Ecologically Significant Wetlands

in the Flathead, Stillwater, and Swan River Valleys

FINAL REPORT

JUNE 1, 1999

Submitted to

the Montana Department of Environmental Quality

Prepared by
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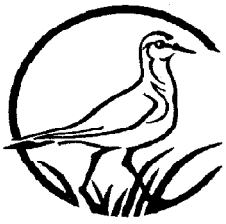

MONTANA
Natural Heritage
Program

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Abstract

The Montana Natural Heritage Program received a wetland protection grant from the Environmental Protection Agency to identify and inventory ecologically significant wetlands and prioritize them for conservation, restoration, and mitigation applications. Much of the state lacks basic information about its wetland resources like National Wetland Inventory maps, and there is even less information available about which of the remaining wetlands are functionally intact and of high quality. This report summarizes the results of a field inventory of high quality wetlands in the Flathead Valley.

The project focused on both public and private wetlands found in the Flathead Lake, Stillwater, and Swan drainages in the Flathead River watershed. We identified potential wetlands for inventory by querying locally knowledgeable individuals, and by using National Wetland Inventory maps, aerial imagery, and agency data. Criteria used to select wetlands for inventory included large size, wetlands without geomorphic or hydrologic modification, presence of intact native plant communities, presence of concentrations of rare plants or animals, and intact uplands. Of the approximately 100 potential wetlands that were identified, 54 appear in this report.

The ecological assessment of each wetland focussed primarily on vegetation, documenting the types of wetland communities present, their quality and condition, and rare or sensitive plant species present. We also recorded information on selected hydrologic and soil variables used in hydrogeomorphic assessments, and the quality/condition of the surrounding landscape as it related to functional integrity.

Our observations indicate that some types of wetlands, like wet meadows and valley bottom riparian communities, have decreased in acreage and quality in the last 150 years, while some types of marsh communities, like cattail communities, are likely more common than they were historically. Peatlands and forested wetlands, such as spruce swamps, are intrinsically rare and provide outstanding habitat for wildlife and rare plants and animals.

The quality and significance of each site was ranked, and sites were placed in one of four categories based on size, wetland condition, upland condition, the diversity of plant communities and wetland features at the site, and presence of rare species and communities. Options and priorities for protecting sites, such as special status designation of public lands or placing sites under conservation easements or in the Wetland Reserve Program, are summarized. Detailed descriptions of wetland sites and communities are presented in appendices. Land managers can apply the process presented here to help evaluate wetlands which were not inventoried.

The wetland information presented here can be used to prioritize wetlands for conservation, identify irreplaceable wetlands, identify reference wetlands, identify potential mitigation sites, provide a context for wetland permit review, and provide information for landuse decisions.

INTRODUCTION

PURPOSE AND SIGNIFICANCE

Wetlands in North America have historically been viewed as unproductive lands with little value to society (Mitsch and Gosselink1993). As a consequence, swamps, marshes, sloughs, and other wetlands have long been drained, filled, and otherwise manipulated to produce goods and services with more value to society. The result of these efforts has been the estimated loss of over half of the conterminous United States' wetland acreage since the 1780's, and a loss of about 25% of Montana's wetland acreage in the same time period (Dahl 1990).

In the last 20 years, however, as awareness of the cumulative losses and impacts to wetlands has grown, so, too, has society's awareness of the numerous ecosystem services provided by wetlands, as well as their economic value; the most recent estimate valued global wetland ecosystem services at $4.9 trillion/year (Costanza et al. 1997). Efforts to protect wetlands have intensified also, and take many forms: acquisition, creation, education, incentives, management, regulation, research, and restoration, to name a few (World Wildlife Fund 1992).

For conservation efforts to be most effective, baseline information must be gathered via wetland inventories to document the location and types of wetlands that exist in an area. The need for wetland inventory information was recognized by the Montana Wetland Council in its Draft Conservation Strategy (Montana Wetland Council Strategy Working Group 1997). This inventory can take many forms, from the National Wetland Inventory's (NWI) mapping of wetlands determined by remote sensing to field inventories of high quality wetlands such as was conducted by the Montana Natural Heritage Program (MTNHP) in 1998.

The purpose of MTNHP's wetland inventory is to identify and inventory ecologically significant wetlands and prioritize them for conservation, restoration, and mitigation applications. Although Montana is one of the few states to have a relatively comprehensive wetland vegetation classification, a comparable inventory of wetlands – one that details location, community composition, condition, functional integrity, and conservation significance – has been sorely lacking. MTNHP's wetland inventory is significant because it will provide government agencies, watershed groups, land trusts, local planners, Conservation Districts, and others involved in wetland protection efforts access to reliable information on the diversity of wetland types, where they are, and their relative significance, in order to effectively prioritize wetland conservation efforts. Good wetland information can help ensure that protection, mitigation, and restoration efforts target the full range of wetland diversity, including those wetlands which are outstanding, unique, or which contribute most to watershed integrity and function. Until now, access to such information in Montana has been limited because it resides in various formats among different agencies or because it has not been collected.

In other western states such as Idaho, Colorado, and Oregon, similar wetland inventories have been underway for several years. These inventories have

contributed directly to the protection of wetlands in these states. For example, in Idaho, the Forest Service, Bureau of Land Management, and Natural Resources Conservation Service have used the inventory results to strategically focus protection efforts on high quality wetlands identified by the inventory, through natural area designation or inclusion in the Wetland Reserve Program. The emphasis of these inventories is on protecting and restoring existing wetlands, rather than creating new wetlands. Although wetland creation is sometimes a necessary mitigation practice, studies of created wetlands reveal the mixed success that such projects have had at creating functioning wetland (e.g. Mitsch et al. 1998). Protecting existing wetlands has the greatest chance of conserving wetland functions, and wetland restoration can be a cost effective way of protecting wetlands (e.g. restoring hydrologically altered sites.)

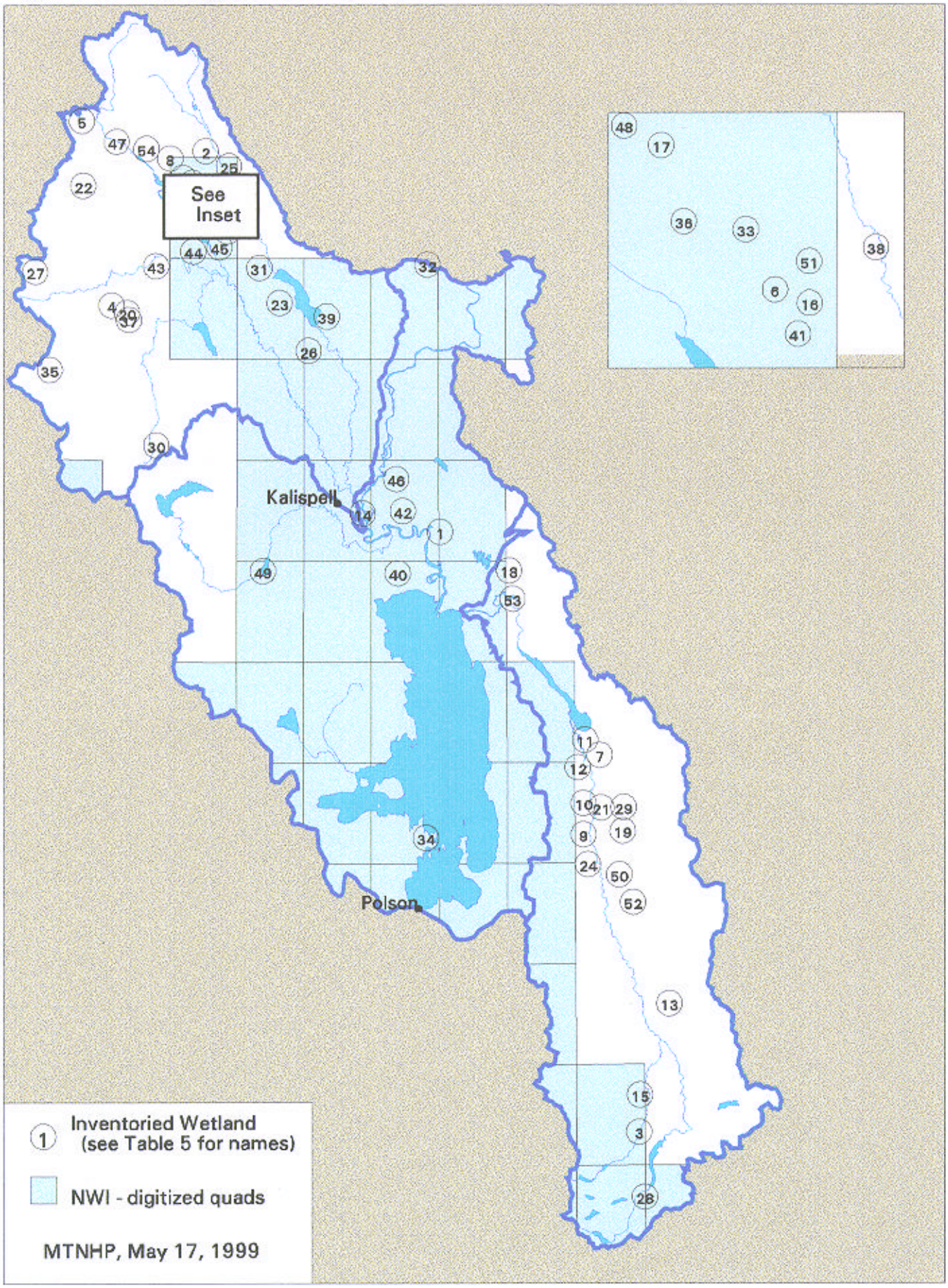
Through consultation with the Wetland Council, MTNHP identified several subdrainages of the Flathead River watershed as the study area for this wetland inventory (Figure 1). The Flathead supports one of the greatest and most diverse concentrations of wetlands in the Rocky Mountains, including peatlands, oxbow ponds, springs and seeps, complexes of pothole ponds, vernal pools, and beaver ponds. Like other areas of the arid West, the importance of wetlands in the Flathead far exceeds their relatively small area.

CLARIFICATION OF TERMS

The sites which were examined in this inventory fall within the definition of wetlands used by Cowardin et al. (1979) because they all had at least one of the following attributes: hydrophytic vegetation, hydric soils, and wetland hydrology. This definition includes riparian areas, wet meadows, and vernal pools.

We use several wetland terms in this report that can be interpreted in more than one way, so following are some definitions to clarify the meaning of these terms. **Marshes** are seasonally to permanently flooded wetlands dominated by emergent herbaceous vegetation. Marshes generally form on mineral soil, but some peat accumulation can occur because of the tremendous productivity of marsh vegetation. In contrast, **peatlands** are wetlands that accumulate peat, or partially decomposed plant matter. All the peatlands in Montana are **fens**, whose water source is predominantly groundwater, as opposed to **bogs**, whose water source is predominantly precipitation. Peatlands dominated by shrubs are known as **carrs**, and carrs are sometimes best developed in the **lagg**, or moat-like ring sometimes found the outer margin of the peatland. A wetland dominated by trees is known as a **swamp**. **Sedge meadows** occur in shallow basins and have limited peat development because they usually dry down for part of the growing season; in Montana, they are frequently dominated by slender sedge (*Carex lasiocarpa*), which is also common in fens. The terms **slope**, **riverine**, **depressional**, and **lacustrine fringe** wetlands are all used as defined by Smith et al. (1995).

Figure 1. Drainages in which 1998 wetland inventory was performed.



STUDY AREA

The study area is located in northwest Montana in three drainages of the Flathead River watershed: the Swan River drainage, Stillwater River drainage, and Flathead Lake (Figure 1). These drainages correspond to 4th Code U.S.G.S. Hydrologic Units (HUC's 17010211, 17010210, and 17010208, respectively). The total acreage of this area is 1.7 million acres.

The study area is within the Flathead Valley (M333B) and Northern Rockies (M333C) ecoregional sections (Nesser et al. 1997). The lower elevations in the study area are predominantly (or have the potential to be) forested with conifers, with ponderosa pine and Douglas fir dominant in drier areas and grand fir, spruce, and western redcedar dominant in more mesic areas. Douglas fir, western larch, and subalpine fir are dominant at mid-elevations, and whitebark pine and subalpine fir are dominant at higher elevations (Sirucek and Bachurski 1995).

The parent materials in the study area are predominantly sedimentary rocks of the Belt formation. Major rock types are argillite, quartzite, and siltite, with localized areas of limestone. The large low elevation valleys were scoured by several advances of continental glaciers during the Pleistocene, and higher mountains were acted on by alpine glaciers. Since the retreat of the glaciers, valley bottoms have been subjected to alluvial processes. Many lakes and wetlands occur on glacially influenced landforms like kettle ponds, outwash plains, and foothills moraines (Alt and Hyndman 1986).

The climate of the study area is strongly influenced by Pacific maritime weather systems. Winters are cool, cloudy, and wet. On average, most precipitation during a year falls between September and February, but June is usually the wettest single month. Kalispell averages 42cm (16.4 inches) of precipitation per year, and has an average yearly temperature of 5.8°C (42.4°F); the highest mountain ridges nearby average about 256cm (100 inches) of precipitation. Summers are warm and dry with cool nights (NOAA 1993, Sirucek and Bachurski 1995).

STATUS OF NATIONAL WETLAND INVENTORY IN STUDY AREA

Large scale final NWI maps have been completed for all of the quads in the study area, and digitized NWI maps exist for a portion of the quads (Figure 1). We summarized wetland area for different classes of wetlands for the digitized quads (Figure 2A-C).
A majority of the wetlands in the study area for which digitized quads are available fall into Cowardin's (1979) lacustrine system, primarily because Flathead Lake is in the study area (Figure 2B). If the deepwater habitat (i.e. lacustrine limnetic) is removed from consideration and one looks at the percentage of different Cowardin wetland classes in the study area, it is clear that the dominant wetland class is emergent wetlands (Figure 2C). The aquatic bed class makes up a surprisingly large portion of the wetland classes (20.5%), with scrub-shrub and forested classes comprising smaller portions of the wetland acreage.

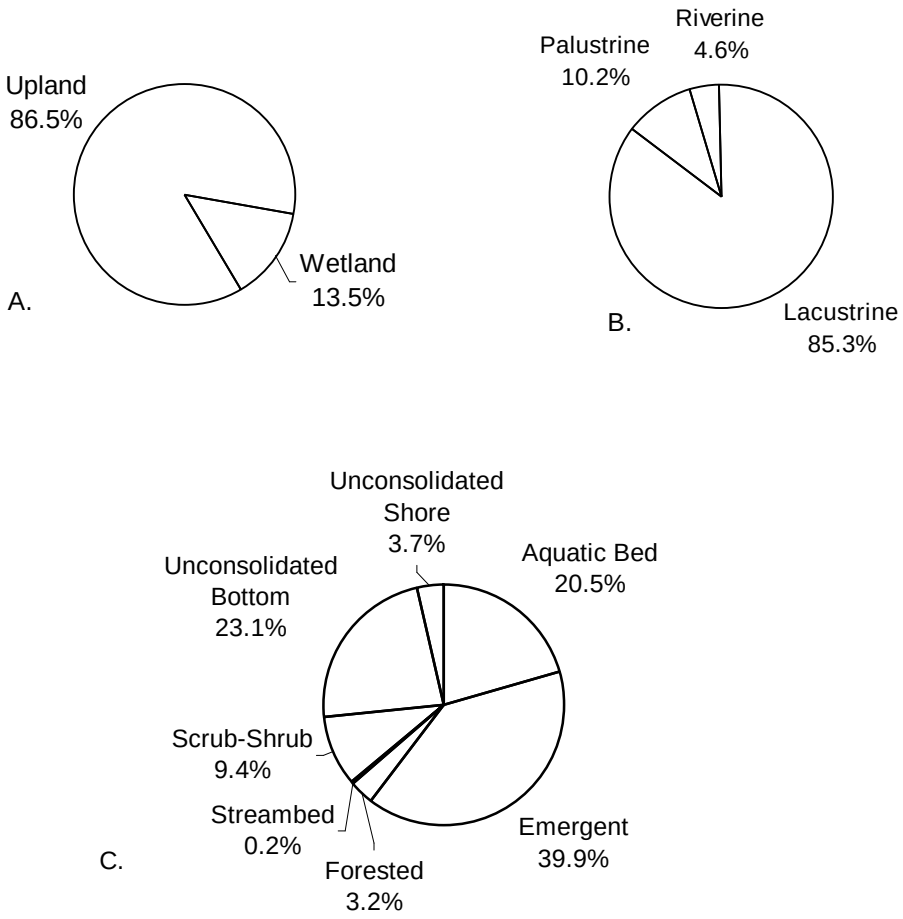


Figure 2. A. Percentage of upland and wetland from digitized NWI maps in study area. B. Percentage of different Cowardin wetland systems from digitized NWI maps in study area. C. Percentage of different Cowardin wetland classes (excluding deepwater classes) from digitized NWI maps in study area.

METHODS

IDENTIFYING AND SELECTING WETLANDS FOR INVENTORY

Several sources of information were consulted to identify wetlands for potential inclusion in the wetland inventory. We first contacted individuals with local knowledge of wetland resources. This list of public and private sector groups included: U.S. Forest Service, U.S. Fish and Wildlife Service, Natural Resource Conservation Service, Montana Department of Fish, Wildlife, and Parks, Montana Department of Natural Resources and Conservation, Confederated Salish and Kootenai Tribes, Riparian and Wetland Research Program, Flathead Lake Biological Station, The Nature Conservancy, ecological consultants, and members of the Montana Native Plant Society. We asked them to identify wetlands they considered ecologically significant, based on the following criteria: sites without major hydrologic or geomorphic modifications,

sites with intact, representative native plant communities, sites with concentrations of rare plant or animal species, sites within established grazing exclosures, or sites with outstanding value as wildlife habitat. We also identified potential sites by inspecting the Flathead National Forest map, National Wetland Inventory maps, and U.S.G.S. quad maps.

About 100 sites were identified through this process, and they are listed in Appendix A. We prioritized the sites using the following guidelines:

- Emphasize larger wetlands over smaller wetlands
- Emphasize sites without geomorphic and hydrologic modification
- Emphasize sites with intact native plant communities, both in the wetland and in the uplands surrounding the wetland
- Emphasize sites with known concentrations of rare plants and animals

Aerial photos from the Flathead National Forest, feedback from the locally knowledgeable individuals, and existing wetland reports were used to aid the selection process. The above guidelines were designed to be flexible and not absolute, since the significance of the wetland depends in part on its landscape context. For example, a valley bottom wetland which is surrounded by lands used for agriculture and which has some irrigation withdrawals and exotic species might nevertheless be considered a priority for inventory if it still has intact native plant communities. If the same wetland were located on state forest lands and surrounded by intact upland forest communities, it might not have been a high priority for inventory if it had the same irrigation withdrawals and exotic species noted above.

Additional wetlands for inventory were identified during the course of fieldwork. Some wetlands that merited inventory were not field-visited because sufficient information from previous fieldwork was already stored in MTNHP files; several peatlands and U.S. Forest Service Research Natural Areas fell into this category. Sixty-three wetlands were inventoried during the 1998 field season.

DATA COLLECTION

Wetlands were surveyed during the summer of 1998 following standard methodology to assess site condition, catalog community types, and document rare plant and animal occurrences (Bougeron et al. 1992). Specifically, we attempted to walk through all wetland plant communities at any given site, except where prevented by deep water. The dominant species in each stratum and ocular estimates of their canopy coverage were noted, as was an estimate of the acreage of each community. We classified each wetland plant community using Hansen et al. (1995) and noted the condition of each community, including: presence of exotic species, evidence of hummocking or pugging, presence of ditches, dikes, riprap, and other geomorphic and hydrologic modifications, presence of old growth conditions in forests, depth of standing water, and beaver activity. A blank field data form is included in Appendix B. For plant communities not previously described or which are uncommon, detailed community plot information was gathered.

At each site the hydrogeomorphic (HGM) class and subclass (Smith et al. 1995) were noted, as were the Cowardin system/subsystem, class/subclass, and

hydrologic regime (Cowardin et al. 1979). We also made notes about offsite landuses and spoke to landowners/ managers about landuse history when possible. A cursory rare plant survey was conducted during our walk-through of each wetland.

Faunal surveys were conducted for selected wetlands. These surveys focussed on animal groups that are ecologically important in wetlands, but inconspicuous and not well documented. This work included surveys for amphibians and snails as well as for carabid beetles, a family of predaceous beetles that includes a diversity of wetland/riparian specialists.

Although no wetland delineations or formal wetland functional assessments were performed as part of this project, MTNHP's wetland inventory was informed by two regional HGM models being developed by researchers at the Flathead Lake Biological Station (Hauer et al. 1999, Hauer 1998). For instance, at some sites the depth of two soil horizons, the O horizon and A horizon, was measured in some plant communities. This variable is measured in the intermontane pothole HGM model, and it represents the long-term store of nutrients in the soil and acts as an index of the characteristic decomposer community in the wetland (Hauer et al. 1999). A very thick A horizon, for example, can mean an excessive amount of upland erosion is taking place. This and other soil data (see field form, Appendix B) was gathered for some wetlands.
About one-fourth of the sites were on private land. Landowners were contacted for permission to gain access to their property prior to site visits. Users of this wetland inventory report should note that they, too, need to get permission before entering private lands.

DATA MANAGEMENT

We created four types of database records for the data we gathered: community **plot** records, community **occurrence** records, **site** records, and community **abstracts**. Wetland plant community plot information (e.g. species composition and cover data) was entered into ECADS, a database developed by the U.S. Forest Service for managing ecological data (Jensen et al. 1993). We created a wetland plant community occurrence record for each community at each site. Community occurrence information (e.g. HGM class, Cowardin class/subclass, dominant species, hydrology, landscape setting) was entered in the Biological and Conservation Data System (BCD), a database developed by The Nature Conservancy and used by Heritage Programs across the country. Summary information about each site as a whole (e.g. general site descriptions, on- and offsite landuses, management needs) was also entered into the appropriate module in BCD. Detailed community abstracts were created which characterize both common and rare wetland plant communities. Information about community range, typical landscape setting, typical species composition, and successional and management information was synthesized from a variety of sources and is being stored temporarily in a word processing template, for later uploading into a new BCD module being developed. The boundaries of each wetland site were digitized and stored as polygons in a GIS layer.

RANKING OF COMMUNITIES AND SITES

Plant community rarity was ranked using the same protocol that was developed by The Nature Conservancy for ranking 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 either rangewide (for global or G ranks) or statewide (for state or S ranks). Secondarily, trends in condition, threats, and fragility contribute to ranks when this information is known. The ranks are scaled from 1 to 5, with G1 indicating that the community is critically imperiled rangewide, and a G5 indicating no risk of extinction. Guidelines used to assign community ranks are included in Appendix C.

A list of wetland and riparian plant communities found in the study area was assembled based on field data gathered for this inventory and range comments found in Pfister et al. (1977), Hansen et al. (1995), and Sirucek and Bachurski (1995). Preliminary global and state community ranks were obtained from the Western Regional Office of The Nature Conservancy. This list of communities with preliminary ranks was sent to a panel of experts with broad knowledge of wetland plant communities statewide, who further refined the ranks. These ranks are not static but will change as more community information is collected from across the state.

Each individual wetland community occurrence was also ranked into one of four categories (A, B, C, or D) using a protocol developed by The Nature Conservancy (The Nature Conservancy 1998). Community size, condition, and landscape context were used to rank each community occurrence. Each of these factors was evaluated for each community and assigned a rank of A to D, and then the ranks of all the factors were averaged for a final community occurrence rank. Community occurrence ranks are not presented in this report; however, they are available upon request. Community occurrence ranks were not explicitly used for ranking sites, but the community occurrence ranking factors were considered during the site ranking process (see below).

Wetland sites were ranked using methods similar to those used to rank wetlands in Idaho and Washington (Washington Department of Ecology 1991, Jankovsky-Jones 1997, Chadde et al. 1998). Each wetland site was evaluated on 5 factors (Table 1). Each factor at each site was assigned a score of 0 to 3, and then all scores at a site were summed for a total ranging from 0 to 15. Presence of rare species as well their degree of rarity influenced the rarity score; for example, presence of a single globally rare species was rated higher than presence of a single state rare species. The condition and landscape context of all the community occurrences at a site was considered when assigning the condition and uplands scores, respectively. The scores of all the sites were then arranged from highest to lowest, and the distribution of scores was divided into quartiles. Each of these quartiles defined a category of site quality or significance. The four categories are described below.

Table 1. Definitions and criteria for ranking sites according to degree of ecological significance.

CRITERIA		DEFINITION	INDICATORS	RANKING SCORES
Richness		Habitat diversity within site	• Assemblage of numerous plant communities within single unit of Cowardin's classification • Assemblage of plant communities or ecological features (e.g. beaver ponds, peatlands, lakes) within several units of Cowardin's classification (= high structural diversity)	3. Site has high diversity of vegetation types or wetland features. 2. Site has a moderate diversity of vegetation types or wetland features. 1. Site has low diversity of vegetation types or wetland features.
Rarity		Presence of state rare plant community, plant or animal species, and degree of rarity	• High concentration of state rare plant or animal species • Presence of globally rare species or communities	3. Site has high concentration of rare species or communities. 2. Site has moderate concentration of rare species or communities. 1. Site has low concentration of rare species or communities 0. Site has no rare species or communities
Viability	Condition	Extent to which site conditions (e.g. processes, communities) depart from range of natural variation	Presence of on-site impacts (e.g. exotics, grazing, roads, ditching, irrigation withdrawal, recreational use, timber harvest)	3. Site in excellent condition; human impacts absent or minimal. 2. Site in good condition; some impacts apparent. 1. Site in poor condition; many impacts present.
	Size	Areal extent of wetland	Acreage	3. Site is large (>40 acres). 2. Site is moderately large (≤40 acres) 1. Site is small (≤20 acres) 0. Site is very small (≤5 acres)
	Uplands	Landuse in surrounding uplands	Presence of off-site impacts (e.g. timber harvest, roads, homes, non-native vegetation)	3. Site with minimal off-site impacts. 2. Site with moderate level of off-site impacts. 1. Site with high level of off-site impacts.

OUTSTANDING SIGNIFICANCE

Sites in this category represent the most ecologically significant wetlands in the survey area. These wetlands are large and composed of a diverse array of plant communities and other important wetland features such as peatlands, beaver ponds, and springs, which provide a diversity of habitats for wildlife. These are pristine sites which typically provide habitat for concentrations of state rare plant and animal species. The wetland plant communities at these sites are generally in excellent condition. There are minimal anthropogenic influences at these sites, so the wetland functions are largely intact and most likely fall within the range of natural variation. Finally, the uplands surrounding these sites tend to be fairly intact, thus maintaining the sites' hydrologic regime. Impacts to these sites are not fully mitigable, and any alterations to such sites could lead to significant degradation.

VERY HIGH SIGNIFICANCE

Wetlands in this category are generally composed of diverse, high quality plant communities, but they are distinguished from the previous category of wetlands by having a larger degree of anthropogenic disturbance either on- or off-site (e.g. logging in the uplands near the site, grazing on a portion of the site, etc.). They may support concentrations of state rare plant or animal species, and they tend to be large. Most of the wetland plant communities at these sites are in excellent condition, but a few may have some moderate impacts. Improvement in resource management at these sites, such as changing grazing management plans or reducing trapping pressure on beaver, would improve the overall suite of wetland functions at this type of site and could put them on a trajectory to become an Outstanding significance site.

HIGH SIGNIFICANCE

High significance sites tend to have a lower diversity of types of wetland plant communities than either of the two previous categories, although they still tend to be large. These sites may support populations of rare plants and animals, but they usually have fewer different species than wetlands in the two previous categories. The degree of anthropogenic disturbance at these sites tends to be similar to that in the previous category. Most of the wetland plant communities at these sites are in excellent condition, but a few may have some moderate impacts. Because the plant communities at these types of sites tend to be less diverse, these sites may be the most appropriate models for wetland restoration projects; they provide good examples of the distribution and composition of common native wetland communities, and they could also serve as seed sources for plant material.

MODERATE SIGNIFICANCE

These sites are similar to High significance sites because they do not have a very diverse array of communities and they harbor few rare species. However, these sites are generally in poorer condition than High significance sites; for instance, they have more communities influenced by exotics (e.g. reed canarygrass or redtop) or with simple structure (e.g. cattail monocultures). Although these sites tend to have the greatest level of current or historic on- and offsite impacts, their large size still makes them good habitat for waterfowl and some types of

wildlife. Despite having been impacted to some degree, these wetlands still provide important wetland functions besides wildlife habitat, such as moderation of peak flows or removal of compounds and particulates. Adjacent or nearby wetlands that have been degraded are good candidates for mitigation sites, as their restoration would add to the total wetland acreage at the site.

TAXONOMIC CONSIDERATIONS

We generally used Hitchcock et al. (1969) to identify plant species in the study area. However, in keeping with The Nature Conservancy's National Vegetation Classification (Anderson et al. 1998), we followed the synonymy presented by Kartesz (1994). There were two exceptions to this usage: for *Betula glandulosa*, we used Flora of North America (1997), which provides a more recent treatment of the genus *Betula.*

A common wetland sedge, usually referred to as beaked sedge, was erroneously called *Carex rostrata* in previous studies. In this report, the species is named *Carex utriculata* (Griffiths 1989). Also, *Picea* sp. (spruce) is used to include *Picea engelmannii*, *Picea glauca*, and hybrids (Daubenmire 1974).

RESULTS AND DISCUSSION

COMMUNITIES

Wetland and riparian plant communities found in the study area are displayed in Table 2. Although we followed the classification developed by Hansen et al. (1995), we split into separate plant associations some communities which Hansen et al. (1995) lumped into one community type for management purposes. For instance, we split the *Carex rostrata* habitat type (Hansen et al. 1995) into three plant associations: *Carex utriculata*, *Carex vesicaria*, and *Carex atherodes* Herbaceous Vegetation, and we split the *Betula glandulosa*/*Carex rostrata* habitat type into three plant associations as well: *Betula glandulosa*/*Carex utriculata*, *Betula glandulosa*/*Carex cusickii*, and *Betula glandulosa*/*Carex lasiocarpa* Shrublands. Lumped plant associations were split out for greater clarity in describing vegetation at each site. Plot data describing these plant associations is on file at MTNHP.

Our treatment of communities not described by Hansen et al. (1995) depended on whether they had been previously described elsewhere. For communities that are described in another classification (e.g. *Thuja plicata*/*Lysichiton americanus* [Kunze 1994, Utzig et al. 1986]), we entered community information into ECADS and BCD and added the plant association to the list in Table 2. Undescribed communities which we repeatedly encountered (e.g. *Betula glandulosa*/*Carex cusickii*) were treated in the same manner. Finally, for undescribed communities which we encountered only rarely, we are maintaining a running list of dominance types. Community plot data supporting all communities not described by Hansen et al. (1995) is on file at MTNHP.

Table 2. Wetland plant communities and their conservation ranks for Flathead wetlands, arranged by Cowardin system, class, and subclass

Scientific Name	Common Name	Rank
PALUSTRINE FORESTED COMMUNITIES, NEEDLE-LEAVED EVERGREEN		
Abies grandis/Athyrium filix-femina	Grand fir/Ladyfern	G2QS2Q
Abies lasiocarpa/Calamagrostis canadensis	Subalpine fir/Bluejoint reedgrass	G5S5
Abies lasiocarpa/Ledum glandulosum	Subalpine fir/Labrador tea	G4S4
Abies lasiocarpa/Oplopanax horridum	Subalpine fir/Devil's club	G3S2
Abies lasiocarpa/Streptopus amplexifolius	Subalpine fir/Claspleaf twisted stalk	G4?S3
Picea sp./Calamagrostis canadensis	Spruce/Bluejoint reedgrass	G3S3
Picea sp./Clintonia uniflora	Spruce/Beadlily	G4S4
Picea sp./Cornus sericea	Spruce/Red osier dogwood	G3G4S3S4
Picea sp./Equisetum arvense	Spruce/Field horsetail	G4S3
Picea sp./Galium triflorum	Spruce/Sweet scented bedstraw	G4S4
Picea sp./Lysichitum americanum	Spruce/Skunkcabbage	G2S2
Thuja plicata/Athyrium filix-femina	Western redcedar/Ladyfern	G3G4S3
Thuja plicata/Gymnocarpium dryopteris	Western redcedar/Oakfern	G3S3
Thuja plicata/Lysichitum americanum	Western redcedar/Skunkcabbage	G4QS2
Thuja plicata/Oplopanax horridum	Western redcedar/Devil's club	G3S3
PALUSTRINE FORESTED COMMUNITIES, BROAD-LEAVED DECIDUOUS		
Betula papyrifera	Paper birch	G4QS3
Populus balsamifera ssp. *trichocarpa/Cornus sericea*	Black cottonwood/Red osier dogwood	G3?S3
Populus balsamifera ssp. *trichocarpa*/herbaceous	Black cottonwood/herbaceous	G?S?
Populus balsamifera ssp. *trichocarpa*/recent alluvial bar	Black cottonwood/recent alluvial bar	G?S?
Populus balsamifera ssp. *trichocarpa/Symphoricarpos albus*	Black cottonwood/Common snowberry	G4S4
Populus tremuloides/*Symphoricarpos albus*	Quaking aspen/Common snowberry	G3?S3?
PALUSTRINE SCRUB-SHRUB COMMUNITIES, BROAD-LEAVED DECIDUOUS		
Alnus incana	Mountain alder	G5S5
Alnus viridis ssp. *sinuata*	Sitka alder	G5S5
Betula glandulosa/Carex cusickii	Bog birch/Cusick's sedge	G?S3
Betula glandulosa/Carex lasiocarpa	Bog birch/Slender sedge	G4S4
Betula glandulosa/Carex utriculata	Bog birch/Beaked sedge	G4?S4
Cornus sericea	Red osier dogwood	G4S3
Kalmia microphylla/Carex scopulorum	Alpine laurel/Holm's Rocky Mountain sedge	G3G4S3
Rhamnus alnifolia	Alder-leaved buckthorn	G5S5
Salix bebbiana	Bebb's willow	G5S5
Salix drummondiana	Drummond's willow	G5S5
Salix drummondiana/Calamagrostis canadensis	Drummond's willow/Bluejoint reedgrass	G5S5
Salix drummondiana/Carex utriculata	Drummond's willow/Beaked sedge	G5S5
Salix exigua/Barren	Sandbar willow/Barren	G5QS5
Salix exigua/Mesic graminoid	Sandbar willow/Mesic graminoid	G5QS5
PALUSTRINE EMERGENT COMMUNITIES, PERSISTENT		
Agrostis stolonifera	Redtop	G5SE
Bromus inermis	Smooth brome	G5SE

Calamagrostis canadensis	Bluejoint reedgrass	G4QS4
Carex aperta	Columbia sedge	G2?S2
Carex aquatilis	Water sedge	G5S4
Carex atherodes	Awned sedge	G5S5
Carex buxbaumii	Buxbaum's sedge	G3S3
Carex lasiocarpa	Slender sedge	G5S5
Carex limosa	Mud sedge	G3S3
Carex nebrascensis	Nebraska sedge	G5S5
Carex scopulorum	Holm's Rocky Mountain sedge	G5S4
Carex utriculata	Beaked sedge	G5S5
Carex vesicaria	Inflated sedge	G5S5
Deschampsia cespitosa	Tufted hairgrass	G4S3S4
Dulichium arundinaceum	Dulichium	G3?S2
Eleocharis palustris	Common spikerush	G5S5
Eleocharis rostellata	Beaked spikerush	G?S1
Equisetum fluviatile	Water horsetail	G5S5
Glyceria borealis	Northern mannagrass	G4S3
Hordeum jubatum	Foxtail barley	G5S5
Juncus balticus	Baltic rush	G5S5
Poa pratensis	Kentucky bluegrass	G5SE
Poa palustris	Fowl meadow-grass	G5SE
Phalaris arundinaceae	Reed canarygrass	G5S5
Scirpus acutus	Hardstem bulrush	G5S5
Typha latifolia	Broadleaf cattail	G5S5

Most emergent and scrub-shrub communities in the study area are relatively common and widespread. For instance, some community types, like cattail (*Typha latifolia*), hardstem bulrush (*Scirpus acutus*), reed canarygrass (*Phalaris arundinacea*) are extremely common in the valley bottom, and may in fact be proportionally more common than before white settlers started populating the valley. Cattail is known to increase in abundance in the presence of increased nutrients, especially nitrogen (Neill 1990), and rapid increases of nutrients are possible with fertilizer run-off and inputs of septic effluent to water bodies. The tendency of reed canarygrass to spread aggressively could be related to the native or exotic origin of this species. Merigliano and Lesica (1998) hypothesize that both native and exotic genotypes of reed canarygrass exist in the state, with the exotic genotypes being responsible for the dense monocultures of this grass found in some wetlands.

Other types of native wetland communities are less common and have probably decreased in acreage in the last 150 years. Wet meadow communities in valley bottoms are one such type. At many sites in valley bottoms, temporarily flooded wet meadows have been converted from native grass communities (e.g. tufted hairgrass (*Deschampsia cespitosa*) and bluejoint reedgrass (*Calamagrostis canadensis*)) to communities dominated by exotics like redtop (*Agrostis stolonifera*) and Kentucky bluegrass (*Poa pratensis*).

Although intact native wet meadow communities are still relatively common at higher elevations, valley bottom wet meadows that have been converted to exotics are quite common and represent a restoration challenge.

Another type of wetland/riparian community that has decreased in acreage in the last 150 years is well developed valley bottom cottonwood riparian forest types (Mitsch and Gosselink 1993). Many such communities in the Flathead have been converted to agricultural uses, urban uses, and subdivisions. In addition, many of the mature cottonwood communities that remain have shifted from more palatable understory species (e.g. red-osier dogwood) to less palatable species (e.g. snowberry) as the result of past landuses such as livestock grazing (Hansen et al. 1995). Finally, fluvial processes that lead to the development of cottonwood bottoms, such as flooding and sediment deposition, have been affected by Hungry Horse dam and bank stabilization efforts. As the result of these factors, valley bottom cottonwood forests are relatively uncommon.

Peatlands are a type of wetland in the study area that are uncommon but which probably have not decreased markedly in acreage in Montana (Chadde et al. 1998). MTNHP tracks the occurrence of 28 peatlands in the study area (MTNHP 1999). Several peatlands in the study area were ranked using existing information; these sites were not field inventoried for this project. Peatlands are common in boreal biomes, but environmental conditions that favor peat formation are less common in more southerly latitudes such as the Northern Rocky Mountains. For a more detailed description of the ecology and conservation of peatlands in Montana, see Chadde et al. (1998).

Some community types in the study area appear to be intrinsically rare. For example, swamp forests such as spruce/skunk cabbage (*Picea* sp./*Lysichiton americanus*) or western redcedar/skunk cabbage (*Thuja plicata*/*Lysichiton americanus*) typically cover small acreages in areas with high water tables adjacent to fens, beaver ponds, or at low gradient toeslope seeps (Hansen et al. 1995, Kunze 1994, Utzig et al. 1986). Although some historic swamp forests were probably converted to scrub-shrub wetlands by timber harvest (pers. obs.), the combination of factors that led to the development of this forest type appears uncommon at this latitude. Spruce swamps in Montana share numerous species with boreal forests (Elliott-Fisk 1988), but also have a maritime influence as evidenced by the presence of skunk cabbage, a species more common in low lying areas near the Pacific coast (Hitchcock et al. 1969). In some regions, boreal swamp forests have declined markedly (H rnberg et al. 1998).

Three emergent wetland communities appear to be rare in the study area: Columbia sedge (*Carex aperta*), dulichium (*Dulichium arundinaceum*), and beaked spikerush (*Eleocharis rostellata*) communities. Beaked spikerush is tracked as a rare plant in Montana as well as a rare community; it is a rhizomatous species of alkaline substrates. Dulichium is a rhizomatous peatland species, and it is rare most likely because peatlands are rare. Lastly, Columbia sedge is a rhizomatous species

that forms communities in depressional basins that are flooded intermittently. More information on these and some common wetland communities is available in Appendix D.

The following paragraphs provide general descriptions of major wetland plant communities in the study area, organized by the palustrine classes of Cowardin et al. (1979).

FORESTED VEGETATION

Riparian and wetland forests in the study area are dominated by both needle-leaved and broad-leaved deciduous vegetation. Islands and alluvial terraces along major rivers like the Flathead, the Swan, and the Stillwater are dominated by stands of black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) and spruce (*Picea* sp.), and western redcedar (*Thuja plicata*) or grand fir (*Abies grandis*) occasionally dominates low elevation tributaries. Low gradient streams at higher elevations often have riparian forest canopies dominated by subalpine fir (*Abies lasiocarpa*), while higher gradient streams frequently have narrow, poorly developed riparian areas. Poorly drained sites on the margins of fens, beaver ponds, or toe slope seeps are usually dominated by wet spruce forests, or by black cottonwood and smaller amounts of spruce, which eventually replaces cottonwood at such sites. Pothole lakes often have a narrow fringe of black cottonwood, quaking aspen (*Populus tremuloides*), and/or western redcedar that quickly gives way to upland forest because of the gradient of the slopes around these sites.

SCRUB-SHRUB VEGETATION

Riparian and wetland shrublands in the study area occur in peatlands, from terraces to the active floodplain of low and high gradient streams and rivers, around beaver ponds, and on the edge of marshes, potholes, and lakes. Drummond's willow (*Salix drummondiana*) is the most common willow species found in the study area; stands of Drummond's willow are found on terraces of low gradient streams and rivers at mid-elevations and higher, and as a mosaic with marsh vegetation in wet meadow complexes (which often have some beaver influence). Bebb's willow (*Salix bebbiana*) and Geyer's willow (*Salix geyeriana*) are much less common as dominant species. Sandbar willow (*Salix exigua*) stands dominate active gravel- and sand-bars. Mountain alder (*Alnus incana*) and red-osier dogwood (*Cornus sericea*) dominate communities along higher gradient streams, and both mountain alder and alder leaved-buckthorn (*Rhamnus alnifolia*) form communities on the fringes of fens and lakes. Bog birch (*Betula glandulosa*) is a common shrub community on peatlands.

EMERGENT (HERBACEOUS) VEGETATION

Herbaceous emergent vegetation in the study area is typically found growing in a variety of settings, including peatlands, marshes, potholes, beaver ponds, wet meadows, lake-edges, oxbows, and sloughs. This type of vegetation usually occurs as a complex mosaic of monocultures, due to the rhizomatous habit of many of the constituent species. Slender sedge (*Carex lasiocarpa*), Buxbaum's sedge (*Carex buxbaumii*), and mud sedge (*Carex limosa*) are three sedges that can dominate portions of fens and sedge meadows. Marshes in the study area are typically dominated by cattail (*Typha latifolia*), hardstem

bulrush (*Scirpus acutus*), beaked sedge (*Carex utriculata*), inflated sedge (*Carex vesicaria*), and awned sedge (*Carex atherodes*). Wet meadows are frequently dominated by exotics like reed canarygrass (*Phalaris arundinacea*) or redtop (*Agrostis stolonifera*), or by native grasses like tufted hairgrass (*Deschampsia cespitosa*) or bluejoint reedgrass (*Calamagrostis canadensis*).

AQUATIC BED VEGETATION

Palustrine, Lacustrine, and Riverine aquatic bed vegetation occurs in littoral (< 2m) and limnetic (> 2m) zones of ponds and lakes or on the bed of slow-moving perennial streams in the study area. An aquatic community classification for western Montana and northern Idaho is in preparation (Pierce, pers. comm.). What follows are some of our observations of aquatic dominance types in the study area. Yellow pond lily (*Nuphar polysepalum*), a floating-leaved species, is a common dominant aquatic species. Water milfoil (*Myriophyllum verticillatum*) and mare's tail (*Hippuris vulgaris*) dominate some aquatic communities and are usually completely submersed or partly emersed. Coontail (*Ceratophyllum demersum*), fennel-leaved pondweed (*Potamogeton pectinatus*), Illinois pondweed (*Potamogeton illinoensis*), and *Chara* sp. (an algae) are dominant in other aquatic communities and are most often completely submersed.

RARE PLANTS

Forty-two plant species which are rare in Montana are known from the study area (Table 3; Heidel 1999). Of these, one (*Asplenium trichomanes*) is believed to be extinct, and 6 are only known from historic collections (*Atriplex truncata*, *Carex* tincta, *Cirsium brevistylum*, *Cyperus erythrorhizos*, *Myosotis verna*, *Ranunculus petafidus*). Of the remaining species, most fall generally into one of two groups: species with a boreal or circumboreal distribution which are restricted to peatlands, or aquatic species. Several moonworts (*Botrychium* spp.) also occur in the study area; they tend to be more terrestrial species, but can occur in riparian forests.

Table 3. Rare flora of Flathead wetlands and their conservation rank (* indicates an historic occurrence of a species that also occurs elsewhere in the state).

Scientific Name	Common Name	Rank
Amerorchis rotundifolia	Round-leaved Orchis	G5S2S3
Asplenium trichomanes	Maidenhair Spleenwort	G5SX
Atriplex truncata	Wedge-leaved Saltbush	G5SH
Bidens beckii	Beck Water-marigold	G4S2
Botrychium campestre	Prairie Dunewort	G3S1
Botrychium crenulatum	Wavy Moonwort	G3S2
Botrychium minganense	Mingan Island Moonwort	G4S3
Botrychium montanum	Mountain Moonwort	G3S2
Botrychium paradoxum	Peculiar Moonwort	G2S2
Brasenia schreberi	Watershield	G5S2
Carex chordorrhiza	Creeping Sedge	G5S2
Carex comosa	Bristly Sedge	G5S1
Carex livida	Pale Sedge	G5S3
Carex paupercula	Poor Sedge	G5S3
Carex prairea	Prairie Sedge	G5?S1

Carex synchocephala	Many-headed Sedge	G4S1
*Carex tincta**	Slender Sedge	G4S1
*Cirsium brevistylum**	Short-styled Thistle	G4S1
Cyperus erythrorhizos	Red-root Flatsedge	G5SH
Cypripedium parviflorum	Small Yellow Lady's-slipper	G5S3
Cypripedium passerinum	Sparrow's Egg Lady's-slipper	G4G5S2
Drosera anglica	English Sundew	G5S2
Dryopteris cristata	Buckler Fern	G5S2
Eleocharis rostellata	Beaked Spikerush	G5S2
Epipactis gigantea	Giant Helleborine	G4S2
Eriophorum gracile	Slender Cottongrass	G5S2
Heteranthera dubia	Water Star-grass	G5S1
Howellia aquatilis	Water Howellia	G2S2
Liparis loeselii	Loesel's Twayblade	G5S1
*Myosotis verna**	Early Forget-Me-Not	G5S1
Najas guadalupensis	Guadalupe Water-nymph	G5S1
Nymphaea tetragona	Pygmy Waterlily	G5S1
Ophioglossum pusillum	Adder's Tongue	G5S2
Petasites frigidus v. nivalis	Palmate-leaved Coltsfoot	G5T?S1
Potamogeton obtusifolius	Blunt-leaved Pondweed	G5S2
*Ranunculus petafidus**	Northern Buttercup	G5S1
Scheuchzeria palustris	Podgrass	G5S2
Scirpus cespitosus	Tufted Club-rush	G5S2
Scirpus subterminalis	Water Bulrush	G4G5S2
Utricularia intermedia	Flat-leaved Bladderwort	G5S1
Viola renifolia	Kidney-leaved violet	G5S3
Wolffia columbiana	Columbia Water-meal	G5S2

RARE ANIMALS

The watersheds included in this inventory provide wetland habitat for 37 animal species of special concern within Montana (Table 4). Two of these (Yellowstone Cutthroat Trout and Snapping Turtle) are not native to the area. Yellowstone Cutthroat are apparently restricted to Echo Lake in the Flathead Lake watershed. There is no evidence that Snapping Turtles are reproducing where they have been introduced near Kalispell, also in the Flathead Lake watershed. The remaining 35 species native to the watersheds use wetland habitats for breeding and foraging to various degrees, or pass through them during migration.

Non-breeding species that utilize wetlands in these watersheds for foraging or during migration (and more local movements) include American White Pelican, Trumpeter Swan, Harlequin Duck, Black-necked Stilt, Franklin's Gull, Forster's Tern, and all of the mammals except Northern Bog Lemming. All of these bird species breed elsewhere in Montana (Harlequin Ducks probably bred in the recent past within the inventory area and still breed in several adjacent watersheds). Species like the Gray Wolf, Grizzly Bear, North American Wolverine and Lynx may use riparian areas, especially in the Swan and Stillwater watersheds, during seasonal and annual movements but are not especially dependent upon them.

Table 4. Rare animals associated with Flathead wetlands and their conservation rank.

Common Name	Scientific Name	Global Rank	State Rank
Fish			
Shorthead Sculpin	*Cottus confusus*	G5	S3
Yellowstone Cutthroat Trout (I)	*Oncorhynchus clarki bouvieri*	G4T2	S2
Bull Trout	*Salvelinus confluentus*	G3	S3
Montana Arctic Grayling	*Thymallus arcticus montanus*	G5T2Q	S1
Amphibians			
Tailed Frog	*Ascaphus truei*	G4	S4
Western Toad	*Bufo boreas*	G4	S3S4
Northern Leopard Frog	*Rana pipiens*	G5	S3S4
Reptiles			
Snapping Turtle (I)	*Chelydra serpentina*	G5	S3
Birds			
Common Loon	*Gavia immer*	G5	S1S2B,SZN
American White Pelican	*Pelecanus erythrorhynchos*	G3	S2B,SZN
Great Blue Heron	*Ardea herodias*	G5	S4B,SZN
Black-crowned Night-heron	*Nycticorax nycticorax*	G5	S2S3B,SZN
White-faced Ibis	*Plegadis chihi*	G5	S1B,SZN
Trumpeter Swan	*Cygnus buccinator*	G4	S2B,SZN
Harlequin Duck	*Histrionicus histrionicus*	G4	S2B,SZN
Bald Eagle	*Haliaeetus leucocephalus*	G4	S3B,S3N
Peregrine Falcon	*Falco peregrinus*	G4	S1S2B,SZN
Black-necked Stilt	*Himantopus mexicanus*	G5	S2B,SZN
Franklin's Gull	*Larus pipixcan*	G4G5	S3B,SZN
Caspian Tern	*Sterna caspia*	G5	S2B,SZN
Common Tern	*Sterna hirundo*	G5	S3B,SZN
Forster's Tern	*Sterna forsteri*	G5	S2B,SZN
Black Tern	*Chilodonias niger*	G4	S3B,SZN
Great Grey Owl	*Strix nebulosa*	G5	S3
Western Screech-owl	*Otus kennicottii*	G5	S3S4
Black Swift	*Cypseloides niger*	G4	S3B,SZN
Mammals			
Townsend's Big-eared Bat	*Corynorhinus townsendii*	G4	S2S3
Northern Bog Lemming	*Synaptomys borealis*	G4	S2
Gray Wolf	*Canis lupus*	G4	S1
Grizzly Bear	*Ursus arctos horribilis*	G3T3	S1S2
Fisher	*Martes pennanti*	G5	S2
North American Wolverine	*Gulo gulo luscus*	G4T4	S2
Lynx	*Felis lynx*	G5	S2
Damselflies			
Subarctic bluet	*Coenagrion interrogatum*	G5	S1S2
Last, best damselfly	*Enallagama optimolocus*	G1G3	S1S3
Mollusks			
Flathead pondsnail	*Stagnicola elrodi*	G1	S1
Largemouth pondsnail	*Stagnicola elrodiana*	G1	S1

Townsend's Big-eared Bat breeds and hibernates in caves and abandoned mines, but often forages in forest openings over streams and ponds where insects are abundant.

Most species are relatively widespread in these watersheds. Several species, however, are quite restricted. There are fewer than 6 sites (ponds or sloughs) in the Flathead Lake watershed where Northern Leopard Frogs still occur, and the Northern Bog Lemming is known only from one area (several fens) along Sunday Creek in the Stillwater watershed. Fisher were extirpated from Montana in the 1920's and successfully reintroduced at three release sites in the late 1950's; one of the reintroduction sites was in the Swan watershed near Holland Lake. Current distribution of Fisher is poorly known, but typically the species is associated with mature spruce-fir and cedar-hemlock forests, sometimes with wetland and riparian habitat. Both damselflies (Subarctic bluet and Last,best damselfly) are reported from one location each in the Whitefish area of the Stillwater watershed (at Whitefish Lake and along the Whitefish River, respectively). The Flathead pondsnail is reported only from Flathead Lake in shallow muddy near-shore habitats. The Largemouth pondsnail is reported from Swan Lake in the Swan watershed and Upper Whitefish Lake in the Stillwater watershed; this species occurs most often on shallow rocky substrates.

Results of faunal surveys conducted as part of this wetland inventory are presented in the site descriptions in Appendix E and in Appendix F, which summarizes the results of the carabid beetle surveys in the study area.

CONSERVATION PRIORITIES FOR ECOLOGICALLY SIGNIFICANT WETLANDS

Sixty-three wetlands in the study area were inventoried during1998, and summary information about 54 wetland sites is presented in Table 5. The original 63 wetlands were reduced to 54 wetlands for several reasons. In several cases, wetlands located near each other were lumped together due to their proximity and treated as a "complex". A few wetlands that were visited are not reported here because they were too degraded and did not qualify in any of the ranking categories. Furthermore, several wetlands are included that were not field-inventoried; ample information to describe and rank these sites was available from a variety of sources including existing Research Natural Area and Botanical Special Interest Area establishment records, unpublished reports from previous field inventories, peatland records from MTNHP's Biological and Conservation Data System, and Chadde et al. (1998).

Several previous efforts to identify significant wetlands have occurred in the study area. One study identified ecologically significant watersheds, river-lake corridors, and wetland complexes of the Swan Valley using existing information sources (Frissell et al. 1995); the authors identified large patches of the Swan Valley landscape which contribute significantly to biodiversity in the watershed. The present MTNHP wetland inventory further refines and complements this previous work by providing site-specific field inventory data gathered at wetlands which nest within the wetland complexes identified by Frissell et al.

Table 5. Site rankings, management status, and ownership of Flathead wetlands inventoried in 1998.

