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# A riparian and wetland classification and management system for the Bureau of Land Management in southern and eastern Idaho

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# A RIPARIAN AND WETLAND CLASSIFICATION AND MANAGEMENT SYSTEM FOR THE BUREAU OF LAND MANAGEMENT IN SOUTHERN AND EASTERN IDAHO

by

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The purpose of this study was to develop a riparian and wetland classification system based on a habitat type and community type vegetation class structure which integrates the overall topography and physiology of the associated landscapes on BLM lands in southern and eastern Idaho. This document describes the general physiographic, edaphic, floristic, and functional features of riparian and wetland environments to aid public administrators and private landowners in future land management decisions. The sampling objective was to locate homogeneous, pristine or moderately undisturbed communities to represent the various vegetation types in their natural states. The method of "subjective sampling without preconceived bias" was chosen for locating sampled stands on BLM lands in the Medicine Lodge, Big Butte and Pocatello Resource Areas (eastern portion of the Upper Snake River District). Once the stands were collected, existing classifications systems were consulted to facilitate the assembly of surveyed stands into types according to their characteristic vegetation structure and composition. Computer generated synthesis tables were developed, and Sorensen's similarity indices were calculated, to compare plots within each vegetation type for further discrimination between stands and ensure proper placement of each stand within the classification. Ordination was an additional tool which helped organize the placement of stands, indicating underlying potential environmental or successional features overlooked during sampling in the field. After the series aggregations and individual types were established, the dominant features of each habitat and community type were isolated, assessed and defined for the purposes of designing a dichotomous key. The key focused on those species that are most diagnostic of each specific type. A total of 45 types, from approximately 230 sites, are described in this classification: 16 tree dominated habitat (8) and community (8) types; 14 willow/shrub dominated habitat (2) and community (12) types; 2 sedge dominated habitat (1) and community (1) types; and, 13 non-sedge dominated habitat (6) and community (7) types.

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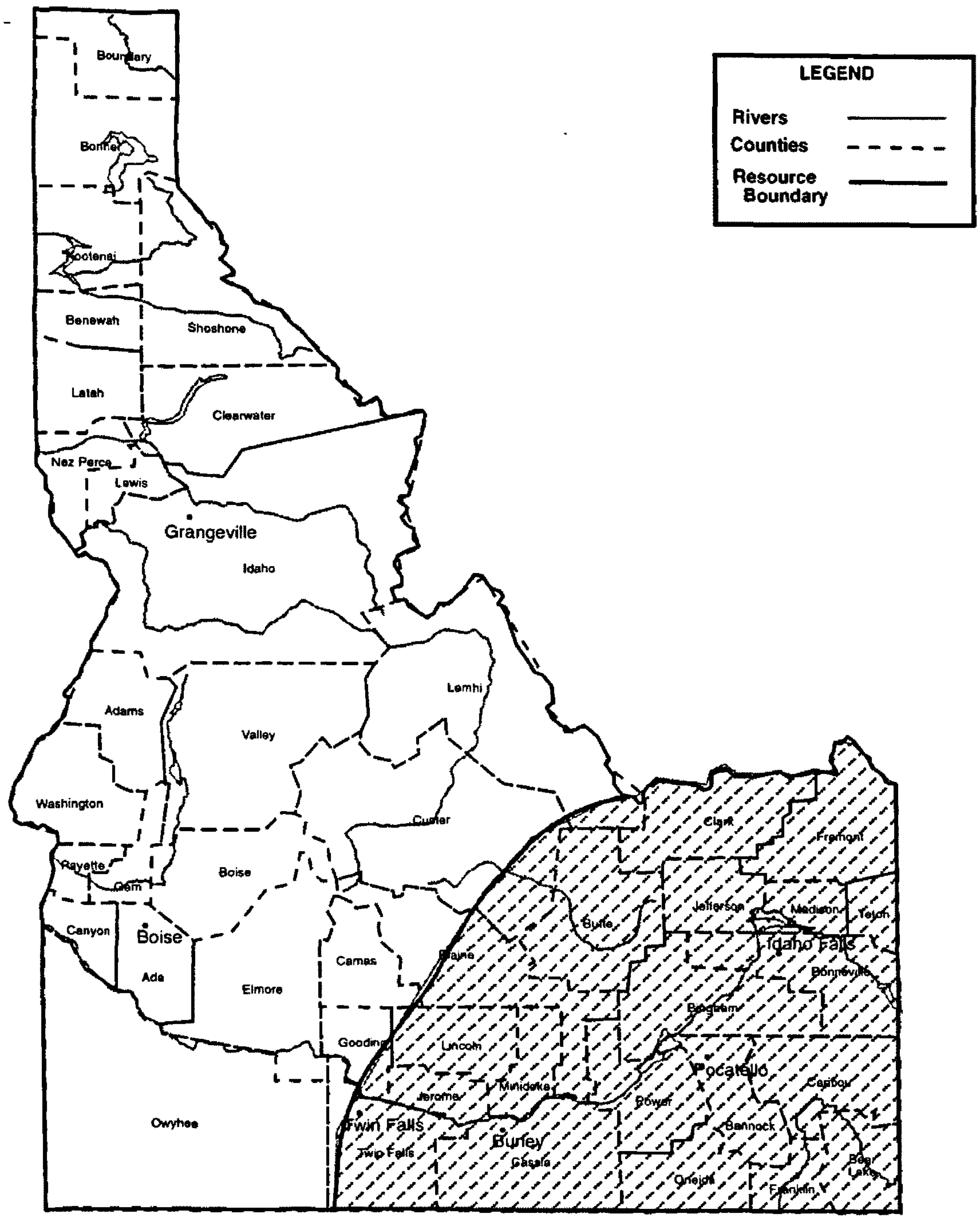


**Figure 1. Area covered by the riparian habitat type classification**

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# INTRODUCTION

Wetland protection and enhancement did not become a significant issue at the federal level until the 1970's when the scientific community began to emphasize the role of wetland and riparian systems in the environment (Mitsch and others 1993). In fact, wetlands were often considered wastelands, areas to be reclaimed for agricultural purposes prior to this period. Approximately 215 million acres of wetlands existed in the continental United States at the time of the country's settlement (1600's). In the mid-1970's, only an estimated 99 million acres, a loss of 54% of the county's indigenous wetlands, remained. Close to 9 million acres alone were converted during the 20 year interval between the mid-1950's to the mid-1970's (USDI Fish and Wildlife Service 1984). Programs such as the Swamp Land Act of 1849 granted a number of states, such as Louisiana and Mississippi, the authority to sell swamp lands as part of their flood control programs to private landowners for the express purpose of levee construction and drainage for agricultural use. Although various forms of legislation, like the Duck Stamp Act, indirectly promoted wetland preservation prior to the 1970's, only a few coastal states, in particular, Massachusetts (1963), Rhode Island (1965), and Connecticut (1969), actually passed statutes protecting wetlands before this period (USDI Fish and Wildlife Service 1984).

It wasn't until 1972 with the passage of Section 404 of the Clean Water Act that the managerial philosophy that "wetlands equal wastelands" really began its transformation. Although not specifically designed for wetland preservation, this program, under the authority of the U.S. Army Corps of Engineers, requires permits for certain dredge and fill activities within the waters of the United States (Mitsch and others 1993). Other programs include the Executive Order 11990 passed in 1977, which requires government agencies to consider wetland protection as a part of their land managing responsibilities, and the Food Security Act (Swampbuster) of 1985 which denies government benefits to farmers who convert wetlands to agricultural lands after 1985. The "No Net Loss" policy under the Bush Administration, proposed to facilitate the creation and restoration of wetlands to replace those that are destroyed during the development of federal projects, plays a dominant role in the design and implementation of government programs in the 1990's (Mitsch and others 1993). Although minimal legislation to protect wetland and riparian habitats currently exist, wetland preservation, mitigation and enhancement play an important role in the decision-making process of state and federal land management agencies, such as the Bureau of Land Management (BLM).

No single definition encompasses all sites classified under the amorphous term "wetland." The Washington State Department of Ecology (1988) proposes that "wetlands are transitional areas between upland and aquatic environments where water is present long enough to form distinct soils and where specialized water-loving plants can grow." This definition is further refined by Cowardin and others (1979) to require at least one of three attributes: 1) at least periodically, the substrate is dominated by hydrophytes; 2) the substrate is predominantly undrained hydric soils; and, 3) the substrate is nonsoil and is either saturated with or covered by shallow water at some time during the growing season. For the purposes of Section 404 permits, wetlands are defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions"(Federal Interagency Committee for Wetland Delineation 1989). The US Army Corps of Engineers (Corps) further requires three critical parameters for wetland identification, defined by: hydric soils, hydrophytic vegetation and hydrology (Federal Interagency Committee for Wetland Delineation 1989). These three criteria are mandatory for wetlands to receive jurisdictional status and consideration under the statutes of the Clean Water Act and the Food Security Act. However, not all wetlands in the United States, especially in the arid West, meet these mandatory requirements. They are often categorized as functional wetlands, because while they provide essentially the same functions as jurisdictional wetlands, they may fail to meet all of the jurisdictional criteria. Due to the generally drier conditions of the West, and in particular, southern and eastern Idaho, a significant portion of the wetlands in the study area may fail to meet some of the Corps requirements. For the purposes of this classification, only one of the above parameters must be satisfied for a site to be considered a wetland. This approach is similar to that taken by Cowardin and others (1979), and by the majority of authors of other vegetative classifications systems developed in the Northwest describing riparian communities, including: Hansen and others (1995), Cooper and others (1991), Padgett and others (1989), Mueggler (1988), Steele and others (1981), Youngblood and others (1985b), and Pfister and others (1977). For a more detailed discussion on functional wetlands, consult the section Wetland Delineation.

By definition, the terms "wetland" and "riparian" are not synonymous, although in the West they are often used interchangeably. Wetlands may be defined by marshes and potholes, bogs and peatlands, swamps and salt flats, rivers and their associated floodplains, and areas along the periphery of impoundments such as ponds and reservoirs, to name some of the major types (Cowardin and

others 1979). The term "riparian " is reserved for riverine systems and associated landforms such as banks, bars, islands and floodplains. Riparian zones are essentially one of the major subsets of wetland types and are emphasized here for their often singular prevalence in the project area. More recently, wetlands in the West have been divided into two broad categories: Lotic and Lentic. **Lotic** systems refer to riparian zones and their associated landforms. **Lentic** systems refer to "still water" systems such as ponds, marshes, etc., essentially those wetlands that do not fall under the lotic system (Hansen and others 1995). For the purposes of this classification, the term "wetland" will refer primarily to riparian, or lotic, systems.

By nature, riparian zones constitute dynamic systems with uncertain equilibriums readily degrading or recovering depending on the particular forces acting at any one time. Riparian and wetland vegetation help to reduce bank erosion and trap sediment from side-slope run-off during precipitation events, reducing soil loss over time. Instream vegetation can reduce the velocity of flood waters which in turn may allow sediments and other pollutants to settle out of the water column, resulting in greater water quality. These zones may act as discharge and recharge areas for ground water within watersheds as well, acting to buffer surface water flows throughout the year (Mitsch and others, 1993). A degraded riparian system is often incapable of many of these functions and can compromise the overall health of an entire drainage. Riparian zones in the West help maintain the tentative balance in an environment where water, which is often the most limiting factor, may also represent the most destructive force on the landscape.

Riparian zones receive a disproportionate amount of "use" for the 1-5% of the landscape that they occupy (USDI Fish and Wildlife Service 1984). Estimates in 1978 indicated that only 10% of the original riparian habitat in the United States remained and 6% of this remnant is lost annually (US Environmental Protection Agency 1993). Timber harvesting practices, livestock grazing systems, recreational use programs, agricultural practices, even roads and housing developments contribute to the overall degradation and destruction of the remaining riparian and wetland network which persists on the landscape. As a result of public policy in recent years, land managers are held responsible for implementing management strategies to ensure the proper health and function of these sites. This requires the identification of the various forces at work in an ecosystem and the documentation of change within these systems over time. The first step in this process is to obtain baseline information on these landscapes.

A number of land classification systems are available to address the baseline inventory needs of land managers. Three main forms of "land" classification systems are based on soil taxonomy, vegetative community types, and landform associations (Pfister 1989). For the purposes of riparian areas, the vegetative-based land classification systems have been the most widely accepted. Soil taxonomy classifications are difficult to develop in riparian zones due to the dynamic nature of stream flow and the constant flux of fluvial substrate which requires regular updating. Landform associations are long-lived but do not provide enough detail to assess micro changes in the environment. Only vegetative-based type classifications provide enough detail to document change yet offer enough longevity to enable managers to observe how various factors, both natural and human-caused, affect these changes in the environment.

Vegetative-based land classifications may be developed at three different levels: habitat types, community types and dominance types. Habitat types are based on the potential natural climax plant community that may occur on a site. Daubenmire (1968) stresses that the habitat type comprises all parts of the landscape that support, or are capable of supporting, the same kind of plant association (climax community), in the absence of disturbance. This system takes into consideration both the vegetative and physical features of a site to predict the climax stage (Hansen and others 1995). Community type classifications are based on the existing structure and composition of communities without any indication of successional status (Padgett and others 1989). Community types may represent seral stages of different plant associations within the habit type framework and help to establish the intermediate successional stages from bare ground to the ultimate climax community (Hansen and others 1995). The third vegetative-based category, the dominance type, represents the dominant vegetation (minimum of 25% coverage), in the tallest layer, observed on a stand. It allows for management in an area based on the existing dominant vegetation, but without regard for ecological status (Hansen and others 1995). Although dominance types are still used by some federal and state agencies, they are not used in this classification. For a more detailed discussion of habitat and community types, consult the section Ecological Concepts.

**Study Objectives**

Currently, no state-wide riparian or wetland classifications exist for Idaho. A number of classifications for other states overlap portions of Idaho, but most of these are in the form of community type classifications and do not provide full

coverage for the range of riparian site types found in the state. The purpose of this study is to:

1) Develop a riparian and wetland classification system based on a habitat type and community type vegetation class structure which integrates the overall topography and physiology of the associated landscapes on BLM lands in southern and eastern Idaho; and,

2) Document and assess the general physiographic, edaphic, floristic, and functional features of riparian and wetland environments for the compilation of resource information in an attempt to aid public administrators and private landowners in future land management decisions.

## PHYSICAL SITE FEATURES

### Geology

Eastern and southcentral Idaho are divided between two distinctly different geologic provinces: the Basin and Range predominates in the southeastern sections while the Snake River Plain composes a wide swath angling from southcentral portions up to the northeast corner near Yellowstone National Park (Fig. 2). The Basin and Range is a product of two superimposed mountain ranges and the forces which led to their creation and ultimate deformation, while the Snake River Plain is primarily the result of volcanic activity that started some 13 million years ago. Glaciation during two separate ice ages, although responsible for scouring much of the landscape to the north in Montana and northern Idaho, and along the higher ranges to the west and south in Wyoming and Utah, was not a significant factor in the development of the topography (Alt and Hyndman 1989).

The majority of the rock in southeastern Idaho (Basin and Range) is classified as sedimentary, formed some time during the Precambrian Era (> 600 million years ago) when oceans covered much of the landscape and deposited extensive layers of sand and silt. Successive continental submergances and subsequent depositions in the Paleozoic Era (250-600 million years ago) during each of the five individual periods accounts for most of the remaining limestones and sandstones present in the area. The ridge and valley topography characteristic of this region, however, is inconsistent with the level terrain expected with oceanic

deposition and alludes to the more complex and violent history attributed with the geologic development of this region (Alt and Hyndman 1989).

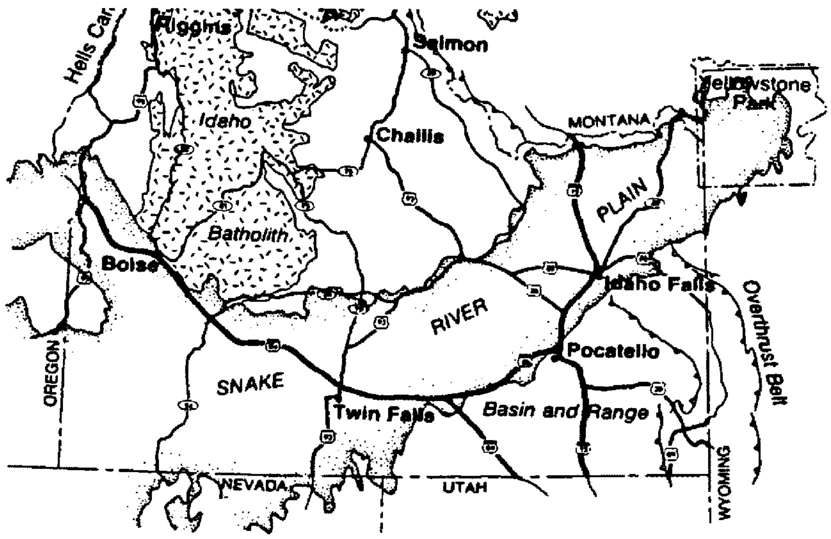


**Figure 2.** Geologic Provinces of Central and Southern Idaho (Alt and Hyndman 1993)

The northern Rocky Mountains, which constitute the first of the two major ranges that developed in the Basin and Range area, originated about 70 to 90 million years ago (Alt and Hyndman 1989). This mountain range formed as the North American continental plate moved westward, colliding with the Pacific Ocean plate. Two major events ensued following this collision. First, the force of the converging plates caused the western edge of the North American plate to buckle and fold along fracture lines. Enormous slabs of rock piled up along these fractures, called thrust faults. As the plates continued to converge, the continental plate rode over the top of the oceanic plate, causing still further uplift along the western border. Second, as the oceanic plate descended into the mantle, it melted and ascended as molten basalt, melting the granitic continental crust above it to magma. The magma rose into the wrinkles and folds under the newly formed mountain range, rupturing it and causing it to slide eastward as a series of immense, discrete slabs. These slabs crumpled and stacked on top of each other and plowed existing rock into massive ridges during their passage eastward to form the present day Rocky Mountains (Alt and Hyndman 1989).

The second phase in the development of the Basin and Range commenced about 17 million years ago when a giant meteorite struck the earth in southeastern Oregon. It passed through the continental crust, the lithosphere, and penetrated

the upper layers of the underlying mantle. The impact induced a fracture in the mantle which persists today. This rift, extending southward from its origin, relieves pressure on the hot rocks forming the mantle, allowing them to partially melt to viscous, molten rock, and fill the breach. During its migration westward, the North American continental plate passes over this rift or fault. The crust above the rift warms, separates as a block or wedge, and settles slightly into the fault. As the plate continues its journey westward, the block heels over, rotating onto its side and pitching so that the leading edge drops while the trailing edge rises. The resulting wedges or blocks overlap one another much like shingles on a roof, forming a series of parallel ridges and valleys in a north to south direction aligned with the fault line. The blocks continue to spread apart as the continental plate progresses west, exposing more of the cross section or side of each block. The result of this block faulting over time has been the gradual accordion expansion of the Rocky Mountains into a series of smaller, parallel ridges and intervening valleys. The ridges appear as exposed, stratified sedimentary rock, eroded over time by wind and water. The valleys are generally blanketed with a layer of alluvium, a collection of eroded mineral materials and lake bottom sediments deposited by river floods and Lake Bonneville, an enormous inland lake which probably appeared during the warming trends at the conclusion of each of the last two ice ages, approximately 15,000 and 100,000 years ago, respectively (Alt and Hyndman 1989).

The Snake River Plain is composed primarily of white rhyolite overlain with a thin veneer of black basalt. The rhyolite originated from a chain of volcanoes that emerged some 13 million years ago, but have long since been extinct. The source for this volcanic activity can be traced back in time roughly 17 million years, again with the collision of the meteorite (Alt and Hyndman 1989). The explosive force of the impact formed a deep crater, which filled with magma from the underlying mantle and formed a lava lake. Pressure-invoked eruptions emptied the lake periodically, although subsequent resurgence of magma refilled the crater after each discharge. This cyclical process continued for about 4 million years. At that time, the intact portion of the North American continental plate east of the lake, which had not been shattered from the collision with the meteorite, began to slid across and cover the crater during its slow progression westward (Alt and Hyndman 1989). The underside of the lithosphere which came in contact with the lava lake melted into rhyolite magma. The crust continued its westward progression and a chain of volcanoes formed. Craters or cones developed where the excessive pressure and heat of the lava lake breached weak locations in the overlying crust, and rhyolite magma spewed forth,

covering the surrounding country, present day southcentral and northeastern Idaho. The actual point of impact of the meteorite on the mantle can be traced along the extinct chain of volcanoes to the present day geysers in Yellowstone National Park in Wyoming (Alt and Hyndman 1989).
The thin facade of basalt 3-15 m (10-50 ft) covering the main body of rhyolite is the result of comparatively recent (geologic time frame; about 1,600 years) basalt lava flows that emanated from fissures and vents extending roughly southeast from Craters of the Moon National Monument to American Falls (Alt and Hyndman 1989). Although the basalt represents only a minor fraction of the rock present in this region, it is a predominant surface layer in many locations and may constitute a primary source of parent material in these areas.

**Physiography**

The project area encompasses most of the former Idaho Falls and Burley Districts, now within the Upper Snake River District (BLM), in southern and eastern Idaho (Fig. 1 and 2). It is bounded by the continental divide at the Montana/Idaho border to the north, and the Wyoming/Idaho border along the Teton, Snake River, and Salt River Ranges to the east. The boundaries to the south and west are less obvious, physiographically. To the south, it is delineated by the Utah/Idaho border which runs along an east/west axis bisecting a series of parallel, block-faulting ranges aligned north/south. The western boundary, just to the west of Twin Falls and Route 93, travels north from the Utah border and then angles to the southeast to follow the Snake River Canyon. Near Milner Lake it progresses northeast via a sinuous route with a series of east and west meanders, which include the Craters of the Moon National Monument, and converges with the Continental Divide approximately 40 km (25 mi) west of Monida Pass on the Idaho/Montana border.

