OWHx	3	6.41	0.01
R2UBH	1	0.99	0.00
R2USC	47	136.69	0.23
R3OWH	4	4.38	0.01
R3UBH	41	187.52	0.32
R3USA	4	5.68	0.01
R3USC	64	113.21	0.19
R4SBC	1	1.35	0.00

TOTAL	3995	58821.76	100.00
Wetland and deepwater habitat summaries for digitized quad maps in Shoshone County.			
COWARDIN TYPE	FREQUENCY	ACRES	PERCENT
L2UBKh	1	181.82	2.00
PAB3/4H	3	3.68	0.04
PAB3H	3	4.91	0.05
PAB3Hh	1	1.32	0.01
PAB4H	4	7.76	0.09
PAB4Hh	2	0.53	0.01
PABH	1	0.55	0.01
PEM/FO1A	1	13.40	0.15
PEM1A	120	1408.65	15.47
PEM1B	1	0.79	0.01
PEM1C	291	1128.82	12.40
PEM1Cd	1	0.36	0.00
PEM1F	15	35.84	0.39
PEM1Fx	1	0.98	0.01
PEM2H	1	1.98	0.02
PFO1A	119	661.34	7.26
PFO1C	331	1382.56	15.18
PFO4A	11	95.54	1.05
PFO4C	11	60.57	0.67
POW/AB4H	1	2.53	0.03
POWFx	1	2.00	0.02
POWH	38	56.70	0.62
POWHb	2	5.47	0.06
POWHh	2	4.29	0.05
POWHx	12	11.50	0.13
POWKx	6	32.07	0.35
PSS/US1C	1	2.43	0.03
PSS1/AB3F	1	3.37	0.04
PSS1A	77	323.33	3.55
PSS1B	4	3.62	0.04
PSS1C	473	1830.47	20.10
PSS1Fb	1	0.46	0.00
PUBF	2	0.64	0.01
PUBFb	1	0.16	0.00
PUBFx	1	0.03	0.00
PUBH	18	31.84	0.35
PUBHb	19	4.48	0.05
PUBHx	4	5.87	0.06
PSS/EMIc	1	3.95	0.04
PSS1/USc	4	8.43	0.09

R2OWH	1	1.84	0.02
R2OWHx	1	33.76	0.37
R3OWH	57	273.54	3.00
R3UBF	1	1.56	0.02
R3UBH	183	660.86	7.26
R3USA	42	207.98	2.28
R3USAs	2	5.43	0.06
R3USC	334	458.33	5.03
R3USCs	44	119.65	1.31
TOTAL	2256	9105.52	100.00

Appendix F.

Taxonomy, range, status, and management of rare animal species in the Spokane River Basin (from Groves et al. 1997).

Birds

Aechmorphis occidentalis
Bartramia longicauda
Chlidonias niger
Glaucidium gnoma
Haliaeetus leucocephalus
Histrionicus histrionicus
Strix varia

Amphibians and Reptiles

Bufo boreas
Plethodon idahoensis
Rana pipiens
Rana pretiosa
Rana sylvatica
Elgaria coeurulea

Mammals

Martes pennanti
Myotis yumanensis
Myotis thysanodes
Myotis volans
Myotis californicus

NOTE: Appendix E not available in CDC homepage version.