Site	Management Status*	Ownership**
WETLANDS WITH OUTSTANDING SIGNIFICANCE		
1. Ambrose Fen	-	Pri
2. Antice Creek	-	Stillwater
3. Glacier Slough	-	FNF
4. Gregg Creek Fen	-	FNF
5. Hidden Lake BSIA	Partially within BSIA	KNF, Pri, MT
6. Lazy Creek Fen	-	Cpt
7. Lost Creek Fen	Candidate BSIA	FNF
8. Molly Lake	-	Stillwater
9. Plum Creek Fen	-	Cpt
10. Porcupine Creek Complex	-	Swan, Cpt, FNF
11. Swan River Delta	TNC Preserve, NWR	FNF, USFWS,TNC
12. Swan River RNA	RNA	FNF
WETLANDS WITH VERY HIGH SIGNIFICANCE		
13. Condon Creek BSIA	BSIA	FNF
14. Flathead River Islands	Partially within Natural Area & State Game Preserve	MT, Pri, FNF
15. Glacier/Windfall Kettle Complex	-	FNF, Cpt
16. Lewis Meadow	-	Cpt
17. McCabe Meadow	-	Stillwater
18. Mud Lake	-	Pri, MT
19. Napa Creek Fen	-	Swan
20. North Sanko Creek Fen	-	FNF
21. Point Pleasant Fen	-	Swan
22. Sunday Creek Bottom	-	Pri, KNF
23. Woods-Beaver-Rainbow Lakes Complex	-	Stillwater, Cpt, Pri
24. Woodward Meadows	-	Pri, Swan, Cpt
WETLANDS WITH HIGH SIGNIFICANCE		
25. Bear Paw Meadow	-	Stillwater
26. Blanchard Lake	Fishing Access	Pri, FWP
27. Bowen Creek Fen	-	FNF
28. Crystal Fen	Wilderness	FNF
29. Foothills Meadow	-	Swan
30. Logan Creek Meadow	-	FNF
31. Lower Lazy Creek Bottom	-	Stillwater, Cpt
32. Ninemile Fen	-	FNF
33. Round Meadow-Meadow Lake	-	Cpt, Stillwater
34. Safe Harbor Marsh	TNC Preserve	TNC
35. Sheppard Creek Fen	-	FNF
36. Skunk Meadow	-	Stillwater
37. South Sanko Creek Fen	-	FNF
38. Swift Creek Meadow	-	Cpt
39. Whitefish Spruce Swamp	CE	Pri
WETLANDS WITH MODERATE SIGNIFICANCE		
40. Blasdel WPA	WPA	USFWS
41. Bootjack Meadows	-	Cpt

42. Egan Slough	CE	Pri
43. Good Creek Marsh	-	FNF
44. Good Creek Tributary	-	Stillwater
45. Lake House Meadow	-	Stillwater
46. McWennegar Slough	-	Pri
47. Point of Rocks	-	KNF, Pri, Stillwater
48. Ritsenburg Meadow	-	Stillwater
49. Smith Lake WPA	Partially within WPA	USFWS, Pri
50. Squeezer Meadows	-	Cpt, Swan
51. Upper West Fork Lazy Creek	-	Cpt
52. Van Lake	-	Swan, Cpt
53. Wolf Creek Slough	CE	Pri
54. Woods Lake	-	Stillwater

***Management Status:** RNA = designated Research Natural Area; BSIA = designated Botanical Special Interest Area; TNC = The Nature Conservancy; NWR = National Wildlife Refuge; WPA = Waterfowl Production Area; CE = conservation easement. ****Ownership**: FNF = Flathead National Forest, KNF = Kootenai National Forest, USFWS = Fish and Wildlife Service, Stillwater = Stillwater State Forest, Swan = Swan River State Forest, FWP = MT Fish, Wildlife and Parks, MT = undesignated state land, Cpt = corporate timber land, Pri = private.

(1995). Two other wetland inventories have been conducted which emphasized identification of wetlands with significant waterfowl production capabilities (King 1975, Wittmier 1986). Both studies partially overlap the present study area, and they both identify priority wetlands for acquisition and conservation easements, but they differ from MTNHP's current inventory because they emphasize the wetlands' value as waterfowl habitat rather than presence of intact native wetland plant communities.

Detailed information about wetland sites can be found in Appendix E, with highlights summarized below. A map showing general locations of wetland sites can be found in Figure 1, with more detailed locations shown in Figures 3A-3E. Users of this wetland inventory report should note that about ¼ of the wetlands are on private land, and permission from landowners is needed before accessing any private lands.

OUTSTANDING SIGNIFICANCE

Sites in this category represent the most ecologically significant wetlands in the survey area. All of these sites have an outstanding diversity of wetland plant communities and wetland features. For example, the Porcupine Creek Complex features a spruce swamp, marsh communities, bog birch carr, willow stands, rich fen communities, beaver ponds, and floating mats. Most of the sites are quite large, and all but Glacier Slough have some degree of peatland development. Most of the fens at these sites have concentrations of rare plant species.

These wetlands tend to be in excellent condition, and the surrounding uplands generally have minimal human impacts. The two wetlands that are closest to being exceptions are Swan River Delta and Ambrose Fen. The former has some large reed canarygrass stands, old ditches which were intended to drain the site, and roads on three sides; however, there are no dams on the Swan River above this site, thus leaving intact many of the fluvial processes which helped

Legend for Figure 3.

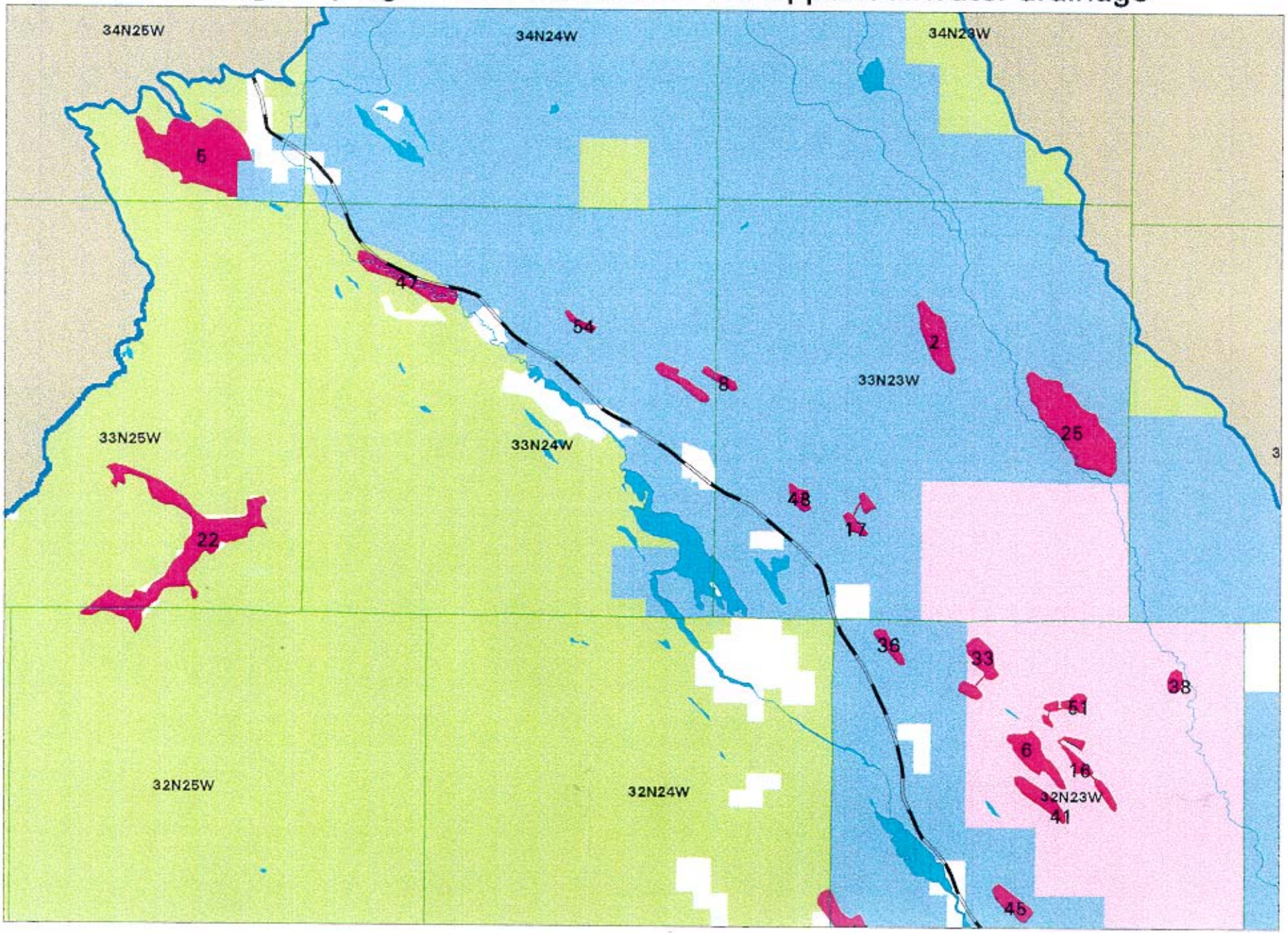
List of Wetlands

1 Ambrose Fen
2 Antice Creek
3 Glacier Slough
4 Gregg Creek Fen
5 Hidden Lake BSIA
6 Lazy Creek Fen
7 Lost Creek Fen
8 Molly Lake
9 Plum Creek Fen
10 Porcupine Creek Complex
11 Swan River Delta
12 Swan River RNA
13 Condon Creek BSIA
14 Flathead River Islands
15 Glacier/Windfall Kettle Complex
16 Lewis Meadow
17 McCabe Meadow
18 Mud Lake
19 Napa Creek Fen
20 North Sanko Creek Fen
21 Point Pleasant Fen
22 Sunday Creek Bottom
23 Woods-Beaver-Rainbow Lakes Complex
24 Woodward Meadows
25 Bear Paw Meadow
26 Blanchard Lake
27 Bowen Creek Fen
28 Crystal Fen
29 Foothills Meadow
30 Logan Creek Meadow
31 Lower Lazy Creek Bottom
32 Ninemile Fen
33 Round Meadow-Meadow Lake
34 Safe Harbor Marsh
35 Sheppard Creek Fen
36 Skunk Meadow
37 South Sanko Creek Fen
38 Swift Creek Meadow
39 Whitefish Spruce Swamp
40 Blasdel WPA
41 Bootjack Meadows
42 Egan Slough
43 Good Creek Marsh
44 Good Creek Tributary
45 Lake House Meadow
46 McWennegar Slough
47 Point of Rocks
48 Ritsenburg Meadow
49 Smith Lake WPA
50 Squeezer Meadows
51 Upper West Fork Lazy Creek
52 Van Lake
53 Wolf Creek Slough
54 Woods Lake

Map Legend

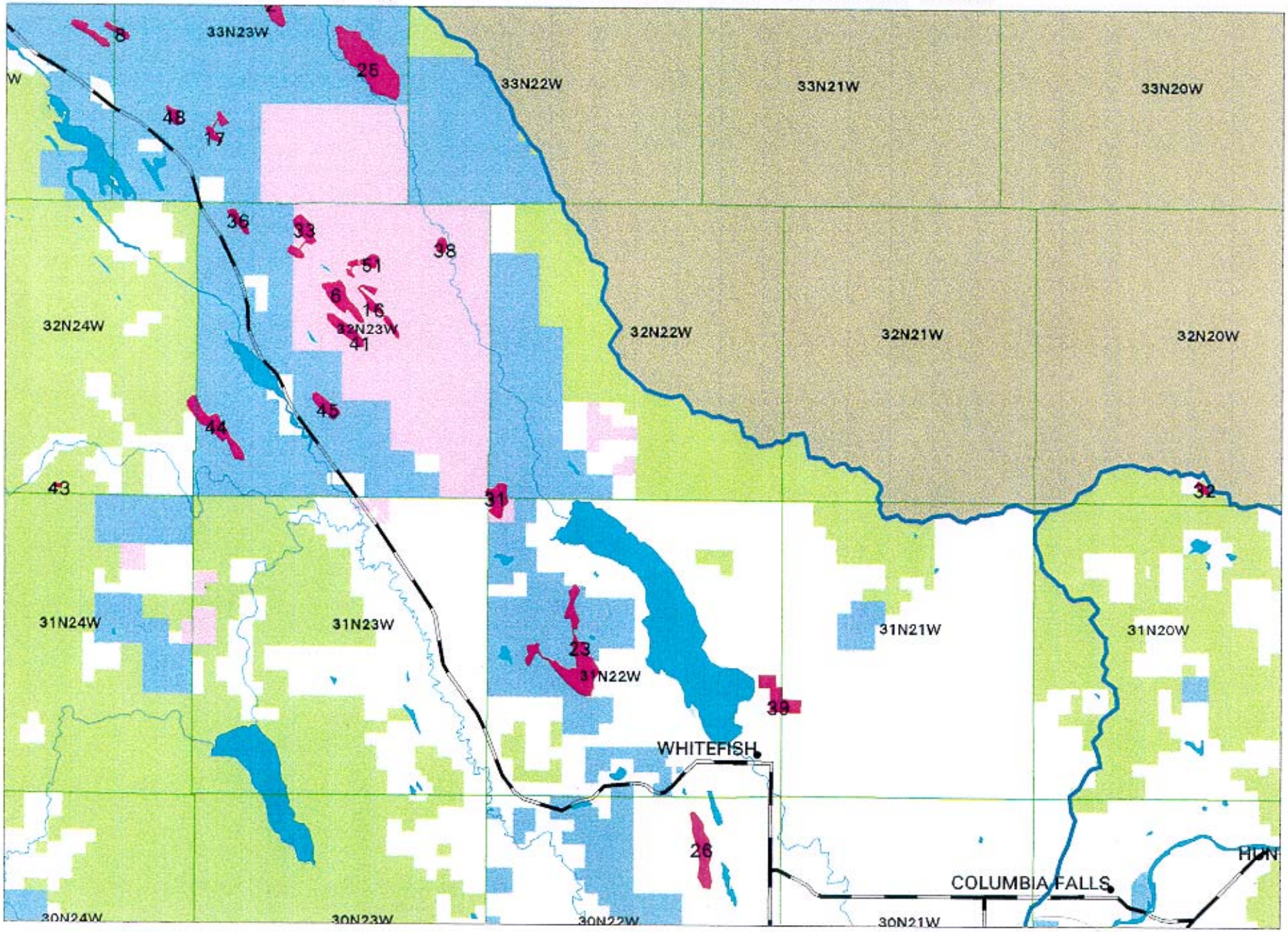
- Wetland sites
- BLM
- BOR (BuRec)
- CoE
- Other DOD
- NPS
- USFS
- Other USDA
- USFWS
- State trust lands
- DFWP
- University & institutions
- Local government
- Tribal & Allotted
- Plum Creek
- Private Conservation
- Other private
- Water

Figure 3a. Ecologically significant wetlands in the Upper Stillwater drainage



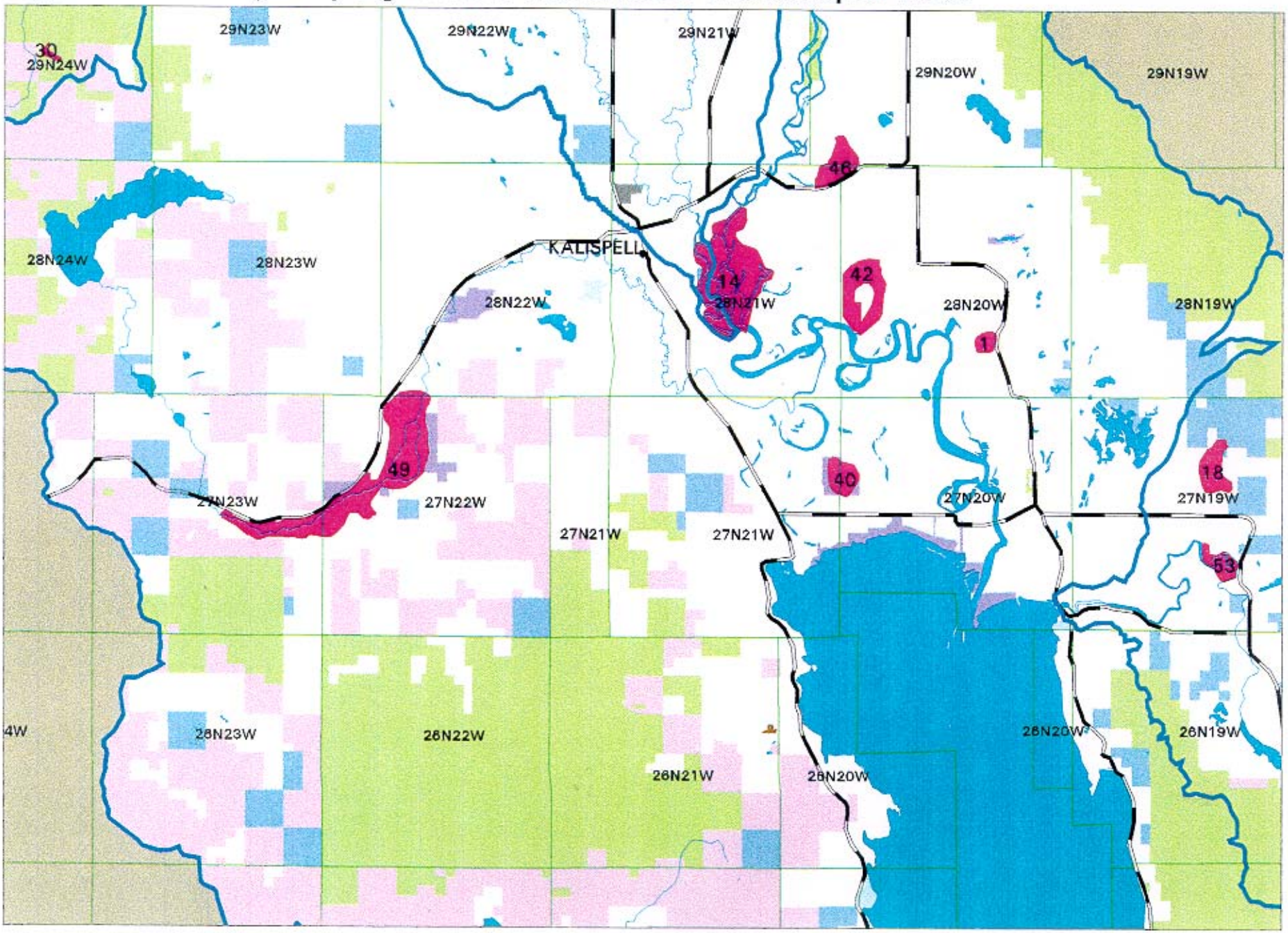
MTNHP, May 17, 1999

Figure 3b. Ecologically significant wetlands in the Whitefish Area



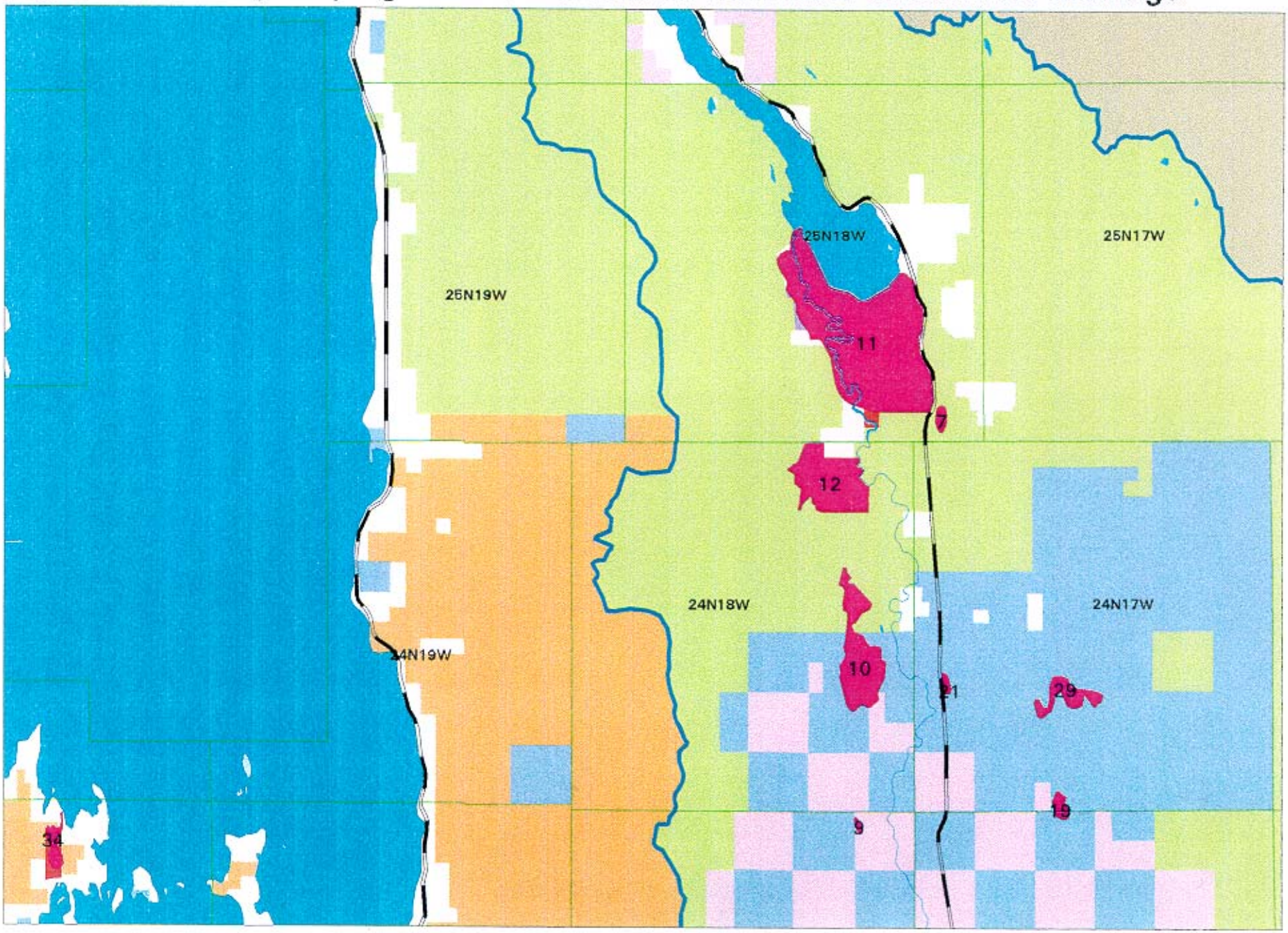
MTNHP, May 17, 1999

Figure 3c. Ecologically significant wetlands in the Kalispell Area



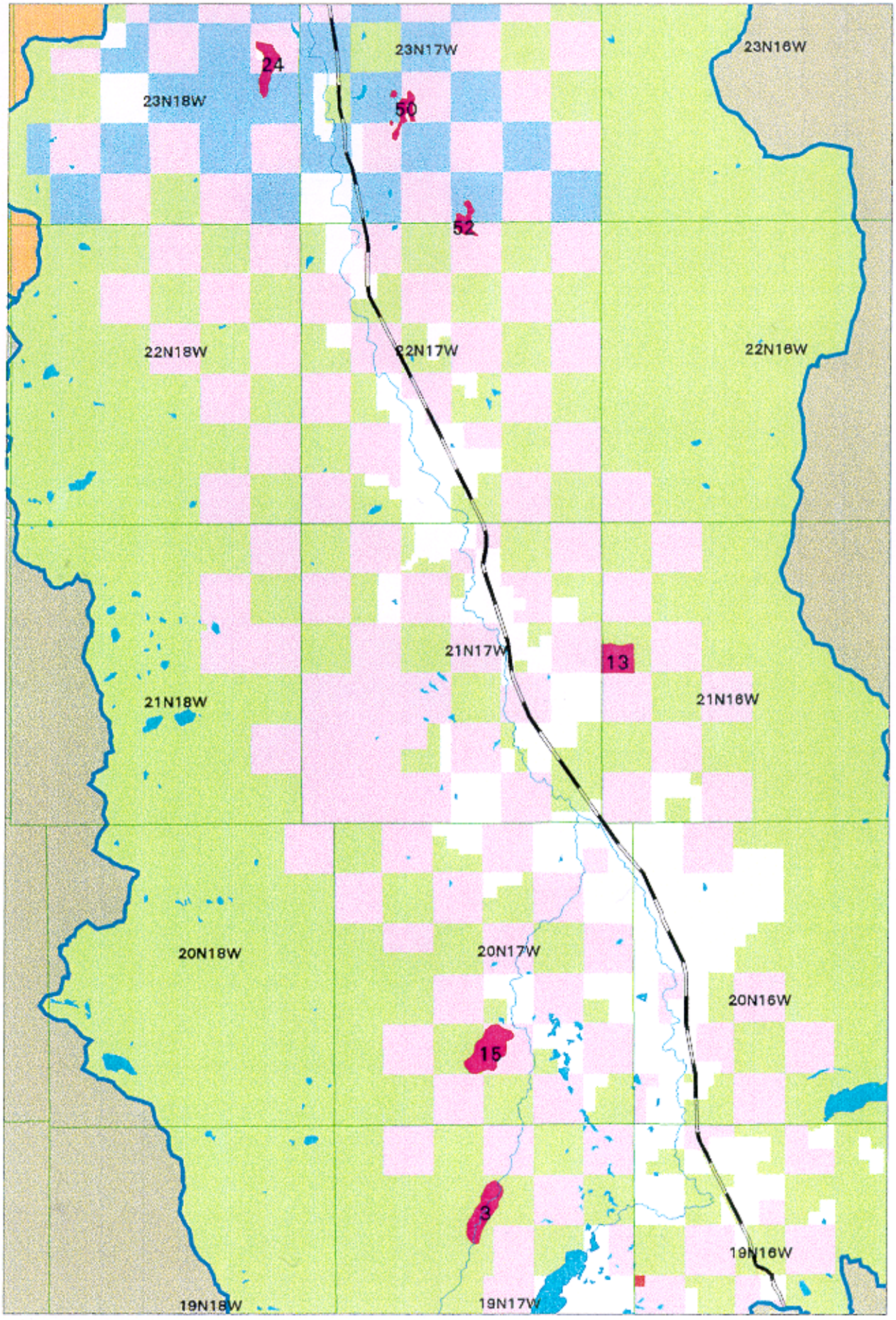
MTNHP, May 17, 1999

Figure 3d. Ecologically significant wetlands in the Lower Swan River drainage



MTNHP, May 17, 1999

Figure 3e. Ecologically significant wetlands in the Upper Swan River drainage



form the site. Ambrose Fen, in spite of some grazing impacts and a major highway nearby, is one of the largest and most diverse fens west of the continental divide in Montana.

Several of these wetlands already have some conservation status. Swan River Research Natural Area (RNA) and Hidden Lake Botanical Special Interest Area (BSIA) are protected by their special Forest Service designations. Part of the Swan River Delta is a U.S. Fish and Wildlife Service National Wildlife Refuge, and part is Nature Conservancy Preserve. Lost Creek Fen is a candidate BSIA, but none of the other sites have any protected status. Glacier Slough is an outstanding example of a montane marsh with intact wet meadow communities and largely intact upland forests in the drainage. It qualifies for Natural Area designation, as do the state owned sites. The remaining Outstanding quality wetlands are in mixed ownership or privately owned. Conservation of these sites will require collaborative efforts between the private parties, land trusts, and/or public agencies.

VERY HIGH SIGNIFICANCE

Very High significance wetlands share some qualities of Outstanding significance wetlands, such as large size, a diversity of wetland plant communities, or concentrations of rare species. They are generally distinguished from the former category by having a greater degree of human impacts, either on- or off-site. For example, Woodward Meadows and Point Pleasant Fen are both composed of a diversity of wetland plant communities that are in good condition (e.g. few exotics, no grazing impacts, etc.). However, the conditions in the uplands next to the two sites have been affected by road-building and timber harvest. Similarly, Flathead River Islands, which has some of the best-developed examples of valley bottom riparian forest in the study area, is surrounded by urban and agricultural landuses. Two sites, Condon Creek BSIA and Glacier/Windfall Kettle Complex, are outstanding examples of glacial pothole ponds in a forested setting.

Minor changes in management practices at some of these sites could put them on a trajectory to become Outstanding significance wetlands. For example, changing the grazing management practices at Sunday Creek Bottom could improve the condition of the willow community at the site and stabilize streambanks. Alternatively, leaving larger buffers between timber harvest units and wetlands like Lewis Meadow would lessen changes to the hydrology of such sites and reduce potential inputs of sediments. Only Owen Sowerwine Natural Area (part of the Flathead River Islands) and Condon Creek BSIA have any special conservation status.

HIGH SIGNIFICANCE

Wetlands in this category differ from the previous category chiefly by having a lower diversity of wetland plant communities and wetland features; these wetlands are also more numerous than those in the previous categories. For example, Skunk Meadow only has some willow and marsh communities, rather than the mix of communities noted above for the Porcupine Creek Complex. The High significance peatlands also tend to be smaller and less diverse than peatlands in the previous categories. One site, Round Meadow-Meadow Lake, has some large areas of wet

meadow, although some parts have been invaded by reed canarygrass. The condition of these wetlands and the surrounding uplands tends to be similar to the previous category.

Only a few of these sites are under conservation management, one as a Nature Conservancy Preserve (Safe Harbor Marsh) and another with a conservation easement (Whitefish Spruce Swamp). Because the plant communities at these types of sites tend to be less diverse, these sites may be the most appropriate models for wetland restoration projects. They provide good examples of the distribution and composition of common native wetland communities, and they could also serve as seed sources for wetland plant. Some of the sites, which have had some hydrologic modification (like Round Meadow-Meadow Lake), could serve as potential mitigation sites.

MODERATE SIGNIFICANCE

Wetlands in this category range from small to large, but they all tend to be dominated by just a few wetland plant communities, and very few sites support populations of rare plants or animals. Moderate significance sites tend to be less functionally intact than any of the previous categories, either because of historic landuses, existing impacts, or both. A few moderate significance sites are in excellent condition, but are quite small; while such wetlands may be functionally intact, their priority for conservation is still relatively low compared to large sites that are in good condition. Despite some of their impacts, these sites do provide some good habitat for wildlife and waterfowl.

Like High significance sites, Moderate significance sites are relatively common. Of the Moderate quality sites we inventoried, only four are under conservation management, two as Waterfowl Production Areas and two with conservation easements. Many of these sites have potential for restoration and/or as mitigation sites due to past use by domestic animals or because of 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 specific basis.

WETLANDS NOT INVENTORIED IN 1998

Additional wetlands in the study area are present that were not surveyed as part of this wetland inventory project. Readers should not infer that wetlands that were not inventoried are in poor condition or have low functional integrity. The project's goal was very specific: to identify the most ecologically significant wetlands in the study area and prioritize them for conservation, restoration, and mitigation applications. Therefore, many wetlands were not inventoried because they did not meet the selection criteria. However, many of the unsurveyed wetlands do provide important wetland functions and are quite valuable for this reason alone.

The majority of the wetland sites in the study area which were not inventoried as part of this project are High and Moderate significance wetlands. Many of these sites have been fragmented by roads or have had their native wetland plant communities degraded by a variety of landuses. Others are pristine but very

small and dominated by single plant communities. The High and Moderate significance sites that we did visit are a fairly representative sample of these types of wetlands. Plant community diversity, presence of rare species, and wetland size and condition information can be summarized for unsurveyed or data-poor wetlands by consulting NWI maps, requesting rare plant and animal occurrence data from MTNHP, and on-site evaluation of impacts.

We are relatively confident that all Outstanding significance wetlands have been identified in the study area and that few to none of the unsurveyed wetlands fall into this category. Our confidence is based on two reasons: 1) the depth and breadth of the locally knowledgeable individuals who were contacted during the inventory, and 2) using NWI maps and aerial photos, we identified and inspected large wetlands which had not been mentioned by the locally knowledgeable individuals.

This wetland inventory identifies and prioritizes certain types of wetlands and wetland functions and processes, but some other types of wetlands and processes were underemphasized during the inventory. Because of the emphasis we placed on large sites, some smaller sites, like small spring/seeps with unique annual plant communities (J. DeSanto, pers. comm.), were not inventoried. Furthermore, some fluvial processes (like deposition, channel migration, and flooding) occur at a larger scale than was targeted by this project. Riparian cottonwood communities are inextricably tied to such processes, and these communities cannot be conserved solely by protecting existing patches of mature cottonwood forest. Areas where deposition is occurring (where future cottonwood stands will be recruited) need to be conserved as well (Merigliano 1996).

HOW THIS INFORMATION CAN BE USED

The intent of this wetland inventory project is to provide information that will assist in the conservation of wetland diversity and quality. The following points illustrate ways in which the information from this wetland inventory can be used:

- *Provide a prioritized list of wetlands for conservation*

This wetland inventory provides a list of wetland sites that is ranked by ecological significance. This list can be used to efficiently prioritize how limited wetland protection funds are spent. For example, this list should assist land trusts considering conservation easements, or state/federal agencies and corporate owners considering easements or land exchanges.

- *Identify irreplaceable wetlands*

This list of significant wetland sites identifies wetlands that are essentially irreplaceable. Some of the Outstanding and Very High significance sites contain wetland features like peatlands and spruce swamps whose loss could not realistically be mitigated.

- *Identify potential Research Natural Areas and Botanical Special Interest Areas*

High ranking sites on Forest Service lands may be good candidates for Research Natural Area or Botanical Special Interest Area designation. Likewise, similar sites on state land merit conservation management and/or designation as Natural Areas.

- *Identify reference wetlands*

This list can be used as a tool by consultants, wetland scientists, watershed groups, and government agencies to identify reference wetlands. Such sites can serve as models of wetland plant community structure/composition for restoration projects, or as seed sources for plant materials. Reference wetlands are also extremely useful for inferring impacts of landuse activities.

- *Identify potential mitigation sites*

Some sites in this list could serve as mitigation sites to help offset losses of wetlands at other locations, in compliance with Section 404 of the Clean Water Act. In some cases restoring hydrology of the site by blocking peripheral drainage would improve wetland function.

- *Provide context for wetland permit review*

For watershed-based assessments of wetland resources, this list of significant wetlands and wetland communities can help regulators ascertain the relative scarcity of a particular wetland type or community within a watershed.

- *Provide information for landuse decisions*

This list can be used as a tool by county planners, regulators, and others to help inform decisions about landuse, growth, and development.

- *Assist HGM modeling efforts*

Some of these sites identified by this inventory could serve as reference sites for the regional guidebook for slope wetlands being developed.

FUTURE NEEDS

With the wetland inventory in the Stillwater, Swan, and Flathead Lake drainages now complete, MTNHP sees two needs for improving Montana wetlands information systems in the future. First, there is tremendous need for completing the National Wetland Inventory for Montana. NWI provides very valuable information on the distribution, size, and types of wetlands found across the state. Second, MTNHP recommends continuing efforts to identify and prioritize ecologically significant wetlands on a watershed basis for other priority watersheds in the state. Appendix G contains a preliminary list of Montana watersheds with a preliminary prioritization by biodiversity value and level of threat that could help direct future wetland inventory efforts.

HOW TO REQUEST ADDITIONAL INFORMATION

Additional wetland data is available for watershed-wide or site specific projects. Digitized National Wetland Inventory maps for some USGS quads in Montana can be viewed on the web at the Natural Resource Information System's Wetland Clearinghouse web page (http://nris.state.mt.us/wis/wis1.html). Hard copy maps are available for inspection at U.S.F.W.S. offices or for purchase from the NWI Regional Distribution Center (605-688-5890).

The following wetland information is available from MTNHP:

- Occurrence information for rare plants, animals, and natural communities
- Site-specific wetland community information
- Information on ecologically significant wetland sites not currently under conservation management
- Information on ecologically significant wetland sites currently protected

For more information, please contact the MTNHP Information Manager at (406) 444-3009, or via MTNHP's website at http://nris.mt.gov/mtnhp/. In the coming months, selected wetland information from the 1998 inventory will also become available via the MTNHP website.

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APPENDIX A – LIST OF WETLANDS IDENTIFIED BY LOCALLY KNOWLEDGEABLE INDIVIDUALS

	WETLAND	LOCATION	REVIEWER COMMENTS
1	Ambrose Fen	T28N R20W	Largest peatland west of divide
2	Beaver Lake vicinity	T31N R22W	
3	Big Spruce Island	T28N R21W	
4	Birch Ck	T27N R21W	
5	Black Lake	T24N R21W	Meromictic lake, very high conductivity, tribal cultural site
6	Blanchard Lake	T30N R22W	May not be pristine, but had good veg
7	Blankenship Area wetlands	T31N R19W	
8	Blasdel WPA	T27N R20W	3 examples of depressional wetlands- good wildlife
9	Bootjack Lake wetlands	T31N R23W	
10	Bowen Lake	T32N R26W	intermediate fen, floating mat, remote
11	Boyle Lake	T31N R22W	aerial photos suggest lots of water lilies
12	Carex utriculata marsh	T31N R20W	remote, pristine, not overly exciting
13	Carney Ck	T26N R19W	
14	Cedar burn fen	T31N R20W	small fen, fading to cottonwood bottom
15	Cedar Lake	T31N R20W	large floating mat peatland, carrs, nice cottonwood riparian bottom, somewhat disturbed
16	Church Slough	T28N R20W	Cottonwood-spruce comm., islands affected by Kerr Dam, veg intact
17	Condon Ck Botanical Area	T21N R16W	Many HOWAQU ponds, some w/ harvest some w/out
18	Coram wetlands	T31N R19W	
19	Corielle Island	T28N R21W	Between Owen Sowerwine and Big Spruce Islands - younger island
20	Cottonwood/Salix exigua	T30N R20W	Bottoms along Flathead R., small sloughs
21	Crystal Bench fen	T31N R20W	very small fen in cedar woods, floating, pristine
22	Daphnia Pond	T26N R20W	Long studied Biostation pond
23	Dog Meadow	T33N R23W	
24	Egan Slough	T28N R20W	Isolated older Charles Jauquette Island, aspen comm., moderately grazed, exc. wildlife
25	Elman Fen	T25N R18W	Hi quality fen in private ownership
26	Fairview Marsh	T29N R20W	
27	Fish Lake fen	T34N R24W	small fen, burned recently
28	Flathead WPA1	T27N R20W	Lacustrine fringe

29	Flathead WPA2	T27N R20W	lacustrine forested - very nice, somewhat rare
30	Glacier/Windfall area	T20N R17W	Many scattered depressional wetlands, undisturbed setting
31	Good Creek Marsh	T32N R24W	Marsh with SCHPAL&CARCHO, prisitne
32	Haskill Basin	T31N R22W	nice fen, small, pristine
33	Hidden Lake wetlands	T34N R25W	Botanical SIA, rich fen, bog birch carr, marshes, ponds, tufa terracing
34	Horseshoe Lake	T26N R19W	Typical kettle lake, studied by biostation
35	Lagoni Lake-LeBeau RNA	T33N R24W	part of LeBeau RNA, mentioned in Rabe&Chadde report
36	Lazy Bay	T31N R22W	nice willow stands and aqu. plant community, so-so condition
37	Lazy Creek Meadows	T32N R23W	largest peatland in Whitefish Range, spruce swamp, carr, fen, marsh
38	LeBeau floating fen	T33N R24W	Unnamed lake,floating fen, pristine-CARLIV
39	LeBeau RNA	T24N R24W	Surrounding uplands undisturbed, ponds, lake, fens
40	Loon Lake	T26N R19W	Typical kettle lake, studied by biostation
41	Lost Creek Fen	T25N R18W	Less upland disturbance, sim. to Porcupine, large Picea/Lysame
42	Louis Lake	T33N R25W	floating mat around open, deep lake;species poor
43	Lower Lazy Ck. drainage	T32N R22W	HOWAQU pot?, lots of wetlands
44	McCabe Mdw	T33N R23W	
45	McWenneger Slough	T28N R20W	Very old oxbow, upwelling zone, 9 Potamageton spp.
46	Meadow Lake	T32N R23W	Looks interesting, worthy of survey, much aquatic veg
47	Mission Well	T25N R19W	Wetland, cut over, but many visits by biostation over years
48	Morning Slough	T29N R20W	Cattail marsh, heavy Canada goose traffic in spring
49	Mountain top wetland	T31N R20W	vernally wet, ontop of mountain, only seen in winter, pristine
50	Mud Lake	T27N R19W	spring/fall griz habitat, forested and open wetlands, grazing?
51	Mud Lake 2	T31N R19W	CARLAS sedge meadow w/ peaty water's edge
52	Murray Lake	T31N R22W	interesting littoral zone, worth botanical survey
53	Ninemile loop wetlands	T32N R20W	Very nice wetlands, diverse, some logging nearby
54	Owen Sowerwine Nat Area	T28N R21W	Island in mainstem Flathead R.
55	Paul Creek fens	T33N R25W	rich fen, impacted by grz, timberharvest,
56	Piper Ck. HOWAQU cluster	T22N R17W	many pristine ponds w/ mid-successional mixed conifer forest
57	Plum Creek Fen		rich fen
58	Porcupine fen	T24N R18W	upland disturbance hi, but intact fen, 10 rareplants, spp. list
59	Pt. Pleasant Fen	T24N R17W	
60	Purple Meadow	T33N R23W	

61	Rattlebone Fen	T34N R25W	small intermediate fen, pretty good condition
62	Riverine wetland 2	T27N R19W	intact; good wildlife
63	Riverine wetland1	T25N R18W	Porcupine Bridge - N along river (east bank)
64	Rogers Road	T30N R20W	Small LYSAME/PICEA swamp, OK condition
65	Round Meadow	T32N R23W	CARUTR marsh, used to be mowed for hay
66	Safe Harbor Marsh	T23N R20W	TNC preserve
67	Small rich fen	T31N R20W	small rich fen, interesting plant community, easy to get to
68	Smith Lake	T27N R22W	Large wetland/shallow lake - may/may not be in good shape
69	Spencer-Skyles lakes	T31N R22W	Marshes and riparian thickets, Scirpus lacustris, locally intensely altered
70	Spruce	T31N R22W	forested - great veg, easy access
71	Star Meadow	T30N R24W	CARUTR marsh, well watered pastureland,
72	Stillwater R. wetlands		
73	Stillwater River	T32N R24W	Water very still, MENTRI and EQUFLU in moving water - odd
74	Sunday Ck wetlands	T32N R25W	Huge bogbirch carrs, willow bottom,good cond.,several rare plants
75	Sunday Lake	T33N R24W	alder and birch carrs, weak fen development at lake edge
76	Swan Lake inlet	T25N R18W	Pretty good and relatively unspoiled wetland area
77	Swan River Oxbow Preserve	T25N R18W	TNC preserve-riverine wetland, HOWAQU, Old growth riparian forest
78	Swan River RNA	T24N R18W	Mosaic of wetland types, pristine
79	Swan-Wolf Ck	T2N7 R19W	riparian/wetland complex
80	Swift Ck. wetlands	T32N R23W	
81	Tally Lake	T31N R23W	Brown lake, cul de sac lake
82	Tally Lake fens		Gregg Ck, Taylor Ck, others - check peatland database
83	Teakettle Meadow	T31N R20W	Large, pristine, rich fen, hard to get to
84	Trumbull Ck. area	T31N R21W	nice riparian bottom, LYSAME, Impatiens aurella
85	Trumbull Ck. area	T31N R21W	
86	Tykesin Pond	T26N R19W	Desmid population, 2 PhD's about
87	unnamed marsh	T28N R20W	Somewhat impacted - depressional wetland - good wildlife
88	Unnamed slough	T27N R21W	next to Hwy 93
89	unnamed wetland 1	T27N R20W	Saltgrass population
90	Unnamed wetland 2	T31N R22W	small alder carr, nearby lakes (Beaver,etc) not rich in aqu. veg
91	Unnamed wetland 3	T31N R19W	never been to, looks interesting
92	Unnamed wetland 4	T31N R20W	CARUTR marsh, vernally wet Populus balsamifera swales

93	Upper Lazy Ck drainage	T32N R23W	lots of wetlands, some large
94	Upper Sunday Ck wetlands	T32N R26W	much sphagnum, bog lemming
95	Upper Trumbull Ck.1	T31N R21W	nice riparian and wetlands, broad floodplain, some fens/marshes
96	Upper Trumbull Ck.2	T31N R21W	nice riparian and wetlands, broad floodplain, some fens/marshes
97	Van Lake	T22N R17W	NE side of Van Lake - Lacustrine fringe
98	Whitefish Spruce Swamp	T31N R21W	

APPENDIX B – FIELD FORM

MTNHP WETLAND SURVEY FORM GENERAL SITE/PLOT DATA:

IDENTIFICATION AND LOCATION:

MANUAL: _____ UNITS: __ft. __m

EXAMINER(S): _____ Date. _____ EOCODE:_____

PLOT NO. __

PLOT NO. __

SITE NAME: _____ STATE: _____ COUNTY: _____

PURP: ____ PREC: ____ QUAD NAME: _____ QUAD CODE: __ __ __ __ __ __ __

GPS REF. NO.:_____ SITE'S LEGAL LOC.: T _ _ ; R _ _; S _ _; ____1/4S; ____4/4; ____4/4/4

OWNERSHIP (circle): Private (Name:_____), U. S. Forest Service, BLM, Tribal, Bur. of Rec. , State MT, _____

PLOT TYPES: __ __ __ __ __ __ PLOT SIZE: _____ RADIUS/LN; _____WIDTH_____SURVEY: ___ ___ ___ ___ ___ ___

PHOTOGRAPHY: (type, azimuth, etc.) _____

_____

_____

DIRECTIONS: _____

_____

GENERAL WETLAND FEATURES

			Cowardin Class		
HGM class	System/subsystem	Class/subclass	Water regime	Water/soil chem.	Dominance type

WETLAND SIZE (ac)_____OUTLET_____INLET_____

PRIMARY WATER SOURCE: SURFACE FLOW (perennial/intermittent stream, overland flow), PPT., SPRING/SEEP, GROUNDWATER, OTHER_____

PRIMARY WATER OUTFLOW: SURFACE FLOW (perennial/intermittent stream, overland flow), evapotranspir., GROUNDWATER, OTHER_____

FLOODING/PONDING EVIDENCE: _____ (A aerial photo, B banded veg. C rocks w/ w/o carbonate coat, D sediment deposition, L rocks w/ and w/o lichen, R herb wrack lines, S water/silt stains) _____

INUNDATION PERIOD (deepest zone present): Permanently flooded (52 wks.), Intermittently exposed (52 wks.), Semipermanently flooded (13-51 wks), seasonally flooded (2-13 wks), Temporary (<2 wks), None _____

AVG. DEPTH STANDING/PONDED WATER (m)_____

BANK STABILITY: Rills, Gully Cutting, Headcuts, Slumps, Undercut Bank, Stable, Other_____:

% OF BANK W/ DEEP BINDING ROOTMASS_____

BEAVER EVIDENCE (Y, N, describe)_____

_____

RIVERINE

GAUGE DATA_____VALLEY FLOOR GRADIENT: _____

FLOODPLAIN WIDTH: (m, ft.) _____ RIPARIAN/WETLAND ZONE WIDTH RANGE (m,ft)_____

BED MATERIAL(Bedrock, boulder, cobble, gravel, sand, silt/clay): _____

BANKFULL WIDTH: _____ BANKFULL DEPTH: _____

FLOODPRONE WIDTH (width at 2x bankfull) _____

CHANNEL ENTRENCH. (width at 2x bankfull/bankfull width): _____

ROSGEN STREAM TYPES _____

SILT/SEDIMENT DEPOSITION(buried root collars,natural levees): _____COVER (%), _____ DEPTH (cm or in.)

EVIDENCE OF SURFACE INFLOWS FROM UPLAND (rills, gullys, lateral tribs that don't connect to channel)_____

EVIDENCE OF SUBSURFACE FLOW (seeps at wetland edge, veg growing during dry season, wetland occurs at toe of slope, upwelling evident)

_____

EVIDENCE OF BRAIDED CHANNEL (Y, N) _____ POINT BARS REVEGETATING? (Y, N, NA)_____

COARSE WOODY DEBRIS SOURCES PRESENT NEARBY IN SYSTEM (Y, N, NA)_____

GENERAL SITE DESCRIPTION (position in landscape, communties present [e.g. carr, marsh, fen, etc.],adjacent c.ts., etc.):

KEY ENVIRONMENTAL FACTORS(driving factors like seasonal flooding, wind, soil, hydrology, geomorphology, beaver activity, etc)

LANDUSE HISTORY (past landuse on site)

LANDUSE COMMENTS (current landuse on site, like recreation, dumping, grazing, agriculture, mining, ROW's, improvements, irrigation, etc)

OFFSITE USES (e.g. farming, logging, grazing, dumping, watershed diversion, etc)

EXOTICS

INFO NEEDS

MANAGEMENT NEEDS

KNOWN RARE PLANT/ANIMAL EO'S (SPP., EO #)

FAUNA OBSERVATIONS

OCULAR PLANT SPECIES DATA:

Plot number: _ Date: _____ Site: _____

Min. cover value:____ GROUND COVER (classes): ___ SOIL+___ GRAVEL+___ ROCK + ___ LITTER + ___WOOD + ___ MOSS + ___ BASAL VEG. + ___ OTHER=100% Plant IDL _____ PNC: _____

TREES: TOTAL CV. _____ MEAN HT. _____

SPECIES IDENTIFICATION* HT. CCC[1,2]

T 1 _ _ _ _____ _ _ _ _____/__ [__/ __]
T 2 _ _ _ _____ _ _ _ _____/__ [__/ __]
T 3 _ _ _ _____ _ _ _ _____/__ [__/ __]
T 4 _ _ _ _____ _ _ _ _____/__ [__/ __]
T 5 _ _ _ _____ _ _ _ _____/__ [__/ __]
T 6 _ _ _ _____ _ _ _ _____/__ [__/ __]
T 7 _ _ _ _____ _ _ _ _____/__ [__/ __]
T 8 _ _ _ _____ _ _ _ _____/__ [__/ __]

SHRUBS: TOTAL CV. _____ MEAN HT. _____

S 1 _ _ _ _____ _ _ _ _____/___[___]
S 2 _ _ _ _____ _ _ _ _____/___[___]
S 3 _ _ _ _____ _ _ _ _____/___[___]
S 4 _ _ _ _____ _ _ _ _____/___[___]
S 5 _ _ _ _____ _ _ _ _____/___[___]
S 6 _ _ _ _____ _ _ _ _____/___[___]
S 7 _ _ _ _____ _ _ _ _____/___[___]
S 8 _ _ _ _____ _ _ _ _____/___[___]
S 9 _ _ _ _____ _ _ _ _____/___[___]
S10 _ _ _ _____ _ _ _ _____/___[___]
S11 _ _ _ _____ _ _ _ _____/___[___]
S12 _ _ _ _____ _ _ _ _____/___[___]
S13 _ _ _ _____ _ _ _ _____/___[___]
S14 _ _ _ _____ _ _ _ _____/___[___]

GRAMINOIDS: TOT. CV. _____ MEAN HT. _____

G 1 _ _ _ _____ _ _ _ _____/___[___]
G 2 _ _ _ _____ _ _ _ _____/___[___]
G 3 _ _ _ _____ _ _ _ _____/___[___]
G 4 _ _ _ _____ _ _ _ _____/___[___]
G 5 _ _ _ _____ _ _ _ _____/___[___]
G 6 _ _ _ _____ _ _ _ _____/___[___]
G 7 _ _ _ _____ _ _ _ _____/___[___]
G 8 _ _ _ _____ _ _ _ _____/___[___]
G 9 _ _ _ _____ _ _ _ _____/___[___]
G10 _ _ _ _____ _ _ _ _____/___[___]
G11 _ _ _ _____ _ _ _ _____/___[___]
G12 _ _ _ _____ _ _ _ _____/___[___]
G13 _ _ _ _____ _ _ _ _____/___[___]
G14 _ _ _ _____ _ _ _ _____/___[___]
G15 _ _ _ _____ _ _ _ _____/___[___]
G16 _ _ _ _____ _ _ _ _____/___[___]
G17 _ _ _ _____ _ _ _ _____/___[___]
G18 _ _ _ _____ _ _ _ _____/___[___]

FORBS: TOTAL CV. _____ MEAN HT. _____

SPECIES IDENTIFICATION HT. CCC

F 1 _ _ _ _____ _ _ _ _____/___[___]
F 2 _ _ _ _____ _ _ _ _____/___[___]
F 3 _ _ _ _____ _ _ _ _____/___[___]
F 4 _ _ _ _____ _ _ _ _____/___[___]
F 5 _ _ _ _____ _ _ _ _____/___[___]
F 6 _ _ _ _____ _ _ _ _____/___[___]
F 7 _ _ _ _____ _ _ _ _____/___[___]
F 8 _ _ _ _____ _ _ _ _____/___[___]
F 9 _ _ _ _____ _ _ _ _____/___[___]
F10 _ _ _ _____ _ _ _ _____/___[___]
F11 _ _ _ _____ _ _ _ _____/___[___]
F12 _ _ _ _____ _ _ _ _____/___[___]
F13 _ _ _ _____ _ _ _ _____/___[___]
F14 _ _ _ _____ _ _ _ _____/___[___]
F15 _ _ _ _____ _ _ _ _____/___[___]
F16 _ _ _ _____ _ _ _ _____/___[___]
F17 _ _ _ _____ _ _ _ _____/___[___]
F18 _ _ _ _____ _ _ _ _____/___[___]
F19 _ _ _ _____ _ _ _ _____/___[___]
F20 _ _ _ _____ _ _ _ _____/___[___]
F21 _ _ _ _____ _ _ _ _____/___[___]
F22 _ _ _ _____ _ _ _ _____/___[___]
F23 _ _ _ _____ _ _ _ _____/___[___]
F24 _ _ _ _____ _ _ _ _____/___[___]
F25 _ _ _ _____ _ _ _ _____/___[___]
F26 _ _ _ _____ _ _ _ _____/___[___]
F27 _ _ _ _____ _ _ _ _____/___[___]
F28 _ _ _ _____ _ _ _ _____/___[___]
F29 _ _ _ _____ _ _ _ _____/___[___]
F30 _ _ _ _____ _ _ _ _____/___[___]
F31 _ _ _ _____ _ _ _ _____/___[___]
F32 _ _ _ _____ _ _ _ _____/___[___]
F33 _ _ _ _____ _ _ _ _____/___[___]
F34 _ _ _ _____ _ _ _ _____/___[___]
F35 _ _ _ _____ _ _ _ _____/___[___]
F36 _ _ _ _____ _ _ _ _____/___[___]

FERNS AND ALLIED FORMS:

TOTAL CV._____ MEAN HT. _____ MED. CV._____

F 1 _ _ _ _____ _ _ _ _____/___[___]
F 2 _ _ _ _____ _ _ _ _____/___[___]
F 3 _ _ _ _____ _ _ _ _____/___[___]
F 4 _ _ _ _____ _ _ _ _____/___[___]
F 5 _ _ _ _____ _ _ _ _____/___[___]
F 6 _ _ _ _____ _ _ _ _____/___[___]

BRYOIDS & LICHENS: TOTAL CV. _____

B 1_____/ __ [_____] B 2_____/ __ [_____]
B 3_____/ __ [_____] B 4_____/ __ [_____]
B 5_____/ __ [_____] B 6_____/ __ [_____]
B 7_____/ __ [_____] B 8_____/ __ [_____]
L 1_____/ __ [_____] L 2_____/ __ [_____]
L 3_____/ __ [_____] L 4_____/ __ [_____]

COMMENTS(EODATA)_____

_____

PARENT MAT.:_____ LANDFORM: _____ PLOT POSITION: _____ SLOPE SHAPE:_____

ASPECT(°): __ __ __ SLOPE (%): __ __ __ ELEVATION: __ __ __ __ __ EROSION POT.: _____ EROS. TYPE: _____

HORIZON ANGLE: N ____; E ____; S ____; W _____ LEGAL: T_____ R_____ S_____ 1/4_____ 4/4_____ 4/4/4____

[2] Tree canopy cover for mature (> 5 in. dbh) and seedlings/saplings (< 5 in. dbh.)