This area overlaps portions of three physiographic provinces described by Fenneman (1931): 1) the Middle Rocky Mountain Province, 2) the Great Basin Section (Basin and Range Province), and 3) the Snake River Plain Section (Columbia Intermountain Province). For the purposes of the geologic discussion, the Middle Rocky Mountain Province is included within the Basin and Range Province, which constitutes the majority of the area. The southeastern portion of Idaho lies on the boundary of the Middle Rocky Mountain and the Basin and Range Provinces, where a series of active block faults are tearing apart the Rocky Mountains (geologic time frame). The location of these faults and the interpretation of their influences has led to some conflicting boundary designations for the different physiographic provinces in this area. Although the

Middle Rocky Mountain and Basin and Range Provinces are treated separately in this section, there is much geologic overlap.

A series of mountain ranges in the southeast corner of Idaho are located within the Middle Rocky Mountain Province (Thornby 1965). The combined Wasatch, Bear River, Bannock, Portneuf, Pruess, Caribou, Snake River, and Webster Ranges and the Blackfoot Mountains constitute this chain of the Rocky Mountains in Idaho. These mountains were formed as a result of closed folds and thrust faulting and are characterized by steeply inclined western exposures and more gradually sloping, eastern faces (Thornby 1965). Although a number of peaks attain heights just short of 3,030 m (10,000 ft), most ridges do not exceed much above 2,424 m (8,000 ft). Valleys generally occur between 1,212-1,818 m (4,000-6,000 ft) in elevation. Eroded sedimentary rock is predominant on the ridge lines while the intervening valleys and depressional areas are overlain with alluvium (Alt and Hyndman 1989). These ranges occur at the eastern edge of the Basin and Range Province and are influenced by block faulting which is slowly expanding the valleys and ranges in accordion fashion.

The southcentral portion of Idaho, labeled as part of the Great Basin section, represents the northern most reach of the Basin and Range Province. This section is characterized by a series of short, parallel mountain ranges and intervening valleys with a generally north/south orientation, evidence of the resulting active block faulting characteristic of this subdivision. The main relief in this area are the Albion, Black Pine and Deep Creek Mountains, and the Sublett Range. Although Cache Peak in the Albion Mountains rises to 3,133 m (10,339 ft), most of these ranges seldom manage heights greater than 2,424 m (8,000 ft). Valleys range from approximately 1,212-1,818 m (4,000-5,000 ft). Sedimentary deposits are dominant in southern Idaho, although igneous intrusions and alluvial fill are present in the valleys. Although most of the Great Basin section has internal drainage to the Great Salt Lake, this portion in Idaho drains north to the Snake River (Thornby 1965).

The Snake River Plain Section represents the eastern most lobe of the Columbia Intermountain Province (Thornby 1965). Level lava plains, primarily rhyolite with a thin, surficial facade of basalt, dominate most of the area. The plains slope to the west, from about 1,818 m (6,000 ft) elevation northeast of Ashton to about 1,060 m (3,500 ft) in the southwest near Twin Falls. Some lava fields, such as the Craters of the Moon complex (1,681 sq. km/643 sq. mi), which are only a few thousand years old, are highly resistant to weathering and may appear much as

they did at the time of their development; bare rock. Older fields which have undergone wind and water erosion, and are subject to alluvial deposition, may offer rich, often deep soils. Extinct volcanic cones and calderas, craters which formed after the eruption of subsurface lava pockets and the subsidence of the surrounding landscape, occur sporadically throughout the plains region. A complex of sand dunes northwest of St. Anthony, the St. Anthony Dune Field (454 sq. km/175 sq. miles), represents another of the unusual features of this complex landscape (Alt and Hyndman 1989).

**Watersheds**—Two major watersheds may be defined within the project area. The Snake River is the most significant drainage in the region. The northern branch, Henrys Fork, flows south from Island Park Reservoir in the northeast corner of the state. The South Fork of the Snake River, flowing northwest from the Palisades Reservoir centrally located near the Idaho/Wyoming border, merges with the north fork, Henrys Fork, outside of Rigby to form the main branch of the Snake River. The river proceeds southwest, where it is joined by the Blackfoot River, and on through the American Falls Reservoir. It flows due west, traveling across the southern portion of the Upper Snake River District before angling north toward Boise. The Snake River captures most of the precipitation south and west of the Continental Divide in this region and drains five major reservoirs (Henrys Lake, Island Park, Palisades, Blackfoot, and American Falls) and more than 20 minor lakes and reservoirs, in addition to countless perennial and intermittent tributaries which join it. Basalt in the Snake River Plain is extremely porous and often characterized with joints, lava tubes and unconsolidated layers, which promote percolation and subsurface flow. Rivers such as the Big Lost and Little Lost, located northwest of the lava fields, virtually disappear upon entering the plains, to reemerge at the thousand springs canyon head wall west of Twin Falls.

The second watershed, the Bear River, is the primary outlet for Bear Lake, and serves as the main outlet for the southeast corner of Idaho. It flows north, diverting around the end of the Bear River Range, the northern extent of the Wasatch Mountains Range, before proceeding south to drain into the Great Salt Lake in northern Utah (Delorme 1992).

**Floristic Patterns**

Cronquist and others (1972) describe three general floristic divisions (Fig. 3) for the study area within the intermountain region that parallel the physiographic provinces described by Fenneman (1931). The Wasatch Mountains section

generally applies to the area classified as the Middle Rocky Mountain Province, the Bonneville Basin section applies to the Great Basin Section (Basin and Range Province) while the Snake River Plain Section remains consistent in name and area for both floristic and geologic classification.

The Wasatch Mountains floristic section encompasses the Bannock Range to the west, the Blackfoot Mountains and Caribou Range to the north and all of the intervening country bounded to the east and south by the Wyoming and Utah state lines. Two vegetation zones are present in this Division: Montane and Sagebrush. The Montane Zone emerges on the upper slopes, ridges and ravines of mountain ranges where sufficient moisture is present. *Pseudotsuga menziesii* (Douglas fir) is the dominant species in this alpine zone, although *Pinus contorta* (lodgepole pine), *Abies concolor* (white fir), *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce) and/or *Populus tremuloides* (quaking aspen) may dominate localized sites (Cronquist and others 1972). *Acer grandidentatum* (bigtooth maple) and/or *Juniperus scopulorum* (Rocky Mountain juniper) woodlands are common at lower elevations. The Sagebrush Zone is present within the broad valleys and lower foothills between ranges where moisture is a limiting factor. *Artemisia tridentata* (big sagebrush) dominates communities in this zone, often with a mixture of other *Artemisia* spp. (sagebrush) and *Chrysothamnus* spp. (rabbitbrush). Graminoids, particularly *Agropyron spicatum* (bluebunch wheatgrass) and *Festuca idahoensis* (Idaho fescue), may occupy some areas and constitute prominent understory species in some locations (Cronquist and others 1972).

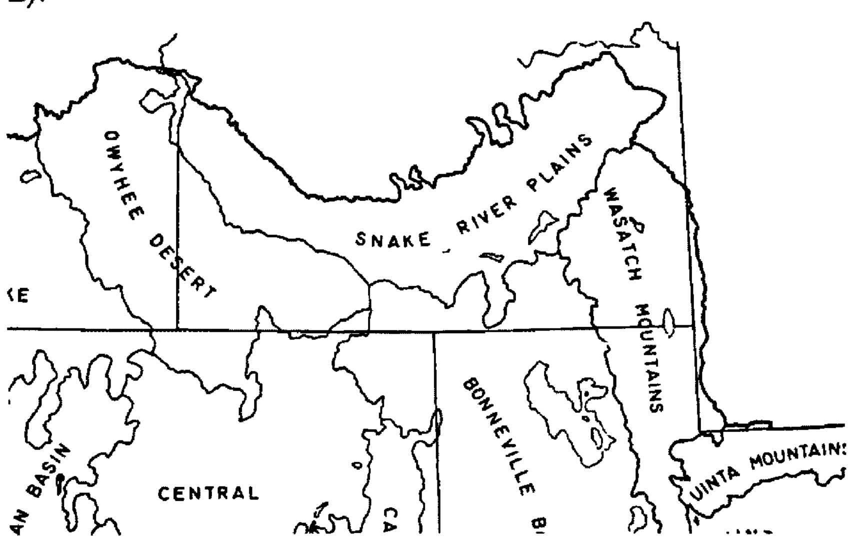


**Figure 3.** Intermountain Region illustrating Floristic Sections for the Project Area(Cronquist and others 1972)

The Bonneville Basin floristic section, applicable to the Basin and Range Province, occurs west of the Wasatch Mountains Division and extends to the western edge of the project area, just west of Twin Falls. The northern and southern boundaries essentially coincide with the Snake River Canyon and the Utah state line, respectively. Three vegetation zones are present here: 1)Montane, 2) Pinyon-Juniper, and 3) Sagebrush. The distribution of the Montane zone is restricted to the ridge lines at higher elevations and constitutes only a minor floral division here. The other alpine zone, the Pinyon-Juniper, occurs at the northernmost extent of its range, for the pinyon component which is prevalent further south in Utah, is essentially absent here. Instead, communities are dominated primarily by *Juniperus scopulorum* (Rocky Mountain juniper) and *Juniperus osteosperma* (Utah juniper). This zone often dominates lower mountain ranges and is generally restricted from colonizing the broad valley bottoms due to moisture limitations. *Acer grandidentatum* (bigtooth maple) chaparral may also persist on the lower foothills. The Sagebrush Zone dominates most valley bottoms and grades into the Pinyon-Juniper forests. In fact, *Artemisia tridentata* (big sagebrush) may be the prominent understory shrub affiliated with these open juniper woodlands (Cronquist and others 1972).

The Snake River Plain floristic section applies both in title and physical location to its geologic counterpart. Two major vegetation zones occur within this region: Sagebrush and Absolute Desert. The Sagebrush Zone dominates the level plains, which, in combination with rainfall levels of < 25 cm (10 in) per year, are considered high desert in many locations. Older lava flows that have undergone pedogenesis and are covered with alluvium may develop thick, rich soils suitable for agriculture crops, if sufficiently irrigated, such as sugar beets, potatoes, and various grains. *Pseudotsuga menziesii* (Douglas fir) and *Pinus flexilis* (limber pine) may inhabit the pinnacles of taller cinder cones scattered across the plains, but represent only a incidental floristic component (Cronquist and others 1972). Absolute Desert is technically not considered a vegetation zone, but rather a non-vegetation zone. Some of the lava fields, such as the Craters of the Moon complex, are so recent (< 2,000 years) that they have not yet attained any soil development, appearing much as they did shortly after the time of their emergence as bare rock. Due to the porous nature of basalt, water percolates through rather than across it, making it essentially impervious to the effects of erosion on a short-term geologic scale (Alt and Hyndman 1989).

**Climate**

The state of Idaho, in its entirety, occurs west of the Continental Divide. Idaho is affected by a maritime climate even though it is approximately 486 km (300 mi) east of the Pacific ocean (Gale 1978). This influence is evident particularly during the winter months as weather patterns tend toward greater cloud cover, warmer temperatures, and elevated precipitation levels, as compared to regions at similar latitudes further inland, east of the Divide. However, within the state itself, eastern Idaho is considered to be more continental than either the northern or central portions; the eastern and southeastern regions of the state may be characterized by a wider range of temperature fluctuations between the summer and winter months (Gale 1978). The mountain ranges, particularly in the southern and central region, are partially responsible for this trend, acting as barriers to hinder the natural movement of air masses from west to east. Moisture received in this area accumulates primarily over the Pacific Ocean and is carried across the continent on predominantly westerly winds. Most of it is released as precipitation on the Rocky Mountains and the intervening ranges between the Continental Divide and the coast. Eastern Idaho generally receives more moisture in the late spring/early summer than in the winter. However, during the hot summer months, fronts may migrate north from the Caribbean and the Gulf of Mexico on high altitude systems to develop as thunderheads over the eastern part of the state. Incidentally, these summer squalls may induce flash flooding in areas of southeastern Idaho, especially between Pocatello and Downy (Gale 1978).

The study area covered by the classification is quite diverse and is not governed by any singularly dominant climatic feature over the entire range, even though fundamental patterns for the region may be perceived. Riparian zones in particular may not characteristically reflect local climatic conditions either. Padgett and others (1989) indicate that climate affects riparian zones much less directly than it influences drier upland areas. They suggest that climate has a more direct impact on the overall watersheds and, subsequently, the stream systems, instead. They note that climatically drier areas in southern Utah tend to have more narrow riparian zones and smaller wet meadow areas than those regions further north or at higher elevations with greater precipitation and colder temperatures. They do stress that temperature plays a pivotal role in the distribution of wetland species and communities. Youngblood and others (1985b) also refute the overall impact of climate on riparian zones. They indicate that precipitation amounts and patterns exert little influence on the development of riparian communities to the extent that they dictate the location and type of

upland communities present on a particular location. However, they also note that temperature gradients can significantly influence local vegetation communities. For instance, extremely sharp gradients, as narrow as a few feet, can develop between upland and riparian areas where streamside zones and low, moist pockets act as sinks for cold air.

Weather station data can provide relative climatalogic conditions for each particular area and help emphasize the differences between regions even if the overall effect on the associated riparian zones has less of a direct correlation. The average annual precipitation during 1961-90 varies considerably between Island Park (75 cm/30 in) in northeast Idaho and Burley (25 cm/10 in) in south-central Idaho, although Pocatello (30 cm/12 in) and Ashton (52 cm/21 in), both somewhat more centrally located, diminish this gap. Mean annual temperature differences during 1961-90 for Island Park (3°C/37°F) and Burley (9°C/48°F) are almost as extreme, with average annual minimum and maximums (Island Park - 6°C/22°F, 11°C/52°F; Burley 1°C/34°F, 16°C/61°F) exhibiting as divergent results (University of Idaho Climate Data 1996). Again, temperature and precipitation may not exact as significant an influence on riparian zones, but the relative differences in climate between these areas accurately predicts the disparities between the relative vegetation communities. Another indicator, the length of the annual growing season, may also provide some insight to region variations in vegetation communities. Five years out of every 10, the average growing season (when temperatures do not drop below 0°C/32°F) for Idaho Falls is 113 days but for Twin Falls it is 138 (University of Idaho Climate Data 1996). While the growing season must be correlated to daily temperature fluctuations and precipitation to determine the actual potential for growth, a difference of 25 days could substantially effect the development of many plant communities.

Elevation may also significantly influence vegetation development and distribution. Generally, higher altitudes exhibit predominantly colder and wetter conditions than adjacent lowlands. In southern Idaho, monthly mean temperatures collected during the winter months of November-March were observed to reflect an elevational gradient. At elevations $\geq$ 1,515 m (5,000 ft ), mean temperatures $\leq$ 0°C (32°F) were present during the entire period of observation. At elevations from 1,212-1,515 m (4,000-5,000 ft), these temperatures occurred for only 4 of the 5 months, while at zones between 909-1,212 m (3,000-4,000 ft) this mean monthly average was recorded for only 3 months. At 606-909 m (2,000-3,000 ft), sub-freezing temperatures persisted for only 1 or 2 months and at elevations of $\leq$ 606 m (2,000 ft) mean monthly temperatures of $\leq$ 0°C (32°F)

were observed for one month or not at all (Gale 1978). Regarding moisture trends, monthly precipitation levels at weather stations near 2,121 m (7,000 ft) elevation were recorded at 65 cm (26 in). Rates recorded at other climate stations from 1,818-1,212 m (6,000-4,000 ft) indicated a declining trend from 45-20 cm (18-8 in), respectively (Baker 1944). Local influences and the placement of weather stations may bias some results, but general trends may provide useful insights. In terms of temperature and precipitation, elevation may exert considerable influence on the distribution patterns of local flora and should not be discounted summarily.

It should be stressed that the extreme variation between the different regions located within the study area make it difficult to emphasize any single predominant climatic factor or even multiple ones. General trends in the regional weather patterns may help to establish boundaries for, or explain discrepancies observed between, community or habitat types and should be considered when comparing stands and sites from divergent areas.

**Soil Morphology**

Five factors control the direction of soil development: 1) climate, 2) organisms, 3) relief, 4) parent material, and 5) time. These factors, termed "clorpt" by Hans Jenny, determine the "state" or condition of an ecosystem, of which soils is one segment (Buol and others 1989). The factor climate is intuitive, referring to temperature belts and precipitation zones, essentially the regional and localized weather patterns. Organisms encompass both flora and fauna and might include modifications ranging from the physical deformation of bedrock in the rooting zone or the burrowing activity of rodents to the chemical processing by soil microorganisms and everything in between. Human disturbances are included here. Relief represents the integration of topographic parameters (elevation, aspect, slope configuration and position), but also incorporates the presence of water tables and their contribution to local features on the landscape. Parent material constitutes the underlying bedrock or substrate (initial material), whether it consists of highly weatherable limestone or more resistant stock such as granite, and the particular properties associated with the various formative elements. The final component time reflects the extent to which each of the other factors act upon the environment and the consequences of long-term verses short-term influences (Buol and others 1989). The integration of these five factors designate the potential range of conditions that may exist on the landscape and, subsequently, the types of soils that may develop at various locations.
The most prevailing force in riparian and wetland environments is water.

Whether underground, as a product of subsurface aquifers, at the surface, in the form of lakes, streams or rivers, or as a combination of both processes, coalescing as seeps or springs, water shapes most every faucet of its environment and controls the direction and degree of development in these areas. Hydric soils develop under the influence of these saturated water regimes and may provide substantive evidence of periodically inundated conditions, even when they are not readily apparent at the surface.

Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (USDA Soil Conservation Service 1987). These conditions are generally satisfied in areas that are inundated with water for at least one week during a period when soil temperatures remain above 5°C (41°F) (biological zero). Hydric soils are generally capable of supporting hydrophytic (water-loving) vegetation (Federal Interagency Committee for Wetland Delineation 1989).

The National Technical Committee for Hydric Soils developed the following criteria for the purposes of creating a national list of hydric soils from the Map Unit Interpretation Records (MUIR) national database. These criteria were defined from soil properties documented in Soil Taxonomy (Soil Survey Staff, 1975, 1994). This computer generated list, maintained and distributed by the Natural Resources Conservation Service, is updated annually. Criteria 1, 3, and 4 serve as both database criteria and as indicators for identification of hydric soils in the field, while criterion 2 serves only as part of the selection method used to retrieve those soils from the database that meet the defined requirements. However, not all soils currently classified as "hydric" can be keyed using the existing indicators. Additional selection measures are being developed that ensure the criteria encompass all soils that fit the hydric definition and are included in the national list (USDA Soil Conservation Service 1995).

Criteria For Hydric Soils:

1. All Histosols except Folists, or
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Aquisalids, Pachic subgroups, or Cumulic subgroups that are:
    A. Somewhat poorly drained with a water table equal to 0.0 cm (0.0 ft) from the surface during the growing season, or
    B. Poorly drained or very poorly drained and have either:
        (1) water table equal to 0.0 cm (0.0 ft) during the growing season if textures are coarse sand, sand, or fine sand in all layers within 50 cm (20 in), or for other soils
        (2) water table at less than or equal to 15 cm (0.5 ft) from the surface during the growing season if permeability is equal to or

greater than 15 cm/hr
(6.0 in/hr) in all layers within 50 cm (20 in), or
(3) water table at less than or equal to 30 cm (1.0 ft) from the surface during the growing season if permeability is less than 15 cm/hr (6.0 in/hr) in any layer within 50 cm (20 in), or
3. Soils that are frequently ponded for long duration* or a very long duration** during the growing season, or
4. Soils that are frequently flooded for long duration* or a very long duration** during the growing season.

* Inundation for a single event that ranges from one week to one month
** Inundation for a single event that is greater than one month

Soils observed on sampled sites may be classified into five basic orders. These soil orders, along with brief descriptions of each type, are provided in the following table (Table 1). Although soil classification aids in the definition of a particular site type, vegetation associations and communities are often not restricted to one particular soil class. In fact, they may be found on one or more separate orders, and potentially on many more subgroups and great groups within each order, as defined by the soil classification hierarchy established in the Keys to Soil Taxonomy (Soil Survey Staff 1994). Rather, the presence and quantity of water is the driving force in the development of various riparian communities. The examination of soils during this sampling focused more on the textural classes of the soils, i.e. their water holding or draining capacity, as the most significant feature. The site and soil descriptions are oriented more toward soil textures as indicators of soil moisture over soil classification, although soil orders are provided where possible.

**Table 1.** Soil orders and formative elements of hydric soils

| Order | Formative Element | Derivation | Description |
|---|---|---|---|
| Alfisols | alf | Pedalfer (Al-Fe) Soil | Mineral soils with argillic horizon (clay accumulation); less organic matter, lower base saturation, and lighter colored than Mollisols. |
| Entisols | ent | Recent Soil | Very young mineral soils; very weak or no horizon development; no deep, wide cracks in most years. |
| Histosols | ist | Gr.–*histos* (tissue) | Organic soils containing > 12-18 percent organic carbon (by weight), depending on |

| | | | |
|---|---|---|---|
| | | | percent of mineral materials and clay, to a depth of 40 cm (16 in). |
| Inceptisols | ept | L.–*inceptum* (beginning) | Mineral soils; minor horizon development with some weatherable minerals; low organic matter content; ash may be abundant; more developed than Entisols. |
| Mollisols | oll | L.–*mollis* (soft) | Mineral soils; thick, dark surface horizon, high organic matter content; high base saturation. |

Soil texture is generally defined as the relative proportion of the different classes of soil particulates (separates) that constitute the soil material (Buol and others 1989). Sand (0.074-2 mm), silt (0.002-0.074 mm) and clay (≤ 0.002 mm) comprise the fine earth fraction that make up that portion of the substrate termed soil (Buol and others 1989). Coarser materials, including fine (0.08-0.6 in) and coarse (0.6-2.5 in) gravels, small (2.5-5 in) and large (5-10 in) cobbles, and small (10-20 in) and medium + (≥ 20 in) stones, constitute other size classes common in the near-surface substrate layer, but are not actually considered soil and have not undergone soil pedogenesis.

Within the fine earth fraction, Black (1960) notes that several descriptive classes have been defined according to the various proportions of sand, silt and clay (Fig. 4). Of the dozen or so arbitrarily divisions based on size, the term "clay" is used in fully half of these names, representing approximately 80% of all of the actual combinations of the three basic soil materials possible. Clay is an essential component in the construct of soil, partially due to the fact that water maintains a greater affinity for fine-textured particles than coarse-textured ones, especially when the particles are charged, as is often the case with clay. This attraction is more critical in upland areas where water stress is a compelling factor for vegetation development. Riparian zones, by nature, are not limited by soil moisture to the degree of adjacent upland sites. However, late in the season, especially along ephemeral and intermittent water courses, and at the outside fringe of the riparian zone opposite the channel, water reserves are often limited. Fine particulate soils are capable of retaining greater moisture for longer periods of time, allowing more hydrophilic plants an opportunity to persist in an otherwise dry environment.