[1] Canopy Cover Classes (Percent Values): 0; 1 = >0, <1; 3 =>1, <5; 10= >5,<15; 20= >15, <25; 30= >25, <35; 40= >35, <45; 50= >45, <55; 60= >55, <65; 70= >65, <75; 80= >75, <85; 90= >85, <95; 98 = >95, <100

*First three letters of genus and species; write complete species name if confusion possible withinlifeform

WETLAND PLANT COMMUNITIES

Site Name:_____ Date: Mo.____ Day____ Yr.____ Investigator(s): _____
Open Water (lacking emergents,% of total): __ __ Bottom Substrate: _____ Wetland ditched or tiled? If yes, into which zone (DM, SM, WM, LP) _____Adjacent Vegetation: _____
pH:_ _ ._ _, Conductivity (μS/cm):_ _ _ _, Temp (°C):____, $CaCO_3$_____, Sulfide odor __Y__N; Root channels __Y__N
Hydrology comments: _____

VEGETATION DESCRIPTION:(see Hansen et al. [1995] for wetland/riparian keys; use six-letter acronyms, cc = canopy cover with standard ECODATA classes)

Plant Associations	Layer 1 Species (cc)	Layer 2 Species (cc)	Layer 3 Species (cc)	Layer 4 Species (cc)	Exotics/Weeds	Position rel. to adjacent comm./water depth	%AA
1)_ _ _ _ _/_ _ _ _ _ _ NHMTECW__99__ ____	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _( )_ _ _ _ _( ) _ _ _ _ _ _( )_ _ _ _ _( )		
2)_ _ _ _ _/_ _ _ _ _ _ NHMTECW__99__ ____	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _( )_ _ _ _ _( ) _ _ _ _ _ _( )_ _ _ _ _( )		
3)_ _ _ _ _/_ _ _ _ _ _ NHMTECW__99__ ____	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _( )_ _ _ _ _( ) _ _ _ _ _ _( )_ _ _ _ _( )		
4)_ _ _ _ _/_ _ _ _ _ _ NHMTECW__99__ ____	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _( )_ _ _ _ _( ) _ _ _ _ _ _( )_ _ _ _ _( )		
5)_ _ _ _ _/_ _ _ _ _ _ NHMTECW__99__ ____	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _( )_ _ _ _ _( ) _ _ _ _ _ _( )_ _ _ _ _( )		
6)_ _ _ _ _/_ _ _ _ _ _ NHMTECW__99__ ____	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _( )_ _ _ _ _( ) _ _ _ _ _ _( )_ _ _ _ _( )		
7)_ _ _ _ _/_ _ _ _ _ _ NHMTECW__99__ ____	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _( )_ _ _ _ _( ) _ _ _ _ _ _( )_ _ _ _ _( )		
8)_ _ _ _ _/_ _ _ _ _ _ NHMTECW__99__ ____	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _( )_ _ _ _ _( ) _ _ _ _ _ _( )_ _ _ _ _( )		
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10)_ _ _ _ _/_ _ _ _ _ _ NHMTECW__99__ ____	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _( )_ _ _ _ _( ) _ _ _ _ _ _( )_ _ _ _ _( )		
						%open water	

Comments_____

HYDROLOGICAL AND PEDOLOGICAL VARIABLES:

Comm. type #	Depth of surface water (cm)	Depth to free water (cm)	Depth to saturated soil (cm)	Depth to impermeable layer (cm)	O horizon thickness (cm)	A horizon thickness (cm)	A horizon hue/chroma	Texture	% of AA
1)									
2)									
3)									
4)									
5)									
6)									
7)									
8)									
9)									
10)									
LowPrairie									
WetMeadow									
ShllowMarsh									
DeepMarsh									
Upland								(A hor.)	

Comments: _____

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APPENDIX C – G/S RANK GUIDELINES

For state ranks, just substitute S for G in these definitions

G1 = Critically imperiled globally because of extreme rarity (typically five or fewer occurrences or very few remaining acres) or because of some factor(s) making it extremely vulnerable to exptirpation.

G2 = Imperiled globally because of extreme rarity (typically six to 20 occurrences or few remaining acres) or because of some factor(s) making it very vulnerable to extirpation.

G3 = Vulnerable; either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single Great Plains state, a single physiographic or ecoregional unit) or because of other factors making it vulnerable to extirpation throughout it's range.

G4 = Apparently Secure; Uncommon, but not rare (although it may be quite rare in parts of its range, especially at the periphery). Apparently not vulnerable in most of its range.

G5 = Secure; Common, widespread, and abundant (though it may be quite rare in parts of its range, especially at the periphery). Not vulnerable in most of its range.

GU = Unrankable; Status cannot be determined at this time.

G? = Unranked; Status has not yet been assessed.

Modifiers and Rank Ranges

? A question mark added to a rank expresses an uncertainty about the rank in the range of 1 either way on the 1-5 scale.

G#G# Greater uncertainty about a rank is expressed by indicating the full range of ranks which may be appropriate.

Q A "Q" added to a rank denotes questionable taxonomy. It modifies the degree of imperilment and is only used in cases where the type would have a less imperiled rank if it were not recognized as a valid name (i.e. if it were combined with a more common type).

E Exotic

CRITERIA USED FOR RANKING

The criteria for ranking are based on a set of quantitative and qualitative factors. These factors are listed below in order of their general importance:

a. Number of Element Occurrences (EOs):
the estimated number of EOs throughout the Element's global range;

b. Abundance:
the estimated global abundance of the Element (measured by number of individuals, or area, or stream length covered);

c. Size of Range:
the estimated size of the Element's global range;

d. Distribution trend:
the trend in the Element's distribution over it's global range;

e. Number of protected EOs:
the estimated number of adequately protected EOs throughout the Element's global range;

f. Degree of threat:
the degree to which the Element is threatened globally;

g. Fragility:
the fragility or susceptibility of the Element to intrusion;

h. Other global considerations:
for example, the quality or condition of EOs that affect or may affect endangerment status; unexplained population fluctuations; reproductive strategies that are dependent on specific habitat; etc.

APPENDIX D – COMMUNITY CHARACTERIZATION ABSTRACTS

Characterization Abstracts for Plant Communities in the Stillwater, Swan, and Flathead Lake Drainages

BETULA GLANDULOSA/CAREX UTRICULATA (BOG BIRCH/BEAKED SEDGE) Herbaceous Vegetation

SIMILAR COMMUNITIES
The Betula glandulosa/Carex utriculata habitat type is equivalent to Betula glandulosa/Carex rostrata (Hansen et al. 1995), which had been previously described in an unpublished study by Pierce (1986). Carex utriculata was erroneously referred to as Carex rostrata in earlier taxonomic and ecological studies (Griffiths 1989). A similar community with an understory dominated by Deschampsia cespitosa was described by Pierce (1986). Other communities with Betula glandulosa overstories and Carex lasiocarpa understories exist in northern Idaho and northwest Montana (Jankovsky-Jones 1997, Chadde et al. 1998, Greenlee 1999). Betula glandulosa/Carex cusickii plant associations also exist in northwest Montana (Greenlee 1999).

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

ENVIRONMENTAL DESCRIPTION
This community type occurs adjacent to beaver ponds, lakes, or marshes, and on seeps, swales and wet alluvial terraces adjacent to low gradient meandering streams (Hansen et al. 1995). This community occurs on fairly wet sites with peat accumulation, indicating a predominance of anaerobic processes. In contrast, some willow stands, like Salix drummondiana stands, commonly occur on soils that are better aerated, and hence are not usually found in peatlands. Soils are commonly flooded until mid summer, and are saturated year round on wetter sites. Redox concentrations are present in some mineral soils; redox depletions (gleyed soil) occur rarely. Organic matter accumulations may form floating, quaking mats as this type encroaches onto open water. Drier extremes have shallow organic horizons overlying deeper mineral soil (Hansen et al. 1995).

VEGETATION DESCRIPTION
Betula glandulosa contributes an average of 35% to the overstory. Minor amounts of Potentilla fruticosa and Salix species are usually present. The canopy cover provided by the various shrubs is sparse to moderate, but the herbaceous layer cover is high. Associated shrubs include Rhamnus alnifolia and various willows. Understory species composition is dependent on water levels. The wettest sites support Carex utriculata and C. aquatilus. Geum macrophyllum and the graminoids Poa pratensis and Agrostis stolonifera are often present in drier micro-sites and/or disturbed sites (Hansen et al. 1995).

WILDLIFE VALUES
Betula glandulosa is a valuable browse species for elk (Kufeld 1973). Communities dominated by Betula glandulosa may function to stabilize channel banks (frequently creating overhanging banks) and provide shade creating quality fish habitat.

SUCCESSION
The Betula glandulosa/Carex utriculata community type represents a fairly stable type. Grazing my decrease the vigor of bog birch and increase the presence of species tolerant of grazing including Agrostis stolonifera, Poa pratensis, Poa palustris, and Juncus balticus.

MANAGEMENT
Saturated soils are highly susceptible to soil compaction and streambank sloughing when used by livestock and heavy machinery. Overuse may result in reduced vigor or eventual elimination of shrubs from the site. Burning of this type can temporarily increase productivity of Carex species. However, care should be taken when burning along streambanks because of the excellent erosion protection provided by Betula glandulosa/Carex utriculata habitat type (Hansen et al. 1995).

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

CONSERVATION RANK
G4?S4

EDITION/AUTHOR
95-09-05/L. Williams

CAREX BUXBAUMII (BUXBAUM'S SEDGE) Herbaceous Vegetation

SIMILAR COMMUNITIES
Includes the Carex buxbaumii-Carex saxatilis (Tuhy 1981) c.t.and Carex buxbaumii-Carex aquatilis (Mattson 1984) h.t. and phases. Hansen et al. (1995) lump this community with Carex lasiocarpa and Carex lanuginosa for management purposes. Pierce (1986) and Padgett et al. (1989) also describe this community type.

RANGE
Carex buxbaumii is a minor community type in the Uinta Mountains of Utah, western and south-central Montana , Yellowstone National Park, and 4 disjunct areas of Idaho.

ENVIRONMENTAL DESCRIPTION
This community type occurs in moderately broad valley bottoms, in depressional wetlands like glacial potholes, in peatlands, and on lake plains. Saturated soil conditions persist in the surface peat from mid spring to mid summer. Water levels may then drop to the soil surface or, on drier stands, to several decimeters below the surface.

VEGETATION DESCRIPTION
Carex buxbaumii is always dominant in this community, with 25% or greater cover. Carex aquatilis and/or Carex saxatilis are sometimes present and occasionally are co-dominants. Other associates include Deschampsia cespitosa, Caltha leptosepala, Eleocharis pauciflora, Senecio cymbalaroides, Pedicularis groenlandica, Ligusticum tenuifolium, Carex lanuginosa, C. utriculata, C. lasiocarpa, C. muricata, C. livida, C. nebraskensis, C. praegracilis, and C. simulata (Padgett et al 1989).

WILDLIFE VALUES

SUCCESSION

MANAGEMENT
Herbage production varies from low to moderate. Saturated soils is a natural deterrent to livestock grazing. Alteration of hydrology and subsequent dewatering may result in communities dominated by Carex buxbaumii being accessible to cattle. Fencing of these relatively small communities is a practical management method for restoration when the hydrologic regime is intact

ADJACENT COMMUNITIES
In Montana, adjacent wetter sites include Scirpus acutus, Carex lasiocarpa, and Carex utriculata, and adjacent drier sites include Deschampsia cespitosa and Juncus balticus communities (Pierce 1986).

CONSERVATION RANK
G3S3

EDITION/AUTHOR
95-06-09/ L. Williams

CAREX LASIOCARPA (SLENDER SEDGE) Herbaceous Vegetation

SIMILAR COMMUNITIES

Some classifications include stands dominated by Carex lanuginosa in the Carex lasiocarpa plant association (Pierce 1986, Hansen et al. 1995), due to similarities in structure and management concerns. Carex lanuginosa tends to occur on mineral soils, while Carex lasiocarpa is most often found on organic soils (Hansen et al. 1988, Lesica 1994). Carex buxbaumii stands are also included in the Carex lasiocarpa habitat type by some classifications due to similarities in management concerns (Kovalchik 1987, Hansen et al. 1995).

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

The Carex lasiocarpa plant association usually occupies former lake basins, long-abandoned beaver ponds, potholes, and lake and stream margins which favor the accumulation of peat. Occasionally this community occurs as floating or quaking mats on fluid peat subsoils. This association can often be found in intermediate to rich fens. The soils are usually organic, with accumulations of sedge peat. This type is typically an indicator of a stable hydrologic regime with year-long saturated soil conditions in the root zone at minimum. This community can tolerate year-long flooded conditions.

VEGETATION DESCRIPTION

Carex lasiocarpa dominates the community with 30-80% cover. It often forms monocultures in sedge meadows in Montana. Carex utriculata and C. lanuginosa are often the only other species with high constancy.

WILDLIFE VALUES

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 use the type for fawning (Hansen et al. 1995).

SUCCESSION

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.

MANAGEMENT

Drought years may make EO 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 h.t. 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 can be 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).

ADJACENT COMMUNITIES

Adjacent wetter sites may be dominated by either Carex utriculata, C. aquatilis, or C. nebrascensis communities. Drier sites may be dominated by Deschampsia cespitosa, Artemisia cana/Festuca idahoensis, or Juncus balticus communities. Adjacent uplands can be dominated by Artemisia tridentata, or a variety of conifer communities (Hansen et al. 1995).

CONSERVATION RANK

G5S5

EDITION/AUTHOR

95-07-11/ L. Williams

CAREX LIMOSA (MUD SEDGE) Herbaceous Vegetation

SIMILAR COMMUNITIES
In Utah Carex limosa appears closely related to the C. aquatilis community type with which it is commonly associated (Padgett et al. 1989). Includes Mattson's (1984) C. limosa series and phases described for the central portion of Yellowstone National Park.

RANGE
The Carex limosa community type is distributed throughout the northern hemisphere; in the western United States it is a minor type in the Uinta Mountains of Utah, southeastern Idaho, throughout much of Montana, and in central Yellowstone National Park.

ENVIRONMENTAL DESCRIPTION
This community type is associated with pond and lake margins, and typically develops on floating or quaking mats. It may also occur on low gradient inflows or outflows of ponds or lakes (Hansen et al. 1995). Sites are usually very poorly drained with persistently saturated with standing water in spring.

VEGETATION DESCRIPTION
Carex limosa cover ranges from 20-90% (Hansen et al. 1995). In Montana, Carex utriculata and Menyanthes trifoliata are common associated species.

WILDLIFE VALUES
Otters, beaver, sandhill cranes, and waterfowl use this community type for bedding and foraging areas (Mattson 1984).

SUCCESSION
Carex limosa is considered a stable, long lived community type, however, dewatering and subsequent decompositon of organic soils may result in a shift in species composition due to invasion by exotic species or an increase in species such as Carex aquatilis (Padgett et al. 1989).

MANAGEMENT
These sites are generally so wet as to preclude most types of livestock and recreational uses.

ADJACENT COMMUNITIES
Adjacent wetter sites include the Eleocharis pauciflora habitat type or open water. Adjacent drier sites include either the Carex utriculata, C. aquatilis, C. lasiocarpa, or the Scirpus acutus ht (Hansen et al. 1995).

CONSERVATION RANK
G3S3

EDITION/AUTHOR
95-07-10/ L. Williams

CAREX UTRICULATA (BEAKED SEDGE) Herbaceous Vegetation

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 that C. utriculata had been misidentified as C. rostrata (Griffiths 1989). This is a well-documented community type. Hansen et al. (1995) places Carex utriculata, C. vesicaria, and C. atherodes together within the C. rostrata h.t. for management purposes.

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, rarely the 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 he growing season. Valley bottom gradients are low (Padgett et al. 1989; Hall and Hansen 1997). Soils are classified as Histisols, Mollisols, and Inceptisols, and Entisols. Mineral soils are generally very organic-matter rich and often have an incipient histic epipedon forming at the surface. These soils may eventually become Histisols. Most of he 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).

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).

SUCCESSION

Carex utriculata is a widespread species that occupies mineral or organic soils with seasonally 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).

MANAGEMENT

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.

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. Adjacent drier wetland communities include various willow communities, and wetter sites include Typha latifolia and Scirpus acutus communities(Hansen et al. 1995).

CONSERVATION RANK

G5S5

EDITION/AUTHOR

1998-01-02/ B. Moseley

CAREX VESICARIA (INFLATED SEDGE) Herbaceous Vegetation

SIMILAR COMMUNITIES

The Carex vesicaria community type is sometimes included within the Carex utriculata [erroneously called Carex rostrata] community (Kovalchik 1993; Hansen et al. 1995; Hall and Hansen 1997). Reasons for lumping are that Carex rostrata 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.

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 1997; Jankovsky-Jones [in preparation]); 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. The Carex vesicaria community is most commonly found in swales, fens, glacially formed kettle ponds, 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 [in preparation]). 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 1997; Jankovsky-Jones [in preparation]). 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 [in preparation]). 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.

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% cover and 100% constancy (Mattson 1984; Kovalchik 1987; Crowe and Clausnitzer 1997; Jankovsky-Jones [in preparation]). 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% cover and 23% constancy) with low cover of Deschampsia cespitosa, Calamagrostis canadensis, and Galium species (Mattson 1984; Crowe and Clausnitzer 1997). Other species associated with Carex vesicaria on sites with long periods of standing water include: Eleocharis palustris (less than 18% cover and 45% constancy), Juncus balticus (less than 8%cover and 42% constancy), Glyceria borealis, Sparganium species (e.g. 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 1998). Better drained sites, which are flooded in spring but dry in summer, are co-dominated by Deschampsia cespitosa(less than 12% cover and 75% constancy) or Aster foliaceus (less than 12% cover and 23% constancy) (Mattson 1984; Kovalchik 1987; Crowe and Clausnitzer 1997). Other species commonly associated with Carex vesicaria in these stands include Carex nebrascensis (less than 31% cover and 42% 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 [in preparation]). Due to longperiods of flooding, the cover of mosses, lichens, and liverworts is low. In contrast, the ground is either bare or deep litter(forming a 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 [in preparation]). 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).

SUCCESSION

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 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).

MANAGEMENT

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). Though the dense sod of Carex vesicaria resists grazing and trampling damage (Hansen et al. 1988), overuse can 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. 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 then dry. Fire will reduce litter and increase productivity forseveral years. However, if peat soils are dry enough they will burn hot and kill Carex vesicaria rhizomes (Kovalchik 1987; Crowe and Clausnitzer 1997).

ADJACENT COMMUNITIES

On sites with long periods of standing water, adjacent wetland communities are nearly pure stands of semi-aquatic, often floating leaved, plants. These communities include : Alopecurus aequalis-Ranunculus flammula, Carex atherodes, Glyceria species, Polygonum species, Sparganium species, and Utricularia species (Mattson 1984; Kovalchik 1987; Hansen et al. 1988). Where water levels drop in late summer, adjacent wetter communities may form on the shoreline below Carex vesicaria, such as stands of Eleocharis bella and Equisetum arvense (Crowe and Clausnitzer 1997). Adjacent communities on sites which dry in late summer, with a similar or slightly drier moisture regime as Carex vesicaria, 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 [in preparation]). 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 [in preparation]). 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

G5S5

EDITION/AUTHOR

1998-01-09/ CHRIS MURPHY

CORNUS SERICEA (RED-OSIER DOGWOOD) 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 DESCRIPTION
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. It may also occur on well-watered sites below beaver dams. 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).

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 geographic location and elevation, but commonly associated 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, cottontail rabbits, snowshoe hares, and many birds. The fruits are an important back 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).

SUCCESSION
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.

MANAGEMENT
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 it's seed-bank is stimulated by fire (Crowe and Clausnitzer 1997).

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
G4S3

EDITION/AUTHOR
98-01-02/ B. Moseley

DULICHIUM ARUNDINACEUM (DULICHIUM) Herbaceous Vegetation

SIMILAR COMMUNITIES
The community is easily recognized by the abundance of Dulichium, which is either monospecific or is growing with only a few other species (Bursik and Moseley 1995, Hansen et al. 1988).

RANGE
Minor type in Montana, Idaho, Oregon, Washington and possibly Wyoming.

ENVIRONMENTAL DESCRIPTION
The community occurs over mineral soils, fibrous peat, or muck on areas that are seasonally or permanently flooded with shallow water. In a few places it occurs adjacent to sphagnum peat (Kunze 1994). In Montana this community occurs in depressional wetlands (frequently glacial potholes) and on lake margins (Hansen et al. 1988).

VEGETATION DESCRIPTION
The Dulichium arundinaceum community type is of rare occurrence and poorly described. Dulichium arundinaceum typically occurs as a monoculture with few associated species. Minor amounts of the Eleocharis palustris, Carex aquatilis, C. limosa, or C. lasiocarpa may be present. The community occurs on organic soils, on lake margins and may occur on fixed or floating mats (Hansen et al. 1988).

WILDLIFE VALUES
Information not available

SUCCESSION
Dulichium arundinaceum is considered a stable, long lived community type, however, dewatering and subsequent decomposition of organic soils may result in a shift in species composition due to invasion by exotic species or an increase in species such as Carex aquatilis.

MANAGEMENT
Drought years may make occurrences 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.

ADJACENT COMMUNITIES
The Dulichium arundinaceum community type frequently occurs in a mosaic of monocultures dominated by Carex aquatilis, Carex utriculata, Carex limosa and/or Sphagnum species. Adjacent uplands are dominated by conifers.

CONSERVATION RANK
G3?S2

EDITION/AUTHOR
97-01-06/ Mabel Jankovsky-Jones

ELEOCHARIS PALUSTRIS (COMMON SPIKERUSH) Herbaceous Vegetation

SIMILAR COMMUNITIES
In some cases, the Eleocharis palustris may be confused with E. rostellata, especially if the stolons of E. rostellata are not present or not obvious. Be sure of the plant's true identity. A misidentification will result in the wrong community type and the sites on which they occur are very different ecologically.

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).

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, Cares utriculata, Glyceria spp., and Phalaris arundinacea. On some sites aquatic species, such as Hippuris vulgaris, Utriculata 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).

SUCCESSION
Padgett at al. (1989) suggest that Eleocharis palustris can represent an early seral species on ponds and streambanks where water is at or above the ground surface. As siltation occurs over time, other communities, such as Carex rostrata, may replace it. However, due to the continual saturated conditions and dense growth of 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. Hansen et al. (1995) have observed that disturbance can drastically shift the vegetative composition of this type toward increaser or invader species such as Hordeum jubatum.

MANAGEMENT
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).

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
G5S5

EDITION/AUTHOR
98-12-08/ B. Moseley

ELEOCHARIS ROSTELLATA (BEAKED SPIKERUSH) Herbaceous Vegetation

SIMILAR COMMUNITIES

In Montana, Hansen et al. (1995) lumped all combinations of E. rostellata and E. pauciflora into an E. pauciflora habitat type due to similarities in environmental conditions and management concerns. Observations in Montana by Lesica (1990), indicate that the E. rostellata association is distinct, and at least partially thermophilic, unlike the E. pauciflora type. In some cases, the Eleocharis rostellata may be confused with E. palustris, 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 rostellata is a minor type in Idaho, Montana, and Yellowstone National Park, Wyoming, and may occur in Washington, British Columbia, and other parts of Wyoming.

ENVIRONMENTAL DESCRIPTION

This community is restricted to thermal areas or areas with alkaline or calcareous soils, especially at the northern edge of it's distribution. It is also found around cold springs in desert canyons. It occurs in intermontane valleys (Lesica 1990), in wet basins and adjacent to streams, rivers, and ponds (Hansen et al. 1995). This community type is known to occur in a variety of soils from relatively deep organic, to alkaline and calcareous soils, to coarse wet mineral soils that are directly in contact with thermal waters. It occurs in spring fed wetlands which are saturated throughout the year, often with water running over the ground surface through the stands (Moseley 1995)

VEGETATION DESCRIPTION

The community type forms near monocultures, and may occur as a quaking mat, or may be more open with considerable areas of bare soil, gravel, rock, and open water (Moseley 1995). Hansen et al. (1995) state that E. rostellata dominates a low (less than 30 cm) herbaceous layer.

WILDLIFE VALUES

This community is a source of green forage early in the spring and attracts wildlife (especially elk and deer). Waterfowl also use this type (Hansen et al. 1995).

SUCCESSION

Little is known about the successional dynamics of this community type.

MANAGEMENT

This community type is threatened by development of thermal areas for recreation (Lesica 1991). Because of the wet, often unstable nature of the substrate, soil disturbance and grazing by livestock is probably minimal. Yet trampling damage of the wet,organic soils of this association occurs readily with any livestock utilization. Livestock may graze forage plants in this association, but overgrazing can cause compositional changes to species of lower palatability (Hansen et al. 1995).

ADJACENT COMMUNITIES

Adjacent upland communities are often sagebrush-steppe or coniferous forest types. Adjacent riparian communities may be dominated by Carex spp., Potentilla fruticosa, and Deschampsia cespitosa.

CONSERVATION RANK

G?S1

EDITION/AUTHOR

95-12-20/ L. Williams

JUNCUS BALTICUS (BALTIC RUSH) Herbaceous Vegetation

SIMILAR COMMUNITIES
This community has been quantitatively defined and described by many studies throughout the western United States. 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 related 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
Throughout its range it occurs near seeps, in meadows, and on alluvial terraces. 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. Soils have been classified as Mollisols, Inceptisols, and Histisols. Soil reaction ranges from neutral to mildly alkaline, pH 7.0 to 8.0 (Padgett et al. 1989; Hansen et al. 1995; Manning and Padgett 1995; Crowe and Clausnitzer 1997).

VEGETATION DESCRIPTION
Baltic rush dominates the stands with canopy cover generally over 50%, usually higher. Cover by other graminoids is usually low, although Poa pratensis appears to be a common associate over the range of the 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).

SUCCESSION
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, IDCDC, unpublished data). 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).

MANAGEMENT
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 that 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).

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
G5S5

EDITION/AUTHOR
98-12-09/ B. Moseley

PICEA SP./*CORNUS SERICEA* (SPRUCE/RED-OSIER DOGWOOD) Forest

SIMILAR COMMUNITIES

The Picea engelmannii/Cornus sericea community type is often treated as Picea/Cornus stolonifera [syn. Cornus sericea]. In Montana and Idaho, Picea glauca and Picea engelmannii hybrids are common, thus, lumping both species together is practical (Hall and Hansen 1997 ; Hansen et al. 1995). However, pure stands of Picea glauca are of conservation concern in Idaho and should be treated within the Picea glauca alliance. In Utah (and Wyoming, southeastern Idaho, and elsewhere) either Picea pungens or Picea engelmannii (or hybrids) may dominate, with similar understory composition. This also facilitates lumping under Picea/Cornus stolonifera or Conifer/Cornus sericea (Padgett et al. 1989). Picea engelmannii is also occasionally present in similar communities such as Alnus incana-Cornus stolonifera, Populus trichocarpa/Alnus incana-Cornus stolonifera, Populus trichocarpa/Cornus stolonifera, and Populus tremuloides/Cornus stolonifera, and other Cornus stolonifera types (Crowe and Clausnitzer 1997, Hansen et al. 1995, Kovalchik 1993). The Picea engelmannii/Cornus sericea type is possibly a successional intermediate between Cornus stolonifera/Galium triflorum and the climax Picea/Galium triflorum (Youngblood et al. 1985). Picea engelmannii is also occasionally present in similar communities such as Alnus incana-Cornus stolonifera, Populus trichocarpa/Alnus incana-Cornus stolonifera, Populus trichocarpa/Cornus stolonifera, and Populus tremuloides/Cornus stolonifera, and other Cornus stolonifera types (Crowe and Clausnitzer 1997, Hansen et al. 1995, Kovalchik 1993).

RANGE

The Picea engelmannii/Cornus sericea type (included in Picea/Cornus stolonifera) is a major type known from eastern Idaho, western Wyoming, northeastern Washington (Okanogan Highlands; Kovalchik 1993), northeastern Oregon (Blue Mountains; Crowe and Clausnitzer 1997), Montana, Utah, and possibly Colorado ..

ENVIRONMENTAL DESCRIPTION

The Picea engelmannii/Cornus sericea (including Picea/Cornus stolonifera) community type is found at elevations ranging from as low as 820 m in Montana (Hansen et al. 1995), to around 1400 to 1700 m in Oregon (Crowe and Clausnitzer 1997) to as high as 2300 m elsewhere. Though it is the driest of the riparian Picea types, it is restricted to alluvial terraces, benches, or moist toeslopes immediately adjacent to high gradient streams in narrow V or trough shaped valleys. The topography ranges from flat to 5 percent slopes and may be undulating (Crowe and Clausnitzer 1997, Hall and Hansen 1997, Hansen et al. 1995, Youngblood et al. 1985). In narrow valleys, this community may occupy the whole floodplain (Moseley 1997, Jankovsky-Jones and Mancuso 1995). The water table is usually shallow (50 to 100 cm deep) and stands are often affected by seasonal high water (Hansen et al. 1995, Youngblood et al. 1985). The soils are derived from alluvium with coarse rock fragments (to 35%) and sometimes decaying woody debris (Hall and Hansen 1997, Youngblood et al. 1985). Soils are coarse loam, loamy silts, sandy, or clayey. They are gleyed and mottled, up to 60 cm deep, and have moderate available water capacity. Soil sub-groups are usually Cryoborolls (Aquic and Cumulic) and Cryaquolls (Cumulic, Histic, and Typic) but sometimes Cryofluvents and Cryorthents (Hansen et al. 1995, Youngblood et al. 1985).

VEGETATION DESCRIPTION

The Picea engelmannii/Cornus sericea (including Picea/Cornus stolonifera) community type has a partially closed overstory dominated by mature Picea. Picea (mostly P. engelmannii) constancy ranges from 86 to 100% with cover from 23 to 50% (Crowe and Clausnitzer 1997, Hall and Hansen 1997, Hansen et al. 1995, Kovalchik 1993, Youngblood et al. 1985). Mixed conifer species are common in both the overstory and the sub-canopy/tree understory resulting in high structural diversity (Youngblood et al. 1985). Snags and high levels of woody debris may be present (Crowe and Clausnitzer 1997, Jankovsky-Jones and Mancuso 1995). However, within the mixed conifer component, the species cover of mature, sapling, and seedlings is usually less than 25%. Species vary across the community's range, though Abies lasiocarpa and Pseudotsuga menziesii are most commonly encountered throughout. There is a dense shrub layer with high cover of mixed species. Usually the dominant species, Cornus sericea constancy ranges from 67 to 100% with 10 to 58% cover (though Hall and Hansen (1997) found less than 3% cover) (Crowe and Clausnitzer 1997, Hansen et al. 1995, Kovalchik 1993, and Youngblood et al. 1985). Co-dominant shrubs, often with high constancy but lower cover than Cornus sericea, are Alnus incana, Salix boothii, and Ribes lacustre. Salix drummondiana, Symphoricarpos albus, Linnaea borealis, Rubus parviflora, and Lonicera involucrata are occasionally prominent. Graminoid cover is usually less than 50% with Elymus glaucus (29 to 38% constancy ; 3 to 30% cover) the most common species. Calamagrostis species (usually C. canadensis), Carex species, Bromus species, and Cinna latifolia are all sometimes present with low cover. Forb species richness is high but cover is low. Common forbs, all with less than 10% cover, though sometimes constancy greater than 50%, are Actaea rubra, Thalictrum occidentale, Smilacina stellata, and Galium triflorum. Other commonly associated forbs are Fragaria virginiana, Aster species, Equisetum arvense, Osmorhiza species, and Senecio triangularis (Crowe and Clausnitzer 1997, Hall and Hansen 1997, Hansen et al. 1995, Jankovsky-Jones and Mancuso 1995, Kovalchik 1993, Youngblood et al. 1985).

WILDLIFE VALUES

The Picea engelmannii/Cornus sericea community type provides good winter thermal cover for deer (especially white-tailed deer), bear, and elk (Crowe and Clausnitzer 1997, Hansen et al. 1995, Hansen et al. 1988). In addition, moose, elk, and other wildlife browse this community as Cornus sericea is a desired forage. Cornus sericea also overhangs streams forming hiding and thermal cover for fish. The diverse forest structure provides habitat and food for small mammals and birds (Crowe and Clausnitzer 1997, Youngblood et al. 1995).

SUCCESSION

Overall, the successional dynamics of this community are poorly known. Based on ecological similarities, Youngblood et al. (1985) hypothesize that Picea/Cornus stolonifera is a persistent successional intermediate between Cornus stolonifera/Galium triflorum and Picea/Galium triflorum. Alternatively, Picea engelmannii (or other Picea) may be a late seral invader of many different related communities including : Populus angustifolia or P. trichocarpa or P. tremuloides/Cornus stolonifera, Populus trichocarpa/Alnus incana-Cornus stolonifera, Alnus incana-Cornus stolonifera, Pseudotsuga menziesii stands, Salix species communities, or other Cornus stolonifera community types (Crowe and Clausnitzer 1997, Hall and Hansen 1997, Hansen et al. 1995, Kovalchik 1993, Youngblood et al. 1985). Succession is probably multiple pathed, the result of interracting soil, site moisture, disturbance, and micro-climate factors. For example, Picea engelmannii quickly re-establishes after fire or other disturbance. However, it is slow in dominating stands which explains the remnant conifer and deciduous trees in the overstory. Though located in cold-air draining valleys, which are not fire prone, disturbance has a role in late seral Picea engelmannii/Cornus stolonifer dynamics. Picea engelmannii is easily killed by fire and succeptible to windfall and spruce beetle or spruce budworm infestation. These disturbances may help maintain Picea dominance by promoting reproduction (Crowe and Clausnitzer 1997, Hall and Hansen 1997).

MANAGEMENT

Due to easily compacted soils, high water tables, and streamside locations many activities are usually incompatible. Road construction and recreation sites like campgrounds are not recommended (Hansen et al. 1995, Hansen et al. 1988). Windthrow and rising water tables are often associated with timber harvest. Partial cutting does favor dominance by Picea while clearcutting promotes mixed conifer regeneration (Hall and Hansen 1997). Livestock grazing is not very practical because of fragile soils and low forage amounts. Picea engelmannii provides good erosion control but is easily killed by fire. However, it quickly re-establishes on disturbed ground but not in areas of thick shrub, herbaceous, or duff cover. Also, its slow growth makes it a moderate revegetation option only in the long-term. By contrast, Cornus sericea provides excellent, long-term erosion control by stabilizing banks and recruiting debris. It also readily re-sprouts after fire (Hansen et al. 1995, Hansen et al. 1988).

ADJACENT COMMUNITIES

Adjacent communities may be other Picea types such as the wetter Picea/Equisetum arvense or the drier Picea engelmannii/Galium triflorum (Hall and Hansen 1997, Kovalchik 1993). Other adjacent wet communities are dominated by Alnus incana, Populus species, Salix species (e.g. Salix exigua), Carex species, or other Cornus stolonifera types (Crowe and Clausnitzer 1997, Hall and Hansen 1997, Hansen et al. 1995, Youngblood et al. 1985). Adjacent uplands are often dominated by Pseudotsuga menziesii, Pinus contorta, or Abies lasiocarpa and occasionally Abies grandis (Crowe and Clausnitzer 1997, Hall and Hansen 1997, Hansen et al. 1995, Youngblood et al. 1985).

CONSERVATION RANK

G3G4S3S4

EDITION/AUTHOR

1998-11-16/ CHRIS MURPHY

PICEA SP./*EQUISETUM ARVENSE* (SPRUCE/FIELD HORSETAIL) Forest

SIMILAR COMMUNITIES
In Montana and Idaho, Picea glauca and Picea engelmannii hybrids are common , thus, lumping both species together is practical for classification purposes (Hall and Hansen 1997; Hansen et al. 1995). Stands with mixed conifers have previously been grouped as PICEA and CONIFER in Padgett et al. (1989) and Youngblood et al. (1985). The PICENG/EQUARV type here represents stands dominated by P. engelmannii or Picea hybrids as described by Pfister et al. (1977), Steele et al. (1981) and Mauk and Henderson (1984).

RANGE
The Picea engelmannii/Equisetum arvense is a widely scattered minor type which extends eastward in Wyoming along the Wind River Range and northwestward into central Idaho and Montana and into eastern Oregon.

ENVIRONMENTAL DESCRIPTION
The community type is usually restricted to flat sites with poor drainage, such as gentle toeslopes, seeps, stream terraces, and fen and lake margins. Typically there is a large amount of microtopographic relief due to windthrow mounds and root crown hummocks (Padgett et al. 1989, Hansen et al. 1995). Soils are usually derived from coarse textured alluvium. Textures are highly variable with a moderate water holding capacity. Soils are often wet throughout the year with standing water. Water tables are usually less than 50 cm deep (Padgett et al. 1989, Hansen et al. 1995).

VEGETATION DESCRIPTION
Picea engelmannii dominates a normally dense overstory. Abies lasiocarpa and Pinus contorta are occasionally present on drier microsites such as windthrow hummocks. Shrub cover is usually negligible, with Alnus incana, Betula occidentalis, Lonicera involucrata, Rosa spp., and Amelanchier alnifolia occasionally present. These species normally indicate drier ecotonal or microsite conditions. A dense carpet of the diagnostic herb Equisetum arvense characterizes the undergrowth. Other associates include Carex aquatilis, Carex disperma, Carex rostrata, Glyceria spp., Calamagrostis canadensis, Elymus glaucus, Geranium richardsonii, Senecio triangularis, and Smilacina stellata (Padgett et al. 1989).

WILDLIFE VALUES
Provides habitat for Parus gambeli (mountain chickadee), Regulus calendula (ruby-crowned kinglet), Dendroica coronata (yellow-rumped warbler), Piranga ludoviciana (western tanager), Coccothraustes vespertinus (evening grosbeak), and Carduelis pinus (pine siskin). Equisetum arvense is of documented importance as a food source for grizzly bear (Knight and Blanchard 1983) and black bear use these sites for wallows (Hansen et al. 1990).

SUCCESSION
The type is considered stable and represents a climax sere (Pfister et al. 1977, Padgett et al.). The Populus tremuloides/Equisetum arvense community described by Youngblood and Mueggler (1981) is considered to be seral to Picea engelmannii/Equisetum arvense. Shrubs tend to dominate forest openings created by disturbance such as windthrow.

MANAGEMENT
Windthrow following timber harvest limits the potential for timber management in this type, as do concerns over easily compacted wet soils. A rise in the water table following timber harvest could interfere with forest regeneration (Hansen et al. 1995).

ADJACENT COMMUNITIES
Adjacent upland vegetation is usually dominated by a variety of conifers across the range of this community. Adjacent wetter communities are frequently dominated by Carex spp., Salix spp., or Betula glandulosa (Padgett et al. 1989, Hansen et al. 1995).

CONSERVATION RANK
G4S3

EDITION/AUTHOR
95-04-04/Mabel Jankovsky-Jones

PICEA SP./*LYSICHITON AMERICANUS* (SPRUCE/YELLOW SKUNK CABBAGE) Forest

SIMILAR COMMUNITIES
This type was originally included within the range of variation of the Picea/Equisetum arvense community (Pfister et al. 1977). It was described by Hansen et al. (1995).

RANGE
Picea sp./Lysichiton americancus communities are found in northwest Montana.

ENVIRONMENTAL DESCRIPTION
This community type occurs in valley bottoms adjacent to beaver ponds, lakes, or marshes, and on toe slope seeps, swales and where low gradient stream channels break up into diffuse surface flows. The ground surface has a great deal of microtopographic relief because the shallow-rooted spruce often blow down, creating hummocks (upturned rootwads) and small swales (root wells). This community type is found only in northwest Montana where the Pacific maritime climate influence is strongest (Hansen et al. 1995). Surface horizons have accumulations of organic material, and redox depletions are found in mineral soils. The water table is typically within 50 cm of the soil surface during any time of year, and sites usually have standing water during the spring and early summer (Hansen et al. 1995).

VEGETATION DESCRIPTION
Picea sp. is the dominant overstory species, usually with moderate cover. Large diameter trees are uncommon, and coarse woody debris levels are usually moderate. Betula papyrifera may also be present. Shrub cover is low, but shrub diversity is high. Common species include Cornus sericea and Alnus sp .. Graminoid diversity is usually fairly low, and the dominant forb is Lysichiton americanus, which usually grows in depressions with standing water. Equisetum arvense, Athyrium filix-femina, Rubus pubescens, and Cornus canadensis are often present.

WILDLIFE VALUES
This community probably provides valuable cover for a variety of wildlife species, based on personal observations of wildlife in this community.

SUCCESSION
This community probably represents a late seral condition. Openings created by blowdown usually have higher shrub cover (pers. obs.). Unless the water regime changes markedly, this is most likely a fairly stable community. This community is the wettest of the spruce types. It probably only experiences infrequent stand replacing fires due to the usually wet ground conditions.

MANAGEMENT
Windthrow following timber harvest limits the potential for timber management in this type, as do concerns over easily compacted wet soils. A rise in the water table following timber harvest could interfere with forest regeneration (Hansen et al. 1995).. Saturated soils are highly susceptible to soil compaction or disturbance by livestock or heavy machinery .

ADJACENT COMMUNITIES
Adjacent wetter sites may be dominated by Carex spp. communities or Betula glandulosa communities, and adjacent drier sites may be dominated by Picea/Equisetum arvense communities or upland communities (Hansen et al. 1995).

CONSERVATION RANK
G2S2

EDITION/AUTHOR
99-04-14/J. Greenlee

POPULUS BALSAMIFERA SSP. *TRICHOCARPA/CORNUS SERICEA* (BLACK COTTONWOOD/RED-OSIER DOGWOOD) Forest

SIMILAR COMMUNITIES

This community is synonymous with the Populus trichocarpa/Cornus stolonifera community type described by Hansen et al. (1995). It may be the same as the Populus trichocarpa/Cornus stolonifera-Salix described in Oregon. Similar communities dominated by different Populus overstory species include Populus/Cornus sericea, Populus angustifolia/Cornus stolonifera, and Populus deltoides/Cornus stolonifera (Manning and Padgett 1995, Youngblood et al. 1985, Hansen et al. 1995).

RANGE

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

ENVIRONMENTAL DESCRIPTION

Sites occur on alluvial terraces of major streams and rivers, point bars, side bars, mid channel bars, delta bars, islands, 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 3 or more feet below the soil surface at the end of summer; upper soil profiles remain moist due to capillary action. Coarse textured soils, moderate stream gradients, and high coarse fragment contents throughout the soil profile provide an environment that produces a rapid movement of highly aerated groundwater. Redox concentrations (mottles) are common as evidence of a fluctuating water table (Kovalchik et al. 1993, and Hansen et al. 1995).

VEGETATION DESCRIPTION

Populus balsamifera ssp. trichocarpa/Cornus sericea community type is characterized by an overstory dominated by Populus balsamifera ssp. trichocarpa (25-85% cover) with Populus angustifolia sometimes occurring as subordinates in the eastern portion of the range and Betula papyrifera and Populus tremuloides occurring as subordinates in the western portion of the range. The dense shrub layer is diverse and dominated by Cornus sericea (20-90% cover). Amelanchier alnifolia, Symphoricarpos 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).

SUCCESSION

Populus balsamifera ssp. trichocarpa is a pioneering species that requires moist, barren, newly deposited alluvium exposed to full sunlight for regeneration. 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. 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).

The erosional and depositional pattern of a river helps maintain diversity of plant communities on the floodplain. The distribution of communities depends on the way the river meanders. In turn, the rate of meandering determines the seral stage of the communities. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop (Hansen et al. 1995 and Boggs et al. 1990).

MANAGEMENT

Because of its close proximity to streams and rivers and the flat topography, recreational developments and transportation corridors are common within this type; care must be taken when locating structures in the floodplain to avoid damage or loss by floods. Dams, which limit peak flows, can lead to the gradual disappearance of mature cottonwood forest because of the lack of sediment deposition for seedbeds; periodic floods are necessary for continued cottonwood recruitment (Merigliano 1996). Although streambank erosion is a naturally occurring process, attempts to stabilize streambanks using riprap can lead to increased erosion downstream, thus speeding the loss of cottonwood forest in some cases. Poorly managed livestock grazing can lead to loss of understory shrubs and decreased recruitment of cottonwoods. Management should emphasize the importance of the understory shrub layer in

streambank stabilization; a buffer strip of the 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).

ADJACENT COMMUNITIES

Adjacent wetter communities may be dominated by Salix exigua, S.lasiandra, S. drummondiana, S. geyeriana, Carex utriculata, C. buxbaumii, or a variety of Alnus incana or Typha latifolia dominated 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 et al. 1993, and Boggs et al. 1990).

CONSERVATION RANK

G3?S3

EDITION/AUTHOR

95-08-07/L. Williams

SALIX DRUMMONDIANA/CALAMAGROSTIS CANADENSIS (DRUMMOND'S WILLOW/BLUEJOINT REEDGRASS) Shrubland

SIMILAR COMMUNITIES
Similar communities include Tuhy's (1981) Salix drummondiana/Ribes lacustre/Thalictrum occidentale, Mutz and Queiroz's (1983) Salix drummondiana-Salix boothii/Calamagrostis canadensis, Baker's (1989) Salix drummondiana-Salix monticola/Calamagrostis canadensis-Carex rostrata, and Kittel et al.'s (1998) Salix drummondiana/mesic forb types.

RANGE
This community is a minor type in Colorado, Utah, Idaho, Washington, and Montana.

ENVIRONMENTAL DESCRIPTION
Elevation ranges from 2320 to 8200 feet throughout the range of the community. 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 and Jensen 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.

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

WILDLIFE VALUES
Abundant food, cover, and proximity to water provide habitat for numerous wildlife species and songbirds. Moose and beaver tend to heavily utilize most species of willow.

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

MANAGEMENT
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).

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
G5S5

EDITION/AUTHOR
1996-06-13/L. Williams

SALIX DRUMMONDIANA/CAREX UTRICULATA (DRUMMOND'S WILLOW/BEAKED SEDGE) Shrubland

SIMILAR COMMUNITIES

Earlier studies lumped this community within broader Salix/Carex rostrata [often misidentified, actually 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 [In preparation]).

The edaphic and hydrologic situations which allow Carex utriculata dominance also promote many different Salix species. However, dominance by any one Salix species can be the result of many 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 rostrata-Carex aquatilis, Salix boothii/Carex rostrata, Salix geyeriana/Carex rostrata, Salix lutea/Carex rostrata, and Salix drummondiana/Carex aquatilis (Mutz and Queiroz 1983; Youngblood et al. 1985; Padgett et al. 1989; Hansen et al. 1995; Hall and Hansen 1997; Walford et al. 1997; Kittel et al. 1998). 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 rostrata (Youngblood et al. 1985; Padgett et al. 1989; Kovalchik 1993; Hansen et al. 1995; Walford et al. 1997). Other Carex species may be more common than 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.

ENVIRONMENTAL DESCRIPTION

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

VEGETATION DESCRIPTION

The Salix drummondiana/Carex urtriculata community type is variable, often having mixed Salix and Carex species present. Salix drummondiana is usually dominant with 30 to 55% cover and 70 to 100% constancy (Kovalchik 1993; Hansen et al. 1995; Jankovsky-Jones [In preparation]). Other tall willow species, such as Salix geyeriana, S. boothii, S. sitchensis, S. lasiandra, S. bebbiana, and S. pseudomonticola, usually have less than 40% cover and less than 30% constancy. While these species form a tall shrub canopy (to 4 m), shorter species, such as 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% cover), Spiraea douglasii, or Ribes species may be important (Hansen et al. 1995). Picea engelmannii, Abies lasiocarpa, and Alnus incana are also occasionally present. The herbaceous layer is dominated by Carex utriculata (10 to 39% cover, about 80% constancy) and Carex aquatilis (less than 34% cover, less than 80% 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%), 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 [In preparation]). 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 [In preparation]). 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 rostrata 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).

Succession

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).

Management

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 may also cause streambank sloughing as well as premature soil drying, the loss of vegetative protection, and eventual loss of the community. Beaver are also important in maintaining necessary hydrologic conditions. Thick shrub cover and excessive wetness often limit 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 can eliminate them from the site allowing graminoid cover to increase. This may occur with a late summer and fall grazing regime, 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). Prescribed fire effectively rejuvenates dead clumps because Salix drummondiana sprouts vigorously after fire (quick, hot fires are preferred over slow, cool burns). Fires also increase Carex rostrata but only if ungrazed before and after the fire (Hansen et al. 1995). Both Salix drummondiana and Carex rostrata (and Carex aquatilis and C. vesicaria) are excellent for re-vegetation over the long-term and provide good erosion control (Hansen et al. 1995).

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 rostrata, Salix boothii/Carex rostrata, 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

G5S5

Edition/Author

1998-11-25/Chris Murphy

SALIX EXIGUA/BARREN (SANDBAR WILLOW/BARREN) Shrubland

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 (Jankovsky-Jones 1997), Nevada (Manning and Padgett 1995), Utah (Padgett et al. 1989), Montana, and Colorado (Kittel et al. 1998) 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 and can be from narrow to very wide. Elevations are mostly below 5,500 feet (Padgett et al. 1989; Manning and Padgett 1995; Moseley 1998). Soils are highly variable, ranging from highly stable Cumulic Haplaquolls and Aquic Cryoborolls to early developmental Typic Udifluvents. All have developed on alluvium of varying ages. Estimated available water-holding capacity ranged from low to high, and particle-size classes include fine-loamy and sandy-skeletal. Water tables ranged from near the surface to over 3 feet below the surface (Padgett et al. 1989).

VEGETATION 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).

SUCCESSION
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).

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

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
G5QS5

EDITION/AUTHOR
97-12-31/B. Moseley

SALIX EXIGUA/MESIC GRAMINOID (SANDBAR WILLOW/MESIC GRAMINOID) Shrubland

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

RANGE
Stands occur throughout Utah, extreme western Colorado (Padgett et al. 1989) and the Colorado Front Range (Kittel et al. 1998) , and throughout Idaho (Padgett et al. 1989; Jankovsky-Jones 1997) and Montana (Hansen et al. 1995).

ENVIRONMENTAL DESCRIPTION
This type occurs on stream terraces and in meadows associated with stream channels from about 2,000 to 7,700 feet. Valley bottoms may be narrow to very wide and of low to moderate gradient. This community is not in the most dynamic portion of the floodplain, as are some of the other Salix exigua types (Padgett et al. 1989). Water tables range from the surface to over three feet below the surface. Distinct and prominent mottle are common within 20 inches of the surface, indicating a seasonally high water table. Soils indicate a broad range of development, from the well-developed Terric Borohemists, Cumulic Haploborolls, Typic Cryaquolls, and Pachic Cryoborolls to less-developed Aquic Cryofluvents and Fluvaquentic Haploxerolls. Soils develop on alluvial depositions of varying ages. Particle-size classes were highly variable, with estimated available water-holding capacity from low to moderate (Padgett et al. 1989).

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

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 heavily(Hansen et al. 1995).

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

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

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

CONSERVATION RANK
G5QS5

EDITION/AUTHOR
97-12-31/B. Moseley

SCIRPUS ACUTUS (HARDSTEM BULRUSH) Herbaceous Vegetation

SIMILAR COMMUNITIES
Hansen et al. (1995), Hall and Hansen (1997), and Kittel et al. (1998) 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 CCA encompasses enough compositional and structural variation to include Cole's types.

RANGE
Stands are known from Oregon, Washington, Nevada, California, Idaho, Colorado, 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).

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).

SUCCESSION
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 her Scirpus acutus types.

MANAGEMENT
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 is 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).

ADJACENT COMMUNITIES

CONSERVATION RANK
G5S5

EDITION/AUTHOR
1998-01-05/B. Moseley

THUJA PLICATA/LYSICHITON AMERICANUS (WESTERN RED CEDAR/YELLOW SKUNK CABBAGE) Forest

SIMILAR COMMUNITIES

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/Lysichiton americanus community is sometimes included within Thuja plicata-Tsuga heterophylla/Lysichitum americanum [syn. Lysichiton americanus], 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 etal. 1986).

RANGE

The Thuja plicata/Lysichiton americanus 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 found near the North Fork Clearwater River (Moseley and Wellner 1991) and in the Selkirk Mountains along the Washington and Idaho border (Wellner 1989). 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). It is also known from the Stillwater Valley of northwestern Montana.

ENVIRONMENTAL DESCRIPTION

The Thuja plicata/Lysichiton americanus 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; Wellner 1989; Moseley and Wellner 1991; 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/Lysichiton americanus 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).

VEGETATION DESCRIPTION

The Thuja plicata/Lysichiton americanus community (including Thuja plicata-Tsuga heterophylla/Lysichitum americanum) is dominated by either Tsuga heterophylla (20 to 50% cover) or Thuja plicata (5 to 80% cover) (Kunze 1994). The canopy is open to closed (60% 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 horridus, 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% cover), Vaccinium alaskaense (less than 20% cover), Rubus spectabilis (less than 10% 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% 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).

SUCCESSION

Little information on the successional dynamics of Thuja plicata/Lysichiton americanus is available. Thuja plicata/Lysichiton americanus (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).

MANAGEMENT

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/Lysichiton americanus vary from highly productive to

nutrient poor bogs. However, forage production for livestock is very low. In addition, the water table is high, making logging, road building, recreational development, or livestock grazing impractical (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. Thuja plicata/Lysichiton americanus 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.

ADJACENT COMMUNITIES

In north Idaho and southeast British Columbia, Thuja plicata/Lysichiton americanus 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/Lysichiton americanus also intergrades with shrubbier communities such as : Thuja plicata-Tsuga heterophylla/Gaultheria shallon/Lysichitum americanum/Sphagnum species; Thuja plicata/Alnus rubra-Cornus stolonifera/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

G4QS2

EDITION/AUTHOR

1998-12-04/Chris Murphy

TYPHA LATIFOLIA (BROADLEAF CATTAIL) Herbaceous Vegetation

SIMILAR COMMUNITIES
Some authors place Typha latifolia and Typha angustifolia together within the same habitat type for management purposes (e.g. Hansen et al. 1995).

RANGE
This community occurs in Montana, Colorado, New Mexico, Wyoming, Idaho, and Nebraska.

ENVIRONMENTAL DESCRIPTION
This community is found along streams, rivers, and the banks of ponds. The soil is saturated or flooded for much of the year. It usually has a high organic content.

VEGETATION DESCRIPTION
This community is dominated by hydrophytic macrophytes, especially Typha latifolia, which grow to approximately 2 meters. T. latifolia can form dense stands in places, almost to the exclusion of other species. Other species typical of wetlands are found in lesser amounts in this community. Among these are Carex spp. and Scirpus spp.

WILDLIFE VALUES
Typha latifolia is an important source of shade, hiding cover, and food for wildlife. Waterfowl use this type for nesting and hiding cover, provided the stands are not too dense. This type is a critical source of nesting cover and roosting cover for yellow-headed and red-winged blackbirds (Hansen et al. 1995).

SUCCESSION
Typha latifolia is a prolific seed producer and colonizes exposed mineral substrates readily. Communities are stable when water regimes remain fairly high, although the species can tolerate periods of drought (Hansen et al. 1988, Hansen et al. 1995).

MANAGEMENT
Some consider Typha latifolia to be too aggressive for use in wetland restoration projects (Mitsch and Gosselink 1993) because of its ability to form dense monocultures.

ADJACENT COMMUNITIES
Carex spp. and Scirpus spp. communities commonly occur nearby.

CONSERVATION RANK
G5S5

EDITION/AUTHOR
95-10-19/J.F. Drake

APPENDIX E – SITE DESCRIPTIONS

1 Ambrose Fen

LOCATION

Ambrose Fen is located in the alluvial plain formed by the Flathead River 5 miles (8 km) north of the north shore of Flathead Lake in northwestern Montana, and 2 miles (3 km) south of the town of Creston. NOTE: This is a private wetland, and landowner permission is needed to access this site.

RICHNESS

Ambrose Fen lies in the Flathead Valley and is a mosaic of wet spruce (Picea sp.) forest, shrub carrs, and open fens. Deep and shallow pools of water occurring at the site suggest that the peatland is formed above and around springs. The water source is most likely the kettle lakes found in the rolling, glaciated uplands to the east (Lesica 1995). This fen-carr complex, which is one of the largest peatlands west of the Continental Divide in Montana, supports a diversity of plant communities. There are two wet spruce forest communities, the spruce/field horsetail (Picea/Equisetum arvense) and spruce/skunkcabbage (Picea/Lysichiton americanum) communities. The former is dominated by spruce and paper birch (Betula papyrifera), and it has a diverse understory. This forest occurs on the northeast and west side of the site. The latter spruce type is much wetter than the former, and is found below the big springs and other wet areas. Lesica (1995) describes two types of carr vegetation at the site, bog birch/water sedge (Betula nana/Carex aquatilis) and bog birch/Baltic rush (Betula nana/Juncus balticus) communities. Neither plant association has been described for Montana. Both are dominated by bog birch up to 1.5 to 2m tall. Other carr communities at the site are the bog birch/slender sedge (Betula nana/Carex lasiocarpa) and bog birch/beaked sedge (Betula nana/Carex utriculata) communities. The fen community at the site is more open and is composed of two plant communities that have less well-developed shrub components. Lesica (1995) describes these as the bog birch/water sedge and bog birch/hardstem bulrush (Betula nana/Scirpus acutus) communities; similar vegetation has been described for Pine Butte Fen (Lesica 1986). The bog birch is generally less than 1.5m tall. The pH in the last 2 communities was measured at 7.3, and the conductivity was 520 uS/cm. The bog birch/water sedge community in the fen differs from that in the carr because the fen community is dominated by a low cover of bog birch, shrubby cinquefoil (Pentaphylloides floribunda), and hoary willow (Salix candida), with a ground cover of beaked spikerush (Eleocharis rostellata), Buxbaum's sedge (Carex buxbaumii), inland sedge (Carex interior), and water sedge. The carr lacks shrubby cinquefoil and beaked spikerush. In the bog birch/hardstem bulrush community, hardstem bulrush is dominant in some areas, often sharing dominance with beaked spikerush.

KEY ENVIRONMENTAL FACTORS

The driving factor at Ambrose Fen is the hydrology of the site. Annual variation in precipitation can play a large role in composition and structure of plant communities in the peatland. Numerous dead bog birch were observed near the eastern edge of the fen, and according to the landowner, they all died during the summer of 1997, when the water at the fen was very high all summer due to record snowfall the previous winter. This high water apparently influenced community composition as well, because during my site visit I noticed several differences between my observations and Lesica's (1995) community descriptions. For example, the spruce/field horsetail community at the western edge of the site had an understory dominated by water horsetail (Equisetum fluviatile), with very little field horsetail. Water horsetail favors wetter conditions than field horsetail, and it's possible that water horsetail became dominant during and following the summer of 1997. In addition, water sedge was not very common in the fen, despite its apparent dominance at times in the past. The wetland communities at the site have apparently responded quite rapidly to changes in the hydrologic regime.

RARITY

In addition to being one of the larger fens in the state and supporting a diverse array of peatland communities, Ambrose Fen also hosts a number of rare plant populations. Pale sedge (Carex livida), poor sedge (Carex paupercula), yellow lady's slipper (Cypripedium calceolus v. parviflorum), beaked spikerush (Eleocharis rostellata), tufted club-rush (Scirpus cespitosus), and flat-leaved bladderwort (Utricularia intermedia) all occur in the peatland and are generally restricted to boreal mires throughout their range. Kidney-leaved violet (Viola renifolia) occurs in the wet spruce forest at the site. The site also has an occurrence of the globally rare spruce/skunk cabbage community, which is large and in good condition.

OTHER VALUES

The owners report having seen mountain lions, grizzly bear, moose, and whitetail deer using the wetland. In addition, fireflies occur in the fen.

CONDITION

The site is privately owned and grazed by cattle. Some hummocking of the soil surface is present around the margins. Canada thistle (Cirsium arvense), prickly lettuce (Sonchus spp.), bull thistle (Cirsium vulgare), houndstongue (Cynoglossum officinale), and bittersweet (Solanum dulcamara) are all present at the site, primarily in the wet spruce forest, especially where grazing has occurred. Bittersweet forms fairly dense patches (up to 30% cover) in some spots. Reed canarygrass (Phalaris arundinacea) is also present at the fen, but it does not currently form large, dominant, monotypic stands as it does at some other fens.

UPLANDS

The surrounding lands in the valley are mostly being used for agricultural purposes. State Highway 35, which was recently widened, lies within .25 mile of the eastern edge of the fen. Housing development has occurred around some of the kettle lakes east of the highway.

INFORMATION NEEDS

A better understanding of the hydrology of the site is needed to ensure that the significant peatland resources at the site are protected.

MANAGEMENT NEEDS

Monitoring of the reed canarygrass is needed to determine if the population is increasing and if it therefore poses a threat to the integrity of the site. A weed management plan is also needed to minimize the spread of weeds in the spruce forest.

ELEMENT OCCURRENCE INFORMATION

Picea sp/equisetum arvense forest	G4	S3
Picea sp/lysichiton americanum forest	G2	S2
Betula glandulosa/carex utriculata shrubland	G4?	S4
Betula glandulosa/carex lasiocarpa shrubland	G4	S4
Peatland	Z	Z
Carex livida	G5	S3
Carex paupercula	G5	S3

2 Antice Creek

LOCATION
Site located on Antice Creek, about 6 miles north of Olney in northwest Montana.

RICHNESS
This low gradient creek bottom sits in a glacially formed valley on Antice Creek. The water source for the site appears to be surface flows and groundwater from Antice Creek and toeslope seeps originating at the base of Stryker Ridge. The site is composed of a diverse array of communities, including an extensive wet spruce forest, willow bottom, marsh, sloping fen, and aquatic bed communities. A spruce/field horsetail (Picea sp./Equisetum arvense) community occupies most of the floodplain of Antice Creek. Spruce dominate the overstory, with subalpine fir (Abies lasiocarpa) occurring on hummock microsites, and the floristically diverse understory is dominated by field horsetail. Closer to the creek is a Drummond's willow/beaked sedge (Salix drummondiana/Carex utriculata) community, which is dissected by small channels formed by water backed up by old beaver dams. The beaver dams appeared to be old and unmaintained (many had been partially breached). The willow community intergrades with a marsh community dominated by beaked sedge. There are several small pools associated with the stream that support aquatic plant communities dominated by Chara sp. On the west side of the site, at the base of Stryker Ridge, are several sloping fens. These fens are mostly dominated by a slender sedge (Carex lasiocarpa) community, although stunted spruce and bog birch (Betula glandulosa) occur throughout, as do hoary willow (Salix candida), green-keeled cottongrass (Eriophorum viridicarinatum), yellow sedge (Carex flava), Sphagnum sp., and other mosses.

KEY ENVIRONMENTAL FACTORS
The chief factors structuring the vegetation communities at the site are hydrology, geomorphology (low gradient creek bottom), and beaver activity.

RARITY
A population of green-keeled cottongrass occurs in the fen at this site. There was also a possible siting of a bog lemming (Synaptomys borealis) during the field inventory.

OTHER VALUES

CONDITION
Currently there is logging occurring in the spruce community immediately downstream from this site, so while not occurring in the site, logging could occur in the spruce forest on the site in the future. This site has few exotics, although traces of reed canarygrass (Phalaris arundinacea) were found in the willow community. While currently not widespread at the site, this invasive species can spread aggressively and may pose a threat to the site eventually.

UPLANDS
Logging and road-building has occurred in the uplands immediately east and west of this site.

INFORMATION NEEDS
A thorough floristic inventory conducted during the growing season (and not during the fall, as was this inventory) is needed for this site because the site supports potential habitat for a number of rare plant species. A survey of the site for bog lemmings is also needed.

MANAGEMENT NEEDS
Any future timber harvest in the vicinity of this site should at minimum employ streamside management zone buffers around the Antice Creek wetlands. Some harvesting of the wet spruce forest downstream from this site has occurred; however, the intact and extensive stand of spruce/field horsetail at this site should be included within the streamside management zone buffer for any future harvest.

ELEMENT OCCURRENCE INFORMATION

Picea sp/equisetum arvense forest	G4	S3
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Salix drummondiana/carex utriculata shrubland	G5	S5

3 Glacier Slough

LOCATION

Glacier Slough is located in the upper Swan Valley on Glacier Creek in northwest Montana, about 8 miles south of Condon, Montana

RICHNESS

Glacier Slough is an extensive montane marsh located in a glacially scoured trough along Glacier Creek, which flows through the site. The creek channel flows through 2 constrictions (formed by moraines) which constrain the creek and form 2 narrow spots along the channel, one in the middle of the marsh and one at the outlet. Upstream of the constriction in the middle of the wetland, the marsh is dominated by willow bottoms composed of Drummond's willow/bluejoint reedgrass (Salix drummondiana/Calamagrostis canadensis) in drier spots and Drummond's willow/beaked sedge (Salix drummondiana/Carex utriculata) in wetter spots. Several large stringers of spruce/bluejoint reedgrass (Picea /Calamagrostis canadensis) extend into the willow bottom on slightly higher ground, and several large slender sedge (Carex lasiocarpa) meadows form inclusions in the willow bottom. The gradient of Glacier Creek, which is very low through the marsh, is steeper above and below the wetland. Along the creek above the marsh is a streambank alder (Alnus incana) community, and adjacent to the alder in the broad, flat creek bottom is a subalpine fir/clasping-leaved twisted stalk (Abies lasiocarpa/Streptopus amplexifolius) community. The part of the marsh upstream of the constriction in the middle of the wetland is generally dominated by drier communities than the area downstream of the constriction. This area is dominated by a water horsetail (Equisetum fluviatile) community and more slender sedge community. Along the creek and around the margins are patches of beaked sedge community, and around the margins of the wetland in the drawdown zone is a matrix of tufted hairgrass (Deschampsia cespitosa) and bluejoint reedgrass communities. The only community in the wetland with any appreciable peat accumulation was the water horsetail community, which has a very unstable quaking mat and accumulations of unconsolidated peat over 1.6m deep. Soils elsewhere in the marsh had well-developed A horizons, which probably indicates substantial drying of the marsh surface periodically. The pH of the open water portion of the marsh near the outlet was 6.7 and the conductivity was a low 40 uS/cm.

KEY ENVIRONMENTAL FACTORS

The site's hydrology and geomorphic setting are 2 important factors that have shaped this marsh. Although no beaver dams or active lodges were seen during my site visit, there were old beaver-cut stumps in the upland surrounding the site, as well as back sloughs in the willow and sedge meadow that are typical of beaver-influenced systems. I suspect that beaver come and go from this system and that they have helped shape the plant communities at this site, but judging by the large willow stands, they've been gone for some time.

RARITY

Although no rare plants were observed at this site during my visit, the site does support at least 10 different wetland plant communities, all of which are in excellent condition and highly representative of their respective type. Two of the communities are uncommon in Montana. These are the spruce/bluejoint reedgrass and subalpine fir/clasping-leaved twisted stalk communities. This site is very valuable for the diversity of high quality habitats which it supports.

OTHER VALUES

Spotted frogs, osprey, and muskrats were observed during my site visit. Given the relatively intact uplands and paucity of roads in the drainage above Glacier Slough, it is likely that all of the wetland functions at the site are intact.

CONDITION

Hunting, fishing, and possibly other recreational activities are probably the only landuses that take place at Glacier Slough. The site is about 1 mile by foot from the nearest open forest road. from There were relatively few exotic plants in the plant communities at this site. In the two of the wet meadow communities, there were traces of timothy grass (Phleum pratense) and fowl bluegrass (Poa palustris). There is a small population of reed canarygrass (Phalaris arundinacea) in one of the slender sedge meadows at the south end of the site. This coarse grass, which forms monocultures in seasonally flooded marshes and fens, has been treated in the literature as both a native and exotic species. Populations in North America may be composed of both native genotypes and European cultivars (Merigliano and Lesica 1998). It is unusual to see small populations of reed canarygrass such as that at Glacier Slough.

Uplands

The uplands immediately surrounding Glacier Slough are intact and lack roads. These lands have been managed by the Flathead National Forest as "unroaded lands suited for dispersed recreation" and "semiprimitive nonmotorized" recreation (Flathead National Forest 1985). Some road-building and timber harvest have occurred further up in the drainage, but don't threaten the viability of the site.

Information Needs

A thorough floristic survey of this site is needed as the one I conducted during my site visit was cursory.

Management Needs

There are no management needs at this time.

Element Occurrence Information

Picea sp/calamagrostis canadensis forest	G3	S3
Alnus incana shrubland	G5	S5
Calamagrostis canadensis herbaceous vegetation	G4Q	S4
Deschampsia cespitosa herbaceous vegetation	G4	S3S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Abies lasiocarpa/streptopus amplexifolius forest	G4?	S3
Salix drummondiana/calamagrostis canadensis shrubland	G5	S5
Salix drummondiana/carex utriculata shrubland	G5	S5

4 Gregg Creek Fen

LOCATION

Gregg Creek Fen is located in the Salish Mountains of northwestern Montana. The site is drained by Gregg Creek, a tributary of Good Creek and the Stillwater River.

RICHNESS

Gregg Creek Fen features peatland and wet forest and shrub communities within an undisturbed portion of the Gregg Creek watershed (adjacent downstream lands have been cut-over). The open fen at the lower, western end of the peatland, is dominated by few-flowered spikerush (Eleocharis pauciflora). A diverse shrub carr, dominated by shrubby cinquefoil (Potentilla fruticosa), bog birch (Betula glandulosa), and buckthorn (Rhamnus alnifolia) lies immediately upstream. The upper, east end of the wetland is a wet spruce (Picea) forest with an undergrowth of common horsetail (Equisetum arvense) and arrowleaf groundsel (Senecio triangularis). Adjacent upland slopes are dominated by mature spruce, subalpine fir (Abies lasiocarpa), and scattered large, fire-scarred western larch (Larix occidentalis). The peatland is at an elevation of 4550 feet (1387 m).

KEY ENVIRONMENTAL FACTORS

Gregg Creek passes through the site and the basin floor is largely waterlogged. A well developed peat and moss layer maintains the saturated conditions.

RARITY

Gregg Creek Fen is an excellent example of a montane peatland. The upper part of the wetland supports a wet spruce forest with horsetail (Equisetum arvense) and arrowleaf groundsel (Senecio triangularis) dominating the undergrowth. Three Northern Region sensitive plant species occur on the site: Eriophorum viridicarinatum, Carex livida, and Viola renifolia.

OTHER VALUES

CONDITION

The wetland was allocated to Management Area 12 (riparian areas) in the 1985 Flathead Forest Plan. (Not shown as such on Forest Plan map but all riparian "stringers" along perennial streams are to be included in MA 12.)

UPLANDS

Adjacent lands are within Management Area 15 (timber base) and have been largely cut-over.

INFORMATION NEEDS

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Peatland	Z	Z

5 Hidden Lake Botanical Special Interest Area

LOCATION

Hidden Lake SIA is within the Salish Mountains of northwestern Montana, about 25 miles (40 km) northwest of the town of Whitefish. The area lies within the Stillwater River drainage.

RICHNESS

Hidden Lake Botanical Area encompasses a series of ridges and troughs created by intense glacial scouring. The site is underlain by a highly calcareous landtype which is largely restricted to portions of the southern Fortine Ranger District. Precipitating calcium carbonate has created extensive marl deposits along stream channels, favorable habitat for large populations of three Northern Region sensitive plant species: small yellow lady's slipper (Cypripedium calceolus), sparrow's egg lady slipper (Cypripedium passerinum), and round leved orchis (Orchis rotundifolia). Other wetland features include two ponds and three wet basins. Prominent wetland species are bog birch (Betula glandulosa), slender sedge (Carex lasiocarpa), and beaked sedge (Carex rostrata). Moist spruce (Picea spp.) forests occur adjacent to the shrub and herbaceous wetlands. Uplands support conifer forests within the western redcedar (Thuja plicata) and Douglas-fir (Pseudotsuga menziesii) series of habitat types. Trees vary in size from sapling to large diameter western larch (Larix occidentalis). Fire-killed snags are scattered throughout the existing forest, evidence of past stand-replacement fires. Elevations of the SIA range from a low of 3280 feet (1000 m) where the Jumbo Lake creek leaves the SIA, to a high of 3702 feet (1128 m) along the northern SIA boundary.

KEY ENVIRONMENTAL FACTORS

The topography of Hidden Lake SIA was greatly influenced by glacial scouring as ice masses were funneled through a narrow portion of the Rocky Mountain trench. Wetlands formed in the valley troughs created by the scouring. Calcium-rich substrates contribute to the overall species richness of the area and provide suitable habitat for three calciophile orchid species.

RARITY

General area of Fortine Ranger District is only known location on Kootenai NF for Orchis rotundifolia, Cypripedium passerinum and for nearly all locations of Cypripedium calceolus. Good examples of low-elevation forest and wetland communities are present within the SIA.

OTHER VALUES

Beaver activity has been important in helping shape the wetland communities at the site. Several old, shrub covered beaver dams are present, and behind the older ones are beaked sedge and slender sedge communities. These basins might have been fairly shallow to begin with and filled in relatively quickly. There is one active beaver dam at the outlet of Jumbo Lake, which probably raised the level of this lake somewhat. Several of the shallow ponds have bottoms that are covered with the algae Chara sp.

CONDITION

No management activities are underway or planned for the site. Access is strenuous (steep, dense vegetation), so human use is low. Traces of reed canarygrass (Phalaris arundinacea) are present in some of the shallow marsh and wet meadow communities, but there are no large stands of this invasive grass forming monocultures. This coarse grass has been treated in the literature as both a native and exotic species. Populations in North America may be composed of both native genotypes and European cultivars (Merigliano and Lesica 1998). Elsewhere at this site, there are traces of bull thistle (Cirsium vulgare), Canada thistle (Cirsium arvense), and marsh sow thistle (Sonchus uliginosus), which currently don't pose a threat to communities.

UPLANDS

Cattle grazing occurs adjacent to northwest boundary of site. Difficult access to wetlands within site keeps livestock out. Logging has occurred on slopes to southwest.

INFORMATION NEEDS

Monitoring of the reed canarygrass populations at the site is needed to determine whether it is spreading and thus poses a threat to the other wetland communities at the site.

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Betula glandulosa/carex utriculata shrubland	G4?	S4
Salix candida/carex rostrata ht	G2	S2
Deschampsia cespitosa herbaceous vegetation	G4	S3S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Scirpus acutus herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Typha latifolia herbaceous vegetation	G5	S5
Cornus sericea shrubland	G4	S3
Meesia uliginosa	G4	S1
Amerorchis rotundifolia	G5	S2S3
Cypripedium parviflorum	G5	S3
Cypripedium passerinum	G4G5	S2

6 Lazy Creek Fen

Location

Lazy Creek Fen is located in the Stillwater River valley of northwest Montana about 13 miles northwest of Whitefish.

Richness

This slope peatland occupies a valley along West Fork Lazy Creek. This area was greatly influenced by glacial scouring as the valley glacier advanced and retreated through this narrow section of the Rocky Mountain trench. The primary water source is most likely groundwater flowing from the northwest and draining from the site along West Fork Lazy Creek to the southeast. The peatland at this site is composed of a fen, carr, and wet spruce forest, along with patches of marsh vegetation. Slender sedge (Carex lasiocarpa) dominates the fen, and ranges from being saturated near the surface year-round at the north end to fairly well-drained at the south end near the creek. Marsh cinquefoil (Comarum palustre) and pale sedge (Carex livida) occur in the moister slender sedge community, while the drier slender sedge community supports Kentucky bluegrass (Poa pratensis), blue-joint reedgrass (Calamagrostis canadensis), and patches of Canada thistle (Cirsium arvense). The drier community has a 30cm mollic epipedon at the surface overlying a 120cm+ thick organic horizon, suggesting that drier conditions have allowed decomposition of surface organic layers. Both the plant composition and soil profile suggest that the drier slender sedge community has switched from a wetter to a drier hydrologic regime, allowing plants tolerant of drier conditions to invade. The reason for this alteration in hydrologic regime is not known. The shrub carr also dominates a large portion of the peatland, and it is composed of bog birch/beaked sedge (Betula nana/Carex utriculata) and bog birch/slender sedge (Betula nana/Carex lasiocarpa) communities. There is also an alder (Alnus sp.) community along the creek, which cuts a channel through the peatland at southern end of the site. The wet spruce forest is composed of a spruce/field horsetail (Picea/Equisetum arvense) community. The small patches of marsh are made up of water sedge (Carex aquatilis), beaked sedge (Carex utriculata), and awned sedge (Carex atherodes) communities. Sphagnum sp. and other mosses form dense ground cover in the carr and spruce forest. The adjacent upland forest community that surrounds the site and which covers an esker that extends into the peatland is a subalpine fir/beadlily (Abies lasiocarpa/Clintonia uniflora) type.

Key Environmental Factors

The hydrologic regime has driven the pattern of plant communities at Lazy Creek Fen. Seasonal flooding and year-long saturation in the root zone has led to peat accumulation. Slightly better drained communities, like the spruce/field horsetail, support trees because of better aeration in the root zone.

Rarity

Lazy Creek Fen supports a number of rare plant species, some of which are characteristic of peatlands. Among these are crested shield fern (Dryopteris cristata), pale sedge (Carex livida), green-keeled cottongrass (Eriophorum viridicarinatum), and poor sedge (Carex paupercula). The last two species are typical of poor fens in Montana (Chadde et al. 1998), and crested shield fern often occurs on hummocks in shrub carrs or wet spruce forests. Spurred gentian often occurs in ecotones, and some of the most robust occurrences are found in early successional settings like forest roads.

Other Values

This peatland provides some important wetland functions and services. It is situated along West Fork Lazy Creek, and during peak flows of the creek, the wetland temporarily stores surface water and attenuates peak flows. This water gradually drains from the site and maintains streamflow later in the summer. The peatland probably also functions to retain particulates and remove and sequester imported elements and compounds such as phosphorus and nitrogen compounds. Because the uplands adjacent to the site have been harvested, these latter functions could increase beyond the natural range of variation.

Condition

There are probably no current landuses within this peatland other than hunting. Canada thistle, Kentucky bluegrass, and redtop (Agrostis stolonifera) have trace coverages in this peatland. If the current drier conditions in the Carex lasiocarpa meadow at the southern end of the site continue, the Kentucky bluegrass there may spread.

Uplands

The uplands surrounding the site have been extensively logged in the last several years, and there is continuing timber harvest in the general vicinity. At Lazy Creek Fen, the uplands have been logged around 90% of the site. I

observed Streamside Management Zone (SMZ) flagging adjacent to the wetland; however, in one instance the placement of the flagging was right at the edge of the wetland, and thus provided no buffer. The stands were tractor-yarded, and in the short term the skid trails could be sources of increased sediments to the wetland. There are logging roads in the catchment, but not adjacent to the wetland.

Information Needs

Floristic surveys of the site have been fairly extensive, although to my knowledge no survey of the bryophyte flora has been conducted. There is a need for hydrologic study of the site to better understand water sources for the site and to understand the cause of the drying of the lower slender sedge meadow (which could be as simple as a blown out beaver dam). A study of the landuse history of the site would be helpful as well.

Management Needs

SMZ buffers need to be observed for future timber harvest, and the Canada thistle population should be monitored at regular intervals to ensure that it is not spreading too rapidly. A noxious weed management plan may be needed for the site.

Element Occurrence Information

Picea sp/equisetum arvense forest	G4	S3
Betula glandulosa/carex utriculata shrubland	G4?	S4
Carex aquatilis herbaceous vegetation	G5	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Carex atherodes herbaceous vegetation	G5	S5
Betula glandulosa/carex lasiocarpa shrubland	G4	S4

7 Lost Creek Fens

Location

Lost Creek Fens are located in the northern Swan Valley of northwestern Montana. The fens are within the Spring Creek drainage which flows into Swan Lake, two miles (3 km) to the north.

Richness

Lost Creek Fens are located in the montane zone in a glacially formed valley. The fen has calcareous parent material. The site contains two distinctly different types of fens separated by a patch of moist coniferous forest. The northern fen (elevation 3160 feet [963 m]) is located at the toe of a slope. An upwelling spring supplies water to a thick accumulation of peat which gently slopes to the south. Water drains from the fen into the Spring Creek drainage. The fen vegetation is difficult to classify, but major species include bog birch (Betula glandulosa), slender sedge (Carex lasiocarpa), and (Eleocharis tenuis). Tomenthypnum nitens is a major moss. There are two adjacent wet spruce forest communities: spruce/skunk cabbage (Picea/Lysichiton americanum) and spruce/blue joint reedgrass (Picea/Calamagrostis canadensis). The southern fen (elevation 3100 feet [945 m]) is composed of two shallow potholes filled with peat and alluvium. The watertable fluctuates seasonally; drawdown in the fall hastens peat decomposition and minimizes peat accumulation. These potholes are dominated by a slender sedge (Carex lasiocarpa) community in which slender sedge and Buxbaums sedge (Carex buxbaumii) are dominant. Pale sedge (Carex livida) is fairly common. A spruce/field horsetail community occupies a gently sloping moist draw to the south, and a bog birch/beaked sedge (Betula glandulosa/Carex utriculata) community occurs where this draw enters the fen. A very wet marginal zone is lined with bog birch, shrubby cinquefoil (Potentilla fruticosa), and buckthorn (Rhamnus alnifolia). Between the two potholes is a bog birch/Cusick's sedge (Betula glandulosa/Carex cusickii) community. This community is very diverse. It has an overstory dominated by bog birch, with buckthorn and shrubby cinquefoil common associates. The understory is dominated by Cusick's sedge, with beaked sedge (Carex utriculata) and Buxbaum's sedge common associates. The forb layer is quite diverse, with Canada bunchberry (Cornus canadensis), dwarf red blackberry (Rubus pubescens), and star-flowered Solomon seal (Smilacina stellata) common.

Key Environmental Factors

The continuous flow of water from the upwelling spring and the calcareous parent material are two driving factors in structuring the plant communities at these fens.

Rarity

Lost Creek Fens feature uncommon peatland types and communities and a concentration of sensitive or special concern plant species including giant helleborine (Epipactis gigantea), yellow lady's slipper (Cypripedium calceolus), sparrow's egg lady's slipper (Cypripedium passerinum), poor sedge (Carex paupercula), pale sedge (Carex livida), Loesel's twayblade (Liparis loeselii), and green-keeled cottongrass (Eriophorum viridicarinatum). The site also supports a small but pristine occurrence of the rare spruce/skunk cabbage community.

Other Values

Area provides wildlife habitat for large ungulates (white-tailed deer, elk) and grizzly and black bears.

Condition

There are probably no current landuses at this peatland other than hunting. No exotic plants were observed during the site visit.

Uplands

The fen is in an area that has historically been managed for timber production. Logging and forest road-building in the drainage could conceivably alter the hydrology of the site and have detrimental effects on the fen and Swan River Oxbow Preserve downstream. If suitable buffers are established around the site for such activities, then threats to the viability of the site would be minimal.

Information Needs

Floristic inventory of the peatland has been thorough. However, the hydrology of the site needs study to better understand the source of water for the springs.

Management Needs

Until there is a better understanding of the site's hydrology, it is probably wisest to limit management actions in the drainage to those likely to have minimal effects on the peatland.

ELEMENT OCCURRENCE INFORMATION

Picea sp/equisetum arvense forest	G4	S3
Picea sp/lysichiton americanum forest	G2	S2
Picea sp/calamagrostis canadensis forest	G3	S3
Betula glandulosa/carex utriculata shrubland	G4?	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Betula glandulosa/carex cusickii shrubland	G?	S3
Peatland	Z	Z
Viola renifolia	G5	S3
Viola renifolia	G5	S3
Carex livida	G5	S3
Carex paupercula	G5	S3
Cypripedium parviflorum	G5	S3
Cypripedium parviflorum	G5	S3
Cypripedium passerinum	G4G5	S2
Cypripedium passerinum	G4G5	S2
Epipactis gigantea	G4	S2
Liparis loeselii	G5	S1

8 Molly Lake

Location

Molly Lake is located in the Stillwater Valley of northwestern Montana, in the Rock Creek drainage.

Richness

This site occurs on two flat, glaciated benches on the lower slopes of Stryker Ridge in the Rocky Mountain Trench. A series of beaver ponds have formed on perennial and intermittent creeks, forming ponds and associated wetlands. The water appears to drain from each bench to both the west and east. The communities that occur at the site are an unusual cedar swamp forest, sedge meadow, fen, floating mat, lake, aquatic bed, and shrub communities. A western red cedar/skunk cabbage (Thuja plicata/Lycichitum americanum) forest makes up the cedar swamp forest. This forest occurs on low, hummocky ground and is dominated by immature western red cedar, with scattered older spruce (Picea sp.) and paper birch (Betula papyrifera) and some large (24+ inch dbh) snags. The understory is dominated by skunk cabbage, with a diverse array of forbs and ferns in the herbaceous layer. Streambank alder (Alnus incana) and alder leaved buckthorn (Rhamnus alnifolia) shrub communities occur around the flowing water of the creeks. Molly Lake has a floating-leaved aquatic community dominated by small bur-reed (Sparganium minimum), pondweed (Potamogeton sp.), and water lily (Nuphar sp.). A water horsetail (Equisetum fluviatile) community occurs on the margins of the open water, and on slightly higher ground there are marshy beaked sedge (Carex utriculata) communities. A floating mat fen occurs in the upper wetland (Sec. 18 NW1/4 SW1/4). This fen was dominated by an unidentifiable sedge (too late in the season to identify); other species included beaked sedge, green keeled cottongrass (Eriophorum viridicarinatum), dagger leaved rush (Juncus ensifolius), Cusick's sedge (Carex cusickii), poor sedge (Carex paupercula), fowl mannagrass (Glyceria striata), leafy aster (Aster foliaceus), American brooklime (Veronica americana), and dwarf bramble (Rubus pubescens). The site also has a sedge meadow dominated by slender sedge (Carex lasiocarpa) community. The surrounding uplands are a western red cedar/beadlily (Thuja plicata/Clintonia uniflora) forest.

Key Environmental Factors

Rarity

Several rare plants occur at Molly Lake. Buckler fern (Dryopteris cristata) occurs on hummocks in the cedar swamp forest. Slender-stalked moonwort (Botrychium pendunculosum) occurs in the mature cedar forest near the lake. Green-keeled cottongrass and poor sedge occur in the fen. The western red cedar/skunkcabbage forest is a rare community in Montana.

Other Values

Condition

No current landuses were evident at the time of the site visit. Canada thistle (Cirsium arvense) and redtop (Agrostis stolonifera) both occur in the alder community at the site, and Canada thistle forms some large patches in the understory of this community.

Uplands

Timber harvest and road building have occurred in the uplands near the site.

Information Needs

The upper wetland at the site needs to be visited during the growing season so the dominant, unidentified sedge in the fen community can be determined.

Management Needs

Any future timber harvest adjacent to the site needs, at minimum, to have streamside management buffers in place.

ELEMENT OCCURRENCE INFORMATION

Alnus incana shrubland	G5	S5
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Thuja plicata/lysichitum americanum forest	G4Q	S2
Carex paupercula	G5	S3
Dryopteris cristata	G5	S2
Botrychium pedunculosum	G2?	S1

9 Plum Creek Fen

LOCATION

Plum Creek Fen is located in the foothills of the Mission Mountains on the west side of the Swan Valley of northwestern Montana. The site is 8 miles (13 km) south of the south end of Swan Lake.

RICHNESS

Plum Creek Fen is situated on a gently sloping bench near the base the Mission Mountains. Elevations range from 3380 feet (1030 m) at the upper edge of the peatland, to 3300 feet (1006 m) below the peatland where drainage water emerges in several large, clear blue pools, ca. 10 meters across and 2 meters deep. The site is maintained by a number of seeps on the upslope side of the fen. The peatland features communities dominated by bog birch (Betula glandulosa) and slender sedge (Carex lasiocarpa). Notable are the presence of five Nothern Region sensitive plant species: poor sedge (carex paupercula), fen orchid (Liparis loeselii), yellow lady's-slipper (Cypripedium calceolus), giant helleborine (Epipactus gigantea), and green-keeled cottongrass (Eriophorum viridicarinatum). Great sundew (Drosera anglica), an uncommon carnivorous plant and Natural Heritage Program species of special concern, also occurs.

KEY ENVIRONMENTAL FACTORS

RARITY

Plum Creek Fen features uncommon peatland communities dominated by bog birch (Betula glandulosa) and slender sedge (Carex lasiocarpa). Notable are the presence of five Nothern Region sensitive plant species: poor sedge (carex paupercula), fen orchid (Liparis loeselii), yellow lady's-slipper (Cypripedium calceolus), giant helleborine (Epipactus gigantea), and green-keeled cottongrass (Eriophorum viridicarinatum). Great sundew (Drosera anglica), an uncommon carnivorous plant and Natural Heritage Program species of special concern, also occurs.

OTHER VALUES

CONDITION

No exotics in peatland. Some exotics (Cirsium arvense, Verbascum thapsus) on adjacent cut-over uplands.

UPLANDS

Lands north and south of the peatland have been partially cut over.

INFORMATION NEEDS

Steve Shelly and Steve Chadde conducted an inventory of vascular plants and sampled plant communities of the site on July 14, 1992. Moss characterization is needed.

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Peatland	Z	Z
Drosera anglica	G5	S2
Carex paupercula	G5	S3
Eriophorum gracile	G5	S2
Cypripedium parviflorum	G5	S3
Epipactis gigantea	G4	S2
Liparis loeselii	G5	S1

10 Porcupine Creek Complex

LOCATION

This wetland complex is between 6 and 7 miles south of the town of Swan Lake. It occurs between Whitetail Creek and the headwaters of a tributary of Porcupine Creek.

RICHNESS

This site is a complex of wetlands that occur at the foot of the Mission Mountains. It is composed of both depressional and slope wetlands. The former occur in glacially scoured depressions with creeks flowing into and out of them, and water flow is impeded by active beaver dams. The water that fills these depressions arises from precipitation, springs and seeps, and groundwater. There are two rich fens at the site, as well as numerous beaver ponds, sedge meadows, a large wet spruce forest, floating mat, bog birch carr, and aquatic plant communities. Porcupine Fen (one of the two fens) is an outstanding example of a flow through fen. There are several springs and seeps that emerge in the fen, which is fed by mineral rich water. The fen community is difficult to classify using Hansen et al. (1995), but is dominated by a dwarf bog birch (Betula glandulosa) community, which is composed of bog birch, a diverse array of forbs and graminoids, and a heavy ground layer of brown mosses. A spruce/skunkcabbage (Picea sp./Lysichiton americanum) and spruce/red-osier dogwood (Picea/Cornus sericea) community occur in and around the diffuse flow of the intermittent creeks that flow in and out of the fen. Another smaller rich fen occurs north of the beaver pond that drains into Whitetail Creek. Water emerging at the toeslope of the Missions flows through the spruce/skunkcabbage and bog birch/slender sedge (Betula glandulosa/Carex lasiocarpa) communities before draining from the fen to both the north and south. Water that flows south passes through slender sedge and inflated sedge (Carex vesicaria) communities, which form a floating mat around the north end of a shallow, Chara sp.-bottomed beaver pond. A streambank alder (Alnus incana) community occurs in the well-aerated soils below this beaver pond. Two other wetlands occur in the Porcupine Creek Complex; both are depressions blocked by one or more beaver ponds. The smaller of the two has a large inflated sedge community surrounding the beaver pond, as well as a smaller, wetter beaked sedge (Carex utriculata) community which intergrades with a stand of Cusick's sedge (Carex cusickii). On the slightly better drained soils surrounding the sedge meadow is an extensive spruce/skunk cabbage forest, and below the beaver dam is a shrub field characterized by Drummond's willow/beaked sedge (Salix drummondiana/Carex utriculata) and red-osier dogwood communities. The larger wetland has 4 beaver ponds, all surrounded by a very wet slender sedge community, parts of which are on a very unstable floating mat. There are scattered dead and dying spruce, bog birch, and Bebb's willow (Salix bebbiana) plants scattered around the margins, as if the water level had recently risen. The uplands surrounding the site are mostly western red cedar/beadlily (Thuja plicata/Clintonia uniflora) forest.

KEY ENVIRONMENTAL FACTORS

The driving factors which structure the plant communities at this site are the hydrology, the mineral rich water, and beaver activity. The two fens depend on the constant supply of mineral rich water from seeps and springs to maintain their characteristic plant communities and peat accumulation. A long history of beaver activity has probably been the biggest factor in the creation of the extensive sedge meadows at the site. Cyclical flooding and drying caused by presence and absence of beaver allowed for the colonization of the meadows by various sedges.

RARITY

The rich fens and wet spruce forest at the site support a number of rare plants. Pale sedge (Carex livida) and Loesel's twayblade (Liparis loeselii) are present in both fens, and Porcupine Fen also hosts occurrences of yellow lady's slipper (Cypripedium parviflorum), great sundew (Drosera anglica), and giant helleborine (Epipactis gigantea). Except for great sundew, all of these are species that typically occur in calcareous fens in Montana (Chadde et al. 1998). There is also an occurrence of Buckler fern (Dryopteris cristata) that is found on hummocks in the large spruce/skunk cabbage forest surrounding one of the beaver ponds. The spruce/skunkcabbage forest itself is a rare community in Montana, limited to poorly drained soils in the northwestern part of the state. The two occurrences of this community at this site are both in excellent condition.

OTHER VALUES

Spotted frogs were noted in the beaver ponds, as were numerous ungulate tracks in the fens. This area seems like excellent habitat for a variety of wildlife, due to the highly productive wetland habitats.

CONDITION

There are probably no landuses besides hunting in the wetlands at this site. The flora of the site is relatively

intact. Canada thistle (Cirsium arvense) and bittersweet (Solanum dulcamara) occur in some of the seasonally flooded shrublands and the seasonally flooded spruce/red-osier dogwood community, but do not pose any serious threats at the present.

Uplands

Timber harvest has occurred right to the western edge of Porcupine Fen, and around the intermittent creek flowing into the fen. However, there is no recent harvest immediately adjacent to any of the other wetlands. There has been timber harvest all around the site, if the larger landscape is considered. There is a logging road across a slope within 30 feet of the smaller fen, but it is on the east side, and most of the groundwater probably comes to the fen from the west side. All other logging roads near the wetlands are over 100-200 feet from the wetland, with intact forest communities serving as buffers.

Information Needs

Although floristic inventory for Porcupine Fen has been thorough, my inventory of the rest of the site was cursory. A thorough floristic inventory of the site is needed. A study of groundwater flow paths is also needed to better understand the hydrology of the site, which is very important to the site's overall integrity.

Management Needs

Any future timber harvest at the site should at minimum employ streamside management zone buffers.

Element Occurrence Information

Picea sp/cornus stolonifera forest	G3	S3S4
Picea sp/lysichiton americanum forest	G2	S2
Picea sp/lysichiton americanum forest	G2	S2
Alnus incana shrubland	G5	S5
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex lasiocarpa herbaceous vegetation	G5	S5
Typha latifolia herbaceous vegetation	G5	S5
Cornus sericea shrubland	G4	S3
Betula glandulosa/carex lasiocarpa shrubland	G4	S4
Carex vesicaria herbaceous vegetation	G5	S5
Carex vesicaria herbaceous vegetation	G5	S5
Salix drummondiana/carex utriculata shrubland	G5	S5
Peatland	Z	Z
Peatland	Z	Z
Drosera anglica	G5	S2
Cypripedium parviflorum	G5	S3
Epipactis gigantea	G4	S2
Liparis loeselii	G5	S1
Dryopteris cristata	G5	S2

11 Swan River Delta

LOCATION

The site is located at the south end of Swan Lake in northwest Montana.

RICHNESS

This site is located on the delta of the Swan River, and it encompasses The Nature Conservancy's Swan River Oxbow Preserve, the Swan Lake National Wildlife Refuge, and adjacent lands. The delta is formed over alluvial sands and gravels and lacustrine silts, which all overlay older glacial and lacustrine deposits. Hydrogeologic studies (Anderson 1992) have shown that the water source for the site is groundwater from Lost Creek, except during spring runoff, when groundwater from the Swan River becomes the dominant water source. The site hosts a diverse array of plant communities, including cottonwood forest, wet spruce forest, fen, carr, marsh, and aquatic communities. At the south end of the delta are wet spruce forests, which are composed of spruce/field horsetail (Picea sp./Equisetum arvense) and spruce/bluejoint reedgrass (Picea sp./Calamagrostis canadensis) communities. These communities have diverse understories, and the ground typically has a great deal of microtopographic relief, with the swales being flooded early in the growing season. These forests grade into a black cottonwood/red-osier dogwood (Populus balsamifera ssp. trichocarpa/Cornus sericea) forest as one moves closer to the Swan River. This forest is dominated by black cottonwood, but spruce are common and will eventually dominate the forest. Scattered stands of cottonwood also occur along the Swan River to the north, but some of these have been invaded by reed canarygrass (Phalaris arundinacea), which will eventually be the dominant plant in the community when the cottonwood overstory dies. Oxbows and sloughs occur on either side of the Swan River, and the lake plain is covered by paleo channels of the Swan River which are now filled in. Aquatic communities occur in the permanently flooded areas of the oxbows, sloughs, and the inlet of Swan Lake, while the shallower areas which typically dry down by the end of the growing season are dominated by marsh communities. Common marsh communities on the delta include inflated sedge (Carex vesicaria) and beaked sedge (Carex utriculata) communities. Water horsetail (Equisetum fluviatile) communities dominate the deeper water of sloughs. Many of the marsh communities have been invaded by reed canarygrass, which now forms a monoculture across large portions of the lake plain. Fen and carr communities occur on peat deposits overlying a relatively impermeable lacustrine silt layer. These communities are typically flooded for all or most of the growing season. A bog birch/slender sedge (Betula glandulosa/Carex lasiocarpa) community forms the ecotone between the spruce forest and the rest of the peatland. Most of the carr is dominated by a community with bog birch dominant in the overstory and inflated sedge the most common understory species. Other associated species are Bebb willow (Salix bebbiana), tea-leaved willow (Salix planifolia), skunk cabbage (Lysichiton americanum), arrowleaf groundsel (Senecio triangularis), and coltsfoot (Petasites sagittatus). This carr community is intermixed with a fen dominated by a slender sedge (Carex lasiocarpa) community, which is dominated by slender sedge, lesser panicled sedge (Carex diandra), inland sedge (Carex interior), and awned sedge (Carex atherodes). Reed canarygrass is invading parts of the fen as well.

KEY ENVIRONMENTAL FACTORS

The hydrology and geomorphology are the two dominant factors structuring plant communities on the Swan River Delta. The very gentle slope of the lake plain keeps the ground water from draining very quickly, thus promoting the development of wetland plant communities. In addition, a layer of lacustrine silts at the southeast end of the delta intercepts groundwater from Lost Creek and, since the silts are less permeable, force the groundwater to the surface as springs (Anderson 1992). The silts keep the water at the surface, thus promoting anaerobic conditions and peat formation.

RARITY

The site supports populations of several rare plants, including water howellia (Howellia aquatilis), blunt-leaved pondweed (Potamogeton obtusifolius), Buckler fern (Dryopteris cristata), and yellow lady's-slipper (Cypripedium calceolus). The two former species are aquatic, while the two latter species occur in the carr community. In addition, the Swan River Preserve provides habitat for grizzly bears and bald eagles, two federally listed species. Bear use is most prevalent during spring and early summer. Western toad (Bufo boreas), Pacific tree frog (Pseudacris regilla), and long-toed salamander (Ambystoma macrodactylum) could also occur at this site.

OTHER VALUES

Other animals noted during a field survey by staff zoologist Paul Hendricks were Columbia spotted frog (Rana luteiventris), Common garter snake (Thamnophis sirtalis), pea clam (Pisidium sp), and several freshwater snails: Stagnicola elodes,Lymnaea stagnalis, Physella gyrina, Planorbella trivolvis. The variety of habitats at the site support elk, deer, moose, beaver, river otter, and at least 171 species of birds according to the bird list for the refuge. In addition to providing important wildlife and waterfowl habitat, the Swan River Delta also performs some

important wetland functions. The wetlands in the river's floodplain help maintain the characteristic subsurface hydrology, retain particulates, cycle nutrients, and temporarily store surface water (Hauer 1998). The inlet is a major deposition zone for sediments in the Swan River.

CONDITION

Current recreational landuses in the Swan River Delta include birding, wildlife watching, waterfowl hunting, fishing, and boating. Some homes are built on the steep upland slopes near the inlet of Swan Lake, and these could potentially contribute septic effluent to the lake. The fill material of the Porcupine Creek Road in the Swan River floodplain and the dike along the east river bank just below the Porcupine Creek Road bridge both inhibit floodwaters from reaching the Swan River floodplain. In addition, there are several drainage ditches on the delta, as well as a dirt road that crosses the delta and which is flooded for parts of the year. flows reaching the A great deal of this site has been invaded by reed canarygrass. It poses a threat to existing intact plant communities because it tends to form monoculture as it invades a community, displacing native plants (Apfelbaum and Sams 1987) and altering successional pathways. Other exotics include Canada thistle (Cirsium arvense) and wild rice (Zizania aquatica). The Canada thistle is scattered in the marsh, and will probably always be present at some low levels barring major disturbances. The wild rice grows at the inlet of Swan Lake, and it does not appear to be spreading.

UPLANDS

Offsite impacts to the site include extensive timber harvest and road building in the drainage, which could be increasing sediment loads in the Swan River. The same activities have the potential to affect the site's hydrology, especially if they occur in the Lost Creek drainage.

INFORMATION NEEDS

Information is needed on a number of issues: a landuse history of the site, the effects of the dike and Porcupine Creek road on the flooding regime in the Swan River Preserve, and information on the rate of spread of canarygrass. Such information could aid in management of the site. In addition, further field survey of plant communities is needed in the floodplain of the Swan River east of road 9714 (on the west side of the river).

MANAGEMENT NEEDS

Reed canarygrass control methods are being tested on the Swan River Preserve. Any significant findings should be shared with Swan Lake Refuge staff to assist in controlling the spread and coverage of reed canarygrass, which is the largest threat to the ecological integrity of this site.

ELEMENT OCCURRENCE INFORMATION

Haliaeetus leucocephalus	G4	S3B,S3
Chlidonias niger	G4	S3B,SZ
Picea sp/equisetum arvense forest	G4	S3
Picea sp/calamagrostis canadensis forest	G3	S3
Populus balsamifera ssp. trichocarpa/cornus sericea forest	G3?	S3
Phalaris arundinacea herbaceous vegetation	G5	S5
Deschampsia cespitosa herbaceous vegetation	G4	S3S4
Carex buxbaumii herbaceous vegetation	G3	S3
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Juncus balticus herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Betula glandulosa/carex lasiocarpa shrubland	G4	S4
Carex vesicaria herbaceous vegetation	G5	S5
Salix drummondiana/carex utriculata shrubland	G5	S5

12 Swan River Research Natural Area

LOCATION

Swan River RNA is located in the Swan Valley of northwestern Montana, about 4 miles (6 km) south of Swan Lake. The RNA adjoins a reach of the Swan River which flows north into Flathead Lake.

RICHNESS

Swan River Research Natural Area is located on the alluvium of the Swan River floodplain and on glacial till deposited during the advance of the last valley glacier, and includes a kame (Anderson 1992). The wetland communities are probably supplied with water from two primary sources: surface and groundwater flows from upland tributaries of the Swan River, and by surface and groundwater flows from the Swan River itself, which forms the eastern boundary of the site. The wetland plant communities are quite diverse and include cottonwood forest, wet spruce forest, carr, domed peatland, springs, marsh, and riverine shrublands (Habeck 1992). The peatland is a thick (3-4m), dome-shaped mass of peat deposits located at the toe of the slopes of the Mission Mountains. Water enters the peatland from several seeps and from a spring that wells up in the middle of the peat dome. A lagg or moat surrounds the peatland, in which alder (Alnus sp.) are common. The sloping sides of the peat dome support scattered spruce (Picea sp.). Common species include bog birch (Betula glandulosa), slender sedge (Carex lasiocarpa), mud sedge (Carex limosa), beaked sedge (Carex utriculata), inland sedge (Carex interior), bog buckbean (Menyanthes trifoliata), slender spikerush (Eleocharis tenuis), and numerous mosses (Chadde et al. 1998). Marsh vegetation occurs along low gradient streams, around small lakes, in backwater sloughs, and in abandoned meanders; marsh vegetation includes beaked sedge, cattail (Typha latifolia), and reed canarygrass (Phalaris arundinacea) communities. Shrub communities also occur along the creeks and in the Swan River floodplain on bars and terraces; these include streambank alder (Alnus incana) and red-osier dogwood (Cornus sericea) communities. The wet spruce forest includes spruce/skunkcabbage (Picea/Lysichitum americanum) and spurce/red-osier dogwood (Picea sp./Cornus stolonifera) communities. Adjacent uplands are dominated by western larch (Larix occidentalis), western redcedar (Thuja plicata), grand fir (Abies grandis), subalpine fir (Abies lasiocarpa), and Engelmann spruce (Picea engelmannii), much of which is old growth (Habeck 1992).

KEY ENVIRONMENTAL FACTORS

The key factor shaping plant communities at this site is hydrology. Toeslope groundwater seeps and springs support a unique raised peat dome, and low gradient streams support extensive areas of marsh vegetation.

RARITY

Swan River RNA supports 5 rare plant populations, all of which are associated with the unique raised peat dome at this site. These include Loesel's twayblade (Liparis loeselii), pale sedge (Carex livida), poor sedge (Carex paupercula), giant helleborine (Epipactis gigantea), and slender cottongrass (Eriophorum gracile). In addition, grizzly bears (Ursus arctos), bald eagles (Haliaeetus leucocephalus), and common loon (Gavia immer) are known to be occasional vistors to the site (Habeck 1992). The Swan River through the site supports a population of bull trout. There is also an occurrence of the rare spruce/skunkcabbage community at this site.

OTHER VALUES

The wetlands provide nesting habitat for numerous species of waterfowl and osprey. Some parts of the site are used as elk calving grounds. The general area is also used as big game winter range; extensive use is made of Pacific yew (Taxus brevifolia) (Habeck 1992).

CONDITION

In 1992, the Swan Lake District allowed removal of "green birch" trees from the road right-of-way along the RNA's western boundary. Cutting of the scattered paper birch continued into 1993. Within the RNA, bird research is underway. The peatland dome was studied by Chadde and Shelly in July 1993. The Flathead Forest Plan allocated the site to Management Areas 2E and 12A (RNAs). Exotic species are mostly confined to areas adjacent to the roadway. Reed canarygrass (Phalaris arundinacea) is present in marshy areas, but whether or not this species is spreading is unknown.

UPLANDS

Lands west of the RNA are in Management Area 15 (timber emphasis). Lands east and south of the RNA are within Management Area 12 (timber harvest allowed with riparian restrictions). Private land abuts the RNA's north boundary. The adjacent green birch sale (1992-93) removed many of the scattered paper birch (Betula papyrifera) located along the Porcupine Creek Road right-of-way.

INFORMATION NEEDS

Hydrogeologic study is needed to understand the source of water for the peatland at the site. In addition, a thorough inventory of wetland plant communities at the site is needed to complete this record.

MANAGEMENT NEEDS

Monitoring of extent and speed of reed canarygrass spread is needed to document the extent of the threat of this invasive grass at this site.

ELEMENT OCCURRENCE INFORMATION

Picea sp/cornus stolonifera forest	G3	S3S4
Picea sp/lysichiton americanum forest	G2	S2
Alnus incana shrubland	G5	S5
Betula glandulosa/carex utriculata shrubland	G4?	S4
Phalaris arundinacea herbaceous vegetation	G5	S5
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Typha latifolia herbaceous vegetation	G5	S5
Cornus sericea shrubland	G4	S3
Meesia triquetra	G5	S1
Peatland	Z	Z
Carex livida	G5	S3
Carex paupercula	G5	S3
Eriophorum gracile	G5	S2
Epipactis gigantea	G4	S2
Liparis loeselii	G5	S1

13 Condon Creek Botanical Special Interest Area

LOCATION

Condon Creek Botanical Area is located in the Swan Valley of northwestern Montana, about 25 miles (40 km) south of Swan Lake. The botanical area includes a reach of Condon Creek, a tributary of the Swan River.

RICHNESS

Condon Creek Botanical Area lies within the central Swan Valley of northwestern Montana, a broad glacial valley bordered on the east by the Swan Range and on the west by the Mission Mountains. The valley floor features many potholes and wetlands, 15 of which are included within the 229 acre (93 ha) botanical area. Nine of these ponds support populations of the aquatic annual species water howellia (Howellia aquatilis). The ponds containing water howellia typically dry by late summer or early fall, allowing seeds of water howellia to germinate. Snowmelt refills the ponds in spring and water howellia seedlings resume their growth. Associated wetland plants include inflated sedge (Carex vesicaria), water horsetail (Equisetum fluviatile), grass-leaved pondweed (Potamogeton gramineus), water buttercup (Ranunculus aquatilis), and water-parsnip (Sium suave). Uplands of the site are dominated by mesic montane zone coniferous forests within the Douglas-fir (Pseudotsuga menziesii), Engelmann spruce (Picea engelmannii), and grand fir (Abies grandis) series of habitat types. Notable are several park-like groves of mature ponderosa pine (Pinus ponderosa), with trees estimated to be ca. 380 years old.

KEY ENVIRONMENTAL FACTORS

The seasonal drying of the ponds supporting water howellia is critical in the life history and survival of this plant. In addition, the presence of park-like groves of ponderosa pine nearby indicates frequent low-intensity ground fires were a common phenomenon historically. Fire history studies conducted near Condon in forest stands around potholes found that nonlethal and mixed severity fires occurred on average every 21 years, compared to the present day average of every 109 years (Barrett 1998), and it seems likely that some burned through the dried out ponds. However, the importance of fire to the distribution of water howellia and its effect on howellia life history are not well understood.

RARITY

Condon Creek SIA contains a significant concentration of ponds occupied by water howellia (Howellia aquatilis).

OTHER VALUES

CONDITION

Current landuses are limited by this site's designation as a botanical special interest area. Possible landuses include hunting and occasional research activities. Following timber harvest in 1986, Forest Road 9815 was seeded with a mixture of non-native grasses and forbs. Also present are two exotic weed species, spotted knapweed (Centaurea maculosa) and sulfur cinqufoil (Potentilla recta).

UPLANDS

The botanical area lies in an area of checkerboard landownership between the Forest Service and private owners. Lands adjacent to the west and south boundaries have been largely cut-over.

INFORMATION NEEDS

Annual monitoring of selected water howellia populations was conducted on the site from 1988-1992 by the Montana Natural Heritage Program. Continued monitoring on a less frequent interval (3-5 years) is recommended and the Flathead National Forest has informally agreed to continue this work. Hydrologic studies of water howellia ponds have begun (Shapley 1998), and more work of this kind is needed to better understand the workings of these ponds' hydrologic regime. Further work to understand the role of fire in the distribution of water howellia and the effects of fire on its life history are also needed.

MANAGEMENT NEEDS

Ponds containing water howellia appear relatively secure and do not require any immediate management action. The old-growth ponderosa pine and western larch groves may need underburning to remove young understory trees.

ELEMENT OCCURRENCE INFORMATION

Calamagrostis canadensis herbaceous vegetation	G4Q	S4
Equisetum fluviatile herbaceous vegetation	G5	S5
Typha latifolia herbaceous vegetation	G5	S5
Carex vesicaria herbaceous vegetation	G5	S5

14 Flathead River Islands

LOCATION

This series of islands occurs in the Flathead River immediately east of Kalispell, Montana. NOTE: Some of this site is on private lands, and landowner permission is needed to access these portions of the site.