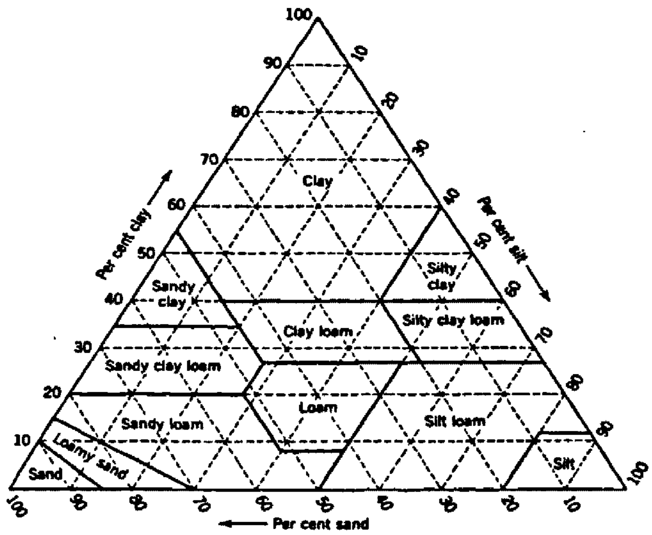


**Figure 4.** Guide for Textural Classification of Soils (Black 1960)

## ECOLOGICAL CONCEPTS

### Classification Theory

Collins and others (1993) suggest that two major schools of thought have evolved regarding the structural treatment of plant communities: the collective unit (Clements) and the continuum (Whittaker). At its most basic level, the collective unit philosophy maintains that vegetative communities are highly structured entities that occur repeatedly over the landscape in recognizable patterns in response to climatic conditions. The continuum principle, in its most elementary state, suggests that species, and therefore communities, are aligned along environmental gradients and can not be divided into discrete assemblages. Rather than abrupt, recognizable boundaries, communities are thought to grade into one another gradually as conditions shift and one community is favored over another. Neither of these rudimentary definitions adequately portrays the full scope of each of these models, but profiles the schism between these diametric schools of thought.

In light of documenting and understanding ecosystems from a managerial perspective, vegetation communities must be classified into artificial categories. However, no two locales, nor the specific environmental factors which influence them, are identical, so no two vegetation communities are precisely alike. Nevertheless, classes can be created based upon the dominant species observed in communities with a high degree of similarity. Out of necessity, this classification applies principles from the collective-unit model to assess patterns

across the landscape for the purposes of management practices. The classification was not created in opposition to the community continuum gradation. In fact, Collins and others (1993) suggest that this model is now the most widely accepted among ecologists in general. This work essentially represents a means to understand the complex processes of ecological succession at the community level.

**Vegetative Succession**

Both primary and secondary vegetative succession occur within riparian and wetland environments. **Primary succession** represents the initial invasion of vegetation on barren sites lacking soil or pedogenic processes. Primary succession may be evident on previously unoccupied bedrock, on recent colluvial or alluvial deposits, or in areas where severe fire or flood has removed surface soil layers. This form of succession develops slowly, especially in the early stages as pioneer species gradually colonize and modify infertile sites over time (Clements 1920). **Secondary succession** generally proceeds after disturbances, resulting in the loss of the vegetation component, but where the soil layer remains intact. Revegetation may occur rapidly since the growth medium and nutrients remain primarily in situ (Clements 1920). The end result of succession in either context is **climax vegetation**, defined by self-replicating vegetation that, barring disturbance, will persist on a site without replacement (Daubenmire 1968).

Daubenmire (1968) essentially defines a **stand** as an array of vegetation that is predominantly homogeneous in all layers and that is separate from adjacent vegetation arrangements due to differences in qualitative or quantitative characteristics. The assemblage of all climax stands, in which, for all practical purposes, the collective dominant species in each of the apparent layers is similar, is termed a **plant association**. No two stands within an association are identical in every facet due to minor physical and environmental variations, but overall, all stands are related to the extent that the integral units bear a high degree of similarity. Kovalchik (1987) coined the term **riparian association** to represent those collections of vegetation in equilibrium with their environment (climax) on sites influenced by specific hydrologic regimes. This classification refers to riparian associations when discussing the actual climax vegetation.

Clements (1920) suggests that every plant is an indicator of a particular combination of environmental conditions. Some species are generalists, able to flourish under a wide range of conditions, but even across these seemingly broad

ecological amplitudes, there is a finite set of conditions for which each is most suited. In the same respect, vegetation communities also reflect the primary conditions acting on a site. This concept is the basis upon which the habitat type classification was developed.

However, there are always exceptions to every rule. Although Clements (1920) indicates that each species has a particular niche, defined by a specific set of conditions, the differences between some of these environments may be negligible, to the extent that two species may appear to occupy essentially the same location on the landscape. This phenomenon is termed, **ecological equivalents.** In regard to vegetation communities on the landscape, a site may be occupied by one, the other, or by any combination of two ecologically equivalent species. Concerning type classifications, and management considerations, ecological equivalents are grouped together as a single type (Hansen and others 1995).

**Vegetation Types**—The land classification system used in this study employs the habitat type concept, which stresses the importance of the potential natural climax plant community (PNC) as an indicator of cumulative environmental site conditions (Daubenmire 1968). These conditions, reflecting a limited range of environmental variation, are best suited for only one climax community (association) and will result in the same climax vegetation at every location where it occurs on the landscape, barring disturbance. Hansen and others (1995) stress that the **habitat type** system is based on the land area, while the vegetation that it supports is merely a surrogate, reflecting those conditions acting on the site. This classification is based on the premise that natural climax plant communities occur repeatedly across the landscape, but due to a variety of disturbances, climax vegetation is often not the dominant stage. By necessity, the system incorporates both the vegetative (pre-climax vegetation) and physical features of each particular location to predict the potential climax vegetation or association for each site. Seral stages often act to modify or alter a site, subsequently preparing it for the next stage, and are crucial for successional projection. Habitat types represent the climax stages while community types represent seral stages preceding the climax.

A **community type**, as defined for these purposes, is an aggregation of major, seral plant communities with floristic similarities both in the overstory (when present) and understory layers. These seral or disclimax communities persist on the land for a duration and frequency that may be appropriate for land

management decisions (Hansen and others 1995). Community types often function as a mechanism to document various successional pathways from the initial pioneer stage to the ultimate climax stage. Due to the nature of disturbances, whether localized or widespread, sporadic or cyclical, plant associations (climax communities) are often not the most prevalent phase of vegetation in the environment. Insect pests, disease, fire, overgrazing, and silvicultural practices represent some of the major causes that reverse successional trends from their natural conclusion. These disturbances may act as minor setbacks, stagnating a particular seral stage of vegetation, or altering conditions to the extent that the physical character of the site has been altered. In some cases, the physical parameters of a site may change rapidly, as a result of major disturbance, or more gradually over decades or even centuries, with shifts in regional climates. As the potential of the site changes, the optimal plant association that may occupy it also varies. In addition to emphasizing dominant seral stages, community types are useful to fill the gaps and document changes where site characteristics are still developing. Although successional pathways on some sites are fairly predictable, readily indicating the potential plant associations, or habitat types, other sites and pathways are much more difficult to gauge, especially under disturbance regimes. Community types may provide a means to classify the existing vegetation but also an avenue to track the successional progression and formulate potentially new pathways for the discrete habitat types.

In some instances, recurrent disturbance has become the dominant influence in an ecosystem. Over time, these disturbances may dictate the direction of development for certain vegetation communities, resulting in artificial, steady-state environments. When the structure and composition of such a vegetation community is repeated over the landscape, it is defined as a **disclimax**. Fire and grazing are common causes which result in the development of disclimax communities in the west (Hansen and others 1995).

Plant communities are typically arranged across the landscape in a mosaic, or series of patterns, according to local and regional climatic conditions and varying physical site features. Subsequently, habitat and community types are ranked into three dominance classes to accommodate these variable conditions. Major types are those plant communities that occupy broad acreages and occur with a high degree of frequency. Minor vegetation types are less prevalent, occupying either occasional larger tracts, or present with some regularity but with smaller

coverages. Incidental types occur sporadically, with minor coverage, or with more extensive cover in a few, restricted locales.

Habitat types are named according to their respective riparian associations. A binomial convention is used, beginning with the dominant overstory species followed by the dominant or most diagnostic understory indicator species and separated by a slash (/). Community types are designated similarly, although in most cases, only a single name is applied. In these cases, no single understory indicator species is individually dominant or distinctive, often due to the frequency and/or regularity of disturbance. Both Latin and common names are provided to facilitate use of the classification.

**Wetland Delineation**

Riparian and wetland zones represent some of the most productive sites across the landscape. They are often subject to the greatest utilization, due not only to the high concentration of localized resources but to the presence of water itself. The focus of this attention has led to the development of various forms of regulatory legislation over the past few decades. Perhaps the most controversial task has been the formulation of a nation-wide wetland definition that encompasses both **jurisdictional** and **functional** wetlands. For the purposes of Section 404 permits, wetlands are defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions"(Federal Interagency Committee for Wetland Delineation 1989). The U.S. Army Corps of Engineers (Corps) requires three parameters for wetland identification: hydrophytic vegetation, hydric soils, and hydrology (Federal Interagency Committee for Wetland Delineation 1989). These three criteria are mandatory for wetlands to receive jurisdictional status and protection under the guidelines of the Clean Water Act and the Food Security Act. However, not all wetlands in the United States meet these mandatory requirements. They are often categorized as functional wetlands, because while they provide essentially the same functions as jurisdictional wetlands, they may fail to meet all of the jurisdictional criteria. Due to the generally drier conditions in southern and eastern Idaho, and the arid West in general, a significant portion of the wetlands in the study area may fail to meet all of the Corps requirements. Cowardin and others (1979), the authors of *Classification of Wetlands and Deepwater Habitats of the United States*, suggest that only one of the above parameters must be satisfied for a site to be considered a wetland. For practical purposes, this classification has adopted a similar approach to defining wetlands.

The discrepancy between definitions arises from the interpretations of legislators and scientists and their conflicting conceptions of jurisdictional verses functional wetlands. The 1987 Corps definition does not incorporate all areas on the landscape associated with surface and subsurface water resources that provide accredited wetland functions. For instance, more arid environments may not receive sufficient moisture to promote the development of the required "wetland" features outlined by the Corps. Woodlands classified under the *Juniperus scopulorum/Cornus stolonifera* habitat type (Rocky Mountain Juniper/Red-Osier Dogwood habitat type) may provide valuable wildlife habitat, streambank stability and enhanced water quality where they dominate riparian zones, yet due to deficiencies in hydric soil development or the presence of "adequate" hydrology, these sites may not receive a jurisdictional wetland designation. These zones deserve consideration from a management perspective for they furnish a variety of valuable services to the land. The function of these areas is considerably more important than satisfying the definition, especially from a delineation standpoint. This classification promotes the notion of wetland function and relies on the attributes and performance of sites to qualify for inclusion in this document. Hansen and others (1995) emphasize this key philosophy and stress the critical distinction between terms, for although all jurisdictional wetlands are functional, not all functional wetlands are jurisdictional.

**Hydrophytic Vegetation**—Hydrophytic vegetation is defined as macrophytic flora that occupies soil/substrate inundated with water for extended periods sufficient to develop an oxygen deficit and anaerobic conditions (Federal Interagency Committee for Wetland Delineation 1989). Approximately 7,000 vascular plant species in the United States have been observed and recorded to inhabit wetland environments. The <u>*National List of Plant Species that Occur in Wetlands*</u>, developed and published through a joint effort between the US Fish and Wildlife Service, U.S. Army Corps of Engineers, Environmental Protection Agency, and Soil Conservation Service, groups these species into four separate divisions (US Fish and Wildlife Service 1996). A fifth division was created but applies only to upland species (UPL) and is not discussed. For all intensive purposes, obligate wetland plants (OBL) are found only in wetlands (> 99%). Facultative wetland plants (FACW) typically occupy wetlands with a high degree of regularity (67-99%) while facultative plants (FAC) may occur with equal propensity in upland or wetland environments (34-66%) Facultative upland plants (FACU) seldom occur in wetlands (1-33%), being more suited to

drier, upland habitats (Federal Interagency Committee for Wetland Delineation 1989).

**Hydric Soils**—Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper portions (USDA Soil Conservation Service 1987). Hydric soils are generally capable of supporting hydrophytic (water-loving) vegetation (Federal Interagency Committee for Wetland Delineation 1989). For a further discussion, consult the soil morphology section.

**Hydrology**—Hydrology, the most critical and compelling of the three wetland criteria, is often the most difficult to determine under field conditions. Different sources may influence the landscape in profoundly different manners. Whether surface or subsurface flow, precipitation in the form of rain, snow, or fog, the timing, intensity and location of events, or the influence of variable temperature, elevation, topography, soil or vegetative cover, each of these factors contribute to the complex nature of water collection, transport, and storage. Annual, seasonal and even daily hydrologic fluctuations further compound the problem of accurately evaluating water regimes. Although hydrologic assessments may constitute the greatest degree of error of the three wetland delineation criteria, only the minimum requirements need to be met to satisfy the Federal definition (Federal Interagency Committee for Wetland Delineation 1989).

The term wetland hydrology incorporates "all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season" (USDA Soil Conservation Service 1987). This criteria is somewhat circular, for it is the presence of hydrophytic vegetation and hydric soils, alluding to saturation and anaerobic conditions, that often allow a determination of sufficient hydrologic inundation and duration at a site. The following criteria establish those conditions which define wetland hydrology by Federal standards (Federal Interagency Committee for Wetland Delineation 1989):

Wetland Hydrology

1. Saturation to the surface normally occurs when soils in the following natural drainage classes meet the following conditions:
    - A. In somewhat poorly drained mineral soils, the water table is less than 15 cm (6 in) from the surface for usually one week or more during the growing season; or
    - B. In low permeability (<15 cm [6.0 in]/h), poorly drained mineral soils, the water table is less than 45 cm (18 in) from the surface for

usually one week or more during the growing season; or

C. In more permeable (≥15 cm [6.0 in]/h), poorly drained or very poorly drained mineral soils, the water table is less than 30 cm (12 in) from the surface for usually one week or more during the growing season; or

D. In poorly drained or very poorly drained organic soils, the water table depth where saturation to the surface occurs more than rarely.

2. An area is inundated at some time if ponded or frequently flooded with surface water for one week or more during the growing season.

# METHODS

## Field Methods

This classification is the product of three seasons of research in which data were collected during the summer field sessions of 1994, 1995, and 1996. A total of 229 sample plots were collected during this time period.

1. Sampling in 1994 was conducted by the Riparian and Wetland Research Program (RWRP) on Bureau of Land Management (BLM) properties of the Upper Snake River District in southern and eastern Idaho. The area included the Medicine Lodge, Big Butte, and Pocatello Resource Areas, formerly of the Idaho Falls District, and the Snake River and Mallad Resource Areas, formerly of the Burley District (Fig.1). The 324 km (200 mi) riparian inventory was designed to define physical and vegetative characteristics of stream reaches for the purposes of creating health and functional assessments for various drainage systems. Additionally, the inventory served as a pilot study for the draft Idaho riparian and wetland classification system. A tentative list of potential habitat types and community types, supplemented with brief descriptions of each type, was derived from the work conducted in 1994 in preparation for field work in 1995 and 1996.

2. Sampling during 1995 and 1996 was conducted on BLM lands in the Upper Snake River District in Idaho. Surveys were restricted primarily to Medicine Lodge, Big Butte, and Pocatello Resource Areas (Idaho Falls District).

The sampling objective in 1995 and 1996 was to locate homogeneous, pristine or moderately undisturbed stands to represent each of the individual vegetation types in their least disturbed states. Pfister (1989) indicates that vegetation may be used as an indicator of physical environmental conditions and notes that a variety of factors may influence the physical expression of a site, specifically:

**flora, fauna, climate, topography, soils, time,** and **treatments**. To use vegetation as a reflection of the landscape, certain factors must be held constant in order to understand the influences of the remaining factors at any particular location. **Flora** can be controlled by selecting a defined area or region to be studied with specific boundaries and, therefore, a finite range of vegetation communities. Variation in **treatment** and **fauna** can be limited by selecting stands that exhibit little influence from outside sources, such as mining or timber practices (treatment) or livestock and wildlife utilization (fauna). By concentrating mainly on climax stands, a degree of stability, in regard to long-lasting, steady-state communities, can essentially halt **time**. The resulting vegetation communities sampled are a product of the **climate, topography,** and **edaphic** (soils) factors that influence the individual sites (Pfister 1989). Although the focus of the inventory was to sample late seral stands, many early to mid-seral stands were sampled to obtain information on the successional pathways of each of the associations encountered. The majority of the landscape does not reside as climax vegetation but generally in a seral state. However, many stands may be considered "stable" at least over a period of time integral to the development of land management practices/strategies.

The method of "subjective sampling without preconceived bias," described by Mueller-Dombois and Ellenberg (1974), was chosen for locating stands. While this method negates the use of statistical analysis reserved for randomly collected data, it enables the investigator the freedom to develop a comprehensive classification for an area without the limitations imposed by community selection according to random chance. The subjective aspect of this method arises during Phase I, with the initial, cursory survey of the study area. A rudimentary list is generated which identifies potential vegetation communities, their basic locations on the landscape and their overall geographic distributions (1994 pilot study). During Phase II, communities are sampled throughout the study area to understand their ecology and their interactions with other communities. The initial framework of the classification and its underlying assumptions are subject to change as warranted by previously unidentified patterns and/or relationships observed on the landscape. This flexibility allows modification to the classification during the developmental stage to most accurately represent environmental conditions, hence the aspect of "without preconceived bias." Sampling of sites in 1995 and 1996 resulted in efforts to visit most of the BLM lands in the Idaho Falls District (eastern portion of the Upper Snake River District) which appeared to contain wetlands as delineated on 1:100,000 scale surface management topographic maps issued by the Geological Survey. Sites

which appeared to have minimal disturbance, as defined according to weed infestation, or evidence of past livestock, mining, timber, and/or recreational use, were preferentially selected. The optimal period for collecting data in this area extended from mid-June to late September, generally considered the greening up period with the highest photosynthetic activity when foliage and reproductive parts are present and individual species can be most readily identified (University of Idaho Climate Data 1996).

Many sites were rejected due to current or past landuse practices. Other sites were dismissed due to a lack of homogeneity within the stand or lack of sufficient size to provide adequate choices for plot placement without sampling ecotones. Finally, more common place communities were often rejected due to self-imposed limits placed on the number of samples collected at any one site and on the number of overall samples inventoried for each type. These restrictions ensured that the majority of BLM properties in the Idaho Falls District with potential riparian zones were visited, guaranteeing coverage of most major and minor types, while reducing the risk of any one particular area over-influencing the defining characteristics of each type. The down side to this approach arises in the limited number of samples (n) collected for many types.

Rectangular plots, with dimensions of 5 m (16.4 ft) by 10 m (32.8 ft) (50 $m^2$/538 $ft^2$), were used predominantly to collect information on herbaceous communities and shrub-dominated communities, while 375 $m^2$ (4083.8 $ft^2$) plots, with dimensions of 15 m (49.5 ft) by 25 m (82.5 ft), were selected for forested stands (Hansen and others 1995; Daubenmire and Daubenmire 1968). Reconnaissance of each site provided an initial assessment of vegetation and physical parameters of the area, allowing for a more accurate placement of plots that best approximated the dominant characteristics of the site. Metal stakes were positioned at the corners of each plot while tape measures and compass bearings were employed to ensure proper dimensions. As the field season progressed, distances were calculated by pacing as I became experienced with measurement techniques. Optimally, sampled sites were situated within each stand so that at least one full plot width was present between the edge of the stand and the placement of the plot. However, due to the difficulty in locating relatively undisturbed sites, this was not feasible in all cases. At a minimum, stands were required to be at least twice the area of the plot. In some cases, riparian zones develop as narrow linear communities along the periphery of vernal pools, reservoirs or streams in narrow canyons. Under such circumstances, the plot dimensions were adjusted accordingly to meet the desired 50 $m^2$ or 375 $m^2$ area while retaining the buffer

zone within the stand to ensure homogeneity of the community and to avoid sampling transition zones or ecotones.

Once plots were situated, 100 percent of the vegetation was sampled (Daubenmire 1968). Species composition, recorded in the six letter codes established by the USDA Forest Service, was noted and **ocular estimates** (Daubenmire 1959) of absolute cover for each species were calculated to predetermined intervals developed by the USDA Forest Service Northern Region ECODATA (1989) program:

| | | | |
|---|---|---|---|
| T = 0.1<1% | 2 = 15<25% | 5 = 45<55% | 8 = 75<85% |
| P = 1<5% | 3 = 25<35% | 6 = 55<65% | 9 = 85<95% |
| 1 = 5<15% | 4 = 35<45% | 7 = 65<75% | F = 95-100% |

In addition to species coverages, age distribution (Myers 1989) and browse utilization of each tree and shrub species was assessed. Comments concerning weed infestation, successional trends, adjacent wetland and upland communities, historic disturbance, and anomalies that might not be readily obvious from the field forms, were also provided. Vegetation was generally identified in the field at the time of the surveys. In some cases, particular specimens could not be identified due to a lack of distinguishing floristic parts and/or due to the limited occurrence of the plants themselves. In these instances, samples were collected and pressed for identification back in the office.

Plant taxonomy follows the "master plant list" on file in the computer database operated by the USDA Ecosystem Management Program (USDA Forest Service, Northern Region, 1987). Plant specimens that were not identified during the summer inventory were collected for later identification in the office. Vascular Plants of the Pacific Northwest (Hitchcock and others 1969) and the Intermountain Flora - Vascular Plants of the Intermountain West, USA (Cronquist and others 1972) were the main guides used in the identification process. Particularly difficult species were compared to mounted specimens at the University of Montana herbarium.