RICHNESS

Owen Sowerwine Natural Area and several nearby islands (which are being considered for natural area designation by the state) constitute the best examples of riparian shrub and forest communities left in the Flathead Valley. The islands occur in a section of the river where the stream gradient drops. As a result of this decrease in energy, a lot of bedload is deposited here, which causes the braiding in the river channel through this stretch. It is also likely that a large amount of upwelling occurs here, where it is thought that water flowing through the relatively permeable cobbles beneath the Flathead River and floodplain (i.e. the hyporheic zone) encounters the less permeable fine sediments of the Flathead River delta, forcing the discharge of the subsurface water into the river (Stanford and Ward 1993). Just below this braided section, the Flathead River makes a sharp bend to the east, following the Creston fault (Alt and Hyndman 1986). Each island in this stretch of river was formed at a different time in the past; this history is reflected in the spectrum of successional stages represented here. The sandbar willow (Salix exigua) and black cottonwood(Populus balsamifera ssp. trichocarpa)/recent alluvial bar communities are two of the early successional communities on the islands. Both are flooded annually. Sandbar willow was dominant in the former community, with heavy cover of streambank alder (Alnus sp.),bunchberry (Cornus canadensis), and narrow spiked reedgrass (Calamagrostis inexpansa). The black cottonwood/recent alluvial bar community was dominated primarily by a gravel and sand bar, with numerous cottonwood seedlings and various native and exotic annuals. Black cottonwood/red-osier dogwood (P. balsamifera/Cornus sericea) communities occur on some of the islands, and they are mid-successional cottonwood forests. They occur on older terraces on the islands and are flooded infrequently. These forests, if they don't experience any major disturbances like fire or channel movement, gradually become dominated by conifers as the cottonwood overstory dies and thins (Hansen et al. 1995). A spruce/red-osier dogwood (Picea sp./Cornus sericea) community, an example of such a late successional riparian community, occurs in Owen Sowerwine Natural Area. The two-types of forest communities mentioned above are in fair to good condition, with typical forest structure, but with an understory compostion shifted to exotics or increasers in some areas. The last types of communities on the islands are those occurring in sloughs. Some sloughs are ancient channels crossing the high terrace of an island. They may be rarely flooded by surface water, but nonetheless have a high water table because of subsurface water. In one such slough I observed a water horsetail (Equisetum fluviatile) community in the deeper part of the slough, with a red-osier dogwood community in the shallower part of the slough. Other sloughs are younger and connected to the river via surface water. In one of these sloughs I observed a needle spikerush (Eleocharis acicularis) community on a mudflat. Associated species were a rush (Juncus sp.), wapato (Sagittaria cuneata), mare's tail (Hippuris vulgaris), common spikerush (Eleocharis palustris), and variegated horsetail (Equisetum variegatum). Beaked sedge (Carex utriculata) communities occurred in several of these sloughs, as did aquatic communities.

KEY ENVIRONMENTAL FACTORS

The riverine wetland communities on Owen Sowerwine Natural Area and the surrounding islands are all dependent on the hydrologic regime of the Flathead River. Gravelbars and sandbars created during floods are the substrate for future cottonwood forests. The hydrologic regime controls many of the vegetation patterns in this river corridor.

RARITY

No rare plant occurrences are known from this very dynamic riparian system, although a number of such species occur in some of the older sloughs nearby. Large intact examples of black cottonwood/red-osier dogwood communities are uncommon in western Montana, and the occurrence at Owen Sowerwine represents the best such example of such a community in the Flathead Valley because of its size, overall condition, and continued occurrence of natural processes such as flooding.

OTHER VALUES

The large, diverse riparian communities at Owen Sowerwine Natural Area, are extremely valuable in a number of ways. They provide important habitat for wildlife and fish. They also provide important wetland functions and services, such as the temporary storage of surface water, energy dissipation, maintaining characteristic subsurface hydrology, nutrient cycling, and particulate retention (Hauer 1998).

CONDITION

The current landuses on and around the islands are mostly limited to recreational uses like hunting, fishing, and

birding. Some of the islands are in private ownership and have a number of homes built on them. Because of these and other nearby residences, human impacts like septic systems and dogs at large do occur. Timber harvest has also occurred on these same islands. Probably all but the wettest plant communities have been influenced by exotics to some degree. The cottonwood and spruce forest communities have been degraded in some areas by up to 30% cover of Canada thistle (Cirsium arvense), houndstongue (Cynoglossum officinale), and redtop (Agrostis stolonifera). In addition, reed canarygrass (Phalaris arundinacea) forms dense patches in some of the sloughs. The gravel bars support some exotic annuals as well as the noxious weeds spotted knapweed (Centaurea maculosa), St. Johnswort (Hypericum perforatum), and oxeye daisy (Chrysanthemum leucanthemum). The frequent flooding disturbance and good local seed sources make the islands extremely susceptible to invasive exotics. Exotic animals, such as brown headed cowbirds (Molothrus ater) and European starlings (Sturnus vulgaris), probably also use the islands. Exotic fish such as bullhead are also known from the Flathead River.

UPLANDS

The islands in this stretch of the Flathead River represent the remnants of a riparian corridor that was very large and diverse at one time. Urban and agricultural development on both sides of the Flathead River have resulted in numerous offsite impacts which undoubtedly affect this series of islands. Some of these offsite impacts include nutrient loading, bank instability, increased particulates, stream channelization because of levees and bridge approaches, and groundwater pollution. Hungry Horse dam influences river levels to some degree. Kerr Dam keeps Flathead Lake at full pool for longer than would occur naturally, and consequently backs water up the Flathead River longer than would occur naturally as well.

INFORMATION NEEDS

A complete noxious weed inventory for the islands should be carried out.

MANAGEMENT NEEDS

Further development on the islands should be regulated by all appropriate state and federal laws relating to wetlands and activities in floodplains. A noxious weed monitoring program should be established for the islands to detect any new occurrences of noxious weeds like leafy spurge (Euphorbia esula) or purple loosestrife (Lythrum salicaria).

ELEMENT OCCURRENCE INFORMATION

Picea sp/cornus stolonifera forest	G3	S3S4
Populus balsamifera ssp. trichocarpa/cornus sericea forest	G3?	S3
Salix exigua ct	G5	S4
Carex rostrata herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Cornus sericea shrubland	G4	S3

15 Glacier/windfall Kettle Complex

LOCATION
This complex of potholes is 6 miles southwest of Condon in a semi-closed basin between windfall creek and kraft creek.

RICHNESS
This site is a dense complex of glacially-formed potholes that lie between Windfall and Kraft Creeks. Most of them have intermittent creeks flowing into and out of the depression; these creek channels connect the potholes to one another, and they eventually drain into Windfall Creek. Most of these potholes probably have appreciable peat accumulations, although no soil cores were taken to verify this. One of the largest potholes in the complex is Windfall Creek fen, which supports a number of rare plants. Most of the kettles are dominated by a slender sedge (Carex lasiocarpa) community with a lower-lying margin occupied by beaked sedge (Carex utriculata) or inflated sedge (Carex vesicaria) communities. Several of the potholes are dominated by dulicheum (Dulicheum arundinaceum). None of these communities are very diverse, although Windfall Creek fen has the greatest species diversity. This poor fen has lower coverage of slender sedge than the other potholes, as well as a very high cover of Sphagnum sp. on the south side of the fen. Other associated species include Buxbaum's sedge (Carex buxbaumii), inland sedge (Carex interior), hooded lady's tresses (Spiranthes romanzoffiana), great sundew (Drosera anglica), and Lycopodium inundatum. Conductivities in the potholes ranged from 20 - 30 uS/cm, and the pH ranged from 6.7 - 7.0. The riparian corridor along Kraft Creek on the east side of the site is dominated by a Drummond's willow community, which occurs on large cobbles along the creek. The understory, which is composed of a low coverage of various native grasses and forbs, doesn't match any of the Drummond's willow communities described by Hansen et al. (1995). On slightly higher ground, out of the active creek channel, is a streambank alder (Alnus incana) community. The surrounding uplands are grand fir/twinflower (Abies grandis/Linnaea borealis) and grand fir/beadlily (Abies grandis/Clintonia uniflora) forest.

KEY ENVIRONMENTAL FACTORS
The driving factors at this site are the seasonal flooding regime, the depressional landforms, and the mineral-poor water.

RARITY
Two rare plants are found at this site, great sundew (Drosera anglica) and bog clubmoss (Lycopodium inundatum). Both occur in Windfall Creek fen. The site also has an occurrence of a dulichium community, which is rare in Montana.

OTHER VALUES

CONDITION
The only landuse likely at these wetlands is hunting. The only exotics observed at the site were along Kraft Creek, where there were traces of Canada thistle (Cirsium arvense) and spotted knapweed (Centaurea maculosa). These don't pose any threat to the rest of the site, unless there is some disturbance.

UPLANDS
The uplands immediately surrounding the potholes are intact and in good condition. Timber harvest has occurred elsewhere in the drainage, such as adjacent to Kraft Creek, and corporate timber lands have been heavily logged. Adjacent lands are within Management Area 15c-timber base with special consideration of white-tail deer summer range (USDA 1985).

INFORMATION NEEDS
With further inventory to document plant communities and landuses, the potholes in adjacent section 22 could be incorporated into this dense complex of potholes.

MANAGEMENT NEEDS
Any future timber harvest adjacent to wetlands or Kraft Creek should employ streamside management zone buffers.

ELEMENT OCCURRENCE INFORMATION

Alnus incana shrubland	G5	S5
Calamagrostis canadensis herbaceous vegetation	G4Q	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Dulichium arundinaceum herbaceous vegetation	G3?	S2
Carex vesicaria herbaceous vegetation	G5	S5
Peatland	Z	Z
Drosera anglica	G5	S2
Lycopodium inundatum	G5	S1

16 Lewis Meadow

LOCATION
The site is located in the Stillwater Valley of northwestern Montana, about 3 miles east of Olney, Montana.

RICHNESS
These wetlands occur in a series of glacially scoured depressions in the Rocky Mountain Trench of northwest Montana. Middle Fork Lazy Creek originates in the uppermost pothole and flows through the lower potholes. The watersource for the uppermost pothole isn't clear. The depressions support a diverse mosaic of emergent, shrub, and mature wet spruce forest communities. The uppermost depression is the deepest one and has a large water horsetail (Equisetum fluviatile) community growing in mucky soils surrounded by a slender sedge (Carex lasiocarpa) community on higher ground. On small patches of higher ground in the water horsetail community are pockets of awned sedge (Carex atherodes) community. A diverse spruce/red-osier dogwood (Picea sp./Cornus sericea) forest occurs around Middle Fork Lazy Creek slightly downstream from the previous depression; it is dominated by spruce in the overstory and alder (Alnus sp.) in the shrub layer, with a diverse herbaceous layer. An alder community (Alnus sp.) occurs along the creek, as does a beaked sedge (Carex utriculata) community. Adjacent to the beaked sedge community on slightly higher ground is more slender sedge community. Lastly, an undescribed spruce community occurs on somewhat higher ground than the previous spruce community. This latter community has a higher coverage of larger diameter spruce in the overstory, and the herbaceous layer is dominated by soft-leaved sedge (Carex disperma) and bunchberry (Cornus canadensis) , and the ground is more hummocky. Associated species are alder-leaved buckthorn (Rhamnus alnifolia), field horsetail (Equisetum arvense), Buckler fern (Dryopteris cristata), liver-leaf wintergreen (Pyrola asarifolia), redtop (Agrostis stolonifera), and moss. Not all of the wetland communities at Lewis Meadow were visited. The upland appears to be mostly grand fir/beadlily (Abies grandis/Clintonia uniflora) forest.

KEY ENVIRONMENTAL FACTORS
The environmental factors that have played the biggest role of structuring the plant communities at this site are the geomorphology and the hydrology.

RARITY
Two rare plant populations are found at Lewis Meadow, Buckler fern (Dryopteris cristata) and spurred gentian (Halenia deflexa).

OTHER VALUES

CONDITION
There are no evident current landuses in Lewis Meadow. Several exotics occur in Lewis Meadow, including Canada thistle (Cirsium arvense) and reed canarygrass (Phalaris arundinacea), which are established in many community types. Reed canarygrass poses the greatest potential threat to the site.

UPLANDS
The uplands were heavily logged in the past, and the second growth has been almost completely logged in recent years. The wet spruce forests at the site were not logged recently, however, and act as a buffer between the wetland and harvested uplands.

INFORMATION NEEDS
More information is needed on the influence of past beaver activity on these wetlands. In addition, complete floristic inventory is needed for Lewis Meadow during the early summer as it good potential habitat for a number of rare plants. Lastly, wetland plant community information is needed for the wetlands in T32N R23W Sec 15SE1/4NE1/4 and Sec 14NW1/4SW1/4.

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Picea sp/cornus stolonifera forest	G3	S3S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Carex atherodes herbaceous vegetation	G5	S5

17 Mccabe Meadow Complex

LOCATION
This site is 3 miles north of Olney, Montana.

RICHNESS
McCabe Meadow is composed of depressions on two glaciated benches connected by surface and probably groundwater flow in the Rocky Mountain Trench. The wetlands on the upper bench are fed by first order streams and probably groundwater, and they drain into the wetlands on the lower bench. The lower pool is predominantly a large sedge meadow dominated by a slender sedge (Carex lasiocarpa) community. A bog birch/beaked sedge (Betula glandulosa/Carex utriculata) shrub community and a beaked sedge community intergrade to form a lagg or "moat" that rings the lower pool. Just above the lower wetland is a spruce/skunkcabbage (Picea sp./Lysichitum americanum) forest. A broad zone with diffuse surface flow connects the upper and lower terraces, and this area is covered with an unusual western red cedar/skunkcabbage (Thuja plicata/Lysichitum americanum) forest community which hasn't been described for Montana. The upper terrace is dominated by a series of depressions which support a complex early seral conifer community. There are scattered young spruce, cedar, lodgepole pine (Pinus contorta), and alder, and the understory is dominated by a mixture of cattail (Typha latifolia) and beaked sedge. Also scattered on the upper terrace wetlands are small patches of water horsetail (Equisetum fluviatile), one of which is drying out, as well as a Sitka alder (Alnus viridis ssp. sinuata) community. The upland is a western red cedar/beadlily (Thuja plicata/Clintonia uniflora) community.

KEY ENVIRONMENTAL FACTORS
The hydrology and geomorphology are probably the two dominant factors structuring plant communities at the site. There are some old beaver-chewed trees at the site, but no dam and no current beaver activity, so while beavers may have been important in the past, they are currently absent from the site. Spruce snags and young conifer regeneration in the wetland indicate alternating high and low water levels (possibly associated with beaver?); this example shows how hydrology can determine the potential vegetation community.

RARITY
One rare plant, spurred gentian (Halenia deflexa), is known to occur at this site. There are also two rare forested wetland communities, a spruce/skunkcabbage and western red cedar/skunkcabbage community.

OTHER VALUES

CONDITION
No current landuses were evident during the site visit. There are relatively few exotics at this site. Small amounts of reed canarygrass (Phalaris arundinacea) and Canada thistle (Cirsium arvense) appear to be invading one small pool that's drying out.

UPLANDS
The adjacent state lands are managed for timber production.

INFORMATION NEEDS
A hydrogeologic study is needed for this and adjacent wetlands to better understand groundwater flowpaths and aquifer locations.

MANAGEMENT NEEDS
Any future timber harvest near this site needs at minimum streamside management zone buffers.

ELEMENT OCCURRENCE INFORMATION

Picea sp/lysichiton americanum forest	G2	S2
Alnus viridis ssp. sinuata shrubland	G5	S5
Betula glandulosa/carex utriculata shrubland	G4?	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Thuja plicata/lysichitum americanum forest	G4Q	S2

18 Mud Lake

LOCATION

Mud Lake is located several miles north of the Swan River and northeast of Bigfork, Montana. NOTE: This is a private wetland, and landowner permission is needed to access this site

RICHNESS

Mud Lake lies on the eastern edge of the Flathead Valley at the foot of the Swan Range. The lake, which has 3 inlet creeks and one outlet that drains to the south, has deep deposits of sediments and organic detritus. Two of the low gradient creeks flow in at the north end of the lake. They are partially blocked by beaver dams, which have formed an extensive network of small sloughs, around which a large bog birch (Betula nana) carr and wet spruce (Picea sp.) forest have formed. Mud Lake has a narrow, patchy hardstem bulrush (Scirpus acutus) community in the shallow water near shore, ringing the deeper aquatic plant community. Most of the lake is dominated by the aquatic plant watershield (Brasenia schreberi), whose leaves and flowers float like water lilies. Other floating- leaved aquatics include broad-leaved pondweed (Potamoageton natans), water lily (Nuphar variegatum), and water crowfoot (Ranunculus aquatilis). Submerged aquatics growing in the lake include large-leaved pondweed (Potamogeton amplifolius), common bladderwort (Utricularia vulgaris), and eel-grass pondweed (Potamogeton zosterformis). At the north end of the lake on a floating substrate there is a small water horsetail (Equisetum fluviatile) community. The poorly drained soils at the north end support a slender sedge (Carex lasiocarpa) community in the wetter, more anaerobic areas, typically nearer to the lake. A bog birch carr occurs around the slow moving creeks and beaver sloughs where the substrate is slightly better oxygenated. A bog birch/slender sedge (Betula nana/Carex lasiocarpa) community forms an ecotone between the slender sedge community noted above and a larger bog birch/beaked sedge (Betula nana/Carex utriculata) community. Traces of hoary willow (Salix candida) occur through the carr, and the bog birch/slender sedge community has a heavy moss cover below the dense stand of slender sedge. At a slightly higher position than the carr is an extensive spruce/skunkcabbage (Picea sp./Lysichiton americanum) community. Spruce forms a sparse overstory above a diverse shrub layer, which isn't dominated by any particular shrub species. Bog birch and alder-leaved buckthorn (Rhamnus alnifolia) are common. The herbaceous layer is composed of a diverse assemblage of graminoids, ferns, and forbs. Common species include beaked sedge, skunkcabbage, coltsfoot (Petasites sagittatus), marsh cinquefoil (Comarum palustre), dwarf red blackberry (Rubus pubescens), and bunchberry (Cornus canadensis). A spruce/field horsetail (Picea/Equisetum arvense) community occurs as a band above the spruce/skunkcabbage community on a slight break in the slope, above which is the grand fir/beadlily (Abies grandis/Clintonia uniflora) upland. Near the inlet creek on the east side of the lake is a large streambank alder (Alnus incana) community, which typically occur in better aerated soils than bog birch communities. This community has a large reed canarygrass (Phalaris arundinacea) component. There is also more spruce/skunkcabbage community near this creek on the wet peaty floodplain soils. The lake waters had a pH of 8.05 and a relatively low conductivity of 190 uS/cm.

KEY ENVIRONMENTAL FACTORS

The hydrology of the site and its landscape position are both very important in driving the pattern of plant communties at the site. The poorly drained soils surrounding Mud Lake and shallow lake waters favor the communities which are typically found at such sites, with the exception of the watershield community, which is rare in Montana..

RARITY

The globally rare spruce/skunk cabbage community that occurs at Mud Lake is an extensive occurrence in good condition. There are also 3 rare plant occurrences at the site: watershield, kidney-leaved violet (Viola renifolia), and Buckler fern (Dryopteris cristata). Kidney-leaved violet is found in moist soil, often associated with openings in low to mid elevation wet spruce forests. Buckler fern is often found growing on hummocks in shrub carrs or wet spruce forests at low to mid elevation.

OTHER VALUES

During the site visit, we observed painted turtles, a clam species, osprey, a sandhill crane, and a snail species. According to Gael Bissell of MTFWP, the wetlands surrounding Mud Lake are important grizzly bear spring and fall habitat.

CONDITION

The lake is a popular local pike fishery. In addition, the streambank alder and part of the spruce/skunkcabbage community probably receive occasional livestock use. There are small concentrations of redtop (Agrostis stolonifera), Canada thistle (Cirsium arvense), and timothy (Phleum pratense) in the spruce/field horsetail community, mostly in areas where some localized disturbance has occurred (probably associated with past logging).

These species are localized and don't pose a threat to the community. In the streambank alder community, reed canarygrass forms a large component of the understory. Pike, an introduced fish species, is found in Mud Lake.

UPLANDS

About half of the uplands immediately adjacent to the site have been cleared of forest cover and converted to hay pasture and grazing lands, while in other places the forest is managed for timber production. Heavy stands of Canada thistle, and scattered bull thistle (Cirsium vulgare) and houndstongue (Cynoglossum officinale), can be found in some of the grazed and/or logged areas. A number of houses have been built around Mud Lake; their septic systems could pose a threat to Mud Lake in the future.

INFORMATION NEEDS

A more thorough floristic survey of the wet spruce forests and bog birch carr at the north end of Mud Lake is needed, as the survey performed during my site visit was cursory. The state lands adjacent to the private lands need to be looked at, too.

MANAGEMENT NEEDS

Periodic monitoring of the reed canarygrass stands in the alder community is needed to determine if it is spreading. It could pose a threat to the carr communities if it gets started there. Control of this species is difficult and expensive (Apfelbaum and Sams 1987). In addition, an integrated weed management plan is needed for some of the weed populations in the uplands adjacent to Mud Lake.

ELEMENT OCCURRENCE INFORMATION

Picea sp/equisetum arvense forest	G4	S3
Picea sp/lysichiton americanum forest	G2	S2
Alnus incana shrubland	G5	S5
Betula glandulosa/carex utriculata shrubland	G4?	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Scirpus acutus herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Betula glandulosa/carex lasiocarpa shrubland	G4	S4
Brasenia schreberi	G5	S2
Dryopteris cristata	G5	S2

19 Napa Creek Fen

Location
Napa Creek Fen is within the Swan River State Forest and Swan Valley of western Montana, 10 miles (16 km) southeast of the town of Swan Lake. The fen encompasses a segment of Napa Creek, a tributary of the Swan River.

Richness
Napa Creek fen is a slope peatland located on glacial moraine material on the east side of the Swan Valley. The water source for the fen is most likely some combination of ground and surface water from Napa Creek. Diffuse flow from the creek appears to enter the fen on the east side of the peatland, where it then hits a topographic divide in the middle of the fen and subsequently flows north and south. The north half of the site is composed of fen, carr, and wet spruce communities, while the south half is dominated by a series of beaver ponds with marsh vegetation. The fen in the peatland at the north end is a slender sedge (Carex lasiocarpa) community, which is dominated by slender sedge and also has Buxbaum's sedge (Carex buxbaumii), yellow sedge (Carex flava), inland sedge (Carex interior), slender spikerush (Eleocharis tenuis), green keeled cottongrass (Eriophorum viridicarinatum), marsh muhly (Muhlenbergia glomerata), and Kalm's lobelia (Lobelia kalmii). The pH here is 7.4, and the conductivity is 460 uS/cm. This community, which is on a 1-2% slope, has a peat depth of 30cm - 120cm. It grades into a bog birch/slender sedge (Betula nana/Carex lasiocarpa) community, which has fairly open grown bog birch averaging about 1.5m tall on a peat substrate 140cm thick. Adjacent to this carr and nearest to the diffuse flow of Napa Creek is a spruce/red-osier dogwood (Picea sp./Cornus sericea) forest, which is wetter than the average occurrence of this type. For example, the herbaceous layer is dominated by beaked sedge (Carex utriculata) and small fruited rush (Scirpus microcarpus). This community might still be responding to the high water of the previous year. The south half of the wetland has more marsh character, and is composed of a series of beaver dams overgrown by alder and red osier dogwood. The dams are intact, but there is only one backing up water to form a small pond with the algae Chara sp. covering the bottom. Beaked sedge (Carex utriculata) communities predominate behind the dams, with one awned sedge (Carex atherodes) community. On higher hummocks in the beaked sedge community are scattered dead alder, spruce, and paper birch, indicating past water level fluctuations. Below the last beaver dam and on drier "fingers" sticking out into the marsh is more typical spruce/red osier dogwood community.

Key Environmental Factors
The hydrology of the site and beaver activity are the dominant factors that structure the plant communities at this site.

Rarity
No rare plant occurrences are known from this site, although the fen would seem to be good habitat for a number of peatland-restricted species known from nearby sites. The bog birch/slender sedge community is rare in Montana.

Other Values
Beaver activity at this site has increased habitat diversity by creation of a series of sedge filled marshes, shrub covered beaver dams, and ponds which are filled sometimes. No recent beaver activity was observed at the site, and water levels behind the dams were low; the marshes seemed to be going through a dry phase, as young spruce and paper birch were sprouting at the bases of older dead trees growing on hummocks in the marsh, killed during an episode of high water.

Condition
The only landuse that probably occurs at this site is hunting. This peatland is in good condition, with no stands of reed canarygrass (Phalaris arundinacea), and only a few scattered bull thistle (Cirsium vulgare) and mullein (Verbascum thapsus) in one drier part of the slender sedge community.

Uplands
The landscape around this peatland has experienced heavy timber harvest, and there are numerous forest roads and skid trails. However, most of the forest immediately surrounding the peatland is intact second growth grand fir/beadlily (Abies grandis/Clintonia uniflora) and western red cedar/beadlily (Thuja plicata/Clintonia uniflora) forest.

INFORMATION NEEDS

The flow path of water through the site needs to be confirmed. This would help explain whether changes in the water source have dried up the beaver ponds, or if the drying is caused by something else, such as absence of beaver to maintain the dams.

MANAGEMENT NEEDS

Floristic inventory of this site has been fairly thorough, although there is a possible Scirpus pumilus occurrence here that has not been confirmed. Any future timber harvest in the vicinity should employ appropriate streamside management zone buffers around the wetland.

ELEMENT OCCURRENCE INFORMATION

Picea sp/cornus stolonifera forest	G3	S3S4
Betula glandulosa/carex utriculata shrubland	G4?	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Carex atherodes herbaceous vegetation	G5	S5
Peatland	Z	Z

20 North Sanko Creek Fen

LOCATION

North Sanko Creek Fen is located in the Salish Mountains of northwestern Montana, 15 miles (24 km) west of the town of Whitefish. Sanko Creek is a tributary of Logan Creek which flows into Tally Lake and the Stillwater River.

RICHNESS

North Sanko Creek Fen features two wetland areas: one is a small pond, 1-2 acres (0.4-0.8 ha) in size and up to 3-4 m deep, and surrounded by a floating to anchored organic mat and a wet meadow. The other wetland is a north-south oriented fen about 6 acres (2.4 ha) in extent. The fen is surrounded by moist spruce (Picea) forest. Western larch (Larix occidentalis) is common on adjacent uplands. The fen has a series of broad, gently sloping terraces with interspersed water tracks and upwelling pools of water. Prominent vascular plant species of the fen include bog birch (Betula glandulosa), slender sedge (Carex lasiocarpa), beaked sedge (C. rostrata), and mud sedge (C. limosa). Two Northern Region sensitive plant species occur: green-keeled cottongrass (Eriophorum viridicarinatum, fen) and kidney-leaved violet (Viola renifolia, adjacent forest). Elevations of the site range from 5000-5080 feet (1524-1548 m).

KEY ENVIRONMENTAL FACTORS

RARITY

OTHER VALUES

CONDITION

The site is not mapped as a distinct management area on the 1987 Flathead Forest Plan map but would be included within MA 12 - riparian areas (timber harvest restrictions).

UPLANDS

Adjacent lands are within Management Area 15 - timber production.

INFORMATION NEEDS

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Peatland	Z	Z

21 Point Pleasant Fen

LOCATION

Point Pleasant Fen is located in the Swan Valley of northwestern Montana, seven miles (11 km) south of the town of Swan Lake.

RICHNESS

Point Pleasant Fen is located in a wet basin in the Swan Valley of northwestern Montana. This valley was scoured by glaciers during the Pleistocene. The basin is fed by springs which enter the site on the east. The route by which water leaves the peatland is not well understood. Surface water was seen flowing south out of the site in a defined channel after a June, 1998, site visit. Whether groundwater follows a parallel or alternate path to the nearby Swan River is not known. The wet conditions have favored the development of a 150cm+ thick organic layer which is quaking in some places. The outer edge of the fen is ringed by an open water zone ("moat"). The adjacent upland forest is dominated by western larch (Larix occidentalis) and Douglas-fir (Pseudotsuga menziesii). Along the east and north end of the site is a wet spruce forest composed of both spruce/field horsetail (Picea/Equisetum arvense) and spruce/bluejoint reedgrass (Picea/Calamagrostis canadensis) communities. Below the the wet spruce forest communities is a shrub carr. Shrubs such as alder (Alnus spp.), bog birch (Betula glandulosa) and Bebbs willow (Salix bebbiana) are common along the moat and ecotone with the adjacent forest. The open fen, which occupies the largest area at the site, is dominated by sedges, notably slender sedge (Carex lasiocarpa) and Buxbaums sedge (Carex buxbaumii), and other graminoids such as sharpstem bulrush (Scirpus acutus). Brown mosses such as Campylium, Drepanocladus, and Hypnum are common. Elevation of the fen is 3200 feet (975 m).

KEY ENVIRONMENTAL FACTORS

The constant supply of water by the springs on the east side of the site were critical to the development of this peatland, as are the calcareous parent materials which favor the presence of the rich fen species at the site (Chadde et al. 1998). A fire history study of riparian areas and glacial potholes in the Swan Valley concluded that frequent nonlethal and mixed severity fires promoted development of open grown stands dominated by ponderosa pine (Pinus ponderosa) and western larch (Larix occidentalis) prior to the advent of fire suppression. The understories of such stands have been filled with younger trees which would have normally been thinned by fire (Barrett 1998). An example of such a larch stand is on the east side of the peatland.

RARITY

Point Pleasant fen is a rich fen and supports a number of rare plant species as well as two rare or uncommon plant communities. Loesel's twayblade (Liparis loesellii), a rare orchid, occurs here and in only a few other rich fens in Montana. Other rare plants that occur here are yellow lady's-slipper (Cypripedium parviflorum), sparrow's egg lady's-slipper (Cypripedium passerinum), pale sedge (Carex livida), and beaked spikerush (Eleocharis rostellata). All of these species are most commonly found in peatlands occurring on calcareous parent materials (Chadde et al. 1998). The spruce/bluejoint reedgrass community is uncommon from low to high elevations in the mountains of Montana (Hansen et al. 1995). The beaked spikerush community is rare in Montana, restricted to northwestern and southwestern Montana. It occurs on calcium rich substrates.

OTHER VALUES

This site is classified as a slope wetland under the classification system used for the hydrogeomorphic (HGM) approach for assessing wetland functions (Smith et al. 1995). The mineral-rich groundwater is discharged into the peatland when the groundwater intersects the land surface. After flowing through the site, the water leaves the site either as groundwater or surface water. Despite the proximity of State Road 83 to Point Pleasant fen, the fen's carbon and nutrient cycling functions still appear to be intact, judging by the peat depths and characteristic plant communities present at the site. In addition to wetland functions, the site provides habitat for a population of fireflies (pers. obs.).

CONDITION

No apparent landuses occur at the site, with the possible exception of hunting. Because the fen is next to State Road 83 and offers a flat, tree-less surface, it's also possible that the site gets some snowmobile use during the winter. No exotic plants were observed in the fen.

UPLANDS

Logging of the adjacent area may affect nutrient inputs to the site. The presence of the state highway and the forest road immediately south of the fen have the potential to affect the hydrology of the site, but have

apparently not done so yet.

INFORMATION NEEDS

Vascular and bryophyte floristic surveys of the site have been thorough. However, there is a need to determine sources for springs which feed the fen and to determine the flow paths for water leaving the site. Continued monitoring of landuses at the site is also needed.

MANAGEMENT NEEDS

Management actions adjacent to the fen need to take into account protection of the fen's hydrology. For example, any timber harvest adjacent to the fen should observe state Streamside Management Zone (SMZ) buffers. The culvert under the forest road at the south end of the fen should be checked annually for blockage, or better yet, removed. If the culvert were to be blocked, water could be ponded in the fen for longer than normal, which could have a detrimental effect on some of the plants at the site.

ELEMENT OCCURRENCE INFORMATION

Picea sp/equisetum arvense forest	G4	S3
Picea sp/calamagrostis canadensis forest	G3	S3
Betula glandulosa/carex utriculata shrubland	G4?	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Eleocharis rostellata herbaceous vegetation	G?	S1
Peatland	Z	Z
Carex livida	G5	S3
Eleocharis rostellata	G5	S2
Cypripedium parviflorum	G5	S3
Cypripedium passerinum	G4G5	S2
Liparis loeselii	G5	S1

22 Sunday Creek Bottom

LOCATION

Sunday Creek Bottom is located in the Sunday Creek drainage of northwest Montana, about 12 miles northwest of Olney, Montana. NOTE: Some of this site is on private lands, and landowner permission is needed to access these portions of the site.

RICHNESS

Sunday Creek Bottom is a glacially scoured depression along Sunday Creek that has been filled with alluvial materials. Beaver activity has strongly influenced the wetland communities at this site, which is composed of wet spruce forest, bog birch carr, fen, and a large willow complex. Groundwater and surface flows from Sunday Creek dominate the site's hydrology, and toeslope seepage could also be important in parts of the wetland. The willow bottom is a Drummond's willow/beaked sedge (Salix drummondiana/Carex utriculata) shrubland, which is dominated by Drummond's willow in the shrub layer and by beaked sedge in the herbaceous layer. The 120-140cm thick A soil horizon on which this community sits indicates that sediments from the uplands have been getting deposited by repeated floods for quite some time. The water table fluctuates with the season and with the presence/absence of beaver activity. The willow community is laced with back sloughs, which get colonized by beaked sedge during dry periods. Adjacent to the willow community is a beaked sedge community, which mostly occurs in wetter areas near the creek. A slender sedge (Carex lasiocarpa) community occurs on slightly higher ground than the beaked sedge community, and a soil core revealed peat depth of 50cm. A bog birch/slender sedge (Betula nana/Carex lasiocarpa) carr occurs patchily through the site, mostly on the south side of the creek, and drier sites within the carr support the development of spruce/field horsetail (Picea sp./Equisetum arvense) forest. This site also includes Paul Creek fen, which is a small peatland located in a glacially scoured basin on Paul Creek. The primary water sources are surface and groundwater from the creek as well as toeslope seepage from adjacent slopes. A beaver dam across the creek forms a small, shallow pond with a Chara sp. covered bottom. Surrounding the pond is a slender sedge (Carex lasiocarpa) community. Both below the willow-covered beaver dam and above the pond is a carr community dominated by bog birch/beaked sedge (Betula nana/Carex utriculata) shrubland. In some parts of this community a heavy Sphagnum sp. layer dominates the ground cover. On one of the slopes leading down to the wetland, a seep emerges to the surface at mid-slope; a beaked sedge community grows on the slope where water keeps the soil saturated. I did not visit the upper part of this fen during my site visit.

KEY ENVIRONMENTAL FACTORS

The hydrology of this site structures its plant communities. However, the hydrologic processes are quite complex, and could involve some combination of beaver activity, stream flooding, and toe slope seepage. Communities have formed both on peat substrates and mineral soils, which tend to be alluvial in nature.

RARITY

Two rare plants are found at Paul Creek fen, kidney-leaved violet (Viola renifolia) and green keeled cottongrass (Eriphorum viridicarinatum) (T. Spribille, pers. com.). Montana Natural Heritage Program has no records on file of any rare plants at the site, although good habitat does exist, and there are nearby occurrences of peatland species that could certainly be in Sunday Creek Bottom. The bog birch/slender sedge community that occurs here is rare in Montana.

OTHER VALUES

This willow bottom performs some important wetland functions. During peak flows of the Sunday Creek, the wetland temporarily stores surface water and attenuates peak flows. This water gradually drains from the site and maintains streamflow later in the summer. The willow bottom probably also functions to retain particulates and remove and sequester imported elements and compounds such as phosphorus and nitrogen compounds. Because the uplands in the watershed have been impacted by road building and timber harvest, these latter functions could be increasing beyond their natural range of variation (i.e. due to increased sediment loads in the creek).

CONDITION

Currently the west and southwest side of the site are grazed by cattle. Hummocking and pugging of the soil surface are evident, and cattle impacts to the willow and graminoid communities have occurred. Some stretches of the stream have gotten wider and shallower due to livestock use. Some grazing also occurs just on the margins of Paul Creek fen (T. Spribille, pers. com.). The following exotic plants are present in the drier parts of most of the communities I visited: Canada thistle (Cirsium arvense), bull thistle (Cirsium vulgare), oxeye daisy (Chrysanthemum leucanthemum), plantain (Plantago sp.). Pasture grasses dominate some of the drier parts of the willow and sedge communities near the margins of the site.

UPLANDS

Road building and extensive timber harvest have occurred throughout this drainage, and in some spots there is timber harvest up to the edge of the wetland.

INFORMATION NEEDS

A thorough landuse history of the site is needed to help explain some of the current community patterns. Furthermore, a thorough site survey is needed. This should include a complete floristic inventory, focussing especially on the carr communitie on the south side of the creek, in addition to some hydrologic study. Both of these activities should help determine the extent of the peatland at the site, which is also needed. Further field survey at Paul Creek fen is needed to document the remaining plant community elements at the northern end of the fen.

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Synaptomys borealis	G4	S2
Synaptomys borealis	G4	S2
Picea sp/equisetum arvense forest	G4	S3
Betula glandulosa/carex utriculata shrubland	G4?	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Betula glandulosa/carex lasiocarpa shrubland	G4	S4
Salix drummondiana/carex utriculata shrubland	G5	S5
Peatland	Z	Z
Peatland	Z	Z

23 Woods-Beaver-Rainbow Lake Complex

LOCATION
Located west of Whitefish Lake in northwestern Montana.

RICHNESS
The lakes and wetlands that comprise this site are glacially-formed pothole lakes that occur on a glacial till substrate. The wetlands occupy depressions near the lakes, seasonally flooded ground between lakes, or the shallow margins of a lake. The water sources for the lakes are precipitation and runoff from the uplands; the wetlands are then supplied with water from the lakes, most likely through occasional surface flows or groundwater. The site supports fen, marsh, and wet meadow communities (and aquatic communities, but these were not visited). A Columbia sedge (Carex aperta) community occupies one of the depressions. The center of the depression has an aquatic bed community, which is ringed by a band of common spikerush (Eleocharis palustris) community, which in turn is surrounded by the Columbia sedge community. The highest part of the Columbia sedge community has a low cover of dead lodgepole pine. These trees were apparently killed when the depression filled with water overflowing from Rainbow Lake after the heavy snow winter of 1997. A bluejoint reedgrass (Calamagrostis canadensis) community dominates another depression near Rainbow Lake. Another wetland lies between Beaver and Little Beaver Lakes; it is dominated by a slender sedge (Carex lasiocarpa) community and an undescribed community composed of hardstem bulrush (Scirpus acutus) and shrubby cinquefoil (Pentaphylloides floribunda). Cattail (Typha latifolia) and hardstem bulrush communties occur in the shallower parts of Beaver Lake. Some of the low-lying forest around these lakes is dominated by spruce (Picea sp.) and paper birch (Betula papyrifera). A small fen occurs north of Woods Lake, and it is dominated by a floating slender sedge community with lots of microtopography and a heavy moss layer. This fen is ringed by a lagg or "moat" dominated by cattail and beaked sedge (Carex utriculata). The upland forest around the wetlands is predominantly grand fir/beadlily (Abies grandis/Clintonia uniflora) forest.

KEY ENVIRONMENTAL FACTORS
The geomorphology and hydrology have interacted to structure the plant communities at this site. The lakes are small catchment (several square miles in area) that drains into Whitefish Lake and the Stillwater River.

RARITY
Several rare plants occur on peaty soils at this site. These are slender cottongrass (Eriophorum gracile), yellow lady's-slipper (Cypripedium calceolus), giant helleborine (Epipactis gigantea), and creeping sedge (Carex chordorrhiza). This site also has a rare community, the Columbia sedge community.

OTHER VALUES

CONDITION
Hunting, fishing, and other recreational activities are probably the only landuses at this time. Traces of Canada thistle (Cirsium arvense), black medic (Medicago lupulina), and reed canarygrass (Phalaris arundinacea) occur in the communities that dry down seasonally, like the Drummond's willow/beaked sedge and spruce/field horsetail communities.

UPLANDS
A logging road adjacent to some of the wetlands just above the high water mark, blocking the outlet of one. Logging has occurred in the catchment in the past, and the uplands are currently managed with a timber emphasis. Several houses have been built on the east side of Beaver Lake, and have the potential to contribute septic effluent to the system.

INFORMATION NEEDS
More information (i.e. water chemistry, peat depths, plant species list) is needed for the fen north of Woods Lake. A study of this fen's hydrology is also needed to determine whether it drains both to the north and south, or just to the north.

MANAGEMENT NEEDS
Monitoring of reed canarygrass populations is needed to determine whether it is spreading, and if so, how fast. Any future timber harvest should at minimum incorporate the state streamside management zones around the wetlands.

ELEMENT OCCURRENCE INFORMATION

Gavia immer	G5	S1S2B,
Picea sp/equisetum arvense forest	G4	S3
Alnus viridis ssp. sinuata shrubland	G5	S5
Calamagrostis canadensis herbaceous vegetation	G4Q	S4
Calamagrostis canadensis herbaceous vegetation	G4Q	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Eleocharis palustris herbaceous vegetation	G5	S5
Scirpus acutus herbaceous vegetation	G5	S5
Typha latifolia herbaceous vegetation	G5	S5
Typha latifolia herbaceous vegetation	G5	S5
Carex aperta herbaceous vegetation	G2?	S2
Salix drummondiana/carex utriculata shrubland	G5	S5
Cypripedium parviflorum	G5	S3
Epipactis gigantea	G4	S2

24 Woodward Meadows

LOCATION

Woodward Meadow is located along South Woodward Creek in the Swan Valley of northwest Montana, about 10 miles south of Swan Lake. NOTE: Some of this site is on private lands, and landowner permission is needed to access these portions of the site.

RICHNESS

This wetland lies in a glacially scoured valley at the toeslope of the Mission Mountain. South Woodward Creek flows through this site, which supports a Geyer's willow (Salix geyeriana) bottom, western red cedar/oak fern (Thuja plicata/Gymnocarpium dryopteris) riparian area, bog birch (Betula glandulosa) carr, wet spruce (Picea sp.) forest, and fen. This site supports numerous communities, some of which are formed over deep (1.5m +) peat deposits. The hydrology of the site is probably a combination of 2 water sources: surface and subsurface flows from South Woodward Creek, and subsurface flows from the toe of the slopes immediately west of the site. In addition, there are beaver dams in the creek and beaver channels extending into the willow and sedge communities. The site is hydrologically quite complex. On the east side of the creek is a long and narrow meadow that is mostly a complex matrix of water sedge (Carex aquatilis), beaked sedge (Carex utriculata), and Buxbaum's sedge (Carex buxbaumii) communities. One soil core was taken in the water sedge community, which had a fairly shallow (10cm thick) organic horizon formed over a 60cm+ thick gleyed clay loam layer. There are scattered bog birch on the east side of the creek, but the dominant shrub community is a Geyer's willow/beaked sedge community at the south end adjacent to the western red cedar forest. Geyer's willow dominates the community, with beaked sedge and Cusick's sedge (Carex cusickii) the dominant sedges in the understory. A larger patch of this community occurs on the west side of the creek nearby. Some of this community appears to have formed in a filled in beaver pond. South of the meadow on both sides of the creek is a western red cedar/oakfern community, which appears to be formed on alluvial deposits. Western red cedar dominates the overstory, which also has scattered spruce. The understory contains scattered streambank alder (Alnus incana) and Rocky Mountain maple (Acer glabrum), with the herbaceous layer dominated by oakfern, field horsetail (Equisetum arvense), and Canada bunchberry (Cornus canadensis). In this forest South Woodward Creek has a moderately steep gradient and isn't very sinuous, but when it hits the meadow to the north it becomes very low gradient and somewhat sinuous. In the meadow, there are deep silt beds on the creek bottom and behind beaver dams, and there is an extensive common mare's tail (Hippuris vulgaris) community in the slow moving creek waters. In addition to the Geyer's willow community on the west side of the creek, there is large bog birch carr composed of both bog birch/slender sedge (Carex lasiocarpa) and bog birch/Cusick's sedge communities. The latter is formed on a slightly quaking substrate, and has a taller, denser stand of bog birch than the former community. Cusick's sedge dominates the understory of the bog birch/Cusick's sedge community, and scattered hoary willows (Salix candida) are present. The substrate is a 1.5m+ deep peat layer, with scattered clay lenses present. The bog birch/slender sedge community has an understory dominated by slender sedge, and Buxbaum's sedge and yellow sedge (Carex flava) are minor components. A slender sedge community is formed between and around these carr communities, and it appears to be slightly wetter than these communities. Parts of the slender sedge community are on a quaking substrate, and one soil core revealed a 30cm peat layer over a gleyed 60cm+ thick clay layer. Finally, the western boundary of the site is covered by spruce/red-osier dogwood community (Picea/Cornus sericea). The overstory was dominated by spruce, and the diverse shrub layer was dominated by streambank alder and alder leaved buckthorn (Rhamnus alnifolia), with a small amount of red-osier dogwood. The dominant graminoid was reed mannagrass (Glyceria grandis), with dwarf red blackberry (Rubus pubescens) and Canada bunchberry dominant in the forb layer.

KEY ENVIRONMENTAL FACTORS

There are three interacting factors that strongly influence this site: the site's hydrology, its geomorphology, and beaver activity. This interaction is very complex, and it's likely that all three factors influenced different parts of the site to varying degrees. Part of the site on the west side of the creek is a peatland, while the rest of the site has a shallow organic layer over mineral soils. Further inventory of the site is necessary to better understand the factors that have shaped Woodward Meadow.

RARITY

Although there are no known rare plant occurrences at the site, there are several outstanding plant community occurrences, some of which are uncommon in Montana. For example, the western red cedar/oakfern and spruce/red osier dogwood communities are both large occurrences that are in good condition, and both are uncommon in Montana. The slender sedge and Geyer's willow/beaked sedge communities, while common, are also large and in excellent condition.

OTHER VALUES

This site appears to provide outstanding wildlife habitat, based on the sitings of goshawk, moose, great blue

herons, and whitetail deer made during the site visit. The large flat expanse of sedge meadow and willow and bog birch carr at Woodward Meadow provide some important wetland functions and services. During peak flows of the creek, the wetland temporarily stores surface water and attenuates peak flows. This water gradually drains from the site and maintains streamflow later in the summer. The marsh and lake probably also function to retain particulates and remove and sequester imported elements and compounds such as phosphorus and nitrogen compounds. Because the uplands in the watershed have been impacted by road building and timber harvest, these latter functions could be increasing beyond their natural range of variation (e.g. due to increased sediment loads in the creek).

CONDITION

The site appeared to be in excellent condition. The land is posted, so theoretically no hunting occurs here. There are no other obvious landuses in the wetland. The only exotic plant found in the wetland is Canada thistle (Cirsium arvense), which occurs as scattered individuals and probably poses little threat to the site at present. There is a small population of reed canarygrass (Phalaris arundinacea) in the sedge meadow on the east side of the creek. This coarse grass, which forms monocultures in seasonally flooded marshes and fens, has been treated in the literature as both a native and exotic species. Populations in North America may be composed of both native genotypes and European cultivars (Merigliano and Lesica 1998). It is unusual to see small populations of the grass such as that at Woodward Meadow.

UPLANDS

While the wetland itself appears to be in good condition, the landscape in which it is located has been fragmented by timber harvest. A checkerboard of state and corporate timber lands surround the site, and while some of the riparian forest stands (e.g. the western red cedar/oakfern community, which is on state land) are intact, much of the surrounding upland has been harvested, in some cases up to the edge of the wetland. Roads and skid trails ring the site, making access easy. While these activities pose some threat to the site, such as increased sediment delivery to the wetland, it's not clear that the hydrology of the site has been greatly affected.

INFORMATION NEEDS

A thorough floristic inventory of the site is needed, as there is good potential habitat for a number of rare plants here. Only a cursory scan for rare plants was made during the site visit. A hydrologic study of the site is also needed, which would lead to a better understanding of the structure of the site and the distribution of plant communities.

MANAGEMENT NEEDS

Future timber harvest adjacent to the site should employ streamside management zone buffers.

ELEMENT OCCURRENCE INFORMATION

Picea sp/cornus stolonifera forest	G3	S3S4
Thuja plicata/gymnocarpium dryopteris forest	G3	S3
Salix geyeriana/carex rostrata ht	G5	S5
Carex aquatilis herbaceous vegetation	G5	S4
Carex buxbaumii herbaceous vegetation	G3	S3
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Betula glandulosa/carex lasiocarpa shrubland	G4	S4
Betula glandulosa/carex cusickii shrubland	G?	S3

25 Bear Paw Meadow

LOCATION
From Olney, Montana, follow forest road 487 on the east side of U.S. 93 about 7.5 miles to the site.

RICHNESS
Bear Paw Meadow, located on the toeslope of the Whitefish Range, sits on alluvial materials deposited over glacial till. Most of the wetland is seasonally flooded in the spring when the intermittent creek flowing through the site overflows and sends diffuse surface flow over the sloping, hummocky and terraced floodplain. The site drains into Swift Creek. The complex microtopography of hummocks, channels, sloughs, and pools creates a complex vegetation mosaic. Large patches of Sitka alder (Alnus viridis ssp. sinuata) are the most distinctive community at the site; they occur on the moist to wet sloping floodplain. Much of the site is dominated by a hard-to-classify community which has lots of patchy conifer regeneratiion. This could be an early seral spruce community. Besides patchy spruce and lodgepole pine (Pinus contorta) regeneration, the community supports black cottonwood (Populus balsamifera ssp. trichocarpa), Drummond's willow (Salix drummondiana), Sitka alder, alder-leaved buckthorn (Rhamnus alnifolia), bluejoint reedgrass (Calamagrostis canadensis), brome (Bromus sp.), and woodreed (Cinna sp.). The site also has some small patches of Drummond's willow community. There are several small depressions on the site which are dominated by an inflated sedge (Carex vesicaria) community. The uplands are a combination of spruce/beadlily (Picea sp./Clintonia uniflora) and grand fir/beadlily (Abies grandis/Clintonia uniflora) forest.

KEY ENVIRONMENTAL FACTORS
The hydrology of the site seems to be the driving factor structuring plant communities at Bear Paw Meadow. Although no beaver activity was observed during the site visit, it's possible that beaver played an important role in creating the wetland in the first place, and that their current absence is responsible for the site drying somewhat and allowing conifer regeneration to proceed.

RARITY
No rare plants or communities are known from the site.

OTHER VALUES
Jim Vanderhorst observed some bear diggings at this site.

CONDITION
Hunting is probably the only current landuse of this wetland. No exotics were recorded on the field form.

UPLANDS
Logging roads nearly surround the site, and their is extensive timber harvest nearby.

INFORMATION NEEDS
A thorough floristic inventory of the site is needed, as well as some research on the history of the site. Closer inspection of the site for signs of historic beaver activity would also be helpful in understanding the site history.

MANAGEMENT NEEDS
Any future timber harvest at this site needs to employ streamside management zone buffers, at minimum.

ELEMENT OCCURRENCE INFORMATION

Alnus viridis ssp. sinuata shrubland	G5	S5
Salix drummondiana shrubland	G5	S5
Carex vesicaria herbaceous vegetation	G5	S5

26 Blanchard Lake

LOCATION
Blanchard Lake is located 2 miles southwest of Whitefish, Montana.

RICHNESS
This site is a large, glacial pothole lake formed in glacial till. The shores and immediately surrounding uplands are, for the most part, gently sloping. There are three intermittent creeks that flow into Blanchard Lake, but whether these or groundwater is the primary water source is not known. No outflow channels are shown on the topo map. The lake supports emergent wetland communities around the lake fringe, and these extend across portions of the lake at the north end. Cattail (Typha latifolia), reed canarygrass (Phalaris arundinacea), and slender sedge (Carex lasiocarpa) communities dominate the emergent communities. There is also a Bebb's willow (Salix bebbiana) community on part of the lakeshore. At the time of the survey, it was flooded by 4 feet of water and had scattered dead (presumably due to flooded conditions) paper birch (Betula papyrifera). These are unusually flooded conditions for Bebb's willow; this lakeshore community is still being affected by high water levels resulting from heavy winter 1997 snows. The floating-leaved and submergent aquatic bed communities are diverse. The deepest zone appears to be dominated by waterlily (Nuphar sp.), while in slightly shallower water watershield (Brasenia schreberi) is dominant. Water milfoil (Myriophyllum sp.) dominates in somewhat shallower water, and water smartweed (Polygonum amphibium) is dominant in the shallowest zone. Associated aquatic species include: common bladderwort (Utricularia vulgaris), grass-leaved pondweed (Potamogeton gramineus), and long-stalked pondweed (Potamogeton praelongus).

KEY ENVIRONMENTAL FACTORS
The geomorphology and hydrology promote a large and diverse floating-leaved and submerged aquatic plant community.

RARITY
Several rare plants occur at Blanchard Lake. These are all aquatic species; they are: watershield, pygmy water lily (Nymphaea tetragona), and water bulrush (Scirpus subterminalis). No rare plant communities occur at this site, although aquatic communities haven't been classified at the time of this entry.

OTHER VALUES
Floating globs of algae occur in the open water of the lake. Whether these are due to nutrient loading caused by septic effluent or due to nutrients from decaying flooded vegetation is unknown. This is a highly productive lake, but eutrophication is a potential threat.

CONDITION
Recreational uses like fishing are the primary landuse, which will probably increase with increasing population pressure. Reed canarygrass is one of the dominant emergent plant species. This invasive grass poses a threat to the other emergent communities at the site. Pike, an exotic fish, occur in the lake.

UPLANDS
Several new large houses occur in the lake basin, and future subdivision probably poses one of the greatest threats to the integrity of the aquatic community. Logging and road-building have occurred in the uplands around the lake.

INFORMATION NEEDS
Persistence of the pygmy waterlily and water bulrush populations need to be confirmed - these weren't observed during the site visit. In addition, information is needed on the water sources and hydrology of the lake.

MANAGEMENT NEEDS
A water quality monitoring program is needed for Blanchard Lake to evaluate the degree of eutrophication. This information could be used to help maintain water quality by improving land management in the basin.

ELEMENT OCCURRENCE INFORMATION

Salix bebbiana shrubland	G5	S5
Phalaris arundinacea herbaceous vegetation	G5	S5
Carex lasiocarpa herbaceous vegetation	G5	S5
Typha latifolia herbaceous vegetation	G5	S5
Brasenia schreberi	G5	S2
Nymphaea tetragona ssp leibergii	G5T5	S1
Scirpus subterminalis	G4G5	S2

27 Bowen Creek Fen

LOCATION

Bowen Creek Fen is located in the Salish Mountains of northwestern Montana, near the boundary between the Flathead and Kootenai National Forests. The site includes a small tributary of Bowen Creek, which flows into Good Creek and the Stillwater River.

RICHNESS

Bowen Creek Fen is a subalpine zone peatland (mean elevation 4740 feet [1445 m]) associated with a second order stream. Water enters the peatland from the east and flows mostly across the surface of the peat toward the southwest. Sphagnum is predominant over most of the fen surface, and has formed hummocks 6-10 inches (15-25 cm) tall. The lowermost end of the wetland has an active beaver pond and adjacent marsh. Bog birch (Betula glandulosa) and smaller amounts of hoary willow (Salix candida) are important shrubs. Slender sedge (Carex lasiocarpa), beaked sedge (Carex utriculata), and purple cinquefoil (Potentilla palustris) are common herbaceous species. Northern bog lemming (Synaptomys borealis), a Northern Region sensitive species, are known to occur in the fen. Kidney-leaf violet (Viola renifolia), also sensitive, occurs upstream along a small creek. Subalpine fir (Abies lasiocarpa) and lodgepole pine (Pinus contorta) dominate the slopes adjacent to the fen.

KEY ENVIRONMENTAL FACTORS

The impeded drainage caused by the beaver dam and the peat-forming mosses themselves maintains saturated conditions favorable to the Sphagnums and other fen species.

RARITY

Bowen Creek Fen is a good example of a peatland dominated primarily by Sphagnum mosses. Such peatlands are uncommon
in Montana. Green-keeled cottongrass (Eriophorum viridicarinatum) and northern bog lemming (Synaptomys borealis), Northern Region sensitive species, occur in the fen. Kidney-leaf violet (Viola renifolia) is present along the drainage upstream from the open fen.