A variety of physical site parameters examined at each location include: 1) elevation, 2) aspect, 3) slope, 4) soil texture and morphology, 5) depth to a restrictive layer, 6) depth to water table, 7) surface topography and geomorphology, 8) percentage of rock, litter/duff, woody debris, moss or bare soil, and 9) natural and human-caused disturbances.

# ANALYSIS

## Vegetation Types

Existing classification systems were consulted to facilitate assembly of sampled stands into groups according to their characteristic vegetation types. Because species do not respect political or state boundaries, floristic communities commonly span any number of states and result in overlaps between classifications. The primary classification used for this correlation process was the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995). Other sources included, but were not restricted to, *Forest Habitat Types of Northern Idaho: A Second Approximation* (Cooper and others 1991), *Riparian Community Type Classification of Utah and Southeastern Idaho* (Padgett and others 1989), *Aspen Community Types of the Intermountain Region* (Mueggler 1988), *Forest Habitat Types of Central Idaho* (Steele and others 1981), *Riparian Community Type Classification of Eastern Idaho-Western Wyoming* (Youngblood and others 1985b) and *Forest Habitat Types of Montana* (Pfister and others 1977).

Although the "type" is named after the dominant indicator species found on a site, other environmental factors such as substrate, topography, geology, and climate are integral to the characterization as well. Sites were evaluated with keys and matched to the descriptions of the appropriate types. Where successional patterns or trends could be discerned, the individual types were placed within the hierarchical structure of the habitat type and community type regime according to their particular successional stage. Some descriptions of previously identified types required any number of modifications due to subtle differences in species diversity and/or coverage, and minor differences in the physical environment. Other stands that did not match existing types under current classifications were either categorized as unclassified riparian sites (approximately 4%) and set aside for future consideration, or described as new types according to their observed frequency and distribution during the field inventory.

## Synthesis Tables

Once the initial stands were assigned to their respective types, computer generated synthesis tables were developed as outlined by Mueller-Dombois and Ellenberg (1974). Synthesis tables were arranged with sampled "stands" along the horizontal axis and "species" identified within the sites along the vertical axis. Species coverages filled the body of the matrix. Species composition of individual stands were compared within each type and between similar types for

fidelity. Stands were reorganized where inconsistencies in composition and canopy cover were noted. Reorganization generally occurred within the series of a type. Series, in this instance, refers to a collection of habitat types in which the common upper story tree or shrub component has more than one dominant under-story layer, generally as a result of slight differences in physical site conditions (Hansen and others 1995). The *Abies lasiocarpa* (subalpine fir) Series, for example, appears to be distributed along a moisture gradient. *Abies lasiocarpa/ Streptopus amplexifolius* habitat type (subalpine fir/clasping-leaved twisted stalk habitat type) occupies moist sites, *Abies lasiocarpa/Galium triflorum* habitat type(subalpine fir/sweetscented bedstraw habitat type) is present on slightly drier sites, and *Abies lasiocarpa/Actaea rubra* habitat type (subalpine fir/baneberry habitat type) inhabits zones drier than either of the preceding types. Habitat types within a series tend to be more closely related than to other habitat or community types. Regrouping of individual stands into unrelated series were exceptionally rare. Constancy tables, described by Mueller-Dombois and Ellenberg (1974), with average cover and range of canopy cover (maximum/ minimum) for each type, were developed from the synthesis tables for further scrutiny and restructuring where necessary. These tables are provided in conjunction with the description for each type.

**Sorensen's Similarity Indices**

Sorensen's similarity indices were calculated to compare plots primarily within each vegetation type for further discrimination between stands and ensure proper placement of each stand within the classification. Similarity indices are a means by which to reduce information from high dimensional space, such as a synthesis table with numerous plots, species, and coverages, into low dimensional space, in this case a single value, which compares species and coverages between two vegetation communities. Sorensen's presence/absence similarity index is a fairly simple equation defined by:

$$\mathbf{Cs} = \mathbf{2(j) / (a + b)}$$

where **Cs** = the similarity of site **A** to site **B**
**j** = the number of species found in both sites **A** and **B**
**a** = the number of species found in site **A**
**b** = the number of species found in site **B**

At the most elemental level, assume that site A and site B are both vegetated with the same species. There is one species present in each site, resulting in a denominator of (1 + 1) = 2. The two sites have the one species in common (j = 1), resulting in a numerator of 2(1) = 2. The similarity score (Cs) for species composition for the two sites equals 1. Similarity scores range from 0 - 1, with complete similarity registering a score of 1. More species will represent more calculations, but with the same end product, a single number.

A derivative of Sorensen's presence/absence similarity index developed by Roberts (1986), that includes a weighting factor reflecting the abundance of each species in relation to canopy cover, was also employed. However, this equation is far more complex than that for the presence/absence index, and will not be discussed in detail here. The equation is defined by:

$$S_{ab} = \frac{\sum_{i=1}^{n} \left[ (X_{ai} + X_{bi}) \left( \frac{\min(X_{ai}, X_{bi})}{\max(X_{ai}, X_{bi})} \right) \right]}{\sum_{i=1}^{n} (X_{ai} + X_{bi})}$$

where $S_{ab}$ = the similarity of site **a** to site **b**
$X_{ai}$ = the abundance of species **i** in site **a**
$X_{bi}$ = the abundance of species **i** in site **b**

The combination of these indices predicts the relationship between stands as a function of the presence of mutual species and further refines this relation according to correlation between coverages for each pair of species. A general discussion concerning the suitability of these analyses can be found in the Results section.

**Ordination Analysis**

Ordination was an additional tool which helped organize the placement of stands, indicating underlying potential environmental or successional features overlooked during sampling in the field. Although a number of types of ordinations are available for analysis, not all are appropriate for the method of data collection or provided practical application due to the type of data collected. Detrended Correspondence Analysis (DCA) provided the best interpretation of results. Although Principal Components Analysis (PCA), Correspondence Analysis (CA), Polar ordination, using the Bray-Curtis method, Non-metric multidimensional scaling (NMS) and Canonical Correlation Analysis

(CCA) were considered, each of these tests were rejected due to complications with underlying criteria (Jongman and others, 1995), or lack of sensitivity to the data analyzed which resulted in unintelligible results.

Detrended Correspondence Analysis (DCA) is essentially a method of weighted averaging (Gauch 1982). At its most basic level, DCA is a process of arbitrarily assigning ranked values to variables in a database and calculating scores for them. The data base axes for this analysis were samples and species. Species coverages filled the rows and columns of the matrix. A basic algorithm, simply an algebraic equation, was used to calculate scores for the sample plots according to species composition and coverage. Another algorithm was used to calculate scores for each species according to its frequency in the matrix and its percent of the total cover for all species. The sample scores and species scores were recalculated in a series of iterations, and the species and samples were shuffled so that scores created by the algorithms were arranged in descending order in a chart. Those samples which had similar species with similar coverages received similar scores and were placed in proximity to one another in the database. Species scores were treated similarly, with species organized according to the numbers of plots they shared. The reshuffling process was complete when scores were calculated and the order of the samples, and species, in the list remained the same. (Jongman and others 1985).

The results of these calculations can be graphed along three possible axes with computer packages designed for multivariate analysis. However, as a result of the calculations involved with the weighted averaging and algorithms, the axis of the graphs are artificial, and represent only a coordinate system by which to plot the data. The value of the data is its spatial arrangement. Attached to each axis is a measure of variation called an eigenvalue (Gauch 1982). An eigenvalue represents the distribution of sample scores or species scores for a particular axis on a scale. In essence, it is a measure of how well the graphical display captures variation in the data. The first axis has the largest eigenvalue (explains the greatest variation in the data), while the second axis has the next largest value. Jongman and others (1995) indicate that the first two axis generally capture most of the valuable information. They suggest ignoring the third and higher axis due to the generally limited amount of information contained within them. Eigenvalues range from 0-1. A value of 0.5 or greater for the first axis generally indicates a good distribution of scores, and, subsequently, an explanation of the variation inherent in a system (Jongman and others 1995). Lower values are not

rejected but merely indicate that less variation was captured or explained. The data can still provide important insights and useful information.

It should be noted that DCA should not be considered as statistical validation with confidence intervals, but as a tool by which to predict general trends and establish basic conclusions. The ordination itself does not provide definitive results. A subsequent, independent step is required by the observer once the ordination analysis is completed (Jongman and others, 1995). For this study, the procedure involved interpreting the graphical ordination displays to predict the relationship with the environmental parameters influencing the various study sites (Gauch 1982). Observations in the field and knowledge of the ecological requirements of the species within the stands were instrumental in predicting factors influencing the various communities. However, where only a limited number of samples were collected for a particular community, the correlation with environmental factors and with other communities becomes more difficult to gauge. A series of graphs, which display these results in conjunction with interpretations for each of the figures, have been provided in the following Results section.

## RESULTS

### Sorensen's Similarity Indices

The Sorensen's similarity indices applied in this study were used to predict the relationship between stands both as a function of the presence of mutual species (presence/absence index), and with the added correlation measure that compared coverages for each pair of shared species (presence/absence index weighted with canopy cover). Similarity scores were most valuable when used in conjunction with the original field data, and provided insights useful in the development of the descriptions and successional placement of some of the types. In general, one or two similar, dominant species with elevated coverages influenced the weighted index score dramatically. Sorensen's similarity indices were calculated for pairs of species primarily from stands within individual vegetation types. Similarity scores for stands categorized within each type could vary over a wide range due to variations in species composition and coverages (range: 0-1, max.: 1.0, min.: .08). Differences in elevation, topography and overall geographic location are thought to account for much of this variation. The successional stage of the stands at the various sites, as well as historic disturbances, may also explain the presence or absence of some species and disparities in similarity scores.

**Ordination Analysis**

Detrended Correspondence Analysis (DCA) was the main ordination method used in this study. Due to the heterogeneity of vegetation communities present at the landscape level, and the sheer numbers of species and the complexity of interactions with one another and the various, associated environmental factors, sites were broken down into three general categories according to the tallest, dominant vegetation layer at each site: trees, shrubs, and herbaceous species. These three categories parallel the initial break in the dichotomous key in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995) and follow the hierarchical organization of the classification. (The development of a similar key, as the final step in this classification process, is described at the end of the Results section). DCA analysis was applied to each of these categories; however, at this level, the amount of noise, or variation of the vegetation communities, prevented the ordination programs from deriving meaningful results. The groups were divided again, paralleling the next break in the dichotomous key, which resulted in six categories: coniferous tree and deciduous tree communities, willow shrub and non-willow shrub communities, and graminoid and forb herbaceous communities. This subsequent division provided enough homogeneity within the individual categories, while limiting the number of stands to be compared for each individual test, to allow the ordination programs to analyze the data with moderate success.

The following graphs, representing the distribution of vegetation communities sampled in the field, are the results of the analysis for each of six basic life form layers: conifer forest types, deciduous forest types, willow shrub types, non-willow shrub types, graminoid types, and forb types. Interpretations for each of the graphs have been provided with these figures. The communities are defined according to species composition and coverage. The legend to the right of each graph indicates the types of vegetation communities sampled and analyzed for each graph. Each sample is designated with a symbol marking the score assigned to it during the DCA analysis. Habitat types are denoted with an HT and community types with a CT. Series refers to a collection of habitat types in which the common upper story tree component has more than one dominant under story layer, generally as a result of slight differences in physical site conditions (Hansen and others 1995). Types within a series are more closely related to one another than to other types, and tend to be grouped together by the ordination analysis. The number in parenthesis following each vegetation type reflects the number of samples collected for each particular type.

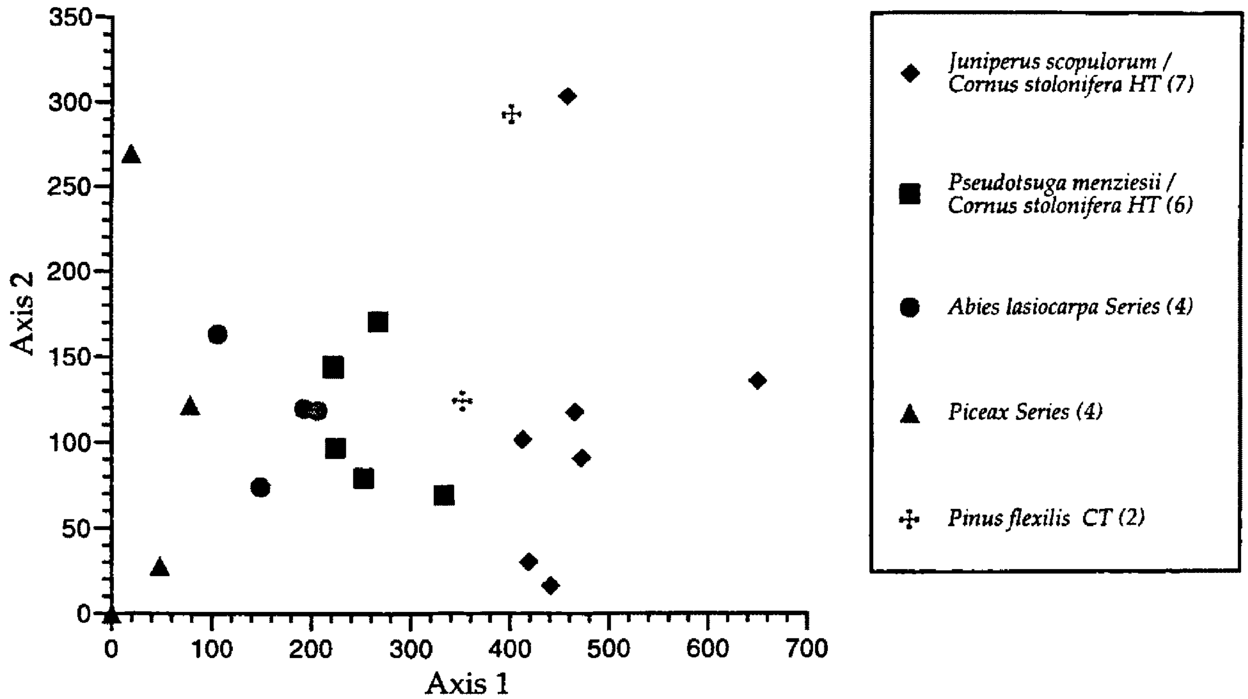


**Figure 5. Detrended Correspondence Analysis - coniferous tree types**

Stands classified as coniferous vegetation types (Fig. 5) for DCA appear to be distributed (Axis 1) along a defined gradient according to the dominant overstory species. Axis 1 accounts for 50% of the variance of the data. Careful scrutiny of the physical site parameters and vegetation features of each of the sites suggests a moisture gradient is influencing the distribution of these communities. *Picea* spp. (spruce) generally occupy wetter environments with neighboring *Abies lasiocarpa* (subalpine fir) communities, while *Pseudotsuga menziesii* (Douglas fir) stands inhabit zones at the drier end of this riparian spectrum in conjunction with *Juniperus scopulorum* (Rocky Mountain juniper). The *Pinus flexilis* (limber pine) stands appear between the *Pseudotsuga menziesii* (Douglas fir) and the *Juniperus scopulorum* (Rocky Mountain juniper) clusters, and have been documented in close proximity to each of these communities during field surveys. These observations suggest that *Pinus flexilis* (limber pine) may represent a potential seral stage within either of these associations or potentially occupies a location on the landscape as a climax between these drier, riparian communities. Additional observations in the field may aid in this determination. The vertical axis (Axis 2) accounts for approximately 30% of the variation between stands. No obvious environmental trends could be interpreted for the distribution, possibly indicating a combination of parameters influencing sites along this axis.

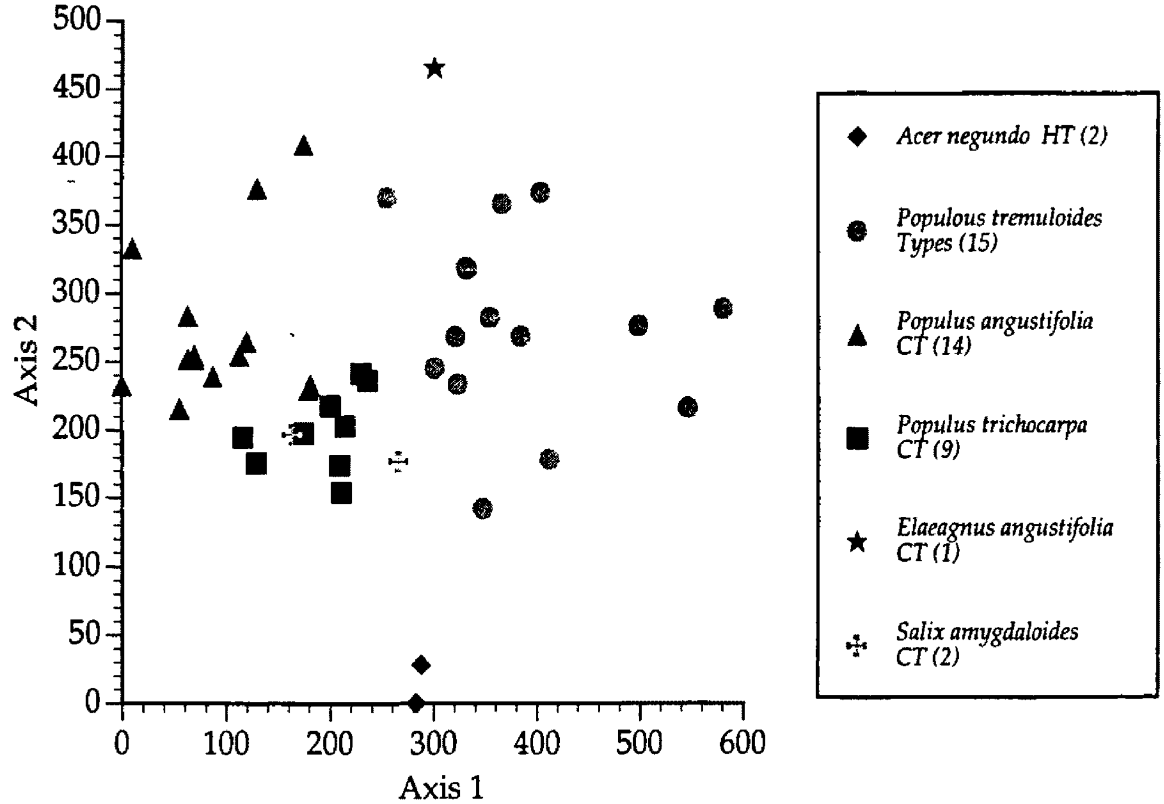


**Figure 6. Detrended Correspondence Analysis - deciduous tree types**

Axis 1 of the DCA ordination illustrates a good separation of the discrete deciduous tree vegetation types (Fig. 6). Although the eigenvalue accounts for only 45 % of the variance, or distribution of species, the clusters of the various types are evident. The stands may be aligned along a minor elevation gradient, at least within the species clusters. The three stands of *Populous tremuloides* (quaking aspen) to the far right hand side of the graph occur above 2,100 m (7,000 ft), while those stands closer to the center of the graph occur around the 1,600 m (5,500 ft) range. However, elevation distributions within the *Populus angustifolia* (narrowleaf cottonwood) cluster near Axis 2, and *Populus trichocarpa* (black cottonwood) group near the center of the graph, are less well defined. Axis 2, representing the vertical distribution of stands, accounts for approximately 32% of the variation between stands. While the types are still clustered, no environmental trends were apparent, suggesting the subtle influence of one or more environmental factors, or potentially the combined effect of numerous factors. However, note that the *Acer negundo* (box-elder) habitat type stands and the *Elaeagnus angustifolia* (Russian olive) community type stands are distributed at opposite ends of the axis. This placement indicates that there are little, if any, species common to both communities, although they have been observed

growing adjacent to each other as part of a larger mosaic across broad riparian zones. The limited number of stands collected, and the fact that *Elaeagnus angustifolia* (Russian olive) is documented as a European exotic while *Acer negundo* (box-elder) is a native which forms climax riparian forests, indicates that further sampling is necessary to better understand these community interactions.

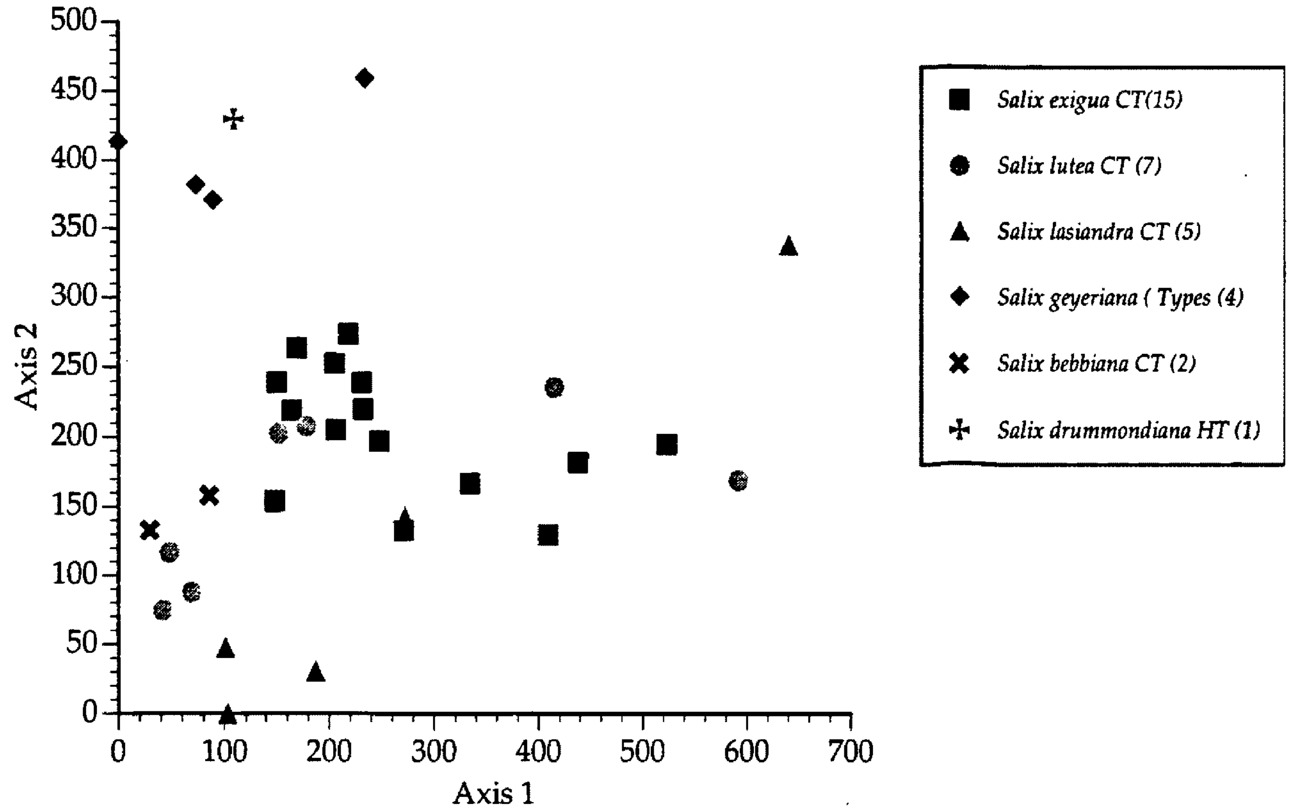


**Figure 7. Detrended Correspondence Analysis - willow shrub types**

The overall pattern of the DCA analysis for willow shrub types (Fig. 7) represents clusters for the distinct communities. However, there is much overlap between the various groups. This distribution is not unlike the complex of willow species often observed in a repeating, patchwork mosaic dominating wide, active floodplains. Axis 1 accounts for over 40% of the variance of the data, while Axis 2 represents approximately 33% of this distribution. The upper left corner of the graph, near Axis 2, represents higher elevations (2,100 m, 7000 ft), and moist climates. *Salix drummondiana* (Drummond willow) often occurs in these subalpine environments, in addition to *Salix geyeriana* (Geyer willow), which is near the upper end of its range (Brunsfeld and Johnson 1985). *Salix exigua* (sandbar willow), a pioneer, shade intolerant species, is a generalist which inhabits a wide range of sites, ultimately modifying them for invasion by later

seral species. The wide distribution of *Salix exigua* (sandbar willow) stands in the center of this graph predicts this life history strategy. The display of both *Salix lasiandra* (Pacific willow) and *Salix lutea* (yellow willow) communities is also widely distributed. These community types may also be found on a variety of locations, acting as mid- to late-seral stages in many places. *Salix lutea* (yellow willow) may also represent a climax community on certain sites as well (Hansen and others 1995).

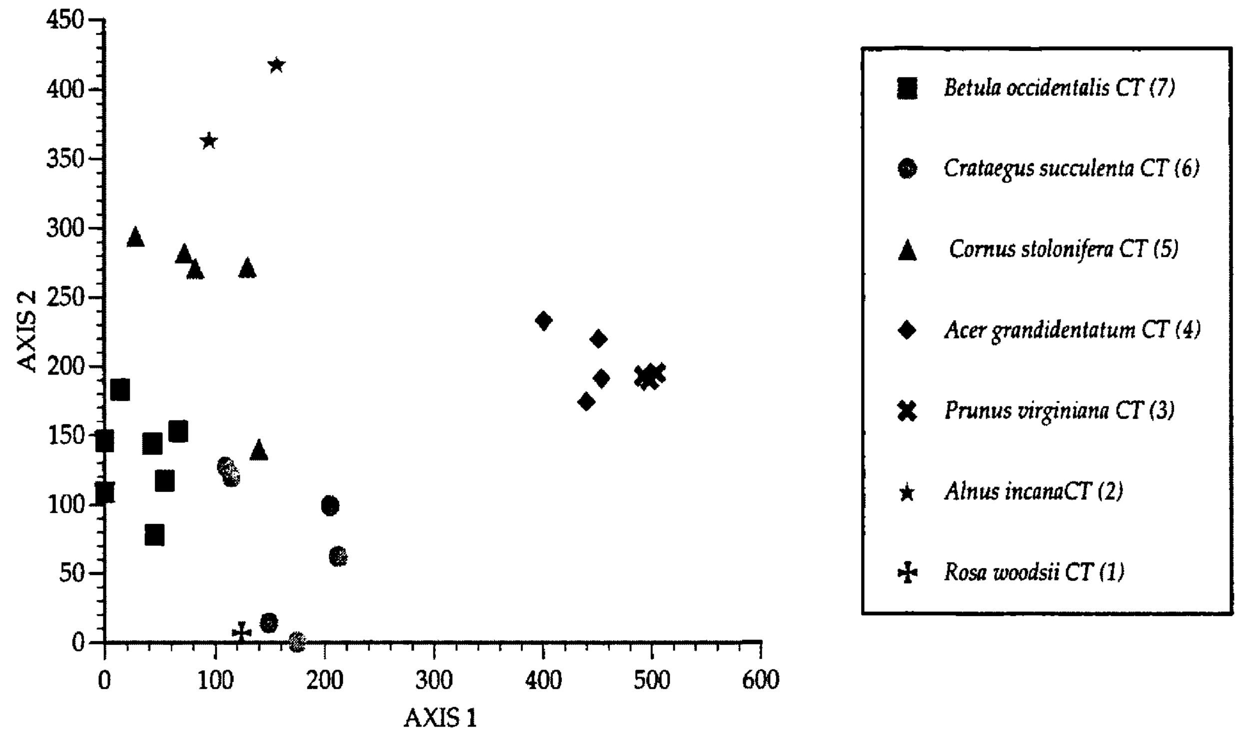


**Figure 8. Detrended Correspondence Analysis - non-willow shrub types**

The DCA analysis for non-willow shrub types (Fig. 8) appears to have disseminated the stands across a moisture gradient along Axis 1. The shrub communities *Betula occidentalis* ( water birch), *Alnus incana* (mountain alder), and *Cornus stolonifera* (red-osier dogwood) found on more moist sites, occur to to the left side of the graph. The *Prunus virginiana* (common chokecherry) and *Acer grandidentatum* (big-tooth maple), to the right side of the graph, are located on generally drier areas. Axis 1 accounts for 47% of the variance of the data. The vertical axis, Axis 2, accounts for approximately 36% of the variation between stands. This axis appears to have established according to a disturbance regime. *Rosa woodsii* (woods rose) and *Crataegus* spp. (hawthorn), at the bottom of the graph near Axis 1, are the most common disturbance-induced communities of the non-willow types. *Alnus incana* (mountain alder) and *Cornus stolonifera* (red-osier dogwood), towards the upper left corner, are present on more natural

settings. *Prunus virginiana* (common chokecherry) and *Acer grandidentatum* (big-tooth maple), situated in the middle of the axis, may be found in both moderately disturbed areas and more natural environments. The lower left corner of the graph may represent an area of ecotones, where species compositions are shifting as stands degrade or recover , or compete for resources and space.

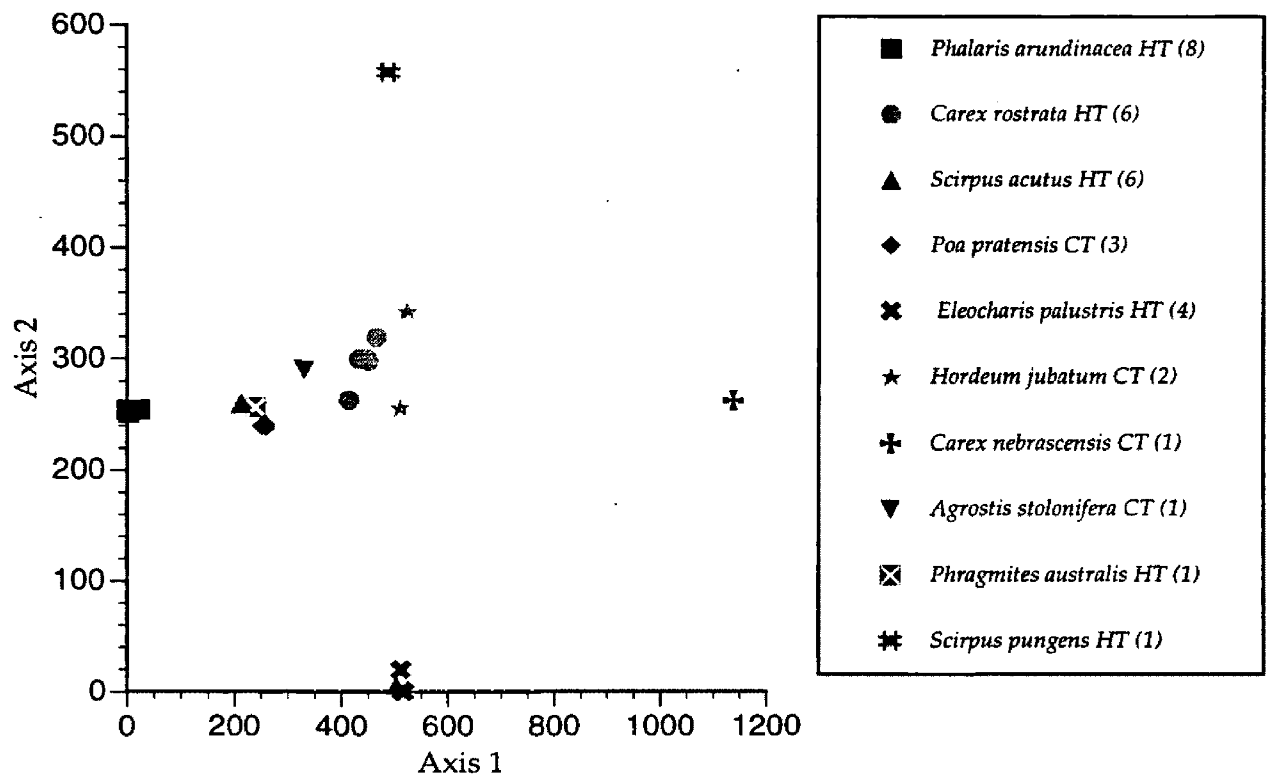


**Figure 9. Detrended Correspondence Analysis - graminoid dominated types**

The graminoid dominated stands (Fig. 9) classified by DCA appear to be distributed along a definitive gradient across Axis 1 (42% variance). However, no apparent environmental trends can account for this distribution. Axis 2, on the vertical plane, accounts for 35% variation of the stand placement. No discernible environmental features predict the dissemination of communities along this axis either. A combination of environmental parameters, rather than any singularly dominant trait, may be responsible for the distribution of the vegetative communities displayed by the ordination. It should be noted that both axes exhibit polar distributions of the distinct vegetation types. In general, these types form monocultures on the landscape, with elevated coverages for the dominant species. The ordination accounted for these trends by creating tightly grouped clusters of the individual vegetation types, and by segregating them along each of the axes. Where stands exhibited greater diversity, placement became less

distinct. For instance, one of the six *Scirpus acutus* (hardstem bulrush) stands contained moderate coverage of *Eleocharis palustris* (common spikesedge), and was subsequently placed within that cluster centered at the bottom of the graph (Fig. 9). Inherent difficulties arise with graphical interpretation, however, when the number of samples in any one category is too low. In this case, four vegetation types were represented by only one stand. Two of these stands were designated as an endpoint for each of the two axes. This placement by the ordination, which identifies these stands as completely dissimilar from the stands at the other end of the axes, could potentially skew the data if the limited information on the single-sample types does not adequately represent the full range of characteristics exhibited by these communities. Additional samples of all of the communities, and especially the four single-sample types, should be collected to provide a more accurate assessment of the vegetation types.

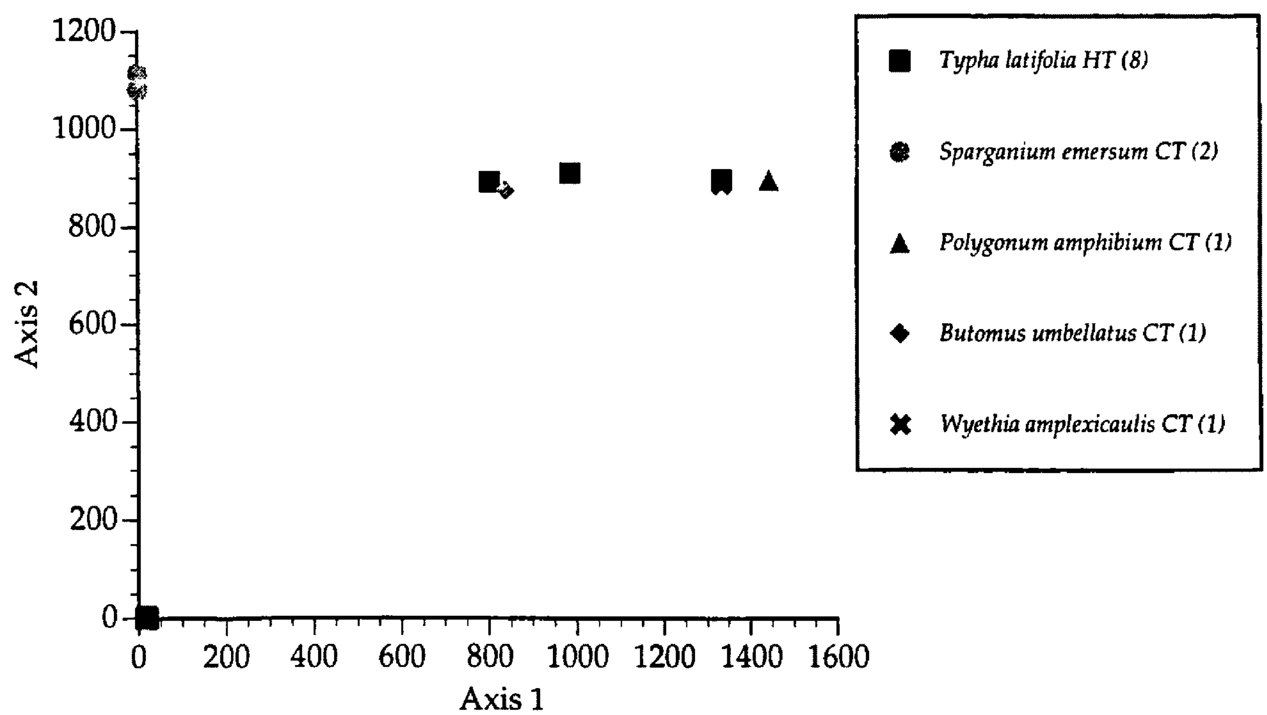


**Figure 10. Detrended Correspondence Analysis - forb dominated types**

The DCA analysis of forb dominated types (Fig. 10) has resulted in the polarized placement of stands along both Axis 1 and Axis 2, although the distribution of communities along Axis 1 appears more as a gradient. Axis 1 explains 44% of the horizontal distribution of points, while Axis 2 accounts for 43% of the vertical variation. Similar to the graminoid-dominated communities, the forb-dominated communities also form monocultures, with dense coverages typical for the

dominant species. *Typha latifolia* (common cattail) communities represent a foci at the origin of the graph, with 4 sites lumped together. However, three other *Typha* spp. (cattail) stands are located along the Axis 1 gradient in the middle of the graph. At one location, the *Butomus umbellatus* (flowering rush) stand and a *Typha* spp. (cattail) stand share *Eleocharis palustris* (common spikesedge) as a common species with moderate coverages. At another location, a *Typha* spp. (cattail) stand also contains *Polygonum amphibium* (water smartweed), so was placed adjacent to the *Polygonum amphibium* (water smartweed) community. By understanding the potentially confusing placements of these stands, the nature of the Axis 1 distribution is clarified. The ordination has separated unlike stands by the greatest possible distance to indicate complete dissimilarity between vegetation composition and coverage, and grouped stands with similar vegetative traits. However, the individual environmental factors which account for the vegetative composition and distribution of these communities on the landscape remains unclear. It should be noted that three of these vegetation types represent only one sample, creating difficulties when looking for trends in community analysis. Additional samples collected in the future may help to alleviate this problem.

**Vegetation Types**

Following the final reorganization of the sampled stands into the individual vegetation types, the key features of each habitat and community type were isolated, assessed and defined for the purposes of designing a dichotomous key. The key was patterned after the Key to Riparian and Wetland Sites of the Rocky Mountains, Foothills and Intermountain Valleys of Montana found in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995) and focuses on those species that are most diagnostic of each specific type. The key identifies first the trees, then the shrubs, and finally the herbaceous types. Within each of these major categories, the habitat types are identified first followed by the community types. At this level, the key generally identifies the wettest habitat types first followed by the drier habitat types. The same order is generally used when identifying the community types (Hansen and others 1995).

A total of 45 types, from approximately 230 sites, were described in this classification: 16 tree habitat types (8) and community types(8); 14 willow/shrub habitat types(2) and community types(12); 2 sedge habitat types(1) and community types(1); and, 13 non-sedge habitat types(6) and community types(7). Five new types, not previously described by other existing classifications, are included within this total and are described in this classification. Approximately

4% of the samples collected during the 1995 inventory were not classified. These stands were considered transitional stands potentially representing ecotones or were listed as undetermined due to lack of sufficient information for placement in the classification. These isolated stands were designated for further analysis as the classification continues to develop, but were not included in the current draft. An index of the types is located at the beginning of this document after the table of contents on page vi.

Table 2 provides information concerning the geographic distribution and abundance of the habitat types and community types found in southern and eastern Idaho. Distribution is divided according to BLM Resource Area. Abundance falls into three categories; major, minor, and incidental. Types characterized by major abundances occupy extensive acreages in some portion of the riparian or wetland zone. Types are considered to have minor abundances if they rarely occupy large areas, although they may occur frequently in riparian or wetland zones. Incidental types only rarely occur in riparian or wetland zones and with minimal acreages. A dash "—" in this table indicates that the type essentially absent from a particular resource area. (Hansen and others 1995).

**Table 2.** Abundance and distribution of riparian and wetland habitat types (h.t.) and community types (c.t.) in eastern and southern Idaho study area

| Type | Number of Stands | BLM Resource Area(s)[1] ML | BB | Po |
|---|---|---|---|---|
| **Coniferous Forest Types** | | | | |
| *Abies lasiocarpa / Streptopus amplexifolius* h.t. | 4 | minor | — | incidental |
| *Juniperus scopulorum/Cornus stolonifera* h.t | 7 | major | major | major |
| *Picea/Cornus stolonifera* h.t. | 3 | minor | — | incidental |
| *Picea/Galium triflorum* h.t. | 1 | incidental | — | — |
| *Pinus flexilis* c.t. | 2 | incidental | — | — |
| *Pseudotsuga menziesii/Cornus stolonifera* h.t. | 6 | major | major | major |
| **Deciduous Forest Types** | | | | |
| *Acer negundo/Prunus virginiana* h.t. | 2 | minor | — | incidental |
| *Elaeagnus angustifolia* c.t. | 1 | incidental | incidental | minor |
| *Populus angustifolia/Cornus stolonifera* c.t. | 4 | major | — | minor |
| *Populus angustifolia*/Herbaceous c.t. | 9 | major | — | minor |
| *Populus angustifolia/Symphoricarpos occidentalis* c.t. | 1 | major | — | minor |
| *Populus tremuloides/Cornus stolonifera* h.t. | 12 | major | minor | minor |
| *Populus tremuloides/Osmorhiza occidentalis* h.t. | 3 | minor | — | incidental |
| *Populus trichocarpa/Cornus stolonifera* c.t. | 7 | major | incidental | — |
| *Populus trichocarpa*/Herbaceous c.t. | 2 | major | incidental | — |
| *Salix amygdaloides* c.t. | 2 | incidental | — | — |

| Type | Number of Stands | BLM Resource Area(s)[1] ML | BB | Po |
|---|---|---|---|---|
| **Willow Shrub Types** | | | | |
| *Salix bebbiana* c.t. | 2 | minor | — | minor |
| *Salix drummondiana/Calamagrostis canadensis* h.t. | 1 | incidental | — | — |
| *Salix exigua* c.t. | 15 | major | major | major |
| *Salix geyeriana/Carex rostrata* h.t. | 2 | major | — | incidental |
| *Salix geyeriana* c.t. | 2 | major | — | major |
| *Salix lasiandra* c.t. | 5 | minor | minor | minor |
| *Salix lutea* c.t. | 7 | major | major | major |
| **Non-Willow Shrub Types** | | | | |
| *Acer grandidentatum* c.t. | 4 | incidental | — | incidental |
| *Alnus incana* c.t. | 2 | minor | minor | minor |
| *Betula occidentalis* c.t. | 7 | major | major | major |
| *Cornus stolonifera* c.t. | 5 | incidental | incidental | incidental |
| *Crataegus succulenta* c.t. | 6 | incidental | incidental | incidental |
| *Prunus virginiana* c.t. | 3 | incidental | incidental | incidental |
| *Rosa woodsii* c.t. | 1 | minor | major | minor |
| **Sedge Types** | | | | |
| *Carex nebrascensis* c.t. | 1 | minor | minor | minor |
| *Carex rostrata* h.t. | 2 | major | minor | minor |
| **Non-Sedge Types** | | | | |
| *Agrostis stolonifera* c.t. | 1 | incidental | — | incidental |
| *Butomus umbellatus* c.t. | 1 | — | — | incidental |
| *Eleocharis palustris* h.t. | 5 | major | minor | minor |
| *Hordeum jubatum* c.t. | 2 | minor | — | incidental |
| *Phalaris arundinacea* h.t. | 8 | minor | minor | minor |
| *Phragmites australis* h.t. | 1 | incidental | — | incidental |
| *Poa pratensis* c.t. | 4 | major | minor | minor |
| *Polygonum amphibium* c.t. | 1 | incidental | incidental | minor |
| *Scirpus acutus* h.t. | 6 | major | minor | major |
| *Scirpus pungens* h.t. | 1 | incidental | — | incidental |
| *Sparganium emersum* c.t. | 2 | — | — | incidental |
| *Typha latifolia* h.t. | 7 | major | major | major |
| *Wyethia amplexicaulis* c.t. | 1 | incidental | — | — |

[1] **BLM Resource Areas:**
ML = Medicine Lodge Resource Area
BB = Big Butte Resource Area
Po = Pocatello Resource Area

Descriptions of each type were developed primarily from the information collected during the 1995 inventory. The format for these descriptions follows the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and

others 1995). Management information was obtained primarily from the Montana classification (Hansen and others 1995), although where new types were developed or where types from other classifications were incorporated, management strategies were assimilated from other sources. Some types observed during the 1994 inventory were not sampled during 1995 due to constraints on time and personnel. A list of these potential types are provided in Appendix C.