OTHER VALUES

CONDITION

Bowen Creek Fen was allocated to Management Area 12 (riparian areas) in the 1987 Flathead Forest Plan. Timber harvest is restricted in this MA to protect riparian vegetation and water quality.

UPLANDS

Adjacent lands are within MA 15 which emphasizes timber production.

INFORMATION NEEDS

Additional surveys along the main stem of Bowen Creek are needed to delineate possible SIA boundaries. Additional trapping for northern bog lemming in the general area was recommended in 1993 by Jim Reichel, Montana Natural Heritage Program.

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Synaptomys borealis	G4	S2
Picea sp/calamagrostis canadensis forest	G3	S3
Betula glandulosa/carex utriculata shrubland	G4?	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Peatland	Z	Z

28 Crystal Fen

LOCATION

Crystal Fen is located in the Mission Mountains Wilderness, in the east foothills of the southern Mission Mountains near the headwaters of the Swan River and one mile east of Crystal Lake. | From Hwy 83 at the divide between the Clearwater and Swan rivers, turn west on Beaver Creek Road (FS Rd 906). Travel southwest on 906 for ca. 8 miles to the trailhead for Trail 34. Hike 0.5 mile north to junction with Trail 351 at the top of the ridge, then southwest for 1 mile to the point above the southwest corner of the wetland (visible to the north from trail). Hike dowslope cross-country to fen.

RICHNESS

The site consists of a mid-elevation pond and peatland occupying a mid-slope bench near the headwaters of the Swan River. The pond is deep, ca. 3 acres in size and fringed with floating organic mats featuring Carex livida and Drosera anglica. East of the pond is a 10 acre expanse of Carex lasiocarpa. Uplands surrounding the wetland have a large component of western larch (Larix occidentalis); lodgepole pine (Pinus contorta) is common on the north side of the wetland.

KEY ENVIRONMENTAL FACTORS

Water input which maintains the high water table is critical to the site. Water source may be seepage from the Swan River to the west.

RARITY

OTHER VALUES

Condition

UPLANDS

INFORMATION NEEDS

Initial botanical surveys conducted by S. Shelly and S. Chadde in 1992.

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Peatland	Z	Z
Drosera anglica	G5	S2
Carex livida	G5	S3

29 Foothills Meadow

LOCATION

Foothills Meadow is located in the Swan Valley of northwest Montana in the Soup Creek drainage, about 9 miles south of Swan Lake, Montana.

RICHNESS

Foothills Meadow is a series of 4 wetlands strung along a tributary of Soup Creek at the base of the Swan Range. Each of the wetlands has at least one beaver dam in the wetland, and sometimes more than one. The easternmost wetland contains 5 communities: beaked sedge (Carex utriculata), awned sedge (Carex atherodes), and common spikerush (Eleocharis palustris) communities in the shallow marsh around the margins, water horsetail in the soft-bottomed deep marsh in the center of the wetland, and spruce/red-osier dogwood (Picea/Cornus sericea) forest above the shallow marsh community. The beaver dam at the outlet is intact and overgrown with alder, willow, and dogwood. There is a definite shoreline cut by wave action on the south side of the wetland, now quite a bit above the present water level, indicating that the site once stored more water. As you progress down the creek, you come to the next wetland, which is a complex of fen, marsh, and forested wetland. The forested wetland is a very small patch of western red cedar/oakfern (Thuja plicata/Gymnocarpium dryopteris) forest, dominated by old growth cedar. This community grades into spruce/red osier dogwood forest. The spruce are invading an adjacent, fairly dry beaked sedge community, which is separated from a fen by another beaver dam. The fen is ringed by a hard-to-classify bog birch (Betula nana) community, which has an understory with numerous exotic forbs in spots. The fen is dominated by slender sedge (Carex lasiocarpa) with a sparse overstory of hardstem bulrush (Scirpus acutus). Associated species are Buxbaum's sedge (Carex buxbaumii), yellow sedge (Carex flava), green sedge (Carex oederi), coltsfoot (Petasites sagittatus), northern bugleweed (Lycopus uniflorus), bog buckbean (Menyanthes trifoliata), slender spikerush (Eleocharis tenuis), and Kalm's lobelia (Lobelia kalmii). A soil core revealed a peat depth of about 90cm above a gleyed clay layer. The next wetland downstream is much wetter than the previous two, and is characterized by several active beaver dams which have ponded water into awned sedge and beaked sedge marsh communities, which grade into a Drummond's willow/beaked sedge (Salix drummondiana/Carex utriculata) shrubland.

KEY ENVIRONMENTAL FACTORS

Ground water from the Soup Creek tributary and impoundment of water and sediments by beaver dams have been major factors driving the formation of the plant communities in these wetlands.

RARITY

There is a population of yellow lady's slipper (Cypripedium parviflorum) in the bog birch carr at this site. The peatland has potential habitat for other rare plant species, but none were found during my cursory survey.

Other Values

The beaver ponds at this site have created quite a bit of habitat diversity. There is an active beaver dam in one of the wetlands, and there is a dried out beaver pond in another of the wetlands. This habitat diversity provides excellent wildlife habitat. Moose sign was seen in one area, and spotted frogs were seen in all three wetlands that I visited.

CONDITION

Hunters probably use the wetlands in the fall. Logging has occurred south of the bog birch carr in the peatland. Part of the logged forest right next to the carr appeared to be a spruce/field horsetail (Picea/Equisetum arvense) community. Timber harvest also occurred right to the edge of the westernmost wetland. The presence of exotics in the peatland suggests that some disturbance could have taken place there in the past, opening the way to weeds. Exotics occurred in a number of plant communities. Patches of Canada thistle (Cirsium arvense) and reed canarygrass (Phalaris arundinacea) occur in drier parts of the beaked sedge community, although this invasive grass hasn't begun to dominate large parts of the wetlands yet. The peatland also has some exotics in it. For example, there are scattered marsh sowthistle (Sonchus uliginosus) in the slender sedge community, and the carr has patches of high cover of marsh sowthistle, Canada thistle, and mullein (Verbascum thapsus). This is one of the few peatlands in which I encountered this many exotics.

UPLANDS

As noted above, forest stands have been logged right up to the edge of the wetland in spots, and there has been additional logging within the drainage upstream. No logging roads cross the wetlands, but several cross the Soup Creek tributary which flows into the wetland. The presence of exotics in the peatland suggests that some disturbance could have taken place there in the past, opening the way to weeds.

INFORMATION NEEDS

A more detailed landuse history of the wetlands might help clarify why weed levels are relatively high in some of these wetland communities. If these sites were part of a grazing allotment in the past, then cattle use could have spread the weeds. However, its also possible that wildlife and fluctuating water levels are responsible.

MANAGEMENT NEEDS

Future timber harvest should employ streamside management zone buffers next to the wetlands. In addition, monitoring of the reed canarygrass population would be helpful to determine whether it's increasing and whether managment action is warranted to control it while levels are low.

ELEMENT OCCURRENCE INFORMATION

Picea sp/cornus stolonifera forest	G3	S3S4
Thuja plicata/gymnocarpium dryopteris forest	G3	S3
Carex rostrata herbaceous vegetation	G5	S5
Eleocharis palustris herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Carex atherodes herbaceous vegetation	G5	S5
Salix drummondiana/carex utriculata shrubland	G5	S5
Peatland	Z	Z
Cypripedium parviflorum	G5	S3

30 Logan Creek Meadow

LOCATION
Logan Creek Meadow occurs on a tributary to Logan Creek in the Salish Mountains of northwest Montana.

RICHNESS
This site occurs along a small, low-gradient, intermittent tributary of Logan Creek. Several old, abandoned beaver dams along the creek back water up into shallow pools. Wet spruce forest, fen, marsh, and carr communities occur around these beaver ponds. As one moves up the creek, a pattern of communities repeats itself. A shallow pond, with its bottom covered by the algae Chara sp., is surrounded by a sedge community, either beaked sedge (Carex utriculata) or slender sedge (Carex lasiocarpa) communities. The pond may have a stand of water horsetail occurring on shallow mud flats. The sedge community grades into a shrub community as one moves away from the pond. Bog birch/slender sedge (Betula glandulosa/Carex lasiocarpa), bog birch/beaked sedge, and Drummond's willow/beaked sedge (Salix drummondiana/Carex utriculata) shrublands all occur along this string of wetlands. The shrubland then grades into a spruce/bluejoint reedgrass forest below the next beaver dam, which forms another pond. Soil cores taken in several of the communities revealed organic soils ranging in thickness from 30-70cm. The uplands are dominated by spruce (Picea sp.), lodgepole pine (Pinus contorta), bunchberry (Cornus canadensis), and Labrador tea (Ledum glandulosum).

KEY ENVIRONMENTAL FACTORS
Beaver activity has strongly influenced the vegetation at this site.

RARITY
There is a population of the rare plant, kidney-leaved violet (Viola renifolia), at this site. It occurs on mossy rootwad hummocks in the wet spruce forest.

OTHER VALUES
Large bear scats, antler rubbings, and moose tracks were observed at the site. No current beaver activity was observed.

CONDITION
There are probably no landuses at this site but hunting. Traces of reed canarygrass (Phalaris arundinacea), Canada thistle (Cirsium arvense), and bull thistle (Cirsium vulgare) are present in the sedge and shrub communities. These exotics could pose a threat to the site in the future with changes in the hydrologic regime, wildlife disturbance, or other disturbance.

UPLANDS
Logging has occurred in the uplands near the site, and a logging road runs along the base of the hill at the south edge of the wetland.

INFORMATION NEEDS

MANAGEMENT NEEDS
Monitoring of the reed canarygrass population is needed to determine whether it's increasing in extent, and if so, how quickly.

ELEMENT OCCURRENCE INFORMATION

Picea sp/calamagrostis canadensis forest	G3	S3
Betula glandulosa/carex utriculata shrubland	G4?	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Betula glandulosa/carex lasiocarpa shrubland	G4	S4
Salix drummondiana/carex utriculata shrubland	G5	S5

31 Lower Lazy Creek Bottom

LOCATION
Site is 1.5 miles northwest of the upper end of Whitefish Lake.

RICHNESS
Site occurs along the low-gradient bottom lands of Lazy Creek and its tributaries. The water source is not clear, but most likely involves some combination of groundwater and surface flows from Lazy Creek. A long, narrow band of an alder (Alnus sp.) community occurs along the creek in places. Alder-leaved buckthorn (Rhamnus alnifolia) shrublands also occur at the site. There are also large marshy depressions dominated by beaked sedge (Carex utriculata) community. Wet spruce forests composed of spruce/field horsetail (Picea sp./Equisetum arvense) and spruce/skunk cabbage (Picea sp./Lysichiton americanum) communities occur on saturated ground near the tributaries of Lazy Creek. Some large wet meadows dominated by the exotic Kentucky bluegrass (Poa pratensis) occur on drier land at the site. The uplands are a spruce/beadlily (Picea sp./Clintonia uniflora) forest.

KEY ENVIRONMENTAL FACTORS
The complex hydrology of this site is the chief factor structuring plant communities in this wetland.

RARITY
Green keeled cottongrass (Eriophorum viridicarinatum) is one rare plant that occurs at this site. The site also supports an occurrence of the rare spruce/skunk cabbage community.

OTHER VALUES
The site likely provides valuable wetland habitat for wildlife.

CONDITION
Except for some firewood cutting at the site margins, little anthropogenic disturbance appears to have occurred at the site. The wet meadow dominated by Kentucky bluegrass is no longer grazed. Exotics dominate the wet meadow community. Kentucky bluegrass is the dominant species, and Canada thistle (Cirsium arvense), timothy (Phleum pratense), and butter and eggs (Linaria vulgaris) are common. Past timber harvest and cattle grazing have lowered the ecological integrity of this community.

UPLANDS
The site is surrounded by areas that have been logged. This logging may have caused increased windthrow and increased sedimentation at the site. The logging roads in the uplands are also popular trails for horseback riding.

INFORMATION NEEDS
This large site received only cursory inventory, and further inventory of wetland plant communities is needed to document what communities occur at the site, their extent, and the role of beaver activity in structuring the site.

MANAGEMENT NEEDS
Further logging and firewood cutting adjacent to the site needs to incorporate streamside management zone buffers at a minimum.

ELEMENT OCCURRENCE INFORMATION

Picea sp/equisetum arvense forest	G4	S3
Picea sp/lysichiton americanum forest	G2	S2
Poa pratensis herbaceous vegetation	G5	SE
Carex rostrata herbaceous vegetation	G5	S5

32 Ninemile Fen

Location
Ninemile fen is located at the south end of the Whitefish Range, several miles northeast of Columbia Falls.

Richness
Two depressional wetlands make up Ninemile Fen. They are glacially formed potholes over an argillite parent material. The eastern one is a poor fen, fed by groundwater and with a surface outlet to the south. The western pothole has two moist draws that channel water to the site, and it too has a surface outlet to the south. The western pothole stores more surface water than the other one, and could have been a lake in the not too distant past. The eastern fen is dominated by a slender sedge (Carex lasiocarpa) community, and it also has a smaller patch of Buxbaum's sedge (Carex buxbaumii) community. The rest of the fen is a complex matrix of various plant communities that individually are too small to rate as element occurrences, but which add to the habitat diversity of the site. Patches of bluejoint reedgrass (Calamagrostis canadensis) and inflated sedge (Carex vesicaria) tend to be in drier and wetter areas near the margins, respectively. An undescribed plant association, small-fruited bulrush (Scirpus microcarpus), also occurs in drier areas near the margin, and water horsetail (Equisetum fluviatile) occurs in a semi-permanently flooded zone. These communities intergrade to some extent, and some have a ground layer of Sphagnum sp. and Aulacomnium sp. mosses. A few of the drier patches in the slender sedge community are tree "islands", with white pine (Pinus monticola), western red cedar (Thuja plicata), spruce (Picea), and heavy Sphagnum sp. cover. Western red cedar/queen-cup beadlily (Thuja plicata/Clintonia uniflora) community forms the upland around the wetland. The western pothole is dominated by a beaked sedge (Carex utriculata) community, which was covered by by water too deep to wade through at the time I visited it. Surrounding the beaked sedge community in slightly shallower water is a band of common spikerush (Eleocharis palustris) community, which occurs on a floating mat. In outer zone is a water horsetail community, which is in slightly shallower water than the previous community. No sphagnum is present in the wetland, and it was quite inundated at the time of the site visit.

Key Environmental Factors

Rarity
This site is home to 4 rare plant populations: poor sedge (Carex paupercula), podgrass (Scheuchzeria palustris), northern adder's tongue (Ophioglossum pusillum), and Botrychium crenulatum. The first two are species of poor fens. The peatland has one uncommon plant community, the Buxbaum's sedge community, although this occurrence is rather small.

Other Values

Condition
There is a road across the western edge of the eastern pothole, through a stand of water horsetail. Because the hydrology of this fen is poorly understood, it's not clear whether the road has an impact on water flow through the fen. There are no other landuses of the fen currently. No exotics were observed in the wetlands, although on road 316D there is a population of orange hawkweed (Hieracium aurantiacum). This species seems to favor moist habitats, but it has not spread to any of the drier parts of the fen.

Uplands
The uplands immediately around the potholes are intact second-growth forest, but the forest in the surrounding vicinity have been logged heavily.

Information Needs
The water source for the eastern fen needs study.

Management Needs
Any future timber harvest around these wetlands should employ a streamside management zone buffer.

ELEMENT OCCURRENCE INFORMATION

Carex buxbaumii herbaceous vegetation	G3	S3
Carex lasiocarpa herbaceous vegetation	G5	S5
Eleocharis palustris herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5

33 Round Meadow-Meadow Lake

LOCATION
Site is located in the Stillwater Valley of northwest Montana, about 2 miles east of Olney.

RICHNESS
This site is composed of two depressional wetlands, Round Meadow and Meadow Lake, located in the glaciated, gently rolling bottom of the Rocky Mountain Trench. A small creek drains Meadow Lake and flows through Round Meadow. The primary water source for Meadow Lake is not known. Round Meadow is predominantly marsh and sedge meadow vegetation;
the center of the site is a slender sedge (Carex lasiocarpa) community surrounded by a band of beaked sedge (Carex utriculata) community. An awned sedge (Carex atherodes) and Baltic rush (Juncus balticus) community also occur in this wetland. The south end of this meadow has a black cottonwood/red-osier dogwood (Populus balsamifera ssp. trichocarpa/Cornus sericea) community which is slightly elevated above the sedge communities, but which is occassionally flooded by high water in the meadow. Meadow Lake is situated in a basin with an extremely low gradient, resulting in wide ecotones and broad areas of communities which more often occupy narrow bands. The dominant community at Meadow Lake is reed canarygrass (Phalaris arundinacea), which forms a near monoculture on the drier, outer edge of the wetland, and which is a component in nearly all the other communities at the site. A common spikerush (Eleocharis palustris) community forms a broad band at a slightly lower elevation than the reed canarygrass community. There are also slender sedge (Carex lasiocarpa), water sedge (Carex aquatilis), and hardstem bulrush (Scirpus acutus) communities at Meadow Lake, as well as an unusual and undescribed yellow sedge (Carex flava) community, which occurs in a saturated zone around the lakeshore. This community is dominated by yellow sedge, and the only associated species are a rush (Juncus sp.), water smartweed (Polygonum amphibium), and reed canarygrass. The aquatic community was not observed except from a distance; water lily (Nuphar sp.) and bur-reed (Sparganium sp.) were present. A wet spruce forest composed of spruce/field horsetail (Picea sp./Equisetum arvense) and spruce/skunk cabbage (Picea sp./Lysichitum americanum) occurs around the north end of Meadow Lake. The spruce/field horsetail community is presently dominated by water horsetail (Equisetum fluviatile) in the understory.

KEY ENVIRONMENTAL FACTORS
The geomorpholgy and hydrology of these two wetlands are the primary forces structuring plant communities at the site. Several old beaver lodges were observed in Meadow Lake, and its possible beaver may have also played a role in the structuring wetland communities.

RARITY
Two rare plants occur at both Round Meadow and Meadow Lake. These two species are adder's tongue (Ophioglossum pusillum) and spurred gentian (Halenia deflexa). This site also has an occurrence of the rare spruce/skunkcabbage community (Picea/Lysichitum americanum).

OTHER VALUES

CONDITION
No current landuses are evident at the site. Reed canarygrass, Canada thistle (Cirsium arvense), redtop (Agrostis stolonifera), marsh sowthistle (Sonchus uliginosus), and Kentucky bluegrass (Poa pratensis) are all exotics that are found at the site. Reed canarygrass is clearly the most problematic weed at the site, as it covers a large expanse of the Meadow Lake wetland and is present in smaller amounts in most of the communities at both wetlands. This coarse grass has been described as both a native and exotic species, and populations in North America may be composed of both native genotypes and European cultivars (Merigliano and Lesica 1998). Control of this species is difficult and expensive (Apfelbaum and Sams 1987). Past landuse activities are probably responsible for the large amounts of reed canarygrass at Meadow Lake.

UPLANDS
Logging roads have been constructed on two sides of Round Meadow, and one runs between Round Meadow and Meadow Lake. In addition, logging has occurred both nearby and in the uplands near the site. The degree to which these logging roads interfere with the hydrology of the site is probably minimal.

INFORMATION NEEDS

More information is needed on the landuse history of this site - this information would help managers understand how the existing condition at the site was influenced by anthropogenic sources (e.g. why the reed canarygrass cover is so high at Meadow Lake). In addition, hydrogeologic study is needed on this and other nearby wetlands to better groundwater flow paths. Closer examination of the ditching at the site is also needed to see if whether restoration efforts (i.e. blocking the ditches) would benefit the site hydrology.

MANAGEMENT NEEDS

Plugging the ditches at the site is one possible management action that may be warranted. However, more information on the site's hydology is needed before any action is taken.

ELEMENT OCCURRENCE INFORMATION

Gavia immer	G5	S1S2B,
Picea sp/equisetum arvense forest	G4	S3
Picea sp/lysichiton americanum forest	G2	S2
Populus balsamifera ssp. trichocarpa/cornus sericea forest	G3?	S3
Phalaris arundinacea herbaceous vegetation	G5	S5
Carex aquatilis herbaceous vegetation	G5	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Eleocharis palustris herbaceous vegetation	G5	S5
Juncus balticus herbaceous vegetation	G5	S5
Scirpus acutus herbaceous vegetation	G5	S5
Carex atherodes herbaceous vegetation	G5	S5
Ophioglossum pusillum	G5	S2

34 Safe Harbor Marsh

LOCATION

Safe Harbor Marsh is located adjacent to Flathead Lake in northwest Montana, about 6 miles north of Polson, Montana.

RICHNESS

This marsh is located in the Rocky Mountain Trench, which was carved out by continental glaciers during the Pleistocene. It sits in a shallow bay which is connected to Flathead Lake by a narrow arm of water. It's not clear whether the hydrology of the marsh is dominated by the surface water connection to Flathead Lake, or if groundwater inputs to the marsh with subsequent outflow to Flathead Lake, or some combination of these, predominates. This marsh is dominated by a hardstem bulrush (Scirpus acutus) community, which occupies about 60% of the marsh, the rest being open water. Much of this community is a floating mat. Cattail (Typha latifolia), beaked sedge (Carex utriculata), and common spikerush (Eleocharis palustris) are common associates in this community. Some aquatic species which occur in the open water as well as with the hardstem bulrush are grass-leaved pondweed (Potamogeton gramineus), eel-grass pondweed (Potamogeton zosterformis), broad-leaved pondweed (Potamogeton natans), verticillate water milfoil (Myriophyllum verticillatum), wavy water nymph (Najas flexilis), common bladderwort (Utricularia vulgaris), lesser bladderwort (Utricularia minor), and water smartweed (Polygonum amphibium). In the drawdown zone around the marsh (i.e. the area that experiences brief inundation during part of the year), a Baltic rush (Juncus balticus) community and red-osier dogwood (Cornus sericea) community are interspersed. Much of the Baltic rush community has a large exotic component, which include redtop (Agrostis stolonifera), Kentucky bluegrass (Poa pratensis), Canada thistle (Cirsium arvense), and marsh sow thistle (Sonchus uliginosus). These communities form a narrow zone on the sides of the marsh, where they are constrained by steep uplands on one side and the hardstem bulrush community on the other side, but form a broader community at the south end, where the gradient is very gentle. The uplands at this site consist of Douglas-fir/ninebark (Pseudotsuga menziesii/Physocarpus malvaceous) and Douglas-fir/snowberry (Pseudotsuga menziesii/Symphoricarpos albus) forest. The soils underlying the marsh have a shallow (<5cm) organic layer over a gleyed clay layer. The shallow organic layer indicates that much of the primary productivity probably gets cycled into detrital pathways (Mitsch and Gosselink 1993). The pH in the aquatic community was 8.3, and the conductivity was 560 uS/cm.

KEY ENVIRONMENTAL FACTORS

The driving factors at this marsh are the semi-permanent flooding regime, and the position in the landscape. These factors influence the temperatures the marsh experiences and increase the primary productivity of the marsh, thus helping to establish the marsh character.

RARITY

This marsh is a frequently used feeding area for bald eagles (Lesica 1990). In addition, it could be home to the rare snail ---, which is only found in Flathead Lake. Safe Harbor Marsh is consistently ranked as one of the most prolific breeding bird habitats in northwest Montana. Past censuses have indicated roughly 65 different bird species and 275 breeding pairs. White-tailed deer, moose, beaver, muskrat, skunk, mink, and marten have also been observed at the marsh (Lesica 1990). No rare plants occur at the site, but there is a small occurrence of the uncommon red-osier dogwood plant community.

OTHER VALUES

Probably the most important function of this wetland is that it supports a diversity of habitats that provide important nesting habitat for birds.

CONDITION

Recreational use of the marsh (birding) is probably the dominant landuse. While birding is fairly benign, I did notice some trailing developing in the wet meadow vegetation, presumably resulting from increased use. Such use could lead to increases in weed populations. Marsh sow-thistle, Canada thistle, Kentucky bluegrass, redtop, bull thistle (Cirsium vulgare), and bittersweet (Solanum dulcamara) occur in the red-osier dogwood and Baltic rush communities. Scattered spotted knapweed (Centaurea maculosa) occurs in the forest surrounding the site.

UPLANDS

There is some private property in catchment, most of which has no residential development yet. However, this could pose a future threat to the marsh, depending on the way in which development occurs. There has been some timber harvest around the marsh. Most of the forest is still intact, except for at the south end of the marsh where

there's a large opening. Along the south and west ends of the marsh there are roads, which could act as vectors for further weed spread.

INFORMATION NEEDS

Hydrologic studies are needed to determine the water source(s) for this marsh. Floristic inventory of the site has been thorough, but further inventory for the rare snail --- is necessary, as it is only found in Flathead Lake. Research into the landuse history of the site would also be useful.

MANAGEMENT NEEDS

The chief management concern is noxious weed spread in the upland forest communities. The Nature Conservancy is currently spot treating knapweed with herbicide. The Nature Conservancy may also do some thinning and attempt to reintroduce fire to the upland forest at this site in the future (B. Martin, pers. comm.).

ELEMENT OCCURRENCE INFORMATION

Juncus balticus herbaceous vegetation	G5	S5
Scirpus acutus herbaceous vegetation	G5	S5
Cornus sericea shrubland	G4	S3

35 Sheppard Creek Fen

LOCATION
Sheppard Creek Fen is in the Salish Mountains of northwestern Montana. The site is 22 miles (34 km) west of the town of Whitefish.

RICHNESS
Both Sheppard Creek Fen North and South are poor fens located on low gradient intermittent creeks. Sheppard Creek Fen South is a 3 acre (1 ha) peatland maintained by springs on the north edge of the fen. Forested lands surrounding the fen are classified as the subalpine fir/grouse whortleberry (Abies lasiocarpa/Vaccinium scopulorum) habitat type. The present forest cover is predominantly pole-sized lodgepole pine (Pinus contorta). Labrador-tea (Ledum glandulosum) is a common undergrowth species. The margins of the fen are dominated by spruce (Picea) with an undergrowth of wood horsetail (Equisetum sylvaticum). The peatland has a nearly continuous coverage of hummock-forming Sphagnum moss, indicative of a 'poor' fen. Important vascular plants include bog birch (Betula glandulosa), Drummonds willow (Salix drummondiana), beaked sedge (Carex rostrata), and the Northern Region sensitive species poor sedge (Carex paupercula). Sheppard Creek Fen North is composed of bog birch carr and temporarily flooded forested edges, and much of the ground layer in the fen is dominated by Sphagnum sp. Dead lodgepole pine in the fen indicate a past flooding event. This fen has an inactive beaver dam at the outlet.

KEY ENVIRONMENTAL FACTORS
Small creeks feeds the peatlands. Thick peat deposits act like a sponge to hold large quantities of water.

RARITY
Sheppard Creek is a good example of a poor fen dominated by Sphagnum mosses. Poor sedge (Carex paupercula), a Northern Region sensitive species, is common in the fen.

OTHER VALUES

CONDITION
The wetland is not mapped as a distinct management area on the 1987 Flathead Forest Plan map. The site is included within MA 12 - riparian areas. The general area has been heavily logged. A narrow forested buffer is present on the northeast and south peatland margins. A more extensive forest is present upslope (northwest) of the peatland.

UPLANDS
Adjacent lands are mostly within Management Area 15 (timber production), and have been heavily logged.

INFORMATION NEEDS

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Abies lasiocarpa/ledum glandulosum pa	G4	S4
Betula glandulosa/carex utriculata shrubland	G4?	S4
Carex rostrata herbaceous vegetation	G5	S5
Salix drummondiana/calamagrostis canadensis shrubland	G5	S5
Salix drummondiana/calamagrostis canadensis shrubland	G5	S5
Peatland	Z	Z
Peatland	Z	Z
Viola renifolia	G5	S3
Carex paupercula	G5	S3
Carex paupercula	G5	S3

36 Skunk Meadow

LOCATION
Skunk Meadow is located in the Stillwater River valley about 1.5 air miles north of Olney, Montana.

RICHNESS
Skunk Meadow is a series of glacially scoured pools occurring along an intermittent creek in the Rocky Mountain Trench. Beaver might have played a role in the formation of the pools in the past (what appear to be old dams are present), but there is no beaver activity currently. The lowest pool is a steep-sided overflow basin that probably doesn't get filled every year, but which was likely filled after the heavy snow winter of 1997. The bottom and steep sides of this pool are covered with a heavy cover of Columbia sedge (Carex aperta), except for slightly higher areas, which support a tufted hairgrass (Deschampsia cespitosa) community. Around the edge of this basin is a fringe of lodgepole pine (Pinus contorta), half of which are dead, apparently killed by high water. The Columbia sedge community contains a number of annual forbs, such as Polygonum douglasii, Potentilla norvegica, and Erysimum chieranthoides. A soil core taken in this community revealed a 5cm thick organic horizon over a 40cm thick A horizon. The middle pools are seasonally flooded and support a Drummond's willow/beaked sedge (Salix drummondiana/Carex utriculata) community. The upper pools have standing water in the deeper, muck filled areas, which support a water horsetail (Equisetum fluviatile) community. These pools are surrounded by a drummond's willow community, which is dominated by Drummond's willow. Associated species in this community are spruce, water horsetail, duckweed (Lemna minor), and Gmelin's buttercup (Ranunculus gmelinii). The surrounding uplands are covered with grand fir/beadlily (Abies grandis/Clintonia uniflora) or spruce/beadlily forest.

KEY ENVIRONMENTAL FACTORS

RARITY
No rare plants occur at this site. However, Skunk Meadow does have a moderately large occurrence of a Columbia sedge community, which is rare in Montana.

OTHER VALUES
This site had abundant deer sign.

CONDITION
Hunting is probably the only current landuse at this site. Reed canarygrass (Phalaris arundinacea), Kentucky bluegrass (Poa pratensis), black medic (Medicago lupulina), common mullein (Verbascum thapsus), and treacle mustard (Erysimum chieranthoides) are all present in the Columbia sedge community. Of these, reed canarygrass and Kentucky bluegrass pose the greatest threat to the integrity of this community.

UPLANDS
Historic and recent logging has occurred in the uplands around this site.

INFORMATION NEEDS

MANAGEMENT NEEDS
Monitoring of the reed canarygrass in the Columbia sedge community is needed to document whether the reed canarygrass is spreading, and if so, how rapidly.

ELEMENT OCCURRENCE INFORMATION

Salix drummondiana shrubland	G5	S5
Deschampsia cespitosa herbaceous vegetation	G4	S3S4
Equisetum fluviatile herbaceous vegetation	G5	S5
Carex aperta herbaceous vegetation	G2?	S2
Salix drummondiana/carex utriculata shrubland	G5	S5

37 South Sanko Creek Fen

LOCATION

South Sanko Creek Fen is located in the Salish Mountains of northwestern Montana, 15 miles (24 km) west of the town of Whitefish. The site is near a headwaters tributary of Sanko Creek, itself a tributary of Logan Creek and the Stillwater River.

RICHNESS

South Sanko Creek Fen is a small peatland covering 5-8 acres (2-3 ha). The fen is oriented east-west along the base of a slope. A number of seeps and springs emerge from the toe of this slope and maintain wet conditions in the peatland. Dominant species include bog birch (Betula glandulosa), hoary willow (Salix candida), and slender sedge (Carex lasiocarpa). Green-keeled cottongrass (Eriophorum viridicarinatum), a Northern Region Forest Service sensitive plant, occurs throughout the fen, especially in the central and eastern portions. Chamisso's cottongrass (Eriophorum chamissonis) is common at the western end. Mosses form a nearly continuous surface layer. Elevation of the peatland is 4840 feet (1475 m).

KEY ENVIRONMENTAL FACTORS

The upslope seeps and springs maintain waterlogged conditions in the peatland.

RARITY

Although small (5-8 acres [2-3 ha]), the site features a representative peatland dominated by bog birch (Betula glandulosa) and slender sedge (Carex lasiocarpa). Green-keeled cottongrass (Eriophorum viridicarinatum), a Northern Region sensitive plant, occurs throughout the peatland.

OTHER VALUES

CONDITION

The site is within Forest Management Area 12, which emphasizes maintenance and enhancement of riparian areas. Spotted knapweed (Centaurea maculosa) occurs along Forest Road 9502, but does not threaten the peatland.

UPLANDS

Adjacent lands are within Forest Management Area 15, which emphasize timber production. North Sanko Creek Fen is located 2000 feet (610 m) north of the site. Gregg Creek Fen is 8500 feet (2591 m) to the northwest.

INFORMATION NEEDS

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Peatland	Z	Z

38 Swift Creek Meadow

LOCATION
This site is located about 4 miles east of Olney, Montana, in the Stillwater Valley.

RICHNESS
Located in the glacially scoured Rocky Mountain Trench, this fen is in a shallow depression which is probably formed on an old alluvial terrace of Swift Creek. The water source is unclear, although it could be groundwater deriving from Swift Creek. The site is dominated by two sedge communities. An inflated sedge (Carex vesicaria) community forms a relatively wide outer zone, and is dry enough in spots to support scattered spruce, alder, and Bebb's willow (Salix bebbiana), although it's dominated by inflated sedge. The center of the fen is dominated by the other large sedge community, slender sedge (Carex lasiocarpa), which in a few places grades back into dominance by inflated sedge, but without trees. A narrow band of water horsetail (Equisetum fluviatile) community forms a lagg or "moat" around the periphery of the fen. At the southeast end of the site is an extensive deciduous woodland dominated by black cottonwood (Populus balsamifera ssp. trichocarpa) and paper birch (Betula papyrifera). The understory is dominated by alder-leaved buckthorn (Rhamnus alnifolia), snowberry (Symphoricarpos albus), and wild sarsaparilla (Aralia nudicaulis). This forest has a hummocky ground layer, and is occasionally flooded by overflow from the fen. creek. the water source is most likely groundwater, possibly deriving from swift creek.

The wetland is surrounded at the southeast end by an extensive deciduous woodland dominated by Betula papyrifera and Populus balsamifera ssp. trichocarpa.

KEY ENVIRONMENTAL FACTORS

RARITY
No rare plants are known from this site.

OTHER VALUES

CONDITION
There are no evident landuses at this site at present. No exotics were observed at this site. However, with the recent logging nearby, the threat of the introduction of exotics into this pristine site is substantial.

UPLANDS
Extensive timber harvest has taken place on the rolling valley bottom nearby, although the stands in the immediate vicinity of this site are still intact.

INFORMATION NEEDS
Hydrogeologic study is needed for this general area to determine the water source for this and other nearby wetlands. A thorough floristic inventory conducted early in the summer is also needed.

MANAGEMENT NEEDS
Any future timber harvest around this wetland should at minimum employ streamside management zone buffers.

ELEMENT OCCURRENCE INFORMATION

Betula papyrifera forest	G4Q	S3?
Populus balsamifera ssp. trichocarpa/cornus sericea forest	G3?	S3
Carex lasiocarpa herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Carex vesicaria herbaceous vegetation	G5	S5

39 Whitefish Spruce Swamp Preserve

LOCATION

Whitefish Spruce Swamp is located in the Flathead Valley about 1 mile north of Whitefish, Montana. NOTE: This is a private wetland, and landowner permission is needed to access this site.

RICHNESS

The Whitefish Spruce Swamp is located in the Rocky Mountain Trench, at the edge of the Flathead Valley. The site sits at the toe of a slope, from which flows groundwater from the adjacent uplands. The groundwater flow keeps the site wet for most of the year. Four plant communities are found at this site. There are two types of wet spruce forest, the so-called spruce swamp, which is a spruce/skunk cabbage (Picea/Lysichiton americanum) community, and the drier spruce/queen's cup (Picea/Clintonia uniflora) community. The soils are moist year-round in the spruce/skunk cabbage community, and surface water flows in a series of small channels through this nearly flat ground which has a great deal of microtopographic relief. Spruce dominates the overstory, which also has some large black cottonwoods (Populus trichocarpa) and paper birch (Betula papyrifera). The shrub and herbaceous layers are diverse, with the shrub layer dominated by streambank alder (Alnus incana). Skunk cabbage dominates the herbaceous layer, where it occurs in the many low-lying spots which have standing water for part of the year. The spruce/queen's cup community is dominated by spruce also, with scattered cottonwoods and aspen (Populus tremuloides). The shrub layer is diverse, with snowberry (Symphoricarpos albus) and serviceberry (Amelanchier alnifolia) common. The herb layer is dominated by queen cup and twinflower (Linnaea borealis). The other 2 communities found at this site are a Bebb's willow (Salix bebbiana) community and a redtop (Agrostis stolonifera) wet meadow. The dominant shrubs in the former community are Bebb's willow, red-osier dogwood, and streambank alder. Common graminoids are water sedge (Carex aquatilis), reed-canarygrass (Phalaris arundinacea), redtop, and yellow sedge (Carex flava). The redtop wet meadow occurs adjacent to the former community, and is dominated by graminoids including redtop, yellow sedge, wooly sedge (Carex lanuginosa), timothy (Phleum pratense), and Nebraska sedge (Carex nebrascensis).

KEY ENVIRONMENTAL FACTORS

The hydrology of this site has been critical to the formation of the plant communities that occur here.

RARITY

The site supports a number of plants which are rare in Montana, including yellow lady's slipper (Cypripedium parviflorum v. calceolus), Buckler fern (Dryopteris cristata), kidney-leaved violet (Viola renifolia), spurred gentian (Halenia deflexa), and northern bastard toadflax (Geocaulon lividum). There is also a large occurrence of a rare plant community here, the spruce/skunk cabbage community, which is in good condition.

OTHER VALUES

Moose and white-tailed deer were observed during the site visit, as was bear scat. The owners report that a variety of wildlife use the area.

CONDITION

Horse and/or cattle grazing occurs in the willow and wet meadow community, although use appears to have been light recently. Occasional selective timber harvesting could be occurring in the spruce forest, but it mostly appears undisturbed at present (Lesica 1987). A number of exotic plants occur on the preserve, but they generally do not pose a threat to the spruce forest, at least in the absence of disturbance. Three exotics occur in the willow and wet meadow communities, and these could pose a threat due to their tendency to spread aggressively. These are timothy grass, Canada thistle (Cirsium arvense), and sow-thistle (Sonchus uliginosus) (Lesica 1987). Reed canarygrass also occurs in these communities, and while it's status as native or exotic is unclear (e.g. see Merigliano and Lesica 1998), it can be quite aggressive and difficult to control.

UPLANDS

The primary offsite activities which threaten the viability of this site are the road-building and residential development taking place next to the site, particularly that going on upslope from the site. There is potential for roadcuts and homesites to interfere with the groundwater flow to the site, as well as potential for nutrient loading from septic systems to alter the composition of the site's plant communities (Lesica 1987). In addition, instances of trespass have been increasing, according to the landowner. Most of these instances are people wanting to walk their pets, or dogs just roaming free. Both activities have potential to increase the spread of weeds and disturb wildlife.

INFORMATION NEEDS

Lesica (1987) identified the need for more information on the site's hydrology and the projected effects of subdivision on the water source as one of the most important and pressing issues. Since that report was written 12 years ago, much of the projected subdivision has taken place. The short-term effects on the site have apparently been relatively benign, as the species and communities dependent on the site's hydrology are still present. However, the long-term effects are not known, and development is continuing. Some form of monitoring program is needed to detect any changes resulting from hydrologic alteration.

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Picea sp/clintonia uniflora forest	G4	S4
Picea sp/lysichiton americanum forest	G2	S2
Salix bebbiana shrubland	G5	S5
Agrostis stolonifera herbaceous vegetation	G5	SE
Viola renifolia	G5	S3
Cypripedium parviflorum	G5	S3
Dryopteris cristata	G5	S2

40 Blasdel Waterfowl Production Area

LOCATION

Turn east on State Road 82 from U.S. 93 about 8 miles south of Kalispell, Montana. After 1.1 miles, turn north toward Bethel Cemetery. After about 1.1 miles, park at public access site on east side of road. Follow dirt road past old barn to wetlands.

RICHNESS

Blasdel Waterfowl Production Area (WPA) is a former farm now owned by the U.S. Fish and Wildlife Service and located on the ancient delta formed by rivers of meltwater from the receding valley glacier during the Pleistocene (Alt and Hyndman 1986). These flowing waters cut into the delta's silts and sediments and formed the paleo channels such as those protected in this WPA. Several plant communities typical of valley bottom wetlands occur here. A fringe of black cottonwood/snowberry (Populus balsamifera ssp. tricocarpa) remains around one of the sloughs. The overstory is dominated by black cottonwood and aspen (Populus tremuloides), while the understory is composed mostly of either increasers like black hawthorne (Crataegus douglasii) or pasture grasses. Although this community's composition is far from pristine, this occurrence is notable since many of these cottonwood communities have been cleared for agriculture or homebuilding. The sloughs have a reed canarygrass community occurring in the shallow marsh and wet meadow zones on the outer margins of the wetlands; this grass forms a near monoculture. In the deep marsh zone, there are patches of both hardstem bulrush (Scirpus acutus) and cattail (Typha latifolia) communities surrounding the deeper open water. The western-most slough is deep and has a diverse aquatic community, at least as viewed from shore. Water-lily (Nuphar sp.) is the dominant species. Free-floating species on the water's surface include star duckweed (Lemna trisulca), spirodela (Spirodela polyrhiza), Columbia water meal (Wolffia columbiana), and the aquatic liverwort Riccia sp. Mostly submerged aquatics in the same slough include fennel-leaved pondweed (Potamogeton pectinatus), eel-grass pondweed (Potamogeton zosterformis), Richardson's pondweed (Potamogeton richardsonii), Berchtold's pondweed (Potamogeton berchtoldii), and hornwort (Ceratophyllum demersum). Soil cores revealed fairly shallow organic horizons over silt clay loam mineral soils.

KEY ENVIRONMENTAL FACTORS

RARITY

One rare plant occurs at this site, the aquatic species Columbia water meal. There are two members of this genus (Wolffia) in Montana, and they are the smallest vascular plants in the state at about 1mm long. Columbia water meal occurs in fresh water ponds and can form dense beds when blown around by the wind.

OTHER VALUES

This site seems to be good wildlife habitat, particularly for waterfowl and other birds. A birder that I ran into while I was visiting the site was very enthusiastic about these wetlands as a birding spot. In addition, the water of two of the eastern sloughs was slightly brackish (conductivities ranged from 1000-1900 uS/cm) according to the definitions used by Stewart and Kantrud (1971). These wetlands could be functioning as discharge wetlands, where groundwater discharges into the wetlands, and then the water evaporates, leaving water with increased salinity. Several areas nearby are classified as "saline-alkali land" (USDA-SCS 1960).

CONDITION

Currently the wetlands are used primarily for waterfowl hunting and birding. A number of exotics are found in the cottonwood/snowberry community. These include a variety of pasture grasses, bittersweet (Solanum dulcamara), bull thistle (Cirsium vulgare), Canada thistle (Cirsium arvense), houndstongue (Cynoglossum officinale), and sow thistle (Sonchus uliginosus). These have degraded the integrity of this community significantly. There is a temporarily flooded wet meadow surrounding two of the eastern sloughs which is dominated by redtop (Agrostis stolonifera), and the shallow marsh around these sloughs is dominated by a monoculture of reed canarygrass.

UPLANDS

Lands in the surrounding area of the Flathead Valley are primarily used for agriculture, such as raising wheat, livestock, or hay. Many of the nearby sloughs are farmed right up to the edge of the slough. Some of the farms are being replaced by subdivisions, and in these cases green lawns extend up to the edge of the water. The sloughs and the plant communities they support represent some of the few remaining intact native plant communities in the Flathead Valley.

INFORMATION NEEDS

Information on the hydrology of these wetlands would be useful in better managing the WPA. For instance, knowing whether the water levels in the sloughs was influenced more by Flathead Lake levels, precipitation, or water of riverine origin would be useful in predicting the influence of fertilizer runoff, potential chemical spills, or septic effluent.

MANAGEMENT NEEDS

There is currently a 30-100 foot buffer of uncultivated land around the wetlands, which probably helps to reduce sediment inputs to the wetlands. It would be useful to increase this buffer in places where it's closer to 30 feet. Some consideration should also be given to planting some cottonwoods around the old river channel to the west. The existing trees are aging and starting to break up, and planting some young cottonwood would help maintain the cottonwood community at this site.

ELEMENT OCCURRENCE INFORMATION

Phalaris arundinacea herbaceous vegetation	G5	S5
Scirpus acutus herbaceous vegetation	G5	S5
Typha latifolia herbaceous vegetation	G5	S5
Populus balsamifera ssp trichocarpa/symphoricarpos albus for	G4	S4

41 Bootjack Meadows

LOCATION
This site is located about 1 mile east of Olney, Montana, in the Stillwater Valley.

RICHNESS
Bootjack Meadow is a glacially formed depression that was scoured out by the glacier that was in the Rocky Mountain Trench. The meadow doesn't appear to have a surface inlet or outlet, and apparently the water in this wetland derives mostly from groundwater. This sedge meadow is dominated by a slender sedge (Carex lasiocarpa) community which is ringed by a narrow beaked sedge (Carex utriculata) community that is at a slightly lower position and thus filled with water - it forms a lagg or "moat". The slender sedge community has a ground layer with high moss cover, and there are some large, dense patches of reed canarygrass (Phalaris arundinacea) in this community. On some slightly higher ground in the meadow is a small tufted hairgrass (Deschampsia cespitosa) community, which is dominated by tufted hairgrass and narrow-spiked reedgrass (Calamagrostis inexpansa). This community has been invaded by Kentucky bluegrass (Poa pratensis). Off of the northwest end of Bootjack Meadow is a short string of small depressions, which are dominated by either awned sedge (Carex atherodes), inflated sedge (Carex vesicaria), or cattail (Typha latifolia) communities, and ringed by a band of spruce/red osier dogwood (Picea sp./Cornus sericea) community. The upland is spruce/beadlily (Picea sp./Clintonia uniflora) and subalpine fir/beadlily (Abies lasiocarpa/Clintonia uniflora) forest.

KEY ENVIRONMENTAL FACTORS
The hydrology of the site is the chief factor structuring and maintaining Bootjack Meadow's wetland communities.

RARITY
There are two rare plant occurrences at the site, crested shield fern (Dryopteris cristata) and spurred gentian (Halenia deflexa), both of which occur in the moist spruce forest surrounding Bootjack Meadow. There are no rare plant communities.

OTHER VALUES

CONDITION
There are probably no current landuses at the site besides hunting. Reed canarygrass forms large dense patches in the slender sedge community and appears to be spreading. Control of this species, which has been treated as both an exotic and a native in the literature, is difficult and expensive (Apfelbaum and Sams 1987). This coarse grass forms monocultures in seasonally flooded marshes and fens. Populations in North America may be composed of both native genotypes and European cultivars (Merigliano and Lesica 1998).

UPLANDS
A great deal of the adjacent upland has been or is in the process of being harvested. Skid trails come down to within about 25 feet of the meadow, to where a forested buffer strip begins.

INFORMATION NEEDS
More information on the site's hydrology is needed, to help better understand the effects of timber harvest on site's water levels.

MANAGEMENT NEEDS
Future timber harvest at the site should continue to employ streamside management zone buffers. Monitoring of the reed canarygrass invasion is needed to document how quickly this agressive species can spread in such habitats.

ELEMENT OCCURRENCE INFORMATION

Picea sp/cornus stolonifera forest	G3	S3S4
Deschampsia cespitosa herbaceous vegetation	G4	S3S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Typha latifolia herbaceous vegetation	G5	S5
Carex atherodes herbaceous vegetation	G5	S5
Carex vesicaria herbaceous vegetation	G5	S5
Ophioglossum pusillum	G5	S2

42 Egan Slough

LOCATION

Egan Slough is located next to the Flathead River north of Flathead Lake in northwest Montana. NOTE: This is a private wetland, and landowner permission is needed to access this site

RICHNESS

Egan Slough is a large horseshoe-shaped oxbow lake next to the Flathead River. Formed when the river cut off one of its meanders, Egan Slough now lacks a surface water connection to Flathead River except for a dike with a headgate which has been constructed between the two. The water level of Egan Slough rises and falls with the level of Flathead River, most likely due to groundwater connections between the two. Formed in soils of alluvial origin (USDA-SCS 1960), the slough is one of the best examples of a large river slough in the Flathead Valley (Lesica undated). Good examples of deep marsh, shallow marsh, and aquatic plant communities are found here. The deep marsh community occurs around the around the margins and at the ends of the slough, and includes water horsetail (Equisetum fluviatile), cattail (Typha latifolia), and hardstem bulrush (Scirpus acutus) communities, as well as some stands of broadfruited bur-reed (Sparganium eurycarpum). This last community hasn't been described for Montana, but at Egan Slough it occurs at about the same position as the cattail community. The shallow marsh community is in slightly shallower water, and includes awned sedge (Carex atherodes) and beaked sedge (Carex utriculata) communities. The aquatic community in shallower parts of the slough is dominated by water lily (Nuphar variegatum), water milfoil (Myriophyllum verticillatum), and common bladderwort (Utricularia vulgaris), while deeper aquatic communities are dominated by Illinois pondweed (Potamogeton illinoensis) and white stalked pondweed (Potamogeton praelongus). At the north end of the slough on an island is an aspen/snowberry (Populus tremuloides/Symphoricarpos albus) forest, much of which has been impacted by grazing. The temporarily flooded margins of the slough support a wet meadow community dominated by exotic pasture grasses; this community has also been heavily influenced by grazing. Between the slough and the Flathead River is a cottonwood/red-osier dogwood community, which has also been influenced by past grazing. I didn't visit either of the last two communities; information about them is taken from Lesica (undated).

KEY ENVIRONMENTAL FACTORS

The hydrology of the site is the most important factor determining the continued existence of the wetland communities at Egan Slough.

RARITY

Four rare wetland plants occur at Egan Slough. These are pygmy water lily (Nymphaea tetragona), which is disjunct in the Pacific Northwest from the main part of its range in eastern North America. Columbia water meal (Wolffia columbiana) also occurs here. Both of these were observed during my site visit. Two other species that occur here but which were not observed during my site visit are water clubrush (Scirpus subterminalis) and water star-grass (Heteranthera dubia). The aspen/snowberry community is the only known occurrence of this type west of the continental divide in Montana. The reason for the dominance of aspen and not black cottonwood is not known (Lesica undated).

OTHER VALUES

Numerous species of birds and mammals have been observed at Egan Slough. The area is rich in wildlife and is undoubtedly important breeding habitat for many species (Westec and Lesica 1986).

CONDITION

Egan Slough is used for waterfowl hunting and for fishing. The slough is also used as a supply of irrigation water for adjacent cropland. Water from the slough is also allowed to flow into the Flathead River during low river levels to prevent flooding of cropland in the spring (Lesica undated). Reed canarygrass (Phalaris arundinacea) poses a threat to the marsh communities at Egan Slough; it has already invaded some of these communities, and it is very difficult to control (Apfelbaum and Sams 1987). Houndstongue (Cynoglossum officinale), Canada thistle (Cirsium arvense), sow thistle (Sonchus uliginosus), and common mullein (Verbascum thapsus) are found in the riparian forest communities. Gray partridge (Perdix perdix), ring-necked pheasant (Phasianus colchicus), European starling (Sturnus vulgaris), and house sparrow (Passer domesticus) are introduced birds reported from Egan Slough (Lesica undated).

UPLANDS

The uplands surrounding the slough and the land between the arms of the slough are used for growing crops. There are also at least 10 residences adjacent to the slough. Both pose threats to the water quality of Egan Slough. The water seemed rather turbid during my site visit.

INFORMATION NEEDS

MANAGEMENT NEEDS

A comprehensive management plan for the slough is needed, which should address grazing management, noxious weed management, and water quality issues.

ELEMENT OCCURRENCE INFORMATION

Populus tremuloides/symphoricarpos albus forest	G3?	S3?
Populus balsamifera ssp. trichocarpa/cornus sericea forest	G3?	S3
Carex rostrata herbaceous vegetation	G5	S5
Scirpus acutus herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Typha latifolia herbaceous vegetation	G5	S5
Carex atherodes herbaceous vegetation	G5	S5
Nymphaea tetragona ssp leibergii	G5T5	S1
Scirpus subterminalis	G4G5	S2
Wolffia columbiana	G5	S2
Heteranthera dubia	G5	S1

43 Good Creek Marsh

LOCATION
This site is located in the Salish Mountains in the Good Creek drainage about 16 air miles northwest of Whitefish, Montana.

RICHNESS
This basin fen occupies a glacially-formed depression on a gently sloping, north-facing hillside above Good Creek. The water source is a small draw to the south with intermittent surface flow. During high-water periods, surface water can flow from the wetland from a small outlet, but primarily water outflows are due to groundwater losses and evapotranspiration. The site is dominated by a slender sedge (Carex lasiocarpa) meadow, with a narrow moat occupied by water horsetail (Equisetum fluviatile) surrounding it. In the center of the sedge meadow is a tiny patch of open water with water lilies (Nupahr sp.). The accumulation of sedge peat exceeds 1.5m, and a clay layer lies below these peat deposits. Immediately surrounding the pond is a narrow band of deciduous vegetation dominated by black cottonwood (Populus trichocarpa), aspen (Populus tremuloides), and various shrubs. The surrounding upland vegetation is a subalpine fir/beargrass (Abies lasiocarpa/Xerophyllum tenax) habitat type which is dominated by lodgepole pine (Pinus contorta).

KEY ENVIRONMENTAL FACTORS
The seasonal flooding of the site and year-long saturation in the rooting zone are responsible for the peat accumulation and plant communities at the site. The uplands are dominated by a seral lodgepole pine community, with scattered fire-scarred larch; infrequent moderate to stand-replacing fires periodically burned the uplands surrounding this fen. (Fischer and Bradley 1987).

RARITY
Good Creek fen, while not especially diverse floristically, does host two plants which are rare in Montana, creeping sedge (Carex chordorrhiza) and pod grass (Scheuchzeria palustris), as well as a pristine example of a slender sedge (Carex lasiocarpa) community.

OTHER VALUES
This fen is most likely a flow-through wetland, meaning it both receives groundwater discharge and provides groundwater recharge to the Good Creek drainage. Given the intact uplands and lack of roads in the catchment, it is likely that all of the wetlands functions are intact (e.g., short-term dynamic surface water storage, long-term static surface water storage, elemental cycling, removal of elements, compounds and particulates) (Cook and Hauer 1998). The site is about 0.5 mile from the nearest road, and its relative inaccessibility largely accounts for its functional integrity.

CONDITION
With the exception of huntine, there are no current land uses at this fen. No exotic flora currently threaten the site.

UPLANDS
There has been some past logging in the lodgepole stands surrounding the wetland. Judging from the presence of dead lodgepole pine killed by mountain pine beetle, the timber harvest was for the salvage of dead trees. There is no obvious ground disturbance in the catchment. This fen is surrounded by Forest Service lands, and there are no obvious threats to the viability of this site at present.

INFORMATION NEEDS

MANAGEMENT NEEDS
Streamside management zone laws should be observed if any future timber harvest occurs in this catchment.

ELEMENT OCCURRENCE INFORMATION

Carex lasiocarpa herbaceous vegetation	G5	S5

44 Good Creek Tributary

LOCATION
This site is about 1.25 miles southwest of Lower Stillwater Lake, and about 3 air miles south of Olney.