## DISCUSSION

### Overview

Idaho is an extremely diverse state characterized by a wide range of landforms extending from desert to alpine environments. No two vegetation communities are precisely alike due to differences in climate, parent material, topography, elevation, disturbance regimes and a host of other variables. The site classification concept used in this study is based on the premise that vegetation is a surrogate reflecting the cumulative effects of the various elements at work at different locations across the landscape. The scale designation appropriate for this classification is applied at the species level, and stresses the those species present on site as best typifying the principal forces acting there.

This approach has resulted in a classification that establishes baseline information for riparian and wetland zones in southern and eastern Idaho and provides land managers with the knowledge essential to develop appropriate management strategies and policies. Two fundamental aspects of the classification that increase its appeal to land managers are the dichotomous key and the successional hierarchy created through the habitat type framework. The dichotomous key offers a simplistic approach toward identifying vegetation types on the landscape. Users, with a limited amount of floristic knowledge, need only identify essentially the dominant species, and some indicator species, on a site in order to use the classification. Type descriptions provide species lists, summarize physical site parameters, outline successional trends and present viable management strategies. The classification has the potential for widespread application by a broad spectrum of users. The second main advantage of the classification is the successional framework inherent with the habitat type concept. The habitat type represents the land area that supports, or has the potential to support, the same climax vegetation wherever it occurs (Daubenmire 1968). The climax vegetation, or riparian association, represents the endpoint of succession on a site. Community types, intermediate, seral plant communities

with similar floristic components in all structural layers, represent the intermediate stages of succession. They can be organized within the framework of the habitat type system to form a successional hierarchy which may be used to predict the pattern of community replacement from the pioneer to climax stage. Projection of potential, future vegetation communities in an area provide land managers with an additional tool with which to develop future strategies and formulate realistic goals.

Classifications, like the communities they describe, are dynamic by nature. The research conducted for this project represents only the first of potentially many drafts of a comprehensive riparian and wetland classification system for the entire state. New types are discovered as a greater percentage of the landscape is sampled, and existing types are further refined. Three seasons of riparian inventory in eastern and southern Idaho have provided the framework for this riparian classification; however, there remains considerable area to be sampled, and potentially many new and existing types to be described or redefined.

**Considerations and Recommendations**

One difficulty which arises with any classification in its infancy is the limited number of samples (n) collected for each type. These limitations become readily obvious when the results are displayed on the DCA ordination graphs, especially for the forb dominated and graminoid dominated vegetation types, some of which may be represented by only one or two samples. Increasing the number of samples collected for each vegetation community may help to capture more of the variation for each individual type. As documentation for each of the types increases, underlying trends not readily observed, or potentially obscure relationships between, or even within, communities may be discovered. Future research, both within the study area and in other regions of Idaho, are necessary to provide a more detailed range of physical site and vegetation features of existing types, and to ensure that all reoccurring site types found in Idaho have been sampled and described.

Funding sources, an essential ingredient for any project, may impose inherent limitations on the project design as well. The Idaho Falls BLM provided the funding for this research; therefore, samples were restricted primarily to those public lands owned, managed, and/or leased by the BLM. BLM properties in southern and eastern Idaho are extensive and provided a wide range of environments and communities for the initial survey. However, Forest Service lands, state lands, and private lands comprise a considerable portion of the

landscape in the project area as well. The classification, while widely distributed, is not necessarily comprehensive. The land along most rivers and many reservoirs is owned privately, and alpine zones along the various mountain ranges are managed primarily by the Forest Service. Exclusion from many of these areas reduces the sampling variability of many types and prevents the collection of potential new types as large tracts of land remain unexplored.

The issue of disturbance is another obstacle that any land management document must address. Locating undisturbed communities can be difficult on BLM lands in Idaho due to both current and past disturbances from agriculture, livestock, timber and/or mining practices. While private land may also be subject to severe disturbances, some areas were observed to exhibit less impact from human activities. Access to these lands might offer insights to certain vegetation communities in more natural settings where prolonged and/or frequent disturbance has been limited historically. However, due to past disturbances, some natural climax or late seral vegetation communities may be scarce. In some cases, certain communities may have been eliminated completely. Conditions on the landscape may have altered to a degree that even with a local seed source available, some communities may be unable to compete with existing vegetation, and are ultimately lost from the system. While predicting the potential future climax or late-seral communities for various sites (habitat types), the classification reflects the potential vegetation in a region and not historically documented communities which may no longer represent a functioning component of the ecosystem.

The analysis of the sampled stands with Sorenson's similarity indices suggests discriminate application of the tests in order to obtain meaningful results most effectively. Comparisons between stands for each of the different vegetation types generally resulted in low numbers, as would be expected when comparing vegetation composition and coverages between the discrete types. However, the similarity scores calculated for stands within individual vegetation types was more informative. Scores between stands within a single type, expected to range from moderate to high, were widely divergent in some instances. Such inconsistencies elicited additional scrutiny and speculation about stands identified as outliers. Occasionally, existing relationships could be confirmed, or overlooked or obscure patterns could be discovered. Different successional phases, past disturbance regimes, and inadvertent sampling of ecotones often accounted for much of the variation when stands exhibited poor correlation.

The ordination of stands with Detrended Correspondence Analysis emphasized two important underlying factors that must be addressed when analyzing data sets. The first introduces the previously addressed problem of limited data collection. Inherent difficulties arise with graphical interpretation when the number of samples in any one category is too low. A vegetation type, represented by a single sample, may skew the ordination analysis. If the single-sample type does not adequately represent the full range of characteristics exhibited by that type, its alignment with the other stands within the ordination may be inaccurate. Samples may need to be excluded from the analysis until additional samples of the single-sample communities are collected to provide a more accurate assessment of community plasticity. The other complication arises with a large collection of samples representing a variety of vegetation types potentially influenced by multiple environmental factors. In this study, the complexity of interactions at broader scales effectively reduced the ability of the ordination program to arrange data samples in two and three dimensional space to reveal potential trends in the underlying data. Data sets must often be sub-divided into groups, and sometimes further divided into sub-groups, as in the case on this study, before interpretable results are achieved. Division breaks can be established according to a variety of factors depending on what parameters are considered most influential in an area or for certain vegetation types. The dominant lifeforms of the various types were selected for the initial division break in this study, mainly because the dichotomous key and hierarchical organization of the types in the classification are based primarily upon lifeform structure. Other studies, with different objectives, will want to emphasize other characteristics upon which to base subdivisions.

# KEY TO WETLAND AND RIPARIAN SITES OF BLM LANDS IN EASTERN AND SOUTHERN IDAHO

## BACKGROUND

1. This classification is the product of three seasons of research collected during the 1994, 1995, and 1996 summer field sessions. Surveys in 1994 were conducted by the Riparian and Wetland Research Program (University of Montana) on BLM lands in the Upper Snake River District, which includes the Medicine Lodge, Big Butte, Pocatello, Mallad and Snake River Resource Areas. The 1994 inventory served as a pilot study for the draft Idaho habitat type classification system. A tentative list of potential habitat and community types was derived from the work conducted in 1994 in preparation for field work in 1995 and 1996. Surveys in 1995 and 1996 were restricted primarily to BLM properties in the Medicine Lodge, Big Butte, and Pocatello Resource Areas as a result of funding sources. These vegetation type surveys were designed specifically for the purposes of developing a classification and represent the majority of the information contained in the type descriptions. The following descriptions of the vegetation types and the key are modeled after the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995). Constraints on time and the number of field crews in 1995 and 1996 prevented crew members from collecting samples of all potential vegetation types listed during the the 1994 inventory. However, a list of these potential types is provided in Appendix D.

2. The key identifies first the trees, then the shrubs, and finally the herbaceous types. Within each of these major categories, the habitat types are identified first followed by the community types. At this lower level, the key generally identifies the wettest habitat types first followed by the drier habitat types. The same order is used when identifying the community types.

3. The key identifies the site potential; if that is not possible due to disturbance, both natural (e.g., recently deposited alluvial bars) and/or human-caused (e.g., livestock, logging), the key will then "drop" into a community type. ***Reminder: This publication describes several major seral plant communities (community types) that are stable for time frames important for making land management decisions.*** The possible potential(s) for the site can be projected by reading the discussion in the Successional Information section of each community type.

4. On severely degraded sites, the user should look at similar positions on the landscape that are less disturbed and estimate what could be there. Then read the type description before making a determination.

5. Most of the conifer stands sampled were successionally late seral to climax, while all other types (deciduous trees, willows, non-willows shrubs, sedges, and herbaceous non-sedges) were sampled from early seral to climax.

## INSTRUCTIONS

1. Accurately identify and record the canopy cover for all indicator species. The indicator species are those species used in the key.

2. The plot being classified must be representative of the stand as a whole. If not, take another plot. Environmental or vegetation uniformity is a primary consideration in plot selection.

3. Identify the potential lifeform using the ***Lifeform Group Key.*** Generally a tree species is considered successfully reproducing if 10 or more individuals per acre (25/ha) occupy ***or will occupy*** the site.

4. Within the correct lifeform group, key to the ***Habitat Type or Community Type*** by following the key literally. ***All*** conditions stipulated for each couplet must be satisfied in order to make a correct determination. The first set of conditions to satisfy the site characteristics should supply the correct classification.

5. Determine the correct ***Phase*** (if appropriate) by matching stand characteristics with phase descriptions for the habitat type. The first phase description that matches the stand is the correct one. Knowledge of a specific phase may be very important in the development of management prescriptions.

6. In sites where the vegetation is obviously depauperate (unusually sparse) because of heavy grazing or browsing pressure, dense shading, or duff accumulations, ***adjust the key downward*** to reflect the reduced canopy cover. For example, when the key refers to a plant with at least 5 percent canopy cover, the amount would be reduced to needing only 1 percent canopy cover. Extrapolation from the nearest non-depauperate condition occurring on a comparable site will assist in the correct determination of the type.

   In addition, when classifying a site, be aware of and avoid ***microsites. Microsites*** are small areas that are atypical for the stand as a whole. Examples include windthrow pockets filled with colluvium/alluvium or raised hummocks of willows growing on either active or abandon beaver dams comprised of woody materials.

7. In sites that are heavily impacted by grazing or browsing pressures, look around to see if you see *ANY* shrub or tree growth or remnants (stumps). In extreme situations, the potential natural community (such as a willow habitat type) may be present only in the form of dwarf-looking, widely scattered individuals. If this is the case, again adjust the key downward to reflect the reduced canopy cover. Once again, extrapolation from the nearest non-grazed or non-browsed condition occurring on a comparable site will assist in the correct determination of the type.

8. Habitat type or community type can generally be projected for a site in an early seral stage by examining the closest site(s) having the same site conditions (soils, hydrologic characteristics, position on the landscape, etc.).

9. *Caution!* The potential of a site may change if there is a change in the soil and/or water characteristics of the site.

10. ***Warning! The key is not the classification! Validate your determination by comparing the site characteristics with the written description of the type. Be aware that the environmental conditions described in the text are from both sampled sites and personal observations and may not include all the sites on the landscape in which the type is found .***

**Key to Life Form Types**

1. Coniferous trees present *AND* successfully reproducing (10 or more trees per acre) *AND NOT* restricted to micro sites............................................................ **Coniferous Forested Types (p.22)**

1. Coniferous trees absent *OR*, if present, *NOT successfully* reproducing *AND/OR* restricted to microsites ............................................................................................................................ 2

    2. Deciduous trees present *AND* successfully reproducing (10 or more trees per acre) *OR* with a combined canopy cover of at least 25 percent, *AND NOT* restricted to microsites........................................................................ **Deciduous Forested Types (p. 23)**

    2. Deciduous trees absent, *OR* if present, *NOT* successfully reproducing *AND* with a combined canopy cover of less than 25 percent, *AND/OR* restricted to microsites...... ............................................................................................................................ 3

3. Shrub species present with a combined canopy cover of at least 25 percent and not restricted to microsites................................................................................................ **Shrub Types (p. 25)**

3. Shrub species absent or, if present, not successfully reproducing and/or restricted to microsites ........................................................................................................... **Herbaceous Types (p. 27)**

## KEY TO CONIFEROUS FOREST TYPES

* Coniferous trees present *AND* successfully reproducing
(10 or more trees per acre), *AND NOT* restricted to microsites

1. *Abies lasiocarpa* (subalpine fir) present and reproducing successfully....2

1. *Abies lasiocarpa* (subalpine fir) absent or, if present, *NOT* reproducing successfully....3

2. *Streptopus amplexifolius* (twisted stalk), *Mitella breweri* (Brewer's mitrewort), *Mitella pentandra* (five-stamened mitrewort), *Senecio triangularis* (arrowleaf groundsel), individually or in combination, with at least 1 percent cover, *OR* presence of *Gymnocarpium dryopteris* (oak-fern)....***Abies lasiocarpa /Streptopus amplexifolius*** **(subalpine fir/twisted stalk) Habitat Type (p. 30)**

2. *Streptopus amplexifolius* (twisted stalk), *Mitella breweri* (Brewer's mitrewort), *Mitella pentandra* (five-stamened mitrewort), *Senecio triangularis* (arrowleaf groundsel), individually or in combination, with less than 1 percent cover, *AND* absence of *Gymnocarpium dryopteris* (oak-fern)....12

3. *Picea* spp. (spruce) present and reproducing successfully....4

3. *Picea* spp. (spruce) absent or, if present, *NOT* reproducing successfully....6

4. *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), or willow species present........***Picea/Cornus stolonifera*** **(spruce/red-osier dogwood) Habitat Type (p. 39)**

4. *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), or willow species absent....5

5. Site containing at least *TWO* of the following moist site indicator forbs: *Streptopus amplexifolius* (twisted stalk), *Galium triflorum* (sweetscented bedstraw), *Actaea rubra* (baneberry), or *Thalictrum occidentale* (western meadowrue)........***Picea/Galium triflorum*** **(spruce/sweetscented bedstraw) Habitat Type (p. 44)**

5. Site lacking at least *TWO* of the following moist site indicator forbs: *Streptopus amplexifolius* (twisted stalk), *Galium triflorum* (sweetscented bedstraw), *Actaea rubra* (baneberry), or *Thalictrum occidentale* (western meadowrue)....12

6. *Pseudotsuga menziesii* (Douglas fir) present and reproducing successfully ....7

6. *Pseudotsuga menziesii* (Douglas fir) absent or, if present, *NOT* reproducing successfully ....8

7. *Cornus stolonifera* (red-osier dogwood), *Acer glabrum* (Rocky Mountain maple), *Prunus virginiana* (common chokecherry), *Poa pratensis* (Kentucky bluegrass) or *Thalictrum occidentale* (western meadowrue), individually or in combination, with at least 1 percent canopy cover....***Pseudotsuga menziesii/Cornus stolonifera*** **(Douglas fir/red-osier dogwood) Habitat Type (p. 50)**

7. *Cornus stolonifera* (red-osier dogwood), *Acer glabrum* (Rocky Mountain maple), *Prunus virginiana* (common chokecherry), *Poa pratensis* (Kentucky bluegrass) or *Thalictrum occidentale* (western meadowrue), individually or in combination, with less than 1 percent canopy cover ........................................................................................................ 12

8. *Pinus flexilis* (limber pine) present and reproducing successfully........................................ 9

8. *Pinus flexilis* (limber pine) absent or, if present, ***NOT*** reproducing successfully ............ 10

9. *Betula occidentalis* (water birch), *Prunus virginiana* (common chokecherry), *Equisetum arvense* (field horsetail), or *Poa pratensis* (Kentucky bluegrass) , individually or in combination, with at least 1 percent canopy cover............***Pinus Flexilis* (limber pine ) Community Type (p. 47)**

9. *Betula occidentalis* (water birch), *Prunus virginiana* (common chokecherry), *Equisetum arvense* (field horsetail), or Poa *pratensis* (Kentucky bluegrass) , individually or in combination, with at least 1 percent canopy cover...................................................................................... 12

10. *Juniperus scopulorum* (Rocky Mountain juniper) present and reproducing successfully ........................................................................................................................ 11

10. *Juniperus scopulorum* (Rocky Mountain juniper) absent or, if present, ***NOT*** reproducing successfully.................................................................................................. 12

11. Cottonwoods with at least 5 percent cover *OR Cornus stolonifera* (red-osier dogwood), *Poa pratensis* (Kentucky bluegrass), Eragrostis *stolonifera* (redtop), individually or in combination, with at least 1 percent canopy cover........................................................***Juniperus scopulorum/ Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) Habitat Type (p. 35)**

11. Cottonwoods with less than 5 percent cover **or** *Cornus stolonifera* (red-osier dogwood), *Poa pratensis* (Kentucky bluegrass), Eragrostis *stolonifera* (redtop), individually or in combination, with less than 1 percent canopy cover......................................................................12

12. Site ***containing*** at least ***one*** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology.................................. **Unclassified Riparian/Wetland Site**

12. Site ***lacking*** at least ***one*** of the wetland attributes: hydric soils, hydrophytic vegetation or wetland hydrology.................................................................................... **Upland Site**

## KEY TO DECIDUOUS FOREST TYPES

* Deciduous trees present *AND* successfully reproducing
(10 or more trees per acre), *OR* with a combined canopy cover
of at least 25 percent, and not restricted to microsites

1. *Acer negundo* (box-elder) present and successfully reproducing.......................................................2

1. *Acer negundo* (box-elder) absent or, if present, ***NOT*** reproducing successfully..............................3

2. *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Acer grandidentatum* (Bigtooth maple), cottonwood species, or willow species, individually or in combination, with at least 5 percent canopy cover ............................................................... ...***Acer negundo/Prunus virginiana*(box-elder/common chokecherry) Habitat Type (p. 56)**

2. *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Acer grandidentatum* (Bigtooth maple), cottonwood species, or willow species, individually or in combination, with less than 5 percent canopy cover........................................................14

3. *Populus tremuloides* (quaking aspen) present and successfully reproducing..................................4

3. *Populus tremuloides* (quaking aspen) absent or, if present, *NOT* reproducing successfully.......... 6

4. *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), *Alnus incana* (mountain alder) or willow species, individually or in combination, with at least 5 percent canopy cover..................................................................................***Populus tremuloides/ Cornus stolonifera* (quaking aspen/red-osier dogwood) Habitat Type (p. 84)**

4. *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), *Alnus incana* (mountain alder) or willow species, individually or in combination, with less than 5 percent canopy cover.................................................................................................... 5

5. Site *CONTAINING* at least *TWO* of the following moist site indicator species: *Osmorhiza occidentalis* (western sweet-cicely), *Galium triflorum* (sweetscented bedstraw), *Actaea rubra* (baneberry), or *Thalictrum occidentale* (western meadow-rue).................***Populus tremuloides/ Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) Habitat Type (p. 89)**

5. Site LACKING at least **two** of the following moist site indicator species: *Osmorhiza occidentalis* (western sweet-cicely),*Galium triflorum* (sweetscented bedstraw), *Actaea rubra* (baneberry), or *Thalictrum occidentale* (western meadow-rue)...................................................................6

6. *Populus trichocarpa* (black cottonwood) with greater cover than other deciduous tree species.......................................................................................................................................7

6. Other deciduous tree species with greater cover than *Populus trichocarpa* (black cottonwood)..............................................................................................................................9

7. *Cornus stolonifera* (red-osier dogwood) or willow species, individually or in combination, with at least 1 percent canopy cover......................................................................***Populus trichocarpa/ Cornus stolonifera* (black cottonwood/red-osier dogwood) Community Type (p. 93)**

7. *Cornus stolonifera* (red-osier dogwood) or willow species, individually or in combination, with less than 1 percent canopy cover.........................................................................................8

8. Shrub species with less than 25 percent cover........................................................ ***Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) Community Type (p. 100)**

8. Shrub species with greater than 25 percent cover................................................................ 9

9. *Populus angustifolia* (narrowleaf cottonwood) with greater cover than other deciduous tree species.....................................................................................................................................10

9. Other deciduous tree species with greater cover than *Populus angustifolia* (narrowleaf cotton-wood)......................................................................................................................................12

10. Shrub species with at least 25 percent cover.................................................................. 11

10. Shrub species with less than 25 percent cover................................ ***Populus angustifolia/* Herbaceous (narrowleaf cottonwood/Herbaceous) Community Type (p. 71)**

11. *Cornus stolonifera* (red-osier dogwood) or willow species, individually or in combination, with at least 1 percent canopy cover................................................................***Populus angustifolia/ Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) Community Type (p. 64)**

11. *Cornus stolonifera* (red-osier dogwood) or willow species, individually or in combination, with less than 1 percent canopy cover; understory may be dominated by shrub species including Rosa spp.( rose), *Symphoricarpos* spp. (snowberry), or *Amelanchier alnifolia* (western serviceberry)............................................... ***Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) Community Type (p. 77)**

12. *Salix amygdaloides* (peach-leaf willow) or *Elaeagnus angustifolia* (Russian olive) with greater canopy cover than any other individual tree species............................................... 13

12. Other individual tree species with greater canopy cover than *Salix amygdaloides* (peach-leaf willow) or *Elaeagnus angustifolia* (Russian olive)................................................14

13. *Salix amygdaloides* (peach-leaf willow) with greater canopy cover than *Elaeagnus angustifolia* (Russian olive).................***Salix amygdaloides* (peach-leaf willow) Community Type (p. 107)**

13. *Elaeagnus angustifolia* (Russian olive) with greater canopy cover than *Salix amygdaloides* (peach-leaf willow)..........................***Elaeagnus angustifolia* (Russian olive) Community Type (p. 61)**

14. Site ***containing*** at least ***one*** of the following wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology.......... **Unclassified Riparian/Wetland Site**

14. Site ***lacking*** at least ***one*** of the following wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology.....................................................................**Upland Site**

## KEY TO SHRUB TYPES

1. Willows with at least 10 percent canopy cover............................................................ **Willow Key**

1. Willows with less than 10 percent canopy cover...................................................**Non-Willow Key**

### Willow Key

1. *Salix lutea* (yellow willow) with at least 10 percent canopy cover *AND* with greater canopy cover than any other willow species present........................................................................................................................................................ ***Salix lutea* (yellow willow) Community Type (p. 137)**

1. *Salix lutea* (yellow willow) with less than 10 percent canopy cover *AND* with less canopy cover than any other willow species present...............................................................................2