RICHNESS
This site is the broad floodplain of an ephemeral stream in the Rocky Mountain Trench. A series of beaver dams on the creek has created a sequence of terraced wetlands. One of the dams is 8 feet tall and crosses the entire floodplain. There is a large occurrence of wet spruce forest at the site which grades into an alder swamp. The spruce/skunkcabbage (Picea sp./Lysichitum americanum) forest and the alder swamp have a similar vegetation composition, and the main difference is dominance by either spruce or alder; it's possible that the alder swamp will gradually be replaced by spruce swamp. Part of the broad floodplain at the site is dominated by a Drummond's willow/beaked sedge (Salix drummondiana/Carex utriculata) community. The cobbly, dry, ephemeral stream channel is dominated by the exotic grass redtop (Agrostis stolonifera). Throughout this community are scattered patches of black cottonwood/snowberry (Populus balsamifera ssp. trichocarpa/Symphoricarpos albus) community, with patches of beaked sedge community in wetter areas. There are also some patches of spruce/field horsetail (Picea sp./Equisetum arvense) community on the outer margins of the spruce swamp where it's drier.

KEY ENVIRONMENTAL FACTORS
The hydrology of the site, its geomorphology, and beaver activity are the three driving factors structuring the plant communities at the site.

RARITY
A population of the rare plant kidney-leaved violet (Viola renifolia) was identified at the site. However, the plants were vegetative and its identity needs to be confirmed while it's in flower. The site also has a rare wet spruce community, the spruce/skunkcabbage forest.

OTHER VALUES

CONDITION
There are no current landuses evident at the site. The most common exotic species at the site is the grass, redtop. Also present at the site are reed canarygrass (Phalaris arundinacea), Kentucky bluegrass (Poa pratensis), tall blue lettuce (Lactuca biennis), Canada thistle (Cirsium arvense), and bittersweet (Solanum dulcamara). The two latter species are especially common on the beaver dams. The prevalence of exotics, especially in the drier habitats, suggests some past disturbance such as grazing.

UPLANDS
The uplands in the vicinity of this wetland are managed for timber production and have current logging activity.

INFORMATION NEEDS
This site needs to have a floristic inventory performed in the spring when kidney-leaved violet is blooming. The site also needs some research into its landuse history.

MANAGEMENT NEEDS
An integrated weed management plan is needed to develop some strategies for controlling or reducing the impact of exotics on the native plant communities at the site.

ELEMENT OCCURRENCE INFORMATION

Picea sp/equisetum arvense forest	G4	S3
Picea sp/lysichiton americanum forest	G2	S2
Carex rostrata herbaceous vegetation	G5	S5
Agrostis stolonifera herbaceous vegetation	G5	SE
Salix drummondiana/carex utriculata shrubland	G5	S5
Populus balsamifera ssp trichocarpa/symphoricarpos albus for	G4	S4

45 Lake House Meadow

LOCATION
Wetland located in Stillwater Valley of northwest Montana, about 3 miles southeast of Olney.

RICHNESS
Lake House Meadow is a cluster of three long, narrow depressional wetlands in a low relief glaciated trough setting in the Rocky Mountain Trench. There are no apparent surface water inlets to the depressions, but there is a surface water outlet at high water. The water source for the wetland is most likely dominated by groundwater and/or precipitation. The potholes are dominated by slender sedge (Carex lasiocarpa) meadows in the central portion of the depression. This community is typically surrounded by a band of beaked sedge (Carex utriculata) or awned sedge (Carex atherodes) community, which forms a lagg or "moat" in slightly deeper water than the slender sedge community. The deeper pools are dominated by a water horsetail (Equisetum fluviatile) community, which has a mucky, soft bottom. A spruce/field horsetail (Picea sp./Equisetum arvense) community occurs as a narrow, discontinuous fringe around one of the depressions. The uplands around the site are a spruce/beadlily (Picea sp./Clintonia uniflora) forest.

KEY ENVIRONMENTAL FACTORS
The hydrology and geomorphology of the site drive the pattern of plant communities at this wetland. No evidence of current or past beaver activity was observed during the site visit.

RARITY
No rare plants or communities are known from this site.

OTHER VALUES

CONDITION
The only probable landuse occurring at this site is hunting. Reed canarygrass (Phalaris arundinacea) is well established around the periphery of the wetlands and is beginning to invade the dominant, central slender sedge community in the largest meadow. This invasive grass poses a threat to the wetland, as it could eventually dominate the slender sedge community and displace the native sedge.

UPLANDS
The uplands are managed for timber production.

INFORMATION NEEDS
The hydrology of this wetland and others nearby needs study to better understand groundwater flow paths and the role of groundwater as a water source for the wetlands.

MANAGEMENT NEEDS
Any future timber harvest around this site needs to employ a streamside management zone buffer, at minimum. In addition, the reed canarygrass needs to be monitored to determine how quickly it's spreading.

ELEMENT OCCURRENCE INFORMATION

Picea sp/equisetum arvense forest	G4	S3
Phalaris arundinacea herbaceous vegetation	G5	S5
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Carex atherodes herbaceous vegetation	G5	S5

46 Mcwennegar Slough

LOCATION

This site is located in the Flathead Valley several miles east of Kalispell, Montana. NOTE: This is a private wetland, and landowner permission is needed to access this site.

RICHNESS

McWennegar Slough is an oxbow lake of the mainstem Flathead River. The slough is eutrophic/mesotrophic and rich in aquatic plant diversity. There is open water in the center and the margins are dominated by water horsetail (Equisetum fluviatile), hardstem bulrush (Scirpus acutus), cattail (Typha latifolia), and water lily (Nuphar sp.). Species of pondweed (Potamogeton sp.) dominate areas between the open water and margins; in fact, 8 species of pondweed are found in the slough, which is an unusually high level of pondweed diversity.

KEY ENVIRONMENTAL FACTORS

RARITY

A number of rare plant species occur at this site, including Columbia watermeal (Wolffia columbiana), and pygmy waterlily (Nymphaea tetragona). River otter use of the site has been observed in the past.

OTHER VALUES

CONDITIOn

During 1983 site visit by Lesica and McAllister, pump houses and one residence were observed adjacent to the slough; the extent of irrigation withdrawals aren't known. Some silt deposits were also observed in the slough, as was some turbidity in Shaw Slough and the northeast end of McWennegar Slough, but overall water clarity seemed good. Water skiers have been using the slough since at least the early 90's. No exotic plants were observed in the slough itself.

UPLANDS

Surrounding lands are primarily used for agriculture and grazing. There is one residence next to the slough, and State Road 35 runs along the south side of the site.

INFORMATION NEEDS

Information on the cause of the silt deposition into McWennegar Slough is needed. There is also a need to learn the water source for the slough and whether agricultural pollution is affecting the slough.

MANAGEMENT NEEDS

Recreational use of the slough could be having long term impacts on the aquatic plant communities at the site, and a management plan that includes limits to such use should be considered.

ELEMENT OCCURRENCE INFORMATION

State champion tree	Z	Z
State champion tree	Z	Z
Eleocharis rostellata	G5	S2
Wolffia columbiana	G5	S2

47 Point of Rocks

LOCATION
This site occurs just off U.S. 93 about 8 miles north of Olney, Montana.

RICHNESS
This extensive willow bottom occurs on the deep alluvial silts of the floodplain of the upper Stillwater River. The floodplain ranges from 100-300m wide, and the willow bottom is about 3km long. The river through this reach is low gradient, sinuous, and fairly entrenched. No beavers or beaver activity was observed, but only a small portion of the willow bottom was inspected. A Drummond's willow/bluejoint reedgrass (Salix drummondiana/Calamagrostis canadensis) community dominates the site. Drummond's willow and red-osier dogwood (Cornus sericea) share dominance of the shrub layer, which also has Bebb's willow (Salix bebbiana), Booth's willow (Salix boothii), black hawthorne (Crataegus douglasii), and woods rose (Rosa woodsii). There is sparse cover of understory graminoids and forbs, with fowl bluegrass (Poa palustris), bluejoint reedgrass, and field mint (Mentha arvensis) the most common species. A soil core revealed a silt clay loam "A" horizon 140cm thick, with water reached at a depth of 80cm. Silt stains on the base of the willows indicate that the community still floods at times, even though the river channel is fairly entrenched.

Key Environmental Factors
Repeated flooding and the resulting sediment deposition, as well as a high water table, have been the key factors that have shaped the plant community at this site.

Rarity
No rare plants or communities are known to occur on this site.

OTHER VALUES
This willow bottom performs some important wetland functions. During peak flows of the Stillwater River, the wetland temporarily stores surface water and attenuates peak flows. This water gradually drains from the site and maintains streamflow later in the summer. The willow bottom probably also functions to retain particulates and remove and sequester imported elements and compounds such as phosphorus and nitrogen compounds. Because the uplands
in the watershed have been impacted by road building and timber harvest, these latter functions could be increasing beyond their natural range of variation (i.e. due to increased sediment loads in the creek).

CONDITION
The willows in this stand are very dense and limit human uses. A gas line runs along the northeast edge of the willow bottom and has cuts into the stand in a few places. There is at least one small clearing where dispersed camping and river access can occur. Traces of fowl bluegrass and Canada thistle (Cirsium arvense) occur in the willow community, but do not present any threats at this time.

UPLANDS
U.S. 93 and a rail line run parallel to the willow bottom on opposite sides of the river, but they are located at the edge of the valley where the upland slopes and valley floor meet, and thus do not really constrain or channelize the river channel at all. There is cleared pastureland on the south edge of the willow stand.

INFORMATION NEEDS
The river through this reach is fairly entrenched, and it would be useful to have a hydrologist visit the site to see if this a natural situation or if it is the result of downcutting caused by human actions elsewhere on the river.

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Salix drummondiana/calamagrostis canadensis shrubland	G5	S5

48 Ritsenburg Meadow

LOCATION

This site is 3 miles north of Olney, Montana. Turn off U.S. 93 3 miles north of Olney onto a state forest road on the northeast side of the highway. Follow this road for about 1 mile, then turn left on a logging road and go about 1 mile to Ritsenburg Meadow.

RICHNESS

Ritsenburg Meadow is a glacially-formed depression in the Rocky Mountain Trench. The primary water source for this site is probably the intermittent creek that flows into the site from the northwest; a perennial creek flows out of the site to the southeast. A Buxbaum's sedge (Carex buxbaumii) meadow makes up a large portion of the center of this depression, and is ringed by a lagg or "moat" of deeper water dominated by a bog birch/beaked sedge (Betula glandulosa/Carex utriculata) shrub community. The site is irregularly shaped, with "arms" extending away from the center. One of these arms, which is in slightly shallower water than the bog birch "moat", is dominated by Sitka alder (Alnus sinuata ssp. viridis) community, while the other arms are considerably drier and dominated by the exotic grass redtop (Agrostis stolonifera) and other weedy species. There is a small common spikerush (Eleocharis palustris) community in the channel near the outlet creek. The uplands near the site are western red cedar (Thuja plicata) forest.

KEY ENVIRONMENTAL FACTORS

The hydrology and geomorphology are probably the two dominant factors structuring plant communities at the site. There are some old beaver-chewed trees at the site, but no dam and no current beaver activity, so while beavers may have been important in the past, they are no longer present. Spruce snags and young conifer regeneration in the wetland indicate alternating high and low water levels (possibly associated with beaver?); this example shows how hydrology can determine the potential vegetation community.

RARITY

No rare plants are known from this site.

OTHER VALUES

CONDITION

No current landuses were evident during the site visit. Several of the drier, irregularly shaped "arms" of this wetland are dominated by the exotic grass redtop, and several other exotics occur in the community, including timothy (Phleum pratense), oxeye daisy (Chrysanthemum leucanthemum), bull thistle (Cirsium vulgare), white clover (Trifolium repens), and black medic (Medicago lupulina).

UPLANDS

The adjacent state lands are managed for timber production.

INFORMATION NEEDS

A hydrogeologic study is needed for this and adjacent wetlands to better understand groundwater flowpaths and aquifer locations. In addition, further study of the landuse history is needed for this site to understand why exotics dominate some of the communities.

MANAGEMENT NEEDS

The redtop community has replaced whatever natural community used to be there, and restoring the native community is desirable but beyond the scope of current restoration methods.

ELEMENT OCCURRENCE INFORMATION

Alnus viridis ssp. sinuata shrubland	G5	S5
Betula glandulosa/carex utriculata shrubland	G4?	S4
Carex buxbaumii herbaceous vegetation	G3	S3
Eleocharis palustris herbaceous vegetation	G5	S5
Agrostis stolonifera herbaceous vegetation	G5	SE

49 Smith Lake Waterfowl Production Area

LOCATION

Smith Lake Waterfowl Production Area is located on Ashley Creek 7 miles southwest of Kalispell, Montana.

RICHNESS

This lake and marsh occupy a glacially scoured depression in the Ashley Creek valley. Ashley Creek both empties into and flows out of Smith Lake. Overland flows from Ashley Creek and Smith Lake dominate the hydrology of the extensive marshlands that have formed on the margins of both the creek and lake. The shallower regions of the marsh around the edges are covered with extensive stands of reed canarygrass (Phalaris arundinacea), while generally the more inundated parts of the marsh are covered by a complex matrix of 3 different plant communities: beaked sedge (Carex utriculata), cattail (Typha latifolia), and hardstem bulrush (Scirpus acutus). Aquatic plant species like water smartweed (Polygonum amphibium), grass-leaved pondweed (Potamogeton gramineus), common bladderwort (Utricularia vulgaris), duckweed (Lemna minor), and liverworts (Riccia sp.) occur in all 3 communities. There are a few scattered patches of Bebb's, Drummond's, and Geyer's willows near Ashley Creek, but not enough to really form willow community per se. Smith Lake proper supports a large water lily (Nuphar sp.) community, and most likely some other aquatic communities; however, these were not visited. Soil cores taken in the reed canarygrass and cattail communities revealed deep (>1m) organic horizons, probably resulting from the abundant primary productivity often associated with marshes (Mitsch and Gosselink 1993), as well as anaerobic conditions, indicated by the hydrogen sulfide odor of some of the deeper soil cores. The uplands are dominated by second-growth Douglas-fir (Psuedotsuga menziesii) forest.

KEY ENVIRONMENTAL FACTORS

Glacial scouring of the depression in this valley and the hydrologic regime driven by water levels in Ashley Creek and Smith Lake are both driving factors that have shaped this site and continue to greatly influence it. In addition, erosion from the uplands has been slowly filling in the valley, making the marshes shallower over time.

RARITY

This site does not support any known rare plant occurrences, but it does contain several large, common marsh communities, including hardstem bulrush, cattail, and beaked sedge communities. These extensive marsh communities form a mosaic and provide good wildlife habitat.

OTHER VALUES

Smith Lake and its surrounding marshes provide some important wetland functions and services. The are situated along Ashley Creek, and during peak flows of the creek, the wetland temporarily stores surface water and attenuates peak flows. This water gradually drains from the site and maintains streamflow later in the summer. The marsh and lake probably also function to retain particulates and remove and sequester imported elements and compounds such as phosphorus and nitrogen compounds. Because the uplands in the watershed have been impacted by road building and timber harvest, these latter functions could be increasing beyond their natural range of variation (i.e. due to increased sediment loads in the creek).

CONDITION

Fishing and waterfowl hunting are probably two of the primary uses of Smith Lake. There are multiple access points for hunters along the marsh, and there is one developed fishing access. Parts of the marsh supporting reed canarygrass have been ditched, and the reed canarygrass is cut for hay. It doesn't seem like the ditches have been very successful at draining the site, and they probably don't pose as great a threat to the site as the reed canarygrass does. Although a two-lane road crosses the marsh and Ashley Creek at the southwest end, it probably doesn't present that great of a hydrologic barrier since the creek connects communities on both sides of the road. The wetland communities themselves don't contain many exotics, with the exception of reed canarygrass. This coarse grass, which forms monocultures in seasonally flooded marshes and fens, has been treated as both a native and exotic species. Populations in North America may be composed of both native genotypes and European cultivars (Merigliano and Lesica 1998). Control of this species is difficult and expensive (Apfelbaum and Sams 1987).

UPLANDS

The Smith Lake valley lands surrounding this site are used in ways typical of low-elevation valleys in the state. Agriculture, grazing, and ranches are common, and much of the accessible timber has been harvested and is now second growth forest. Most of the native riparian and wetland plant communities have been altered in the process, and nutrient loading in Ashley Creek is a concern. Although there is not a diversity of plant communities in the Smith Lake Waterfowl Production Area, the sheer size of this wetland make it valuable not only as wildlife habitat

and open space but also for the wetland's filtering and water storage functions, which offset some of the impacts from development. A growing threat is subdivision of the surrounding lands, which brings fragmentation and increased nutrient loads from septic systems.

INFORMATION NEEDS

The site would benefit from a complete floristic inventory, as well as an inventory of the site's mollusks, since there is a globally rare snail that lives in nearby Flathead Lake.

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Phalaris arundinacea herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Eleocharis palustris herbaceous vegetation	G5	S5
Scirpus acutus herbaceous vegetation	G5	S5
Typha latifolia herbaceous vegetation	G5	S5

50 Squeezer Meadows

LOCATION
Squeezer Meadows is located in the Swan Valley of northwest Montana, in the Squeezer Creek drainage.

RICHNESS
Squeezer Meadow is a series of glacially-formed potholes located on the Swan Valley floor. The depressions are topographically closed, with no inlets or outlets. The water source for these potholes is not clear - no springs or seepage areas were observed during my site visit. Sedge meadows dominate all the potholes but one, which hosts an aquatic community. The perimeter of the sedge meadows is dominated by one or more coarse sedge communities like inflated sedge (Carex vesicaria), beaked sedge (Carex utriculata), or awned sedge (Carex atherodes). This perimeter is often at a slightly lower elevation than the adjacent wetland communities, and often has standing water. The sedge meadows are dominated by slender sedge communities, which form a large expanse in each depression. The following species are fairly constant associates: marsh cinquefoil (Comarum palustre), water smartweed (Polygonum amphibium), and bog buckbean (Menyanthes trifoliata). One of the slender sedge communities has a quaking substrate in places, as does a mud sedge (Carex limosa) community that occurs as a small patch in a depression in the middle of one of the slender sedge meadows. One of the meadows has a hardstem bulrush (Scirpus acutus) community in a slight depression surrounded by slender sedge community. This bulrush community has a large sedge component in the understory; it's possible that as the bulrush community fills in with peat, sedges are colonizing the peat and will eventually dominate the ground layer and possibly replace the bulrush community. On a slight rise in a couple of depressions, green sedge (Carex oederi) is the dominant species, with high coverage of slender sedge and a few scattered spruce; this community type hasn't been described in Montana. Small patches of cattail (Typha latifolia), water horsetail (Equisetum fluviatile), and bog birch/beaked sedge (Betula glandulosa/Carex utriculata) communities occur in the meadows as well. The lone aquatic community is dominated by water smartweed on the water surface, while the pond bottom is covered with the algae Chara sp. The uplands are dominated by western larch (Larix occidentalis) and lodgepole pine (Pinus contorta), while aspen (Populus tremuloides), black cottonwood (Populus balsamifera ssp. trichocarpa), streambank willow (Alnus incana), Bebb's willow (Salix bebbiana), and alder-leaved buckthorn (Rhamnus alnifolia) are common on the edge of the wetlands.

KEY ENVIRONMENTAL FACTORS
Hydrology drives the structure and composition of the wetland communities at these sites.

RARITY
One rare plant, podgrass (Scheuchzeria palustris), occurs on a floating mat in one of the depressions. This circumboreal species occurs in both poor and rich fens (Chadde et al. 1988) in Montana. The mud sedge community where podgrass occurs is also rare in Montana.

OTHER VALUES
A wallow of some kind was observed in one of the meadows. Because these meadows are about 2 miles from an open road, it's likely that they and the surrounding uplands provide good habitat for some wildlife.

CONDITION
No human landuses of the wetlands were evident during my site visit. Generally, the meadows were dominated by native species with no exotics. The only exception is the occurrence of reed canarygrass in two of the meadows. One meadow has just a trace of reed canarygrass, while the other meadow has heavy reed canarygrass coverage under a fringe of alders near the meadow's edge. This invasive grass poses a threat to the meadows where it occurs because it can spread and form dense monocultures which are difficult to control (Apfelbaum and Sams 1987).

UPLANDS
Logging has occurred up to the edge of a few of the depressions, with more logging and road building in the surrounding uplands.

INFORMATION NEEDS
More information on the water source for the potholes is needed.

MANAGEMENT NEEDS
Any future timber harvest around the depressions should employ streamside management zone buffers. Monitoring of the reed canarygrass populations is needed to determine if the grass is spreading, and how fast.

ELEMENT OCCURRENCE INFORMATION

Carex lasiocarpa herbaceous vegetation	G5	S5
Carex limosa herbaceous vegetation	G3	S3
Carex rostrata herbaceous vegetation	G5	S5
Carex atherodes herbaceous vegetation	G5	S5
Carex vesicaria herbaceous vegetation	G5	S5
Scheuchzeria palustris	G5	S2

51 Upper West Fork Lazy Creek

LOCATION

This site is at the headwaters of West Fork Lazy Creek in the Stillwater valley in northwestern Montana.

RICHNESS

Located in the Rocky Mountain Trench, these three fens form the headwaters of West Fork Lazy Creek. They're formed in glacial potholes with some evidence of old beaver activity. The water source for the fens is most likely groundwater, but its origin is unclear. The largest fen is dominated by a slender sedge (Carex lasiocarpa) community, which had a peat depth of 50cm where a soil core was taken. A beaked sedge (Carex utriculata) lagg or "moat" surrounds the former community. Around the outer edge of the fen in the drawdown zone is a bluejoint reedgrass (Calamagrostis canadensis) community, which in spots has been replaced by a redtop (Agrostis stolonifera) community, perhaps as a result of some past disturbance. One small pool in the fen has a water horsetail (Equisetum fluviatile) community in the mud flats surrounding the pool. While this fen doesn't have an inlet, it does have an outlet, from which water flows down to the second fen. This pothole is dominated by beaked sedge community, and has scattered alder (Alnus sp.) growing around the margins. The third fen doesn't have an inlet or outlet and is dominated primarily by a beaked sedge community, although there are small patches with high cover of Sartwell's sedge (Carex sartwellii) and slender sedge. Moss completely covers the ground layer, and a soil core revealed a peat depth of 160cm. The uplands in the area are grand fir/beadlily (Abies grandis/Clintonia uniflora) forest. potholes, with some evidence of old beaver activity. The water source is most likely groundwater, but its origin is unclear. Upland is abies grandis/clintonia uniflora forest.

KEY ENVIRONMENTAL FACTORS

The geomorphology, hydrology, and past beaver activity have interacted to structure the plant communities in these fens.

RARITY

This site has a population of adder's tongue, a rare plant in Montana. It occurs on a small, mossy mound, which was possibly a muskrat or beaver lodge at one time.

OTHER VALUES

CONDITION

There are no evident current landuses at this site. Kentucky bluegrass (Poa pratensis), Canada thistle (Cirsium arvense), reed canarygrass (Phalaris arundinacea) are spottily distributed in the patches of redtop that occur in the margins of the largest fen in the bluejoint reedgrass community. These exotics have significantly degraded this community.

UPLANDS

Extensive timber harvest has occurred in the uplands surrounding this site. Although a buffer of uncut trees was left around the wetlands, it is not clear what effect the logging will have on the hydrology of the site.

INFORMATION NEEDS

Hydrogeologic study is needed for this general area to determine the water source for this and other nearby wetlands. A thorough floristic inventory conducted early in the summer is also needed.

MANAGEMENT NEEDS

ELEMENT OCCURRENCE INFORMATION

Picea sp/equisetum arvense forest	G4	S3
Calamagrostis canadensis herbaceous vegetation	G4Q	S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5
Ophioglossum pusillum	G5	S2

52 Van Lake

LOCATION
Van Lake is located in the Swan Valley of northwest Montana, about 15 miles south of the town of Swan Lake.

RICHNESS
Van Lake is a glacially formed pothole lake fed by an intermittent stream, but with no surface water outlet at present water levels. The surrounding upland forest is dominated by western red cedar/beadlily (Thuja plicata/Clintonia uniflora) and spruce/beadlily (Picea sp./Clintonia uniflora) communities. A thin fringe of either beaked sedge (Carex utriculata) community or slender sedge (Carex lasiocarpa) community occurs in patches around the edge of Van Lake. These seasonally flooded shallow marsh communities both have a fairly large Cusick's sedge (Carex cusickii) component. There is also a large slender sedge meadow in outstanding condition that has developed around the intermittent inlet creek. The open water of Van Lake is dominated by an extensive algal aquatic bed community, with Chara sp. the dominant type of algae. There are heavy marl, or calcium carbonate, deposits on the lake bottom. Chara sp. sequesters calcium carbonate, and over time large deposits accumulate on the bottom as the algae die. There are also beds of broad leaved pondweed (Potamogeton natans) and beds of large-leaved pondweed (Potamogeton amplifolius), which occurs in deeper water. The pH of the water in Van Lake is 7.5.

KEY ENVIRONMENTAL FACTORS
The hydrology of the lake is the key environmental factor.

RARITY
Although there are no rare plant occurrences at Van Lake, there is a very small occurrence of a spruce/red-osier dogwood (Picea sp./Cornus sericea) community in one corner of the lake. This forested wetland community is uncommon in Montana.

OTHER VALUES
Crayfish were observed in the extensive Chara sp. beds. Chara sp. serves important functions in aquatic communities. It can be quite important in maintaining water quality and keeping water bodies from becoming eutrophic. Zooplankton use Chara sp. beds as cover, and they feed on phytoplankton from this cover, thus reducing the water body's algal content and improving water clarity (Scheffer 1998).

CONDITION
At present, fishing is the major use of this lake. There is a little bit of trash on the lake bottom, and there has been some disturbance to the aquatic bed community where people put their boats in the water. There is a small amount of Canada thistle (Cirsium arvense) in the slender sedge community, but at this point it does not pose a threat to the community integrity.

UPLANDS
There are a number of dispersed campsites around Van Lake that get heavy use during the summer. Garbage and human waste disposal are recurring problems, and there are several large openings in the riparian vegetation that have developed on the lakeshore from recreational use. These threats are not very large at present, but since this lake does have a road to it and is reasonably accessible, use can be expected to increase. In addition, there is recent timber harvest nearby, although substantial buffers were left around the lake.

INFORMATION NEEDS
Monitoring of recreational impacts on lakeshore vegetation is needed, as is a study to better understand the lake's hydrology and determine what the primary paths are for water to leave the lake.

MANAGEMENT NEEDS
Some water bars are needed on the badly eroding road leading down to the lakeshore to reduce the amount of sediment dumping into the lake.

ELEMENT OCCURRENCE INFORMATION

Gavia immer	G5	S1S2B,
Picea sp/cornus stolonifera forest	G3	S3S4
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Equisetum fluviatile herbaceous vegetation	G5	S5

53 Wolf Creek Slough

LOCATION

Wolf Creek Slough occurs along the Swan River several miles east of Bigfork, Montana. NOTE: This is a private wetland, and landowner permission is needed to access this site.

RICHNESS

Wolf Creek Slough is diverse array of emergent, aquatic, and forested wetland communities located on the floodplain of the Swan River. The backwater slough and old oxbow at this site host diverse riverine marsh communities, and the entrance to the slough and the river bed have well-developed aquatic plant communities. On the highest terrace at the site is a cottonwood dominated forest. This forest, which represents the black cottonwood/snowberry (Populus balamifera ssp. trichocarpa/Symphoricarpos albus) plant association, has been impacted by grazing. The overstory is dominated by black cottonwood, and ponderosa pine (Pinus ponderosa), aspen (Populus tremuloides), and spruce (Picea sp.) also occur here. The slight incline which separates the forested terrace from the marsh community has three characteristic species: sneezeweed (Helenium autumnale), green sedge (Carex oederi), and physostegia (Physostegia parviflora); this community is temporarily flooded and influenced by grazing, too. The parts of the slough without year-round surface water connections to the Swan River are dominated by a slender sedge (Carex lasiocarpa) meadow being invaded by reed canarygrass (Phalaris arundinacea). The rest of the slough is dominated by beaked sedge (Carex utriculata) community in shallower areas and by hardstem bulrush (Scirpus acutus) and common spikerush (Eleocharis palustris) communities in deeper areas. This is an especially diverse occurrence of the beaked sedge community, with associated species being common spikerush, a rush species (Juncus sp.), green sedge, reed canarygrass, seaside arrowgrass (Triglochin maritimum), water plantain (Alisma plantago-aquatica), water parsnip (Sium suave), grass-leaved pondweed (Potamogeton gramineus), small burweed (Sparganium minimum), and creeping buttercup (Ranunculus flammula). The oxbow, which is about 100m from the river, is supports an inflated sedge (Carex vesicaria) community. There is also a temporarily flooded community that occurs on a terrace below the riparian forest in one area that is dominated by a sedge (probably misidentified as Buxbaum's sedge [Carex buxbaumii]) and tufted hairgrass (Deschampsia cespitosa); this community has few exotics and supports a well-developed population of tufted hairgrass. Finally, the aquatic community in the slough entrance is composed of water lily (Nuphar sp.), water horsetail (Equisetum fluviatile), grass-leaved pondweed, eel-grass pondweed (Potamogeton zosterformis), fennel-leaved pondweed (Potamogeton zosterformis), common bladderwort (Utricularia vulgaris), simplestem bur-reed (Sparganium emersum), and Chara sp. The pH of the slough water was 7.2, and the conductivity was 290 uS/cm.

KEY ENVIRONMENTAL FACTORS

The hydrology of the site has driven the formation of the plant communities. This dynamic lower riverine system has created the terraces, oxbow, and backslough, and all of the communities depend on the annual fluctuations of the river. Flooding and deposition of fines creates habitat for cottonwood recruitment, the high water table allows these riparian forests to persist (Hansen et al. 1995).

RARITY

There are no rare plant communities or species at this site.

OTHER VALUES

Wolf Creek Slough represents a small occurrence of riparian cottonwood forest that is relatively intact relative to nearby cottonwood forest that's been converted to agricultural use or fragmented by home building. The wetland still functions to temporarily store surface water during floods, and there is a lot of microtopographic complexity that functions to remove particulates and dissipate energy when overbank flow occurs. From the distribution of wrack in the shrubs and trees, it's clear that flooding still occurs; there are no levees, and the power generating dam in Bigfork doesn't back up water this far upstream. The connection between the river and the floodplain is still strong, as evidenced by the emergent vegetation present in the old oxbow, which is about 100m from the river. This wetland falls into the HGM subclass bounded alluvial floodplain (Hauer 1998).

CONDITION

The cottonwood/snowberry forest at the site is currently grazed by horses. Impacts are starting to be seen, such as hummocking in some of the shallow marsh community, and dominance by increasers such as black hawthorne (Crataegus douglasii), snowberry, and Bebb's willow (Salix bebbiana). The ponderosa pine plantation is not presently grazed. There is also a pasture used for hay production that was probably a cottonwood community at one time. Pasture grasses dominate the understory in the ponderosa pine plantation, which is a highly altered community. In addition, reed canarygrass dominates part of the backslough, and there is some orange hawkweed (Hieracium aurantiacum) in the

cottonwood/snowberry forest. Bullheads, a type of catfish, were seen in the slough, and pike are in this part of the Swan River as well.

UPLANDS

The surrounding landscape is dominated by agricultural uses such as farming. A substantial amount of timber harvest has occurred in the uplands of the Swan River drainage.

INFORMATION NEEDS

A more detailed landuse history would be useful to gain a better understanding of the existing condition of this site.

MANAGEMENT NEEDS

Monitoring of grazing impacts in the cottonwood/snowberry community is needed, as are some possible changes in grazing management. Such changes now could prevent the spread and increase of noxious weeds. Occasional monitoring of the slough vegetation is also needed because purple loosestrife (Lythrum salicaria) has been found along the Swan River less than a mile away. This agressive exotic could have a very detrimental effect to the slough's plant communities if it gets established.

ELEMENT OCCURRENCE INFORMATION

Haliaeetus leucocephalus	G4	S3B,S3
Phalaris arundinacea herbaceous vegetation	G5	S5
Carex buxbaumii herbaceous vegetation	G3	S3
Carex lasiocarpa herbaceous vegetation	G5	S5
Carex rostrata herbaceous vegetation	G5	S5
Eleocharis palustris herbaceous vegetation	G5	S5
Carex vesicaria herbaceous vegetation	G5	S5
Populus balsamifera ssp trichocarpa/symphoricarpos albus for	G4	S4

54 Woods Lake

LOCATION
Woods Lake is at the foot of the Whitefish Range in northwest Montana, about 7 miles northwest of Olney, Montana.

RICHNESS
Woods Lake is a shallow lake in a glacially formed trough in the Rocky Mountain Trench. Intense glacial scouring removed much of the softer bedrock to form the depression, leaving harder bedrock outcrops in and adjacent to the lake. Two inlet creeks enter the lake, but there is no surface outlet. It's possible that some water seeps out through cracks in the bedrock and emerges from a spring 1/4mile downhill from the lake. One of the inlet creeks has perennial flow, and around it's inlet are an inflated sedge (Carex vesicaria) and common spikerush (Eleocharis palustris) community. Both are seasonally flooded and occur on mineral soils. An old willow-covered beaver dam crosses the southeast end of the lake. On one side of the dam is a willow stand dominated by Drummond's willow (Salix drummondiana) in the shrub layer and inflated sedge in the herbaceous layer. This putative plant association, the Drummond's willow/inflated sedge shrubland, hasn't been described for Montana per se; Hansen et al. (1995) place this community within the Drummond's willow/beaked sedge habitat type for management purposes. On the other side of the beaver dam is a shallow lake, with water crowfoot (Ranunculus aquatilis), burreed (Sparganium sp.), and the algae Chara sp. A cedar/beadlily (Thuja plicata/Clintonia uniflora) forest grows around the lake, in the uplands and around the inlet creeks.

KEY ENVIRONMENTAL FACTORS
The hydrology of the site, geomorphology of the site, and beaver activity have interacted to structure plant communities at the site. There is an obvious lakeshore well above the water level observed at the time of my site visit. The periodicity of the water level fluctuation is not known.

RARITY
Two different rare moonworts occur in the cedar forest around the lake, Mingan Island moonwort (Botrychium minganense) and mountain moonwort (Botrychium montanum).

OTHER VALUES
This wetland could play a large role in groundwater recharge, although more study is needed to confirm this. No conductivity measurements were taken at this site.

CONDITION
Hunting is the only probable landuse occurring at the site. Some small patches of Canada thistle (Cirsium arvense) are growing in old slash piles on the lakeshore at the north end of the lake. They haven't spread into the cedar forest, and pose little threat to the integrity of the site.

UPLANDS
Timber harvest in the uplands around this site have occurred in the past and will continue. There has been no recent harvest adjacent to Woods Lake, judging by some of old growth cedar that occur here.

INFORMATION NEEDS
More information on the water flow out of Woods Lake is needed to determine whether it plays a role in supplying the spring below the lake.

MANAGEMENT NEEDS
Streamside management zone buffers should be employed if timber harvest occurs next to Woods Lake.

ELEMENT OCCURRENCE INFORMATION

Thuja plicata/clintonia uniflora pa	G5	S4
Eleocharis palustris herbaceous vegetation	G5	S5
Carex vesicaria herbaceous vegetation	G5	S5

Appendix F – Carabid Beetle Fauna Associated With Wetlands Of The Flathead River Watershed Of Northwest Montana

CARABID BEETLE FAUNA *(Coleoptera, Carabidae)* ASSOCIATED WITH WETLANDS OF THE FLATHEAD RIVER WATERSHED OF NORTHWEST MONTANA

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TABLE OF CONTENTS

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INTRODUCTION

Project Overview

This project is part of a multi-disciplinary survey designed to inventory, and prioritize for conservation and mitigation applications, wetlands in the Flathead River watershed of northwest Montana. The project is being coordinated by The Nature Conservancy - Montana Natural Heritage Program. The objective of this project was to inventory carabid beetle faunulas of five wetlands using rapid bioassessment techniques limited to hand-collecting. Although the results of only five wetland carabid surveys are presented here (03-12 August, 1998), I sampled carabids at more than 60 wetland sites in northwest Montana from 31 July - 19 August, 1998. Whereas these more diverse samples provide a more complete assessment of the wetland carabid fauna of northwest Montana, the carabid species and their relative abundance in samples from all sites have yet to be determined. I anticipate publishing the results of the more inclusive survey at a later date and after final determination of all unidentified species. The information synthesized in this report will hopefully stimulate additional research on carabid beetles as biological indicators of wetland ecology in western Montana.

Pacific Northwest Carabid Beetles

Carabid beetles are primarily generalist predators (and scavengers) of other soil invertebrate species. Seed (including conifers), snail, and millipede specialists have also been described, as well as some large-bodied forest species known to prey on juvenile salamanders. Within soil food webs carabids are the ecological equivalent of lions, tigers and bears. Carabids typically produce one generation each year, although individuals of large-bodied species often live for multiple years. In the mild climates of the Pacific Northwest some adult carabids are active in the winter, but spring and fall peaks in soil-surface activity by adults in the lowlands are typical. Because of their abundance and predaceous food habits, carabids are important biological control agents of potential pests in many ecosystems (e.g. *Calasoma* spp.) Their role in other ecosystem services, such as organic matter decomposition, nutrient cycling, and the structuring of soil invertebrate communities is undoubtedly significant (albeit largely undocumented).

The beetle fauna of the Pacific Northwest (and presumably its insect fauna in general) shares significant similarities with the southeast United States and Japan-Manchuria region. These faunal similarities probably have their origin in a common, widespread, ancient (early Tertiary?) Holarctic fauna that subsequently migrated south due to major climate change and become isolated in these three widely-separated regions. Yet there are some obvious peculiarities in the general composition of the Northwest beetle fauna; most notable is the poor representation of major, primarily sun-loving, leaf-feeding taxa. In contrast, families favoring cool and moist climates are well-represented (e.g. Carabidae and Staphylinidae). The selective action of dense conifer forests and a damp, cool climate has evidently been the major filter excluding many sun-loving herbivores. Biogeographers refer to the Pacific Northwest insect fauna as *Vancouveran*, a biogeographic realm that extends along the coast from the Aleutian Archipelago south into central California and easterly along the Rocky Mtns. and Sierra Nevada. Paleobotanical evidence suggests the Vancouveran biota is very old (Pliocene?), and once occupied a much larger and continuous region. There are a number of interesting relicts in the Vancouveran carabid beetle fauna - taxa with an ancient origin that have strayed far from their original home. Among the carabids these include *Omus* and *Promecognathus* with closest relatives in South Africa, and *Metrius* with its relatives in South America and Australia. *Callisthenes* species (= *Calasoma*) are found only in the montane regions of western North America and Eurasia. As discussed in the previous section, many of these spectacular range disjunctions probably have their origin on the Paleozoic supercontinent of Pangea, followed by 250 million years of plate-tectonic movement of the continents to their current locations. These carabid relics are primarily large-bodied, flightless, forest beetles with relatively poor dispersal power. This suite of characters is similar to those seen in relic ant taxa.

The other major biogeographic realm in the Pacific Northwest is the *Sonoran*, an arid region with hot summers. Many classic Sonoran taxa have distant affinities with Neotropical or southern South America groups, however, the Sonoran biota is also very ancient (early Tertiary?) and significantly distinct.

Bousquet et al. (1991) recently published a checklist of the beetles of Canada and Alaska (*7,447 species*). Given the similarity in geography, climate, and vegetation of British Columbia (BC) and the U.S. Pacific Northwest [Washington (WA), Idaho (ID) and Oregon (OR)], the BC beetle fauna can be used as a regional model. British Columbia has the second highest beetle diversity for a Canadian province (*3,628 species*). British Columbian beetles are primarily aggregated in the following families: Staphylinidae (rove-beetles; *581 species*), Carabidae (ground-beetles; *463 species*), and Curculionidae (weevils; *261 species*). Carabids, which make up the bulk of the beetle biomass of northern ecosystems because of their abundance and large body size, account for more than 13% of the beetle species of British Columbia. In Sweden, which is a little more northern and only about half the size of BC, approximately 9% of the beetle fauna (ca. *4,400 spp.)* are carabids (*356* spp.). In Oregon's H.J. Andrews Forest, carabids account for 12% of the beetle species. Statistical analysis of the species distributions of different beetle families across Canadian provinces suggests there is significantly more *species turnover* between regions in phytophagous beetle families than in the Carabidae (primarily predators/scavengers), and significantly less in the aquatic beetle familes (Bergdahl *unpubl.*).

Carabid beetle species richness is correlated ($n = 69$, $r^2 = 0.35$, $p < 0.001$) with geographic area in North America. Regional (state) carabid beetle species richness is correlated ($n = 48$, $r^2 = 0.36$, $p < 0.001$) with vascular plant species richness, as is the number of endemic plant species and endemic carabid species ($n = 49$, $r^2 = 0.79$, $p < 0.001$). It is interesting to note that vascular plant species richness of the 48 contiguous United States is not much better of a predictor of butterfly species richness than it is of carabid beetle richness (plant species richness vs. butterfly: $n = 48$, $r^2 = 0.54$, $p < 0.001$). Interestingly, carabid beetle vs. plant richness is more strongly correlated than carabid vs. butterfly richness ($n = 48$, $r^2 = 0.17$, $p < 0.01$).

I have recently completed an account of all known carabid beetle species in the Pacific Northwest (BC, WA, ID & OR), a fauna which totals 698 species and subspecies. The carabid species richness of the individual geographic units are as follows: BC (486), WA (447), ID (321) and OR (478). (California has 671 carabid beetle species!) Introduced carabids account for 4% of the PNW taxa. Near 53% of the fauna is strictly associated with wetlands, and ca. 30% are forest specialists. The average adult body size of the 698 Pacific Northwest carabid species is ~ 8.4 mm (range ~ 1.6 mm - 28 mm).

The rarefaction (species accumulation) curve for Pacific Northwest carabids suggests that relatively few carabid species have yet to be discovered. Four new species have been described over the last ten years, and three undescribed species are known. However, more systematic exploration of remote mountain ranges in the Pacific Northwest may yield a surprising number of undiscovered invertebrate species with small geographic ranges. For instance, using a comprehensive U.S. National Park Service analysis of endemic species from the Olympic Mountains, and the assumption that the number of endemics is roughly proportional to the relative size of taxa from the H.J. Andrews forest, I predicted the number of endemic invertebrate species in the Olympics should be ~150 species, an order-of-magnitude more than the 11 species presently known. Furthermore, a number of factors suggest that endemic invertebrates should be over-represent within regional biotas when compared to plants and vertebrates. Some of these undiscovered endemic species may be carabids. Similar gaps in our knowledge undoubtedly occur throughout the Pacific Northwest.

With regard to which genera the undiscovered carabid species in the region may belong, Bousquet & LaRochelle (1993) suggest: *"... the current number of* [carabid] *species and subspecies occurring in America north of Mexico certainly is much greater than* [2,635 species]. *Obviously, there are numerous undescribed carabid species and subspecies in the area, particularly in the western mountains and the southern regions. Most of these taxa probably belong to the tribes Bembidiini and Trechini."* They estimate the number of species and subspecies in North America north of Mexico to be close to 3,100 taxa, i.e. there are about 500 taxa yet to be accounted for in the U.S. and Canada. Bembidiini and Trechini have small-

bodied adults, are typically wetland/riparian habitat specialists, and are found from sea level to the alpine elevations.

Eighty-nine (89) carabid species are endemic to the Pacific Northwest region (33% of the fauna). Six species are narrowly restricted to BC, 11 to WA, 6 to ID, and 25 to OR. California has 225 endemic carabids, also about 1/3rd of its fauna. I have determined that the geographic range size of North America carabid beetle species on a continental-scale is significantly correlated with the extent of regional distribution (i.e. rarity is spatially concordant). Some Pacific Northwest carabid endemics may currently be at risk of extinction due to rapid change in habitat or climate. Four Pacific Northwest carabid species are on the 1994 U.S. Fish & Wildlife Service's list of potentially endangered or threatened species: *Nebria gebleri siskiyouensis* (CA, OR), *Cicindela arenicola* (ID), *Scaphinotus behrensi* (CA, OR), *Pterostichus rothi* (OR) and *Agonum belleri* (BC, WA, OR). Other lowland carabids should be added to the list including *Cicindela columbica* (WA, ID, OR), *Scaphinotus manni* (WA, OR) and *Stomis termitiformis* (OR). These *Nebria* and *Cicindela* are riparian species, *Agonum belleri* is an acute sphagnum specialist, and the others are forest carabids, some of which are probably closely associated with the margin of small streams.

The Carabid Fauna of Montana

TABLES MTTRIBES and MTGENERA provide a summary of my assessment of the tribes and genera of the 354 carabid beetles species currently known from Montana (Bousquet & LaRochelle 1993; Bergdahl *unpubl.*).

An overview of the carabid fauna of Montana is as follows:

No. of MT tribes = 26
No. of MT genera = 65
No. MT species = 354
No. holarctic MT species = 32
No. introduced MT species = 6
Average year MT species was first described in entomology literature = 1858
Average number of 65 states and provinces MT species occur in = 23
No. species found in both MT & ID = 238
No. species found in both MT & WY = 219
No. species found in both MT & ND = 160
No. species found in both MT & SK = 230
No. species found in both MT & AB = 287
No. species found in both MT & BC = 284

There are no known carabid species *narrowly endemic* to Montana. However, in comparison to other Pacific Northwest states and provinces, this is anomalous, suggesting that a few carabids endemic to Montana have yet to be discovered. The number of endemics in regions near Montana are:
BC = 7, AB = 2, WA = 11, ID = 7, OR = 25, UT = 15, WY = 2, NV = 6, CA = 226, and PNW (BC, WA, ID & OR) = 88.

Six species currently known from Montana are found in only 2 or 3 states or provinces, as indicated below:

Cicindela (Cylindera) terricola cyanella	MT, NE
Pterostichus (Hypherpes) beyeri	MT, ID
Pterostichus (Hypherpes) idahoae	MT, ID
Scaphinotus merkelii	MT, ID, BC
Bembidion rosslandicum	MT, BC, AB
Pterostichus (Hypherpes) restrictus	MT, CO, WY

Cicindela terricola is a tiger beetle, and a habitat specialist on saline ditches and flats of eMT. The species is uncommon. Soil conditions undoubtedly significantly affect the distribution of the beetle. All of these *Pterostichus (Hypherpes)* are large-bodied, flightless, forest species. A few of the flightless, forest-stream

Pterostichus (Pseudoferonina) species presently known as narrowly endemic to Idaho will undoubtedly eventually be collected along the crest of the Bitterroot Mountains in Montana. *Scaphinotus merkelli* is a good candidate for threatened & endangered status since it is known from only a very small area in nID, seBC, and nwMT, and few sites and specimens. The species is a flightless, snail predator found only along small, montane-forest streams. *Bembidion rosslandicum* is a subalpine/alpine species in the Rocky Mountains ca. the USA-Canada border.

Two hundred and thrity two (232) carabid beetle species (TABLE NWMTLIST) are known or suspected as resident in northwest Montana (Bousquet & LaRochelle 1993, LaBonte & Johnson 1989, Edwards 1975, Russell 1968). Based on trends of habitat affinity of carabids in the Pacific Northwest (BC, WA, ID, OR), near 55% of these species are probably wetland/riparian habitat specialists.

Invertebrates as Biological Indicators

Terrestrial invertebrates are valuable indicators of biodiversity pattern and ecosystem monitoring tools for many reasons including: 1) their high species richness and biomass, and 2) wide range of body sizes, habitat and food requirements, seasonal activity, reproductive biology and population growth rates, powers of dispersal, and geographic distributions. Low-cost, passive, survey methods can reliably sample large numbers of individuals over short periods of time with minimal manpower. Because of the diversity of invertebrate species and their tendency to exhibit large population sizes, statistical rigor and robust conclusions are feasible for experimental and comparative studies.

Invertebrates have been shown to respond to many environmental impacts, including habitat fragmentation and population isolation, habitat modification and disturbance, climate change, and chemical pollution. Many invertebrates species have the potential for rapid response to fluctuating environmental conditions because of their high population growth rates and short generation times. Invertebrate species are often so faithful to specific climates and habitats that their fossils have been used to reconstruct climate history. Many published reports using carabids to reconstructed paleoenvironments can be found in the paleoecology literature. Given the high number of regional endemics and habitat specialists, many Northwest invertebrate species will undoubtedly prove to be very accurate indicators of habitat conditions (including local and regional biodiversity hotspots) and management impacts.

Not all invertebrate taxa are equally effective as indicators of biodiversity patterns or environmental impacts. Ideally, indicator taxa should exhibit the following characteristics: 1) high species diversity, endemism and habitat fidelity, 2) wide geographic distribution, 3) taxonomically and ecologically well-known, 4) easy to obtain large random samples of species, and 5) large body size for easy identification. Also, indicator taxa should be ecologically diverse (encompass a broad range of ecological requirements and life-histories, and exhibit varying sensitivity to environmental perturbations), in addition to being functionally important in ecosystem processes, and having relatively sedentary habits or poor powers of dispersal. Carabids meet these qualifications much better than many other terrestrial invertebrate taxa. In northern Europe, where the biology of carabid species is much better known, carabids have been used extensively to monitor the biological integrity of forest and heathland. In North America this potential has barely been tapped. Carabid faunas are analyzed in a recent article focusing on multivariate methods to determine indicator species and characteristic species assemblages in biological assessment research (Dufrene & Legendre 1997).

METHODS

Study Sites and Sample Dates

The carabid beetles faunulas at five wetlands in the Flathead River Basin were sampled (see TABLE SITES). These wetlands were selected by staff at The Nature Conservancy - Montana Natural Heritage Program, and are a small subset of the many wetlands in TNC/MTNHP-Flathead wetland project. All study sites included a mosaic of habitat types ranging from forest edge to open water. In most cases, I attempted to sample all major habitat types suitable for carabids. Sphagnum communities occur at the Swan River, Ambrose Fen, and Bowen Creek sites. Since a number of rare or endemic carabids are known from sphagnum bogs in the Pacific Northwest, collecting on sphagnum mats received special attention. An overview of the bogs of the region, including some color pictures, can be found in Chadde et al. (1998), however, none of the wetlands in this study are described in their report. More detailed descriptions of the wetlands in this study will be provided in future reports by TNC/MTNHP Flathead wetland project.

The dates of the samples span 03 -12 August, 1998. The weather during this period of time was warm and sunny, and provided excellent conditions for hand-collecting carabids. The weather on both 01 and 02 August was warm and cloudy with light rain. Due to an abundance of precipitation in June in northwest Montana, wetlands in the region probably had water-table elevations that were higher than average. When wetland basins are full there is in general less periodically-submerged habitat available for sampling non-aquatic wetland insects such as carabids, which are well-adapted to exploit these ephemeral micro-habitats. It is unclear how wetter than normal conditions may have effected the diversity or abundance of the samples.

Collection Methods

All carabids in the samples were collected by hand-collection technique. No pitfall traps were used due to the very limited number of funds available to the project. All carabids that were seen were taken if they could be caught regardless of the fact that the species may have already been taken in the sample. That is, the samples represent an estimate of the relative abundance of the carabid beetle species actually seen. Although hand-collecting at night can yield large carabid samples and help find rare species, no night collecting was conducted at these five wetlands. I relied primarily on flooding and trampling the ground to scare carabids from hiding places. A small, three-pronged garden fork was used to move litter. When available, decaying logs and branches were dissected and examined for hiding beetles. Small bodied species were quickly aspirated into a vial to reduce the possibility of escape. All specimens were immediately pickled in small vials in 70% ethanol + 30% kitchen vinegar. Labels were added to each vial immediately after the sample was taken.

Assessment of Samples

All samples were assessed in my lab in Seattle. Specimens were quickly washed in a tea strainer using tap water, dried on paper, pointed (glued to a small paper point using water-soluble Elmers glue), and then the point was pinned with an insect pin.

All specimens were examined under a dissecting scope and sorted into "morphospecies". Most of these groups were then identified to species using Lindroth (1961-1969) and reference to my large Pacific Northwest synoptic collection. Twelve of the fifteen (15) *Bembidion* species have yet to be identified to species. The genus *Bembidion* is exceptionally rich in species (e.g. the largest carabid genus in Montana), the species have small adult body size, and are often difficult to key to species without access to a good synoptic collection of the region and previous experience. My preliminary determinations of these species will need to be verified by another carabidologist before the *Bembidion* of these samples can be fully assessed.

RESULTS

Seventeen samples were taken - locality describtions are outlined in TABLE SITES. Forty-four (44) species among 259 specimens were represented in the samples. A brief overview of these species is provided in TABLE SPECIES. The species and their relative abundance within and between the 17 individual samples is presented in TABLE SAMPLES, in addition to notes on "hunting success" and rarefaction (FIGURE RAREFACTION) of the entire collection.

DISCUSSION

Very little has been published on the carabid beetles of Montana. Russell's (1968) unpublished University of Washington masters thesis focused on the faunal affinities of the Coleoptera of western Montana, and provides the first detailed list of carabids for the region. Edwards (1975) surveyed the carabid fauna of Glacier National Park from 1947-68, which includes parts of the Flathead River basin, but primarily at higher elevations than the sites described in this report. The number of carabids he reported from Glacier National Park includes 109 species and 28 genera, but as with Russell (1968), some of the taxa are no longer recognized as unique or resident in Montana (Bousquet & LaRochelle 1993). In a note on the first records of *Bethisa multipunctata* and *B. quadricollis* in Montana (Lake County), LaBonte & Johnson (1989) provide a list of wetland carabids associated with these species in their collections. Chadde et al. (1998) provide an appendix on the invertebrates associated with peatlands in the Rocky Mountains of Montana, Idaho, Washington and Wyoming, including beetles, but surprisingly no carabids are mentioned. The species reported here, combined with Russel (1968), Edwards (1975), LaBonte & Johnson (1989) and Bousquet & LaRochelle (1993), provides a provisional list of 232 carabid species known or suspect as resident in the Flathead River watershed (TABLE NWMTLIST). Ca. 55% of these species can be expected to be wetland/riparian habitat specialists.

In general, in comparison to wetlands that I have sampled in Washington, Idaho and Oregon, these Montana wetlands yielded rather small samples. These is especially true when they are compared to non-sphagnum wetlands west of the Cascade Mountains. Although sphagnum bogs and fens everywhere typically yield small carabid samples, the numerous non-sphagnum Flathead samples produced remarkably poor catches. One factor probably accounts for most of this variation: the longer and more intense winters of northwest Montana. Many of the "missing specimens" include species in the following genera: *Stenolophus*, *Bradycellus*, and *Bembidion.*

Of the 17 samples, Swan 1 Oxbow and Swan 2 Oxbow produced the greatest number of specimens/hr and high species/hr (TABLE SAMPLES). Sunday 2 was also high in this regard. The catch at the Swan River oxbox was undoubtedly influenced by proximity to riparian habitats associated with the active floodplain of Swan River, which was extremely close to the western end of the oxbow (ca. 100 meters). Floodplain habitats support the highest abundance and diversity of carabids in the Pacific Northwest. The Sunday Creek samples were typical for small mountains streams with forested shorelines, "riparian" habitats which also support an abundance of carabids, albeit a much less diverse fauna than habitats associated with large rivers.

Similarly, the sphagnum fen samples deserve comment - these samples typically yielded the fewest specimens-per-unit-effort, and low-to-moderate diversity. However, whereas capture rates may be low in sphagnum habitats, the species are typically unique bog/fen specialists. Carabid species associated with sphagnum habitats in the Flathead River watershed include: *Pterostichus patruelis, Agonum mutatum, Agonum gratiosum, Bembidion* sp. 3 and *Bembidion* sp. 4. The first three of these species are known to be associated with sphagnum throughout their range in North America. *Agonum mutatum* is a widespread, acute sphagnum specialist in western Washington, and maybe in Montana. *Agonum gratiosum*, however, is

not a sphagnum specialist in the Flathead region. *Agonum cupripenne* was the only carabid collected in a 1 hour sample from the Swan 4 Fen. This species is not closely associated with sphagnum. It was collected at Swan 4 Fen on bare, wet, gravel/sand substrate at the margin of a spring that originates at this fen. Although the sphagnum hummocks at this site were well-developed, the sphagnum mats at this site were not very extensive. The diversity of species in the Ambrose 2 Fen sample is remarkably high in comparison to the other fen samples. Ambrose Fen is a very-large, (raised?) forest-sphagnum bog supporting what appeared to be exceptionally high plant diversity. The single *Lebia moesta* in this sample most likely represents the rarest species across all 17 samples. *Lebia* are parasites of leaf-beetles, and *Lebia moesta* is a leaf-beetle mimic. I rarely encounter them in the Pacific Northwest, however, this may be an artifact of the difficulty of sampling canopy habitats.

This is the first time I have personally collected *Agonum errans* after many years of hunting carabids in the Pacific Northwest. The species is an exceptionally beautiful, shiny-metallic green color. It is day active, a strong flier, and difficult to catch. It appears to prefer, warm, sun-exposed shorelines with a dry, compacted clay/sand substrate, which was found just above the cattails at Cat Bay marsh. The species is widespread in North America, but according to Lindroth (1961-69) the species does not reach the Pacific coast. I collected the species at a number of other Flatead Basin wetlands in August 1998, indicating the species is not uncommon in the Flathead Lake area. These is the possibility that Flathead Lake, which is the largest natural lake in the U.S.A. west of the Missippissi River, contributes directly to the abundance of *Agonum errans* in the area due to the large extent of the Lake's open, sun-sxposed shorelines.

None of the identified species in the 17 samples appear to represent exceptional records except for *Trechus obtusus*, an introduced species from Europe and the only introducted carabid is the 17 samples. The Ambrose Fen specimens represent the first records of this carabid in Montana, and deserves a publication note in the entomological literature. The spread of this species across the Pacific Northwest has been rapid and is fairly well-documented (e.g. Kavanaugh & Erwin 1985). This small-bodied, wing-dimorphic species was first reported in Seattle, WA - Vancouver, BC area in 1933 (Hatch 1933), California in 1972 (Erwin 1972), and in eastern Washington and Central Idaho in 1985 (LaBonte 1989). The species is not a wetland specialist - is it often found in open-grassy areas. Some of the unidentified *Bembidion* species may also prove to be noteworthy records once final determinations are available.

Rarefaction (FIGURE RAREFACTION) of the catch data produces a curve that has not flattened, indicating that additional collecting will add a number of taxa to the list of 44 carabid species represented across the 259 specimens analyzed within these 17 samples.

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TABLE MTTRIBES: The 26 carabid beetle tribes *(Coleoptera: Carabidae)* in Montana (U.S.A.) and their species richness.

Data based on analysis by J.C. Bergdahl, 05 March, 1999.

TRIBE	NO. SPP.
Bembidiini	89
Brachinini	4
Broscini	2
Carabini	11
Chlaeniini	9
Cicindelini	26
Clivinini	13
Cychrini	4
Elaphrini	8
Gehringiini	1
Harpalini	42
Lebiini	21
Licinini	7
Loricerini	1
Nebriini	10
Notiophilini	4
Omophronini	4
Opisthiini	1
Patrobini	7
Platynini	32
Psydrini	2
Pterostichini	19
Scaritini	1
Trachypachini	2
Trechini	4
Zabrini	30
Total No. Species =	*354*

TABLE MTGENERA: The 65 carabid beetle genera *(Coleoptera: Carabidae)* in Montana (U.S.A.) and their species richness.

Data based on analysis by J.C. Bergdahl, 05 March, 1999.

TRIBE	GENUS	NO. SPP.
Bembidiini	***Bembidion***	81
Bembidiini	***Elaphropus***	3
Bembidiini	***Phrypeus***	1
Bembidiini	***Tachys***	1
Bembidiini	***Tachyta***	3
Brachinini	***Brachinus***	4
Broscini	***Miscodera***	1
Broscini	***Zacotus***	1
Carabini	***Calosoma***	7
Carabini	***Carabus***	4
Chlaeniini	***Chlaenius***	9
Cicindelini	***Cicindela***	26
Clivinini	***Dyschirius***	11
Clivinini	***Schizogenius***	2
Cychrini	***Cychrus***	1
Cychrini	***Scaphinotus***	3
Elaphrini	***Blethisa***	2
Elaphrini	***Elaphrus***	6
Gehringiini	***Gehringia***	1
Harpalini	***Anisodactylus***	6
Harpalini	***Bradycellus***	5
Harpalini	***Cratacanthus***	1
Harpalini	***Dicheirus***	1
Harpalini	***Discoderus***	1
Harpalini	***Euryderus***	1
Harpalini	***Harpalus***	19
Harpalini	***Piosoma***	1
Harpalini	***Stenolophus***	6
Harpalini	***Trichocellus***	1
Lebiini	***Apristus***	3
Lebiini	***Calleida***	1
Lebiini	***Coptodera***	1
Lebiini	***Cymindis***	3
Lebiini	***Dromius***	1
Lebiini	***Lebia***	9
Lebiini	***Microlestes***	1
Lebiini	***Syntomus***	1
Lebiini	***Tecnophilus***	1
Licinini	***Badister***	3
Licinini	***Dicaelus***	1
Licinini	***Diplocheila***	3
Loricerini	***Loricera***	1
Nebriini	***Leistus***	1
Nebriini	***Nebria***	9
Notiophilini	***Notiophilus***	4
Omophronini	***Omophron***	4

TRIBE	GENUS	NO. SPP.
Opisthiini	***Opisthius***	1
Patrobini	***Diplous***	2
Patrobini	***Patrobus***	4
Patrobini	***Platidiolus***	1
Platynini	***Agonum***	24
Platynini	***Anchomenus***	1
Platynini	***Calathus***	2
Platynini	***Oxypselaphus***	1
Platynini	***Platynus***	1
Platynini	***Sericoda***	3
Psydrini	***Nomius***	1
Psydrini	***Psydrus***	1
Pterostichini	***Poecilus***	3
Pterostichini	***Pterostichus***	15
Pterostichini	***Stereocerus***	1
Scaritini	***Pasimachus***	1
Trachypachini	***Trachypachus***	2
Trechini	***Trechus***	4
Zabrini	***Amara***	30
Total No. Species =		*354*

TABLE SITES *(mtsites.xls;10iii99)*:

Collection localities for seventeen 1998 Flathead (nw Montana) wetland carabid samples.

NO	NAME	LOCATION	ELEVATION	DATE	START TIME	END TIME	HRS
1	Swan 1 Oxbow	SWAN R. OXBOW, USFW Nat. Wildl. Res., Porcupine Ck. Rd., USFS Rd.10229, so. SWAN LAKE, LAKE Co., nw MT	3070 FASL	03viii	1530	1630	1
2	Swan 2 Oxbow	SWAN R. OXBOW, USFW Nat. Wildl. Res., Porcupine Ck. Rd., USFS Rd.10229, so. SWAN LAKE, LAKE Co., nw MT	3070 FASL	04viii	1900	1930	0.5
3	Swan 3 forest	SWAN R. FOREST ca. bridge, USFW Nat. Wildl. Res., Porcupine Ck. Rd., USFS Rd.10229, so. SWAN LAKE, LAKE Co., nw MT	3070 FASL	04viii	1930	2000	0.5
4	Swan 4 Fen	SWAN R. SPHAGNUM FEN, USFW Nat. Wildl. Res., Porcupine Ck. Rd., USFS Rd.10229, so. SWAN LAKE, LAKE Co., nw MT	3070 FASL	05viii	930	1030	1
5	Ambrose Fen 1	AMBROSE SPHAGNUM FEN, 7 miles N of BIGFORK, HWY 35, FLATHEAD Co., nw MT	2910 FASL	05viii	1300	1400	1
6	Ambrose Fen 2	AMBROSE SHPAGNUM FEN, 7 miles N of BIGFORK, HWY 35, FLATHEAD Co., nw MT	2910 FASL	05viii	1415	1515	1
7	Bowen 1 Fen	BOWEN CREEK SPHAGNUM FEN (Upper), USFS Rd. 60, OLNEY, LINCOLN Co., nw MT	4720 FASL	06viii	1200	1300	1
8	Bowen 2 Marsh	BOWEN CREEK SEDGE MARSH (Lower), USFS Rd. 60, OLNEY, LINCOLN Co., nw MT	4720 FASL	06viii	1330	1430	1
9	Bowen 3 F&M	BOWEN CREEK FEN & MARSH, USFS Rd. 60, OLNEY, LINCOLN Co., nw MT	4720 FASL	06viii	1530	1630	1
10	Sunday 1 FstSh	SUNDAY CREEK forested shoreline, USFS Rd. 315, STRYKER, FLATHEAD Co., nw MT	4310 FASL	07viii	1230	1330	1
11	Sunday 2 DpCh	SUNDAY CREEK wet side channels, USFS Rd. 315, STRYKER, FLATHEAD Co., nw MT	4310 FASL	07viii	1345	1415	0.5
12	Sunday 3 FstSh	SUNDAY CREEK forested shoreline, USFS Rd. 315, STRYKER, FLATHEAD Co., nw MT	4310 FASL	07viii	1430	1500	0.5
13	Sunday 4 DpCh	SUNDAY CREEK wet side channels, USFS Rd. 315, STRYKER, FLATHEAD Co., nw MT	4310 FASL	07viii	1600	1630	0.5
14	Sunday 5 FstSh	SUNDAY CREEK forested shoreline, USFS Rd. 315, STRYKER, FLATHEAD Co., nw MT	4310 FASL	07viii	1700	1730	0.5
15	Sunday 6 Marsh	SUNDAY CREEK sedge-willow-birch marsh, below USFS Rd. 3711, STRYKER, FLATHEAD Co., nw MT	4300 FASL	11viii	1245	1315	0.5
16	Cat 1 Marsh	CAT BAY CATTAIL MARSH - NW Arm, 7 mi. N of POLSON, LAKE Co., nw MT	2895 FASL	12viii	1000	1100	1
17	Cat 2 Marsh	CAT BAY CATTAIL MARSH - NE Arm, 7 mi. N of POLSON, LAKE Co., nw MT	2895 FASL	12viii	1300	1400	1
						Total	**13.5**

TABLE SPECIES *(species.xls;10iii99)*:

The 44 carabid species in the 17 wetland samples from Flathead River watershed, with notes on their biology and geographic distribution.

SpNo follows Bergdahl *(unpubl.)*. **Taxonomy** and **species names** follow Bousquet & LaRochelle (1993).

HL: 1 = holarctic species. **IT**: 1 = introduced species. *BS*= median adult body size (mm).

WINGS: (+) = all individuals long-winged, and probably capable of flight; (-) = all individual brachypterous; (+/-) = species dimorphic for wingedness.

HABITAT: xero = xerophilic; meso = mesophilic; hygr = hygrophilic; arbo = arboreal.

fqNA = number of 65 North American U.S. states and Canadian provinces species has been recorded in.

NO	SpNo	TRIBE	GENUS	SUBGENUS	SPECIES	SUBSPECIES	AUTHOR	YEAR	HL	IT	BS	WINGS	HABITAT	fqNA
1	9004	Loricerini	***Loricera***		***pilicornis***	***pilicornis***	(Fabricius)	1775	1	0	7.8	+	hygr	39
2	18071	Cychrini	***Scaphinotus***	***Brennus***	***marginatus***		(Fischer von Waldheim)	1820	0	0	14.0	-	meso	9
3	21011	Elaphrini	***Elaphrus***	***Elaphrus***	***californicus***		Mannerheim	1843	0	0	7.2	+	hygr	50
4	52007	Trechini	***Trechus***	***Trechus***	***chalybeus***		Dejean	1831	1	0	4.3	-	hygr	11
5	52019	Trechini	***Trechus***	***Trechus***	***obtusus***		Erichson	1837	0	1	3.9	+/-	meso	6
6	54050	Bembidiini	***Bembidion***	***Trechonepha***	***iridescens***		(LeConte)	1852	0	0	4.3	+	hygr	9
7	54054	Bembidiini	***Bembidion***		***kuprianovii***		Mannerheim	1843	0	0	5.1	+	hygr	12
8	54163	Bembidiini	***Bembidion***	***Eupetedromus***	***incrematum***		LeConte	1860	0	0	5.5	+	hygr	33
9		Bembidiini	***Bembidion***		***sp. 1***									
10		Bembidiini	***Bembidion***		***sp. 2***									
11		Bembidiini	***Bembidion***		***sp. 3***									
12		Bembidiini	***Bembidion***		***sp. 4***									
13		Bembidiini	***Bembidion***		***sp. 5***									
14		Bembidiini	***Bembidion***		***sp. 6***									
15		Bembidiini	***Bembidion***		***sp. 7***									
16		Bembidiini	***Bembidion***		***sp. 8***									
17		Bembidiini	***Bembidion***		***sp. 9***									
18		Bembidiini	***Bembidion***		***sp. 10***									
19		Bembidiini	***Bembidion***		***sp. 11***									
20		Bembidiini	***Bembidion***		***sp. 12***									
21	93004	Pterostichini	***Pterostichus***	***Argutor***	***patruelis***		(Dejean)	1831	0	0	7.0	+/-	hygr	37
22	93006	Pterostichini	***Pterostichus***	***Bothriopterus***	***adstrictus***		Eschscholtz	1823	1	0	11.3	+	meso	41
23	93008	Pterostichini	***Pterostichus***	***Bothriopterus***	***mutus***		(Say)	1823	0	0	11.5	+	meso	37
24	93153	Pterostichini	***Pterostichus***	***Hypherpes***	***sphodrinus***		LeConte	1863	0	0	10.3	-	meso	6
25		Pterostichini	***Pterostichus***	***Hypherpes***	***sp. 1***									
26		Pterostichini	***Pterostichus***	***Hypherpes***	***sp. 2***									
27	93188	Pterostichini	***Pterostichus***	***Cryobius***	***riparius***		(Dejean)	1828	0	0	7.3	-	hygr	9
28	111011	Licinini	***Badister***	***Baudia***	***grandiceps***		Casey	1920	0	0	4.9	+	hygr	26
29	119011	Harpalini	***Stenolophus***	***Stenolophus***	***incultus***		Casey	1914	0	0	5.2	+	hygr	7

NO	SpNo	TRIBE	GENUS	SUBGENUS	SPECIES	SUBSPECIES	AUTHOR	YEAR	HL	IT	BS	WINGS	HABITAT	fqNA
30		Harpalini	*Harpalus*		*sp. 1*									
31	151007	Platynini	*Agonum*	*Europhilus*	*gratiosum*		(Mannerheim)	1853	0	0	7.8	+/-	hygr	36
32	151017	Platynini	*Agonum*	*Platynomicrus*	*ferruginosum*		(Dejean)	1828	0	0	6.3	+/-	hygr	12
33	151018	Platynini	*Agonum*	*Platynomicrus*	*nigriceps*		LeConte	1848	1	0	5.6	+/-	hygr	23
34	151019	Platynini	*Agonum*	*Platynomicrus*	*piceolum*		(LeConte)	1879	0	0	6.8	+/-	hygr	21
35	151025	Platynini	*Agonum*	*Agonum*	*corvus*		(LeConte)	1860	0	0	8.8	+	hygr	17
36	151026	Platynini	*Agonum*	*Agonum*	*cupreum*		Dejean	1831	0	0	8.3	+/-	hygr	24
37	151027	Platynini	*Agonum*	*Agonum*	*cupripenne*		(Say)	1823	0	0	8.4	+	hygr	46
38	151034	Platynini	*Agonum*	*Agonum*	*harrisii*		LeConte	1848	0	0	9.5	+	hygr	27
39	151037	Platynini	*Agonum*	*Agonum*	*metallescens*		(LeConte)	1854	0	0	9.5	+	hygr	21
40	151044	Platynini	*Agonum*	*Agonum*	*propinquum*		(Gemminger & Harold)	1868	0	0	7.4	+	hygr	31
41	151050	Platynini	*Agonum*		*mutatum*		(Gemminger & Harold)	1868	0	0	8.0	+/-	hygr	30
42	151062	Platynini	*Agonum*	*Stereagonum*	*errans*		(Say)	1823	0	0	8.2	+	hygr	34
43	152004	Platynini	*Platynus*	*Platynus*	*decentis*		(Say)	1823	0	0	11.5	-	hygr	58
44	175031	Lebiini	*Lebia*	*Lebia*	*moesta*		LeConte	1850	0	0	4.5	+	arbo	23

TABLE SAMPLES *(mtsampl2.xls;10iii99)*:

Distribution of carabid species within samples and between collection sites in 1998 Flathead wetland samples.

Species names follow Bousquet & LaRochelle (1993). SpNo follow Bergdahl (*unpubl.*). The last two rows of data describe the rarefaction of the samples (FIGURE RAREFACTION).

						COLLECTION LOCALITY (sample #)																
					SITE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
NO	SpNo	TRIBE	GENUS	SUBGENUS	SPECIES	Swan 1 Oxbow (14-98)	Swan 2 Oxbow (18-98)	Swan 3 Forest (19-98)	Swan 4 Fen (21-98)	Ambrose 1 Fen (22-98)	Ambrose 2 Fen (23-98)	Bowen 1 Fen (24-98)	Bowen 2 Marsh (25-98)	Bowen 3 F&M (26-98)	Sunday 1 FstSh (27-98)	Sunday 2 DpCh (28-98)	Sunday 3 FstSh (29-98)	Sunday 4 DpCh (30-98)	Sunday 5 FstSh (31-98)	Sunday 6 Marsh (38-98)	Cat 1 Marsh (42-98)	Cat 1 Marsh (43-98)	TOTAL
					Date	3viii	4viii	4viii	5viii	5viii	6viii	6viii	6viii	6viii	7viii	7viii	7viii	7viii	7viii	11viii	12viii	12viii	7 day
					# Hours	1	0.5	0.5	1	1	1	1	1	1	1	0.5	0.5	0.5	0.5	0.5	1	1	13.5 hr
1	9004	Loricerini	*Loricera*		*pilicornis*																	1	1
2	18071	Cychrini	*Scaphinotus*	*Brennus*	*marginatus*	2		1										3					6
3	21011	Elaphrini	*Elaphrus*	*Elaphrus*	*californicus*		2						2										4
4	52007	Trechini	*Trechus*	*Trechus*	*chalybeus*	2										4							6
5	52019	Trechini	*Trechus*		*obtusus*						2												2
6	54050	Bembidiini	*Bembidion*	*Trechonepha*	*iridescens*										15	8	7						30
7	54054	Bembidiini	*Bembidion*		*kuprianovii*	1									1	7	1	1	5				16
8	54163	Bembidiini	*Bembidion*	*Eupetedromus*	*incrematum*	1	2						2										5
9		Bembidiini	*Bembidion*		*sp. 1*		11														2	1	14
10		Bembidiini	*Bembidion*		*sp. 2*		3												1		3		7
11		Bembidiini	*Bembidion*		*sp. 3*						1		2		1							1	5
12		Bembidiini	*Bembidion*		*sp. 4*						1												1
13		Bembidiini	*Bembidion*		*sp. 5*								4		1								5
14		Bembidiini	*Bembidion*		*sp. 6*								3	1						6			10
15		Bembidiini	*Bembidion*		*sp. 7*								2										2
16		Bembidiini	*Bembidion*		*sp. 8*										1								1
17		Bembidiini	*Bembidion*		*sp. 9*										5	1							6
18		Bembidiini	*Bembidion*		*sp. 10*											3							3
19		Bembidiini	*Bembidion*		*sp. 11*												1						1
20		Bembidiini	*Bembidion*		*sp. 12*																	1	1
21	93004	Pterostichini	*Pterostichus*	*Argutor*	*patruelis*						2	1		1									4
22	93006	Pterostichini	*Pterostichus*	*Bothriopterus*	*adstrictus*	1																	1
23	93008	Pterostichini	*Pterostichus*	*Bothriopterus*	*mutus*			2															2
24	93153	Pterostichini	*Pterostichus*	*Hypherpes*	*sphodrinus*											1							1
25		Pterostichini	*Pterostichus*	*Hypherpes*	*sp. 1*	3		1				3				2							9
26		Pterostichini	*Pterostichus*	*Hypherpes*	*sp. 2*			1															1
27	93188	Pterostichini	*Pterostichus*	*Cryobius*	*riparius*			4								9	2	5	2				22
28	111011	Licinini	*Badister*	*Baudia*	*grandiceps*						1												1
29	119011	Harpalini	*Stenolophus*	*Stenolophus*	*incultus*																2		2
30		Harpalini	*Harpalus*		*sp. 1*	1																	1
31	151007	Platynini	*Agonum*	*Europhilus*	*gratiosum*	3	2			4	4			1							11	1	26
32	151017	Platynini	*Agonum*	*Platynomicrus*	*ferruginosum*						1			1							2		4
33	151018	Platynini	*Agonum*	*Platynomicrus*	*nigriceps*		1														2		3
34	151019	Platynini	*Agonum*	*Platynomicrus*	*piceolum*			5															5
35	151025	Platynini	*Agonum*	*Agonum*	*corvus*							1											1
36	151026	Platynini	*Agonum*	*Agonum*	*cupreum*						2				3								5
37	151027	Platynini	*Agonum*	*Agonum*	*cupripenne*				2														2
38	151034	Platynini	*Agonum*	*Agonum*	*harrisii*		2																2
39	151037	Platynini	*Agonum*	*Agonum*	*metallescens*																	1	1
40	151044	Platynini	*Agonum*	*Agonum*	*propinquum*	10	6						2								2	1	21
41	151050	Platynini	*Agonum*		*mutatum*					6		1		1									8
42	151062	Platynini	*Agonum*	*Stereagonum*	*errans*																1	1	2
43	152004	Platynini	*Platynus*	*Platynus*	*decentis*	5		2			1												8
44	175031	Lebiini	*Lebia*	*Lebia*	*moesta*						1												1
					No. of Specimens	29	29	16	2	10	16	6	17	5	27	35	11	9	8	6	25	8	259
					No. of Species	10	8	7	1	2	10	4	7	5	7	8	4	3	3	1	8	8	44
					Specimens/hr	29	58	32	2	10	16	6	17	5	27	70	22	18	16	12	25	8	19.2
					Species/hr	10	16	14	1	2	10	4	7	5	7	16	8	6	6	2	8	8	3.3
					Σ Specimens	29	58	74	76	86	102	108	125	130	157	192	203	212	220	226	251	259	
					Σ Species	10	15	19	20	21	29	30	33	33	36	38	39	39	39	39	41	44	

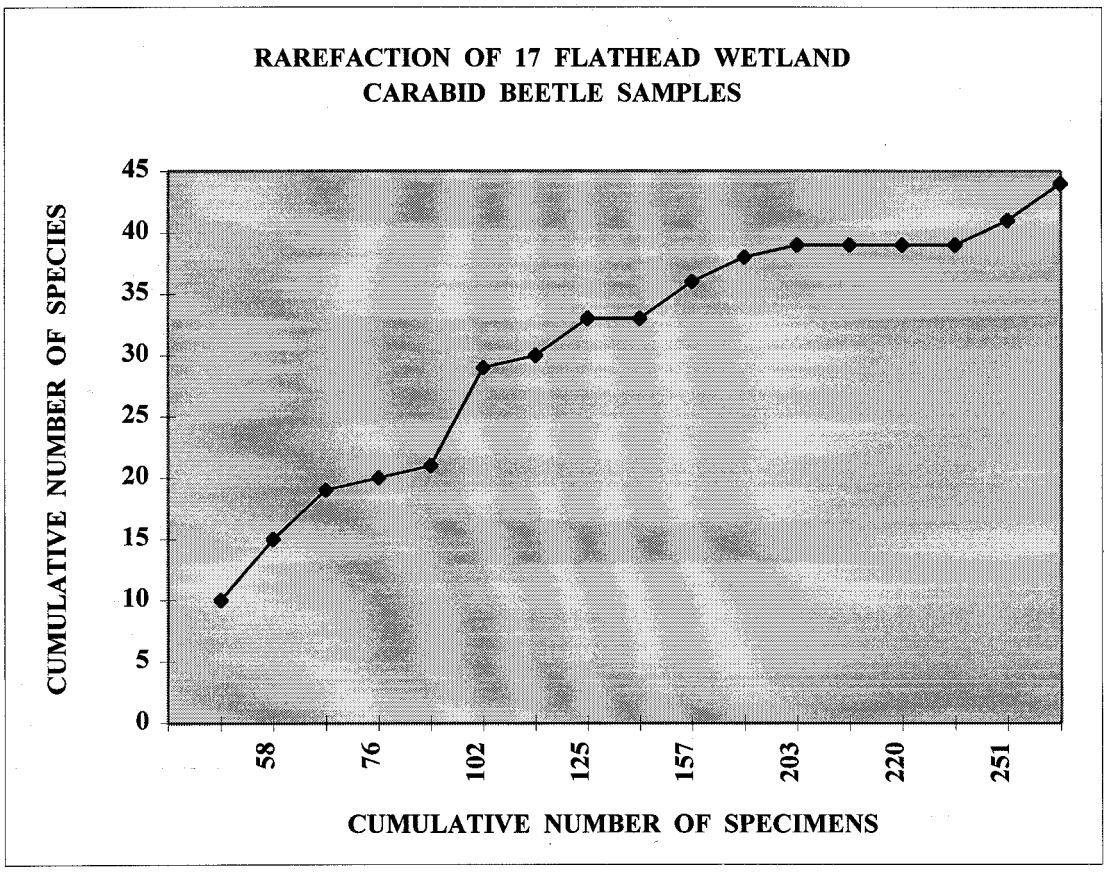

FIGURE RAREFACTION: Rarefaction of 17 wetland carabid samples from the Flathead River watershed of northwest Montana.

TABLE NWMTLIST *(nwmtlist.xls;11iii99)*:

Checklist of 232 carabid beetle species (Coleoptera: Carabidae) known or suspected as resident in the Flathead River watershed of northwest Montana.

SpNo follow Bergdahl *(unpubl.)*. **Taxonomy** and **species names** follow Bousquet & LaRochelle (1993).
References are: 1: Bergdahl (this report); 2: LaBonte & Johnson (1989); 3: Edwards (1975); and 4: Russell (1968).
The following valid species recorded by Edwards (1975) in Glacier National Park area are not recognized as Montana residents by Bousquet & LaRochelle (1993): *Bembidion californicum*(OR,CA); *Bembidion nigrocoeruleum* (CA,OR,WA); *Bembidion rusticum lenensoides* (AB,AK,BC,YT); *Amara impuncticollis* and *Amara pennsylvanica* (eastern species not reaching Pacific Northwest).
The following valid species recorded by Russell (1968) in west Montana are not recognized as Montana residents by Bousquet & LaRochelle (1993): *Nebria eschscholtzii* (CA,ID,NV,OR,WA), *Elaphrus americanus* (widespread in North America), *Bembidion lorquini* (BC,CA,ID,NV,OR,WA), *Bembidion disjunctum* (BC,CA,OR), *Bembidion approximatum* (CA,OR,WA), *Amara impuncticollis* (see above), *Amara brunnea* (AK,YT), *Amara exlineae* (WA), *Amara rubrica* (eastern species), *Stenolophus limbalis* (BC,WA,OR,WA), and *Apristus laticollis* (CA,OR,UT)
All of these species should be seriously considered as possible residents in northwest Montana.
Bousquet & LaRochelle (1993) do not list Edwards' (1975) *Bembidion nigricornis* as a recognized published name, or Russell's (1968) *Amara surata* and *Agonum californum*, so it is unclear what species these authors' records represent.

NO	SpNo	TRIBE	GENUS	SUBGENUS	SPECIES	SUBSPECIES	AUTHOR	YEAR	REF
1	1001	Trachypachini	***Trachypachus***		***gibbsii***		Leconte	1861	3,4
2	1002	Trachypachini	***Trachypachus***		***holmbergi***		Mannerheim	1853	3,4
3	4001	Opisthiini	***Opisthius***		***richardsoni***		Kirby	1837	3,4
4	5002	Nebriini	***Leistus***	***Neoleistus***	***ferruginosus***		Mannerheim	1843	4
5	7006	Nebriini	***Nebria***	***Boreonebria***	***crassicornis***	***intermedia***	Van Dyke	1949	3,4
6	7009	Nebriini	***Nebria***	***Boreonebria***	***gyllenhali***	***castanipes***	(Kirby)	1837	3,4
7	7012	Nebriini	***Nebria***	***Boreonebria***	***hudsonica***		LeConte	1863	3,4
8	7024	Nebriini	***Nebria***		***arkansana***	***edwardsi***	Kavanaugh	1979	3,4
9	7042	Nebriini	***Nebria***		***obliqua***	***obliqua***	LeConte	1866	3,4
10	7045	Nebriini	***Nebria***		***sahlbergii***	***sahlbergii***	Fischer von Waldheim	1828	3
11	7061	Nebriini	***Nebria***		***metallica***		Fischer von Waldheim	1820	4
12	7079	Nebriini	***Nebria***		***gebleri***	***gebleri***	Dejean	1831	3,4
13	8002	Notiophilini	***Notiophilus***		***aquaticus***		(Linné)	1758	4
14	8005	Notiophilini	***Notiophilus***		***directus***		Casey	1920	3,4
15	8008	Notiophilini	***Notiophilus***		***nitens***		LeConte	1857	4
16	8014	Notiophilini	***Notiophilus***		***simulator***		Fall	1906	3,4
17	9004	Loricerini	***Loricera***		***pilicornis***	***pilicornis***	(Fabricius)	1775	1,4
18	13030	Cicindelini	***Cicindela***	***Cicindela***	***hirticollis***	***shelfordi***	Graves	1988	4
19	13043	Cicindelini	***Cicindela***	***Cicindela***	***longilabris***	***laurentii***	Schaupp	1884	4
20	13046	Cicindelini	***Cicindela***	***Cicindela***	***nebraskana***		Casey	1909	4
21	13051	Cicindelini	***Cicindela***	***Cicindela***	***oregona***	***oregona***	LeConte	1857	4
22	13062	Cicindelini	***Cicindela***	***Cicindela***	***purpurea***	***audubonii***	LeConte	1845	4
23	13068	Cicindelini	***Cicindela***	***Cicindela***	***repanda***	***repanda***	Dejean	1825	4
24	13089	Cicindelini	***Cicindela***	***Cicindela***	***tranquebarica***	***tranquebarica***	Herbst	1806	4
25	13169	Cicindelini	***Cicindela***	***Cylindera***	***terricola***	***cyanella***	LeConte	1857	4
26	14016	Carabini	***Calosoma***	***Chrysostigma***	***calidum***		(Fabricius)	1775	4
27	14023	Carabini	***Calosoma***	***Chrysostigma***	***tepidum***		LeConte	1852	4
28	14033	Carabini	***Calosoma***	***Callisthenes***	***luxatum***		Say	1823	4
29	14034	Carabini	***Calosoma***	***Callisthenes***	***moniliatum***		(LeConte)	1852	4
30	15006	Carabini	***Carabus***	***Archicarabus***	***nemoralis***		O.F. Müller	1764	4
31	15007	Carabini	***Carabus***	***Hemicarabus***	***serratus***		Say	1823	4
32	15012	Carabini	***Carabus***	***Oreocarabus***	***taedatus***	***agassii***	LeConte	1850	3,4
33	17002	Cychrini	***Cychrus***		***hemphillii***	***rickseckeri***	LeConte	1884	4
34	18030	Cychrini	***Scaphinotus***	***Pseudonomaretus***	***merkelii***		(G.H. Horn)	1890	4
35	18032	Cychrini	***Scaphinotus***	***Pseudonomaretus***	***relictus***		(G.H. Horn)	1881	4
36	18071	Cychrini	***Scaphinotus***	***Brennus***	***marginatus***		(Fischer von Waldheim)	1820	1,3,4
37	20004	Elaphrini	***Blethisa***		***multipunctata***	***aurata***	Fischer von Waldheim	1828	2,4
38	20006	Elaphrini	***Blethisa***		***quadricollis***		Haldeman	1847	2
39	21004	Elaphrini	***Elaphrus***	***Neoelaphrus***	***clairvillei***		Kirby	1837	4
40	21011	Elaphrini	***Elaphrus***	***Elaphrus***	***californicus***		Mannerheim	1843	1,3,4
41	21013	Elaphrini	***Elaphrus***	***Elaphrus***	***lecontei***		Crotch	1876	3,4
42	21021	Elaphrini	***Elaphrus***	***Elaphroterus***	***purpurans***		Hausen	1891	4

NO	SpNo	TRIBE	GENUS	SUBGENUS	SPECIES	SUBSPECIES	AUTHOR	YEAR	REF
43	22008	Omophronini	*Omophron*		*ovale*		G.H. Horn	1870	3,4
44	27017	Brachinini	*Brachinus*	*Neobrachinus*	*fumans*		(Fabricius)	1781	4
45	27029	Brachinini	*Brachinus*	*Neobrachinus*	*medius*		T.W. Harris	1828	4
46	27041	Brachinini	*Brachinus*	*Neobrachinus*	*quadripennis*		Dejean	1825	2,4
47	30008	Clivinini	*Dyschirius*	*Dyschirius*	*tridentatus*		LeConte	1852	4
48	30036	Clivinini	*Dyschirius*		*sphaericollis*		(Say)	1823	4
49	30052	Clivinini	*Dyschirius*	*Dyschiriodes*	*integer*		LeConte	1852	2,4
50	41001	Broscini	*Zacotus*		*matthewsii*		LeConte	1869	4
51	43001	Gehringiini	*Gehringia*		*olympica*		Darlington	1933	3
52	52007	Trechini	*Trechus*	*Trechus*	*chalybeus*		Dejean	1831	1,3,4
53	52019	Trechini	*Trechus*	*Trechus*	*obtusus*		Erichson	1837	1
54	52020	Trechini	*Trechus*	*Trechus*	*oregonensis*		Hatch	1951	4
55	52029	Trechini	*Trechus*	*Trechus*	*tenuiscapus*		Lindroth	1961	3,4
56	54007	Bembidiini	*Bembidion*	*Bracteon*	*inaequale*		Say	1823	4
57	54009	Bembidiini	*Bembidion*	*Bracteon*	*levettei*		Casey	1918	3,4
58	54015	Bembidiini	*Bembidion*	*Odontium*	*bowditchii*		LeConte	1878	4
59	54027	Bembidiini	*Bembidion*	*Ochthedromus*	*bifossulatum*		(LeConte)	1852	3,4
60	54028	Bembidiini	*Bembidion*	*Eurytrachelus*	*interventor*		Lindroth	1963	3,4
61	54029	Bembidiini	*Bembidion*	*Eurytrachelus*	*nitidum*		(Kirby)	1837	3,4
62	54032	Bembidiini	*Bembidion*	*Leja*	*dyschirinum*		LeConte	1861	3,4
63	54040	Bembidiini	*Bembidion*	*Lionepha*	*erasum*		LeConte	1859	3,4
64	54050	Bembidiini	*Bembidion*	*Trechonepha*	*iridescens*		(LeConte)	1852	1,3,4
65	54054	Bembidiini	*Bembidion*		*kuprianovii*		Mannerheim	1843	1,3,4
66	54058	Bembidiini	*Bembidion*	*Plataphodes*	*breve*		(Motschulsky)	1845	3
67	54059	Bembidiini	*Bembidion*	*Plataphodes*	*complanulum*		(Mannerheim)	1853	3,4
68	54062	Bembidiini	*Bembidion*	*Plataphodes*	*haruspex*		Casey	1918	4
69	54065	Bembidiini	*Bembidion*	*Plataphodes*	*manningense*		Lindroth	1969	4
70	54068	Bembidiini	*Bembidion*	*Plataphodes*	*quadrifoveolatum*		Mannerheim	1843	3,4
71	54069	Bembidiini	*Bembidion*	*Plataphodes*	*rosslandicum*		Lindroth	1963	4
72	54073	Bembidiini	*Bembidion*	*Plataphus*	*curtulatum*		Casey	1918	3,4
73	54075	Bembidiini	*Bembidion*	*Plataphus*	*gebleri*	*turbatum*	Casey	1918	3,4
74	54077	Bembidiini	*Bembidion*	*Plataphus*	*gratiosum*		Casey	1918	4
75	54081	Bembidiini	*Bembidion*	*Plataphus*	*planatum*		(LeConte)	1848	3,4
76	54083	Bembidiini	*Bembidion*	*Plataphus*	*rufinum*		Lindroth	1963	4
77	54099	Bembidiini	*Bembidion*	*Hirmoplataphus*	*concolor*		(Kirby)	1837	4
78	54102	Bembidiini	*Bembidion*	*Hirmoplataphus*	*quadrulum*		LeConte	1861	3,4
79	54103	Bembidiini	*Bembidion*	*Hirmoplataphus*	*recticolle*		LeConte	1863	3,4
80	54104	Bembidiini	*Bembidion*	*Hirmoplataphus*	*salebratum*		(LeConte)	1848	3
81	54114	Bembidiini	*Bembidion*		*commotum*		Casey	1918	3,4
82	54116	Bembidiini	*Bembidion*		*nebraskense*		LeConte	1863	4
83	54120	Bembidiini	*Bembidion*		*actuosum*		Casey	1918	4
84	54122	Bembidiini	*Bembidion*		*nevadense*		Ulke	1875	4
85	54127	Bembidiini	*Bembidion*	*Peryphanes*	*grapii*		Gyllenhal	1827	4
86	54129	Bembidiini	*Bembidion*	*Peryphanes*	*platynoides*		Hayward	1897	3,4
87	54135	Bembidiini	*Bembidion*		*bimaculatum*		(Kirby)	1837	3,4
88	54138	Bembidiini	*Bembidion*		*sordidum*		(Kirby)	1837	4
89	54142	Bembidiini	*Bembidion*	*Peryphus*	*obscurellum*		(Motschulsky)	1845	3,4
90	54144	Bembidiini	*Bembidion*	*Peryphus*	*petrosum*	*petrosum*	Gebler	1833	4
91	54146	Bembidiini	*Bembidion*	*Peryphus*	*rupicola*		(Kirby)	1837	3,4
92	54149	Bembidiini	*Bembidion*	*Peryphus*	*tetracolum*		Say	1823	4
93	54151	Bembidiini	*Bembidion*		*transversale*		Dejean	1831	3,4
94	54152	Bembidiini	*Bembidion*		*scopulinum*		(Kirby)	1837	3
95	54163	Bembidiini	*Bembidion*	*Eupetedromus*	*incrematum*		LeConte	1860	1,3,4
96	54179	Bembidiini	*Bembidion*	*Notaphus*	*castor*		Lindroth	1963	3
97	54180	Bembidiini	*Bembidion*	*Notaphus*	*coloradense*		Hayward	1897	3,4
98	54187	Bembidiini	*Bembidion*	*Notaphus*	*graphicum*		Casey	1918	4
99	54191	Bembidiini	*Bembidion*	*Notaphus*	*intermedium*		(Kirby)	1837	4
100	54194	Bembidiini	*Bembidion*	*Notaphus*	*nigripes*		(Kirby)	1837	3,4
101	54198	Bembidiini	*Bembidion*	*Notaphus*	*patruele*		Dejean	1831	2,3,4
102	54202	Bembidiini	*Bembidion*	*Notaphus*	*semipunctatum*		(Donovan)	1806	4

NO	SpNo	TRIBE	GENUS	SUBGENUS	SPECIES	SUBSPECIES	AUTHOR	YEAR	REF
103	54203	Bembidiini	*Bembidion*	*Notaphus*	*umbratum*		(LeConte)	1848	3,4
104	54219	Bembidiini	*Bembidion*		*impotens*		Casey	1918	4
105	54222	Bembidiini	*Bembidion*		*timidum*		(LeConte)	1848	3,4
106	54224	Bembidiini	*Bembidion*		*versicolor*		(LeConte)	1848	4
107	54233	Bembidiini	*Bembidion*	*Bembidion*	*quadrimaculatum*	*dubitans*	(LeConte)	1852	3,4
108	54237	Bembidiini	*Bembidion*	*Semicampa*	*convexulum*		Hayward	1897	4
109	54244	Bembidiini	*Bembidion*	*Dioplocampa*	*transparens*		(Gebler)	1829	2,4
110	54245	Bembidiini	*Bembidion*	*Trepanedoris*	*acutifrons*		LeConte	1879	2,4
111	54250	Bembidiini	*Bembidion*	*Trepanedoris*	*concretum*		Casey	1918	2,4
112	54251	Bembidiini	*Bembidion*	*Trepanedoris*	*connivens*		(LeConte)	1852	4
113	54252	Bembidiini	*Bembidion*	*Trepanedoris*	*fortestriatum*		(Motschulsky)	1845	4
114	54257	Bembidiini	*Bembidion*	*Trepanedoris*	*siticum*		Casey	1918	4
115	55001	Bembidiini	*Phrypeus*		*ricksecker*i		(Hayward)	1897	4
116	57003	Bembidiini	*Tachyta*	*Tachyta*	*nana*	*inornata*	(Say)	1823	4
117	57004	Bembidiini	*Tachyta*	*Tachyta*	*nana*	*kirbyi*	Casey	1918	4
118	58001	Bembidiini	*Elaphropus*		*anceps*		(LeConte)	1848	4
119	58014	Bembidiini	*Elaphropus*		*incurvus*		(Say)	1830	4
120	75001	Psydrini	*Nomius*		*pygmaeus*		(Dejean)	1831	3
121	76001	Psydrini	*Psydrus*		*piceus*		LeConte	1846	3
122	77001	Patrobini	*Diplous*		*aterrimus*		(Dejean)	1828	3,4
123	77002	Patrobini	*Diplous*		*californicus*		(Motschulsky)	1859	4
124	78001	Patrobini	*Patrobus*	*Neopatrobus*	*longicornis*		(Say)	1823	3,4
125	80001	Patrobini	*Platidiolus*		*vandykei*		Kurnakov	1960	3
126	86010	Pterostichini	*Poecilus*	*Poecilus*	*lucublandus*	*lucublandus*	(Say)	1823	4
127	93004	Pterostichini	*Pterostichus*	*Argutor*	*patruelis*		(Dejean)	1831	1
128	93006	Pterostichini	*Pterostichus*	*Bothriopterus*	*adstrictus*		Eschscholtz	1823	1,3,4
129	93008	Pterostichini	*Pterostichus*	*Bothriopterus*	*mutus*		(Say)	1823	1
130	93045	Pterostichini	*Pterostichus*	*Morphnosoma*	*melanarius*		(Illiger)	1798	4
131	93077	Pterostichini	*Pterostichus*	*Hypherpes*	*beyeri*		Van Dyke	1925	4
132	93092	Pterostichini	*Pterostichus*	*Hypherpes*	*ecarinatus*		Hatch	1936	3,4
133	93102	Pterostichini	*Pterostichus*	*Hypherpes*	*herculaneus*		Mannerheim	1843	4
134	93106	Pterostichini	*Pterostichus*	*Hypherpes*	*idahoae*		Csiki	1930	4
135	93143	Pterostichini	*Pterostichus*	*Hypherpes*	*protractus*		LeConte	1860	4
136	93153	Pterostichini	*Pterostichus*	*Hypherpes*	*sphodrinus*		LeConte	1863	1,3,4
137	93188	Pterostichini	*Pterostichus*	*Cryobius*	*riparius*		(Dejean)	1828	1,3,4
138	97005	Zabrini	*Amara*	*Curtonotus*	*carinata*		(LeConte)	1848	4
139	97018	Zabrini	*Amara*	*Bradytus*	*apricaria*		(Paykull)	1790	3,4
140	97026	Zabrini	*Amara*	*Bradytus*	*latior*		(Kirby)	1837	3
141	97032	Zabrini	*Amara*	*Percosia*	*obesa*		(Say)	1823	4
142	97043	Zabrini	*Amara*	*Amara*	*californica*	*californica*	Dejean	1828	4
143	97048	Zabrini	*Amara*	*Amara*	*conflata*		LeConte	1855	3,4
144	97049	Zabrini	*Amara*	*Amara*	*confusa*		LeConte	1848	3,4
145	97050	Zabrini	*Amara*	*Amara*	*convexa*		LeConte	1848	3,4
146	97052	Zabrini	*Amara*	*Amara*	*cupreolata*		Putzeys	1866	3
147	97053	Zabrini	*Amara*	*Amara*	*discors*		Kirby	1837	3,4
148	97056	Zabrini	*Amara*	*Amara*	*erratica*		(Duftschmid)	1812	3,4
149	97059	Zabrini	*Amara*	*Amara*	*familiaris*		(Duftschmid)	1812	3,4
150	97060	Zabrini	*Amara*	*Amara*	*farcta*		LeConte	1855	3
151	97069	Zabrini	*Amara*	*Amara*	*littoralis*		Mannerheim	1843	3
152	97078	Zabrini	*Amara*	*Amara*	*patruelis*		Dejean	1831	4
153	97080	Zabrini	*Amara*	*Amara*	*pseudobrunnea*		Lindroth	1968	3
154	97081	Zabrini	*Amara*	*Amara*	*quenseli*		(Schönherr)	1806	4
155	97084	Zabrini	*Amara*	*Amara*	*sanjuanensis*		Hatch	1949	4
156	97086	Zabrini	*Amara*	*Amara*	*sinuosa*		(Casey)	1918	3
157	97099	Zabrini	*Amara*	*Triaena*	*pallipes*		Kirby	1837	3,4
158	97100	Zabrini	*Amara*	*Triaena*	*scitula*		Zimmermann	1832	3,4
159	107027	Chlaeniini	*Chlaenius*	*Chlaenius*	*sericeus*	*sericeus*	(Forster)	1771	2,4
160	107033	Chlaeniini	*Chlaenius*	*Agostenus*	*alternatus*		G.H. Horn	1871	2,4
161	107035	Chlaeniini	*Chlaenius*	*Agostenus*	*harpalinus*		Eschscholtz	1833	3
162	107037	Chlaeniini	*Chlaenius*	*Agostenus*	*niger*		Randall	1838	2

NO	SpNo	TRIBE	GENUS	SUBGENUS	SPECIES	SUBSPECIES	AUTHOR	YEAR	REF
163	107042	Chlaeniini	*Chlaenius*	*Brachylobus*	*lithophilus*	*lithophilus*	Say	1823	4
164	107055	Chlaeniini	*Chlaenius*	*Chlaeniellus*	*pennsylvanicus*	*pennsylvanicus*	Say	1823	2,4
165	107059	Chlaeniini	*Chlaenius*	*Chlaeniellus*	*tricolor*	*tricolor*	Dejean	1826	4
166	108006	Licinini	*Diplocheila*	*Isorembus*	*obtusa*		(LeConte)	1848	4
167	108008	Licinini	*Diplocheila*	*Isorembus*	*striatopunctata*		(LeConte)	1844	2
168	111006	Licinini	*Badister*	*Badister*	*neopulchellus*		Lindroth	1954	2,4
169	111011	Licinini	*Badister*	*Baudia*	*grandiceps*		Casey	1920	1, 2
170	115003	Harpalini	*Anisodactylus*	*Anisodactylus*	*californicus*		Dejean	1829	4
171	115013	Harpalini	*Anisodactylus*	*Anisodactylus*	*similis*		LeConte	1851	4
172	115026	Harpalini	*Anisodactylus*	*Anadaptus*	*nivalis*		G.H. Horn	1880	4
173	115029	Harpalini	*Anisodactylus*	*Anadaptus*	*sanctaecrucis*		(Fabricius)	1798	4
174	118005	Harpalini	*Dicheirus*		*piceus*		(Ménétriés)	1843	4
175	119002	Harpalini	*Stenolophus*	*Stenolophus*	*anceps*		LeConte	1857	2,4
176	119011	Harpalini	*Stenolophus*	*Stenolophus*	*incultus*		Casey	1914	1
177	119028	Harpalini	*Stenolophus*	*Agonoleptus*	*conjunctus*		(Say)	1823	3,4
178	120010	Harpalini	*Bradycellus*	*Catharellus*	*lecontei*		Csiki	1932	2,4
179	120013	Harpalini	*Bradycellus*	*Stenocellus*	*californicus*		(LeConte)	1857	2,4
180	120015	Harpalini	*Bradycellus*	*Stenocellus*	*congener*		(LeConte)	1848	3,4
181	122002	Harpalini	*Trichocellus*	*Trichocellus*	*cognatus*		(Gyllenhal)	1827	4
182	126001	Harpalini	*Piosoma*		*setosum*		LeConte	1848	4
183	127001	Harpalini	*Euryderus*		*grossus*		(Say)	1830	4
184	128017	Harpalini	*Harpalus*	*Euharpalops*	*animosus*		Casey	1924	3,4
185	128018	Harpalini	*Harpalus*	*Euharpalops*	*fraternus*		LeConte	1852	3,4
186	128021	Harpalini	*Harpalus*	*Euharpalops*	*laevipes*		Zetterstedt	1828	3,4
187	128025	Harpalini	*Harpalus*	*Euharpalops*	*reversus*		Casey	1924	3
188	128031	Harpalini	*Harpalus*		*nigritarsis*		C.R. Sahlberg	1827	3,4
189	128041	Harpalini	*Harpalus*		*cautus*		Dejean	1829	4
190	128043	Harpalini	*Harpalus*		*innocuus*		LeConte	1863	4
191	128050	Harpalini	*Harpalus*	*Harpalomerus*	*amputatus*		Say	1830	3,4
192	128054	Harpalini	*Harpalus*		*somnulentus*		Dejean	1829	3,4
193	128064	Harpalini	*Harpalus*	*Harpalobius*	*fuscipalpis*		Sturm	1818	4
194	132011	Harpalini	*Discoderus*		*parallelus*		(Haldeman)	1843	3
195	138004	Platynini	*Calathus*	*Neocalathus*	*ingratus*		Dejean	1828	3
196	138011	Platynini	*Calathus*	*Procalathus*	*advena*		(LeConte)	1848	3,4
197	143002	Platynini	*Sericoda*		*bogemannii*		(Gyllenhal)	1813	3,4
198	145001	Platynini	*Anchomenus*		*aeneolus*		(LeConte)	1854	4
199	150001	Platynini	*Oxypselaphus*		*pusillus*		(LeConte)	1854	4
200	151001	Platynini	*Agonum*	*Europhilus*	*anchomenoides*		Randall	1838	4
201	151007	Platynini	*Agonum*	*Europhilus*	*gratiosum*		(Mannerheim)	1853	1, 2
202	151008	Platynini	*Agonum*	*Europhilus*	*lutulentum*		(LeConte)	1854	2
203	151013	Platynini	*Agonum*	*Europhilus*	*sordens*		Kirby	1837	4
204	151015	Platynini	*Agonum*	*Europhilus*	*thoreyi*		Dejean	1828	2,4
205	151016	Platynini	*Agonum*	*Platynomicrus*	*bicolor*		(Dejean)	1828	4
206	151017	Platynini	*Agonum*	*Platynomicrus*	*ferruginosum*		(Dejean)	1828	1,4
207	151018	Platynini	*Agonum*	*Platynomicrus*	*nigriceps*		LeConte	1848	1,4
208	151019	Platynini	*Agonum*	*Platynomicrus*	*piceolum*		(LeConte)	1879	1,4
209	151020	Platynini	*Agonum*	*Agonum*	*affine*		Kirby	1837	2
210	151025	Platynini	*Agonum*	*Agonum*	*corvus*		(LeConte)	1860	1,3,4
211	151026	Platynini	*Agonum*	*Agonum*	*cupreum*		Dejean	1831	1,3,4
212	151027	Platynini	*Agonum*	*Agonum*	*cupripenne*		(Say)	1823	1,3,4
213	151034	Platynini	*Agonum*	*Agonum*	*harrisii*		LeConte	1848	1,2,4
214	151036	Platynini	*Agonum*	*Agonum*	*melanarium*		Dejean	1828	4
215	151037	Platynini	*Agonum*	*Agonum*	*metallescens*		(LeConte)	1854	1
216	151043	Platynini	*Agonum*	*Agonum*	*placidum*		(Say)	1823	3,4
217	151044	Platynini	*Agonum*	*Agonum*	*propinquum*		(Gemminger & Harold)	1868	1,2,4
218	151046	Platynini	*Agonum*	*Agonum*	*suturale (= subsericeum)*		Say (LeConte)	1830	4
219	151050	Platynini	*Agonum*		*mutatum*		(Gemminger & Harold)	1868	1,4
220	151062	Platynini	*Agonum*	*Stereagonum*	*errans*		(Say)	1823	1
221	151066	Platynini	*Agonum*	*Stictanchus*	*decorum*		(Say)	1823	2,4
222	152004	Platynini	*Platynus*	*Platynus*	*decentis*		(Say)	1823	1,4

NO	SpNo	TRIBE	GENUS	SUBGENUS	SPECIES	SUBSPECIES	AUTHOR	YEAR	REF
223	163005	Lebiini	***Cymindis***	***Cymindis***	***cribricollis***		Dejean	1831	3,4
224	163013	Lebiini	***Cymindis***	***Cymindis***	***planipennis***		LeConte	1863	3,4
225	163015	Lebiini	***Cymindis***	***Cymindis***	***unicolor***		Kirby	1837	3
226	169001	Lebiini	***Dromius***	***Dromius***	***piceus***		Dejean	1831	3,4
227	172004	Lebiini	***Apristus***		***constrictus***		Casey	1920	4
228	174001	Lebiini	***Syntomus***		***americanus***		(Dejean)	1831	2, 3
229	175021	Lebiini	***Lebia***	***Lebia***	***cyanipennis***		Dejean	1831	4
230	175031	Lebiini	***Lebia***	***Lebia***	***moesta***		LeConte	1850	1
231	175047	Lebiini	***Lebia***	***Lebia***	***viridis***		Say	1823	4
232	180014	Lebiini	***Calleida***	***Philophuga***	***viridis***	***amoena***	(LeConte)	1848	4

APPENDIX G – PRIORITY WATERSHEDS FOR WETLAND INVENTORY

Montana Watersheds of High Biodiversity Value Prioritized for Inventory and Conservation
Compiled by the Montana Natural Heritage Program, Montana State Library

Watershed	Criteria used
Blackfoot	2,3
Lower Flathead	2,3,4
Swan	1,2,3
Flathead Lake	1,3,4
Stillwater (Flathead)	1,3,4
North Fork Flathead	1,2,3,4
Middle Fork Flathead	1,2,3
South Fork Flathead	1,2,3
St. Mary	1,2,3
Milk Headwaters	1,2,3
Cut Bank	2,4
Two Medicine	2,3,4
Upper Milk	2,4
Willow	2,3
Teton	2,3
Sun	2,4
Upper Clark Fork	3
Bitterroot	3,4
Big Hole	3
Beaverhead	3
Red Rock	1,2,3
Madison	2,3,4?
Jefferson	3
Yellowstone Hdwtrs	1,2,3
Clarks Fork Yllwstone	3
Gallatin	3,4
Smith	3
Bighorn Lake	3
Middle Powder	2,3
Little Powder	2,3
Lower Powder	2,3
Lower Yellowstone	3
Big Muddy	2,3,4
Brush Lake	1,3
Whitewater	2,3,4
Cottonwood	2,3,4
Bullwacker-Dog	2,3
Beaver	2,3,4

This is a preliminary ranking of Montana watersheds compiled by staff of the Montana Natural Heritage Program and The Nature Conservancy's Montana Field Office. This is a qualitative ranking based on best professional judgement. The watersheds were evaluated using the criteria listed below.

Criteria:

1. Extent and degree of development of wetland & riparian communities
2. Quality and integrity of wetland and riparian communities
3. Presence of rare communities, outstanding community examples and sensitive or E/T species
4. Level of threat