2. *Salix geyeriana* (Geyer willow) and/or *Salix boothii* (Booth willow) with at least 10 percent canopy cover *AND* with a greater canopy cover than any other willow species present ........................................................................................................................ 3

2. *Salix geyeriana* (Geyer willow) and/or *Salix boothii* (Booth willow) with less than 10 percent canopy cover *AND* with less canopy cover than any other willow species present ........................................................................................................................................4

3. *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), *Carex atherodes* (awned sedge), and/or *Carex aquatilis* (water sedge), individually or in combination, with at least 10 percent canopy cover................................................................................................................................ ............. ***Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) Habitat Type (p. 123)**

3. *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), *Carex atherodes* (awned sedge), and/or *Carex aquatilis* (water sedge), individually or in combination, with less than 10 percent canopy cover.................... ***Salix geyeriana* (Geyer willow) Community Type (p. 128)**

4. *Salix drummondiana* (Drummond willow) with at least 10 percent canopy cover *AND* with a greater canopy cover than any other willow species present......................................5

4. *Salix drummondiana* (Drummond willow) with less than 10 percent canopy cover *AND* with less canopy cover than any other willow species present ............................................ 6

5. *Calamagrostis canadensis* (bluejoint reedgrass), *Calamagrostis stricta* (narrow-spiked reedgrass), and/or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with at least 10 percent canopy cover.................................................................................. ***Salix drummondiana/ Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) Habitat Type (p. 114)**

5. *Calamagrostis canadensis* (bluejoint reedgrass), *Calamagrostis stricta* (narrow-spiked reedgrass), and/or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with less than 10 percent canopy cover.........................................................................................................6

6. **Individual non-willow species** with a greater canopy cover in the tallest layer than any **individual willow species** present..............................**GO THE NON-WILLOW KEY**

6. **Individual willow species** with a greater canopy cover in the tallest layer than any **individual non-willow species** present ..........................................................................7

7. *Salix lasiandra* (Pacific willow) with a greater canopy cover than any other individual willow species present..............................***Salix lasiandra* (Pacific willow) Community Type (p. 133)**

7. Any other individual willow species present with a greater canopy cover than *Salix lasiandra* (Pacific willow........................................................................................................................8

8. *Salix bebbiana* (Bebb willow) with a greater canopy cover than any other individual willow species present.............. ***Salix bebbiana* (Bebb willow) Community Type (p. 110)**

8. Any other individual willow species present with a greater canopy cover than *Salix bebbiana* (Bebb willow) ...........................................................................................................9

9. *Salix exigua* (sandbar willow) with a greater canopy cover than any other individual willow species present................................***Salix exigua* (sandbar willow) Community Type (p. 117)**

9. Any other individual willow species present with a greater canopy cover than Salix *exigua* (sandbar willow)........................................................................................................................10

10. Site ***containing*** at least ***one*** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology................................**Unclassified Riparian/Wetland Site**

10. Site ***lacking*** at least ***one*** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology..........................................................................**Upland Site**

## Non-Willow Key

1. *Betula occidentalis* (water birch) with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer..............................................................................................................................................................***Betula occidentalis*** **(water birch) Community Type (p. 149)**

1. *Betula occidentalis* (water birch) with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer..........................................................................2

2. *Alnus incana* (mountain alder) with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer..................................................................................................................................***Alnus incana*** **(mountain alder) Community Type (p. 145)**

2. *Alnus incana* (mountain alder) with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer..................................................................3

3. *Crataegus succulenta* (succulent hawthorn) or *Crataegus douglasii* (black hawthorn), individually or in combination,with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer...............................................................................................................................***Crataegus succulenta*** **(succulent hawthorn) Community Type (p. 157)**

3. *Crataegus succulenta* (succulent hawthorn) or *Crataegus douglasii* (black hawthorn), individually or in combination with less than 15 percent canopy cover ***AND WITHOUT*** the greatest canopy cover in the tallest layer..................................................................................................4

4. *Acer grandidentatum* (big-tooth maple) with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer..................................................................................................***Acer grandidentatum*** **(big-tooth maple) Community Type (p. 142)**

4. *Acer grandidentatum* (big-tooth maple) with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer.....................................................5

5. *Prunus virginiana* (common chokecherry) with at least 15 percent canopy cover AND ***WITH*** the greatest canopy cover in the tallest layer.........................................................................................................***Prunus virginiana*** **(common chokecherry) Community Type (p. 161)**

5. *Prunus virginiana* (common chokecherry) with less than 15 percent canopy cover ***OR WITH-OUT*** the greatest canopy cover in the tallest layer..........................................................6

6. *Cornus stolonifera* (red-osier dogwood) with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer...................................................................................................***Cornus stolonifera*** **(red-osier dogwood) Community Type (p. 154)**

6. *Cornus stolonifera* (red-osier dogwood) with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer.....................................................7

7. *Rosa woodsii* (woods rose) or *Rosa acicularis* (prickly rose), individually or in combination, with at least 15 percent canopy cover *AND WITH* the greatest canopy cover in the tallest layer..... ......................................................................***Rosa woodsii*** **(woods rose) Community Type (p. 164)**

7. *Rosa woodsii* (woods rose) or *Rosa acicularis* (prickly rose), individually or in combination, with less than 15 percent canopy cover *AND WITHOUT* the greatest canopy cover in the tallest layer.................................................................................................................................... 8

8. Site ***containing*** at least ***one*** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology................................ **Unclassified Riparian/Wetland Site**

8. Site ***lacking*** at least ***one*** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology.............................................................................................. **Upland Site**

## KEY TO HERBACEOUS TYPES

1. Sedges with at least 25 percent canopy cover..................................................................**Sedge Key**

1. Sedges with less than 25 percent canopy cover....................................................... **Non-Sedge Key**

### Sedge Key

1. *Carex rostrata* (beaked sedge) with at least 25 percent canopy cover.............................................. ......................................................................***Carex rostrata*** **(beaked sedge) Habitat Type (p. 169)**

1. *Carex rostrata* (beaked sedge) with less than 25 percent canopy cover.......................................... 2

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**NOTE** : The following herbaceous communities represent seral or human-caused disturbance communities (Hansen and others 1995). Before you use this portion of the key, do the following:

A. Carefully examine the stand and determine if *ANY* shrub species are present. If so, go back through the shrub key and reduce all canopy coverages to "present."

B. If NO shrub species are present, then go back through the herbaceous key and reduce all canopy coverages to 5 percent.

C. If the stand still does not key out, then use the following key to ***EITHER*** major seral or disturbance herbaceous community types ***OR*** unclassified riparian or wetland sites.

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2. *Carex nebrascensis* (Nebraska sedge) with at least 25 percent canopy cover........................ ......................................... ***Carex nebrascensis*** **(Nebraska sedge) Community Type (p. 167)**

2. *Carex nebrascensis* (Nebraska sedge) with less than 25 percent canopy cover....................3

3. Site **containing** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology..............................................................**Unclassified Riparian/Wetland Site**

3. Site **lacking** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology........................................................................................................**Upland Site**

## Non-Sedge Key

1. *Typha latifolia* (common cattail) or *Typha angustifolia* (lesser cattail), individually or in combination, with at least 25 percent canopy cover..................................................................... ..............................................................***Typha latifolia*** **(common cattail) Habitat Type (p. 199)**
1. *Typha latifolia* (common cattail) or *Typha angustifolia* (lesser cattail), individually or in combination, with less than 25 percent canopy cover.................................................................... 2

2. *Scirpus acutus* (hardstem bulrush) or *S. validus* (softstem bulrush), individually or in combination, with at least 25 percent canopy cover.................................................................... ....................................................***Scirpus acutus*** **(hardstem bulrush) Habitat Type (p. 192)**

2. *Scirpus acutus* (hardstem bulrush) or *S. validus* (softstem bulrush), individually or in combination, with less than 25 percent canopy cover............................................................... 3

3. *Phragmites australis* (common reed) with at least 25 percent canopy cover....................................... ........................................................***Phragmites australis*** **(common reed) Habitat Type (p. 185)**

3. *Phragmites australis* (common reed) with less than 25 percent canopy cove.................................... 4

4. *Phalaris arundinacea* (reed canarygrass) with at least 25 percent canopy cover.................... ............................................ ***Phalaris arundinacea*** **(reed canarygrass) Habitat Type (p. 182)**

4. *Phalaris arundinacea* (reed canarygrass) with less than 25 percent canopy cover...............5

5. *Scirpus pungens* (sharp bulrush) or *Scirpus americanus* (American bulrush), individually or in combination, with at least ..............***Scirpus pungens*** **(sharp bulrush) Habitat Type (p. 195)**

5. *Scirpus pungens* (sharp bulrush) or *Scirpus americanus* (American bulrush), individually or in combination, with less than 25 percent canopy cover............................................................... 6

6. *Eleocharis palustris* (common spikesedge) or *E. acicularis* (needle spike-rush), individually or in combination, with at least 25 percent canopy cover................................. ........................................***Eleocharis palustris*** **(common spikesedge) Habitat Type (p. 177)**

6. *Eleocharis palustris* (common spikesedge) or *E. acicularis* (needle spike-rush), individually or in combination, with less than 25 percent canopy cover...............................7

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NOTE : The following herbaceous communities represent seral or human-caused disturbance communities (Hansen and others 1995). Before you use this portion of the key, do the following:

A. Carefully examine the stand and determine if *ANY* tree or shrub species are present. If so, go back through the tree or shrub key and reduce all canopy coverages to "present."

B. If NO tree or shrub species are present, then go back through the herbaceous key and

reduce all canopy coverages to 5 percent: ignore the presence of the biennial forbs *Melilotus alba* (white sweet-clover) and *Melilotus officinalis*(yellow sweet-clover)

C. If the stand still does not key out, then use the following key to ***EITHER*** major seral or disturbance herbaceous community types ***OR*** unclassified riparian or wetland sites.

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7. *Polygonum amphibium* (water smartweed) with a greater canopy cover than any other individual herbaceous species........................................................ ***Polygonum amphibium* (water smartweed) Community Type (p. 191)**

7. Other individual herbaceous species with a greater canopy cover than *Polygonum amphibium* (water smartweed).........................................................8

8. *Sparganium emersum* (Simplestem Bur-reed) with a greater canopy cover than other individual herbaceous species........................................................ ***Sparganium emersum* (simplestem bur-reed) Community Type (p. 197)**

8. Other individual herbaceous species with a greater canopy cover than *Sparganium emersum* (Simplestem Bur-reed).........................................................9

9. *Butomus umbellatus* (Flowering Rush) with a greater canopy cover than any other individual herbaceous species.............. ***Butomus umbellatus* (flowering rush) Community Type (p. 176)**

9. Other individual herbaceous species with a greater canopy cover than *Butomus umbellatus* (Flowering Rush).........................................................10

10. *Agrostis stolonifera* (redtop) with a greater canopy cover than any other individual herbaceous species......................... ***Agrostis stolonifera* (redtop) Community Type (p. 174)**

10. Other individual herbaceous species with a greater canopy cover than *Agrostis stolonifera* (redtop).........................................................11

11. *Hordeum jubatum* (foxtail barley) with a greater canopy cover than other individual herbaceous species..................... ***Hordeum jubatum* (foxtail barley) Community Type (p. 180)**

11. Other individual herbaceous species with a greater canopy cover than Hordeum *jubatum* (foxtail barley).........................................................12

12. *Poa pratensis* (Kentucky bluegrass) with a greater canopy cover than any other individual herbaceous species........................................................ ***Poa pratensis* (Kentucky bluegrass) Community Type (p. 187)**

12. Other individual herbaceous species with a greater canopy cover than *Poa pratensis* (Kentucky bluegrass).........................................................13

13. *Wyethia amplexicaulis* (northern mule's-ears) with a greater canopy cover than other individual herbaceous species........................................................ ***Wyethia amplexicaulis* (northern mule's-ears) Community Type (p. 202)**

13. Other individual herbaceous species with a greater canopy cover than Wyethia *amplexicaulis* (Northern Mule's-ears).........................................................14

14. Site **containing** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology................................ **Unclassified Riparian/Wetland Site**

14. Site **lacking** at least **one** of the wetland attributes: hydric soils, hydrophytic vegetation, or wetland hydrology.................................................................. **Upland Site**

# DESCRIPTIONS OF HABITAT TYPES AND MAJOR SERAL COMMUNITY TYPES OF SOUTHERN AND EASTERN IDAHO

## CONIFEROUS FOREST TYPES

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### *Abies lasiocarpa/Streptopus amplexifolius* Habitat Type (Subalpine Fir/Twisted Stalk Habitat Type)

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**ABILAS/STRAMP (ABLA/STAM2)**
**Number Of Stands Sampled = 4**

### LOCATION AND ASSOCIATED LANDFORMS

The *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type is a minor type at mid to upper elevations in mountains and valleys of Idaho. Elevations of sampled sites range from 1,550 to 2,182 m (5,115 to 7,200 ft). This habitat type occurs along slopes with seeps/springs, on subirrigated alluvial terraces, or may occupy zones along small streams and rivers in U- and V-shaped canyons.

### VEGETATION

*Abies lasiocarpa* (subalpine fir) and *Pseudotsuga menziesii* (Douglas fir) codominate late seral stands sampled in Idaho. At the climax stage, *Abies lasiocarpa* (subalpine fir) may form dense canopies in both the upper and middle structural layers, shading out most understory species. Where the canopy is more open, *Amelanchier alnifolia* (western serviceberry), *Rosa woodsii*(woods rose), and *Rubus parviflorus* (thimbleberry) may dominate the understory. Characteristic herbaceous species include *Thalictrum occidentale* (western meadowrue), *Galium triflorum* (sweetscented bedstraw), *Osmorhiza chilensis* (mountain sweet-cicely), *Geranium viscosissimum* (sticky geranium) and *Arnica cordifolia* (heart-leaf arnica) (Table 2). Although *Streptopus amplexifolius* (twisted stalk) is the indicator species and represents one of the main indicator understory species for this type in Montana, it was not observed in any of the sampled stands in Idaho. This discrepancy may be the result of the limited number of stands observed. Additional sites need to be studied to determine if this trend continues, requiring modification to the type description.

**Table 3.** Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type (number = 4 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Abies lasiocarpa* (subalpine fir) | 55 | 40-80 | 100 |
| *Pinus contorta* (lodgepole pine) | <1 | 0-1 | 50 |
| *Populus tremuloides* (quaking aspen) | 3 | 0-10 | 25 |
| *Pseudotsuga menziesii* (Douglas fir) | 30 | 0-80 | 75 |
| **Shrubs** | | | |
| *Acer glabrum* (Rocky Mountain maple) | 10 | 0-20 | 50 |
| *Acer grandidentatum*(bigtooth maple) | <1 | 0-1 | 25 |
| *Amelanchier alnifolia* (western serviceberry) | 6 | 0-10 | 75 |
| *Arctostaphylos uva-ursi* (kinnikinnick) | 3 | 0-10 | 25 |
| *Berberis repens* (creeping Oregon grape) | 2 | 0-3 | 50 |
| *Chimaphila menziesii* (little Prince's pine) | 1 | 0-3 | 25 |
| *Clematis occidentalis* (Columbia clematis) | 1 | 0-3 | 25 |
| *Cornus stolonifera* (red-osier dogwood) | 1 | 0-3 | 25 |
| *Pachistima myrsinites* (mountain-boxwood) | 1 | 0-3 | 25 |
| *Prunus virginiana* (common chokecherry) | <1 | 0-1 | 25 |
| *Ribes lacustre* (swamp currant) | 2 | 0-3 | 50 |
| *Ribes viscosissimum* (sticky currant) | 2 | 0-3 | 75 |
| *Rosa woodsii* (woods rose) | 5 | 0-10 | 75 |
| *Rubus parviflorus* (thimbleberry) | 8 | 0-20 | 75 |
| *Sambucus racemosa* (red elderberry) | 1 | 0-3 | 25 |
| *Shepherdia canadensis* (Canada buffaloberry) | <1 | 0-1 | 25 |
| *Sorbus scopulina* (Cascade mountain-ash) | 5 | 0-20 | 25 |
| *Spiraea betulifolia* (shiny-leaf spiraea) | 5 | 0-20 | 25 |
| *Symphoricarpos albus* (common snowberry) | 5 | 0-20 | 25 |
| *Symphoricarpos occidentalis* (western snowberry) | 2 | 0-3 | 50 |
| *Symphoricarpos oreophilus* (mountain snowberry) | <1 | 0-1 | 25 |
| *Vaccinium membranaceum* (big huckleberry) | 1 | 0-3 | 25 |
| **Graminoids** | | | |
| *Agropyron repens* (quackgrass) | 3 | 0-10 | 25 |
| *Agrostis stolonifera* (redtop) | <1 | 0-1 | 25 |
| *Calamagrostis rubescens* (pinegrass) | 5 | 0-20 | 25 |
| *Calamagrostis stricta* (narrow-spiked reedgrass) | 1 | 0-3 | 25 |
| *Carex geyeri* (elk sedge) | 1 | 0-3 | 25 |
| *Carex raynoldsii* (Raynold's sedge) | <1 | 0-1 | 25 |
| *Elymus cinereus* (basin wildrye) | <1 | 0-1 | 25 |
| *Elymus glaucus* (blue wildrye) | 1 | 0-3 | 25 |
| *Festuca subulata* (bearded fescue) | 1 | 0-3 | 25 |
| Grass perennial (perennial grass) | 1 | 0-3 | 25 |
| *Melica spectabilis* (showy oniongrass) | <1 | 0-1 | 25 |
| *Phleum alpinum* (alpine timothy) | <1 | 0-1 | 25 |
| *Poa pratensis* (Kentucky bluegrass) | 1 | 0-3 | 25 |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | 2 | 0-3 | 75 |
| *Aconitum columbianum* (Columbian monkshood) | <1 | 0-1 | 25 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Actaea rubra* (baneberry) | 2 | 0-3 | 50 |
| *Arnica cordifolia* (heart-leaf arnica) | 2 | 0-3 | 75 |
| *Arnica latifolia* (broadleaf arnica) | 1 | 0-3 | 25 |
| *Aster engelmannii* (Engelmann's aster) | 1 | 0-3 | 25 |
| *Aster modestus* (few-flowered aster) | <1 | 0-1 | 25 |
| *Aster occidentalis* (western aster) | <1 | 0-1 | 25 |
| *Circaea alpina* (enchanter's nightshade) | 1 | 0-3 | 25 |
| *Claytonia lanceolata* (western springbeauty) | <1 | 0-1 | 25 |
| *Collinsia parviflora* (small-flowered blue-eyed mary) | <1 | 0-1 | 25 |
| *Delphinium nuttallianum* (Nuttall's larkspur) | <1 | 0-1 | 25 |
| *Disporum trachycarpum* (wartberry fairy-bell) | 2 | 0-3 | 75 |
| *Epilobium angustifolium* (fireweed) | <1 | 0-1 | 25 |
| *Epilobium ciliatum* (common willow-herb) | <1 | 0-1 | 25 |
| *Erythronium grandiflorum* (glacier-lily) | 1 | 0-3 | 25 |
| *Fragaria virginiana* (Virginia strawberry) | 2 | 0-3 | 75 |
| *Galium triflorum* (sweetscented bedstraw) | 7 | 0-20 | 75 |
| *Geranium viscosissimum* (sticky geranium) | 3 | 0-10 | 75 |
| *Geum macrophyllum* (large-leaved avens) | 1 | 0-3 | 25 |
| *Heracleum lanatum* (cow-parsnip) | <1 | 0-1 | 25 |
| *Hydrophyllum capitatum* (ballhead waterleaf) | <1 | 0-1 | 25 |
| *Lithophragma parviflorum* (smallflower woodlandstar) | <1 | 0-1 | 25 |
| *Lomatium ambiguum* (swale desert-parsley) | 1 | 0-3 | 25 |
| *Lupinus polyphyllus* (many-leaved lupine) | 1 | 0-3 | 25 |
| *Mitella breweri* (Brewer's mitrewort) | 2 | 0-3 | 75 |
| *Nepeta cataria* (catnip) | <1 | 0-1 | 25 |
| *Osmorhiza chilensis* (mountain sweet-cicely) | 6 | 0-10 | 75 |
| *Osmorhiza occidentalis* (western sweet-cicely) | <1 | 0-1 | 25 |
| *Pedicularis bracteosa* (bracted lousewort) | <1 | 0-1 | 25 |
| *Potentilla gracilis* (slender cinquefoil) | 1 | 0-3 | 25 |
| *Pyrola elliptica* (white wintergreen) | <1 | 0-1 | 25 |
| *Ranunculus* spp. (buttercup) | 1 | 0-3 | 25 |
| *Senecio foetidus* (sweet-marsh butterweed) | <1 | 0-1 | 25 |
| *Silene menziesii* (Menzies' silene) | 3 | 0-10 | 25 |
| *Smilacina racemosa* (false spikenard) | 2 | 0-3 | 50 |
| *Smilacina stellata* (starry Solomon-plume) | 1 | 0-3 | 25 |
| *Stellaria jamesiana* (sticky starwort) | 1 | 0- | 25 |
| *Taraxacum officinale* (common dandelion) | 1 | 0-3 | 50 |
| *Thalictrum occidentale* (western meadowrue) | 6 | 3-10 | 100 |
| *Urtica dioica* (stinging nettle) | <1 | 0-1 | 25 |
| *Valeriana occidentalis* (western valerian) | <1 | 0-1 | 25 |
| **Ferns and Allies** | | | |
| *Cystopteris fragilis* (brittle bladder-fern) | 1 | 0-3 | 25 |
| *Equisetum arvense* (field horsetail) | <1 | 0-1 | 25 |
| *Gymnocarpium dryopteris* (oak-fern) | <1 | 0-1 | 25 |

## SUCCESSIONAL INFORMATION

*Populus tremuloides* (quaking aspen) and *Pinus contorta* (lodgepole pine) occasionally appear with limited coverages in seral stands of *Abies lasiocarpa* (subalpine fir). *Pseudotsuga menziesii* (Douglas fir) represents a codominant in most late seral stands, but eventually declines as the stand moves toward climax. Slightly drier sites may contain *Pinus contorta* (lodgepole pine) while wetter sites might be populated with *Populus tremuloides* (quaking aspen), suggesting a potential seral stage for the *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type.

## SOILS

The typical litter/duff layer, primarily needles and small twigs, may reach a thickness of 10 cm (4 in) or more, but is generally much thinner. The underlying organic layer, when present, may reach a depth of 15 cm (6 in) but is often less than 7.5 cm (3 in). Boulders and large rocks are typically present near the surface, often underlying a silt layer that ranges from 2.5 to 45 cm (1-18 in). Clay may or may not be a component; however, alluvial materials in the form of cobbles, gravels, and sands, may comprise 50 percent or more of the substratum. Steele and others (1983) concluded that parent materials are primarily granitics and basalt, but may include quartzite, and rhyolite. Water tables tend to be within 30 cm (1 ft) of the ground surface for at least part of the year.

## ADJACENT COMMUNITIES

*Populus tremuloides* (quaking aspen) and *Abies lasiocarpa* (subalpine fir) stands may converge where alpine seeps and springs surface. *Wyethia* spp. (mule's-ears) may occupy significant coverage as adjacent open meadows or as an understory component with *Populus tremuloides* (quaking aspen). Adjacent wetter communities include *Salix geyeriana* (Geyer willow) and *Betula occidentalis* (water birch). *Abies lasiocarpa* (subalpine fir), *Pinus contorta* (lodgepole pine) and/or *Pseudotsuga menziesii* (Douglas fir) often persist individually as homogeneous stands, or more often, as mosaics, on the adjacent uplands.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Forage value is high for this habitat type. Adjacent streams may act as another attractive feature for livestock. Grazing during wet periods can churn the wet soil and destroy plant cover as well as limit conifer establishment and should be avoided where possible. (Hansen and others 1995).

**Timber**

Timber productivity for *Abies lasiocarpa* (subalpine fir) ranges from moderate, where cold air drainage is impeded and soils are saturated throughout the year, to high on sites with better drainage (Hansen and others 1995).

Blowdown may be a hazard in this habitat type. Removal of decadent, old growth trees, leaving younger, windfirm species often leaves the Streamside Management Zone in better condition to withstand winds following logging. However, if retention of old growth for fish and wildlife habitat (including cavity dwelling birds) is a primary objective, then prescriptions must be designed to minimize blowdown (Hansen and others 1995). Cooper and others (1991) report that clear cutting will reduce the high probability of windthrow associated with partial cutting, but the resulting rise in water tables may produce herb-dominated meadows that reforest very slowly. Light selection cutting may avoid these problems, but heavy equipment use should be delayed until the late summer. Roads, trails, or other site development should be avoided. Cole (1983) showed trails crossing this habitat type to be in much poorer condition than those located in habitat types with better drainages (Hansen and others 1995).

*Pseudotsuga menziesii* (Douglas fir) is a major seral species while *Pinus contorta* (lodgepole pine) acts only in a minor capacity. Even aged management offers greater promise for production of seral species. Partial cutting will lead to dominance by the less desirable climax species. Exposure of bare soil may be required for regeneration of *Pseudotsuga menziesii* (Douglas fir).

Heavy partial cutting or harvesting of adjacent stands by even aged systems will accelerate windthrow of large trees. If large numbers of uprooted trees lead to water quality problems, then removal may be appropriate. Silvicultural prescriptions must be tempered by clearly defined, obtainable objectives and on site evaluation of existing stands (Hansen and others 1995).

**Wildlife**

Browse production and cover levels in early successional stages are good to excellent for elk, deer, bear, and moose. Good cover is also provided for upland game and small mammals. Elk and deer may use low elevation stands as winter range if snow depths are low. Overwintering moose can have a tremendous impact on seedlings of *Abies lasiocarpa* (subalpine fir). Reduction or elimination of the seral shrub species tends to hasten succession toward climax with less suitable food being available for big game (Steele and others, 1983). In this case,

logging or burning the stand may renew production of the browse species (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

Moist, fine textured soils are subject to compaction and damage in spring and early summer when water tables are high. Heavy equipment should be restricted to this habitat type when soils have dried out or are frozen and snow covered to reduce the danger of soil compaction. Efforts to minimize displacement or disturbance of the soil surface during timber management activities should be made to maintain the high productivity of these sites (Hansen and others 1995).

Heavy equipment use should be delayed until the late summer. Roads, trails, or other site development should be avoided and should be located on adjacent uplands. Cole (1983) showed trails crossing this habitat type to be in much poorer condition than those located in habitat types with better drainage (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = seasonally flooded to saturated.

## OTHER STUDIES

Hansen and others (1995) describe this habitat type in Montana. Two phases are recorded for the *Abies lasiocarpa/ Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type: *Streptopus amplexifolius* (twisted stalk) phase and the *Menziesia ferruginea* (fool's huckleberry) phase. Neither *Menziesia ferruginea* (fool's huckleberry) nor *Streptopus amplexifolius* (twisted stalk) were observed in any stands in Idaho; therefore, both phases were rejected. Although both indicator species are absent, stands in Idaho are very similar to those stands from Montana and the name has been preserved until additional sites can be studied to determine whether this type needs to be revised and whether any phases need to be added. Both Cooper and others (1991) and Steele and others (1983) describe a series of *Abies lasiocarpa* (subalpine fir) habitat types for forests of northern and

central Idaho, including *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk). Only Steele and others (1983) distinguish the *Streptopus amplexifolius* (twisted stalk) phase which is currently used by Hansen and others (1995) and appears to match the type observed in eastern and southern Idaho.

## *Juniperus scopulorum/Cornus stolonifera* Habitat Type (Rocky Mountain Juniper/Red-Osier Dogwood Habitat Type)

**JUNSCO (JUSC2)**
**Number Of Stands Sampled = 7**

### LOCATION AND ASSOCIATED LANDFORMS

The *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type is considered a major type at mid to lower elevations in valleys and foothills of Idaho. Elevations of sampled sites range from 1,030 to 1,940 m (3,400 to 6,400 ft). The habitat type may form narrow, stringer communities paralleling stream bottoms of V-shaped canyons, or clumped stands near head water springs. Where it occurs adjacent to larger streams and rivers on older alluvial terraces, this type emerges as a mosaic with other deciduous tree and shrub species in broad stands. In general, this habitat type is found on drier riparian sites.

### VEGETATION

In Idaho, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type characteristically develops an open canopy of widely scattered *Juniperus scopulorum* (Rocky Mountain juniper) on broad alluvial benches. Mid/late seral stands may be dominated by *Populus angustifolia* (narrowleaf cottonwood) and/or *Populus trichocarpa* (black cottonwood). In narrow canyons and draws where *Juniperus scopulorum* (Rocky Mountain juniper) develops a closed canopy, other tree species are essentially absent, except for an occasional *Pseudotsuga menziesii* (Douglas fir). The undergrowth for this habitat type, which varies considerably from site to site, may include: *Cornus stolonifera* (red-osier dogwood), *Rosa woodsii* (woods rose), *Betula occidentalis* (water birch), *Ribes lacustre* (swamp currant), and *Poa pratensis* (Kentucky bluegrass) (Table 3).

**Table 4.** Average canopy cover, range of canopy cover, and constancy for species recorded in mid/late seral to climax stands of the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type (number = 7 stands)

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Juniperus scopulorum* (Rocky Mountain juniper) | 43 | 10-80 | 100 |
| *Populus angustifolia* (narrowleaf cottonwood) | 14 | 0-60 | 29 |
| **Shrubs** | | | |
| *Acer glabrum* (Rocky Mountain maple) | 3 | 0-20 | 14 |
| *Acer grandidentatum* (bigtooth maple) | <1 | 0-3 | 14 |
| *Amelanchier alnifolia* (western serviceberry) | 1 | 0-3 | 29 |
| *Arctostaphylos uva-ursi* (kinnikinnick) | 1 | 0-10 | 14 |
| *Artemisia tridentata* (big sagebrush) | <1 | 0-1 | 29 |
| *Berberis repens* (creeping oregongrape) | 1 | 0-10 | 14 |
| *Betula occidentalis* (water birch) | 4 | 0-20 | 43 |
| *Chrysothamnus nauseosus* (common rabbitbrush) | <1 | 0-1 | 14 |
| *Chrysothamnus viscidiflorus* (green rabbitbrush) | <1 | 0-3 | 14 |
| *Clematis ligusticifolia* (western virgins-bower) | 2 | 0-10 | 43 |
| *Cornus stolonifera* (red-osier dogwood) | 8 | 0-20 | 57 |
| *Crataegus douglasii* (black hawthorn) | <1 | 0-1 | 14 |
| *Elaeagnus commutata* (silverberry) | 3 | 0-20 | 14 |
| *Prunus virginiana* (common chokecherry) | 9 | 0-40 | 43 |
| *Purshia tridentata* (antelope bitter-brush) | <1 | 0-1 | 14 |
| *Rhus aromatica* (fragrant sumac) | 3 | 0-20 | 14 |
| *Ribes lacustre* (swamp currant) | <1 | 0-1 | 43 |
| *Ribes odoratum* (buffalo currant) | <1 | 0-3 | 14 |
| *Rosa woodsii* (woods rose) | 5 | 0-20 | 71 |
| *Salix exigua* (sandbar willow) | 1 | 0-3 | 29 |
| *Salix lutea* (yellow willow) | 2 | 0-10 | 29 |
| *Sambucus cerulea* (blue elderberry) | <1 | 0-3 | 14 |
| *Symphoricarpos albus* (common snowberry) | <1 | 0-1 | 14 |
| *Symphoricarpos occidentalis* (western snowberry) | 9 | 0-60 | 29 |
| *Toxicodendron rydbergii* (poison ivy) | <1 | 0-1 | 14 |
| **Graminoids** | | | |
| *Agropyron caninum* (bearded wheatgrass) | 1 | 0-3 | 43 |
| *Agropyron smithii* (western wheatgrass) | 3 | 0-20 | 29 |
| *Agrostis stolonifera* (redtop) | 1 | 0-10 | 14 |
| *Bromus commutatus* (hairy brome) | 3 | 0-20 | 43 |
| *Bromus inermis* (smooth brome) | 2 | 0-10 | 29 |
| *Bromus japonicus* (japanese brome) | 4 | 0-30 | 14 |
| *Bromus tectorum* (cheatgrass) | 9 | 0-60 | 43 |
| *Carex* spp.(sedge) | 1 | 0-3 | 29 |
| *Dactylis glomerata* (orchard-grass) | 10 | 0-70 | 14 |
| *Elymus cinereus* (basin wildrye) | 1 | 0-3 | 43 |
| *Elymus glaucus* (blue wildrye) | <1 | 0-3 | 14 |
| *Elymus virginicus* (Virginia wildrye) | <1 | 0-1 | 14 |
| *Phleum pratense* (common timothy) | <1 | 0-1 | 14 |
| *Poa palustris* (fowl bluegrass) | 1 | 0-10 | 14 |
| *Poa pratensis* (Kentucky bluegrass) | 8 | 0-20 | 86 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | <1 | 0-1 | 14 |
| *Apocynum androsaemifolium* (spreading dogbane) | <1 | 0-3 | 14 |
| *Arabis* spp.(rockcress) | <1 | 0-1 | 14 |
| *Arabis hirsuta* (hairy rockcress) | <1 | 0-1 | 14 |
| *Arabis holboellii* (holboell's rockcress) | <1 | 0-1 | 14 |
| *Arctium minus* (common burdock) | <1 | 0-3 | 14 |
| *Arnica longifolia* (longleaf arnica) | <1 | 0-1 | 14 |
| *Aster chilensis* (long-leaved aster) | 3 | 0-20 | 14 |
| *Aster* spp. (aster) | <1 | 0-1 | 14 |
| *Camelina microcarpa* (littlepod falseflax) | <1 | 0-1 | 14 |
| *Cirsium arvense* (Canada thistle) | 2 | 0-10 | 29 |
| *Cirsium* spp. (thistle) | <1 | 0-1 | 14 |
| *Cirsium vulgare* (bull thistle) | <1 | 0-1 | 14 |
| *Collomia linearis* (narrow-leaf collomia) | <1 | 0-1 | 14 |
| *Cynoglossum officinale* (common hound's-tongue) | 1 | 0-3 | 43 |
| *Erigeron glabellus* (smooth daisy) | <1 | 0-1 | 29 |
| *Eriogonum heracleoides* (wyeth buckwheat) | <1 | 0-1 | 14 |
| Forb (unknown forb) | <1 | 0-1 | 29 |
| *Galium triflorum* (sweetscented bedstraw) | 2 | 0-10 | 43 |
| *Glycyrrhiza lepidota* (American licorice) | 2 | 0-10 | 29 |
| *Heracleum lanatum* (cow-parsnip) | <1 | 0-3 | 14 |
| *Lactuca serriola* (prickly lettuce) | 2 | 0-10 | 43 |
| *Lappula redowskii* (western Stickseed) | <1 | 0-3 | 14 |
| *Nepeta cataria* (catnip) | <1 | 0-3 | 14 |
| *Osmorhiza chilensis* (mountain sweet-cicely) | 3 | 0-10 | 29 |
| *Senecio serra* (tall butterweed) | <1 | 0-3 | 14 |
| *Sisymbrium loeselii* (Loeselii tumblemustard) | <1 | 0-1 | 14 |
| *Smilacina racemosa* (false spikenard) | <1 | 0-3 | 14 |
| *Smilacina stellata* (starry Solomon-plume) | 5 | 0-30 | 29 |
| *Solidago canadensis* (Canada goldenrod) | 1 | 0-3 | 29 |
| *Solidago missouriensis* (Missouri goldenrod) | <1 | 0-1 | 14 |
| *Taraxacum officinale* (common dandelion) | 1 | 0-3 | 29 |
| *Tragopogon dubius* (goat's beard) | 1 | 0-3 | 57 |
| *Trifolium* spp. (clover) | 3 | 0-20 | 14 |
| **Ferns and Allies** | | | |
| *Equisetum laevigatum* (smooth scouring-rush) | <1 | 0-3 | 14 |

## SUCCESSIONAL INFORMATION

Seral stands of this type may be dominated by *Populus trichocarpa* (black cottonwood), *Populus angustifolia* (narrowleaf cottonwood), or various shrub species, such as *Salix* spp. (willows) or *Betula occidentalis* (water birch). In these seral stands, *Juniperus scopulorum* (Rocky Mountain juniper) will be present and successfully reproducing, but may only dominate the understory, especially in mature *Populus trichocarpa* (black cottonwood) and *Populus angustifolia*

(narrowleaf cottonwood) forests. Stands may persist in this seral stage for decades, but eventually the more shade-tolerant *Juniperus scopulorum* (Rocky Mountain juniper) will prevail as the dominant tree species, barring severe disturbance.

## SOILS

The *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type in Idaho appears on a variety of locations across the landscape. On rocky slopes in V-shaped canyons, only a shallow layer of silt/loam 2.5-15 cm (1-6 in) deep may cover the underlying rocky substrate. The litter /duff layer, when present, is shallow, 5 cm (2 in) or less, and composed primarily of needles. Alluvial floodplains are characterized by silts, clays and sand often 60 cm (24 in) or more deep, overlying gravels, cobbles or larger rocks. Hansen and others (1995) indicate that this habitat type is intolerant of frequent and prolonged flooding. However, the type is tolerant of periodic flooding and high water tables. Soils of this habitat type, typically Mollisols, Entisols (Fluvents), or Inceptisols, are generally well drained and have a low water holding capacity. Coarse textured soils and moderate stream gradients provide an environment that produces a rapid movement of well aerated groundwater.

## ADJACENT COMMUNITIES

*Pseudotsuga menziesii* (Douglas fir), *Juniperus scopulorum* (Rocky Mountain juniper), and *Acer grandidentat*um (bigtooth maple) communities may occupy adjacent uplands. *Artemisia tridentata* (big sagebrush) shrubland/grasslands are often present on plateaus adjacent to canyon sites, or at the edge of secondary floodplains. Adjacent wet site communities may be dominated by *Salix exigua* (sandbar willow), *Salix lutea* (yellow willow), or *Betula occidentalis* (water birch) types. The *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type may actually be quite narrow in some locations and may convert to an upland community rapidly. Indicator species are vital for determining the often abrupt transition from riparian to upland communities.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Forage production ranges from low for stands in steep sided canyons, to moderate on sandy floodplains. Stands are typically very droughty, thereby reducing forage production. *Juniperus scopulorum* (Rocky Mountain juniper) is not very palatable to livestock, but young plants can be eliminated by grazing.

*Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife and its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995). Long term utilization may result in the loss of native species and subsequent replacement by weedy invaders.

**Timber**

Other than fenceposts and pencils, *Juniperus scopulorum* (Rocky Mountain juniper) is considered primarily an ornamental species and generally unproductive for timber harvest activities (Hitchcock and Cronquist 1973).

**Wildlife**

Moose and deer use this type for forage and cover. Stands of the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type provide good to excellent structural diversity for both thermal and hiding cover. The berry-like cones of *Juniperus scopulorum* (Rocky Mountain juniper) are an excellent source of food for small mammals and birds. Birds often relish this species, especially in the winter (Arno and Hammerly 1984).

**Fire**

Fire potential is low to moderate in this type. Young juniper trees are easily killed by fire primarily because of their small size, thin bark, and compact crown (Fischer and Bradley 1987). As juniper ages, the bark thickens and the crown develops a bushy, open growth form. A hot fire can kill or severely damage a tree, but the same tree may survive a cool fire. Low, spreading branches can provide a route for fire to enter the crown. Often large junipers have survived a number of fires (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

Typically, these soils have weak structures, low organic matter contents, coarse textures, and thus, low water holding capacities. The high component of coarse textured fragments in the soil make it relatively impervious to compaction. Other less drought resistant, more preferred, forage species associated with this habitat type can be easily disturbed with moderate animal use and can cause an increase of *Juniperus scopulorum* and invader species (Hansen and others 1995).

**Recreational Uses and Considerations**

Although stands of this habitat type are often small, especially when occupying

steep slopes, they may be developed for the purposes of camping and recreational fishing when growing on flat alluvial benches along rivers and streams. Additionally, they may provide excellent opportunities for nature study because of the diversity of wildlife associated with them. However, fire hazard is a serious consideration because even a light fire can kill stands of *Juniperus scopulorum* (Rocky Mountain juniper) .

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

Similar communities have been described for this type in Montana by Hansen and others (1995).

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## *Picea/Cornus stolonifera* Habitat Type (Spruce/Red-Osier Dogwood Habitat Type)

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**PICEA/CORSTO (PICEA/COST4)**
**Number Of Stands Sampled = 3**

## LOCATION AND ASSOCIATED LANDFORMS

The *Picea/Cornus stolonifera* (red-osier dogwood) habitat type is a minor type at mid to higher elevations in Idaho. Elevations of sampled sites range from 1,848 to 2,303 m (6,100 to 7,600 ft). This habitat type occupies flat alluvial terraces bordering mountain streams or moist toe slopes in U- and V-shaped canyons. In some instances, it may inhabit bogs along lakeshores.

## VEGETATION

Stands of the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type are dominated by *Picea* spp. (spruce) in the upper canopy. *Abies lasiocarpa* (subalpine fir), *Pinus contorta* (lodgepole pine), and *Pseudotsuga menziesii* (Douglas fir)

represent only minor components when actually present on site. The understory may be dominated by *Ribes lacustre* (swamp currant) and various *Salix* spp. (willows), with *Lonicera involucrata* (twin-berry) and *Cornus stolonifera* (red-osier dogwood) less well represented. Abundant herbaceous species include *Actaea rubra* (baneberry), *Fragaria virginiana* (Virginia strawberry), *Thalictrum occidentale* (western meadowrue), *Calamagrostis inexpansa* (northern reedgrass) and *Senecio triangularis* (arrowleaf groundsel). Where the overstory is dense, the herbaceous component may be sparse and characterized by low vigor. While species richness is relatively high within each of the canopy layers, covers and constancy for the individual species are actually low; however, the low number of sites sampled may account for this phenomenon.

NOTE: The treatment of *Picea* spp. (spruce) in this classification, which terminates identification at the genus level, derives from the hybridization known to occur within this particular conifer. Most populations of *Picea* in Montana are hybrids derived from *Picea glauca* (white spruce) and *Picea englemanii* (Engelmann spruce) (Daubenmire 1974, Habeck and Weaver 1969). The hybrid cross appears to predominate in Idaho forests as well. However, Pfister and others indicate that the extent of hybridization between *Picea glauca* (white spruce) and *Picea englemanii* (Engelmann spruce) be detected according to the size and shape of cone scales and should be noted due to its potential value for silvicultural purposes. A unique community of *Picea glauca* (white spruce) persists along the periphery of Henry's Lake in the northeast corner of Idaho adjacent to the Montana and Wyoming borders. This stand persists between bog/floating mat environments and appears as a relict community. It has been included within the *Picea* spp. (spruce) series because it keys to the *Picea/Cornus stolonifera* (red-osier dogwood) habitat type, but it may represent a rare community. This site and the surrounding area should be examined during subsequent sampling to properly define the complex nature of communities in this vicinity.

**Table 5.** Average canopy cover, range of canopy cover, and constancy for species recorded in sampled stands of the *Picea/Cornus stolonifera* (red-osier dogwood) habitat type (number = 3 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Abies lasiocarpa* (subalpine fir) | 1 | 0-3 | 33 |
| *Juniperus scopulorum* (Rocky Mountain juniper) | <1 | 0-1 | 33 |
| *Picea* spp. (spruce) | 50 | 50-50 | 100 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Pseudotsuga menziesii* (Douglas fir) | <1 | 0-1 | 33 |
| **Shrubs** | | | |
| *Amelanchier alnifolia* (western serviceberry) | 1 | 0-3 | 33 |
| *Berberis repens* (creeping oregongrape) | 1 | 0-3 | 33 |
| *Cornus stolonifera* (red-osier dogwood) | 2 | 0-3 | 67 |
| *Linnaea borealis* (twinflower) | 1 | 0-3 | 33 |
| *Lonicera involucrata* (twin-berry) | 1 | 0-3 | 67 |
| *Lonicera utahensis* (Utah honeysuckle) | <1 | 0-1 | 33 |
| *Ribes lacustre* (swamp currant) | 7 | 1-10 | 100 |
| *Rosa woodsii* (woods rose) | 1 | 0-3 | 33 |
| *Rubus parviflorus* (thimbleberry) | 7 | 0-20 | 33 |
| *Salix bebbiana* (Bebb willow) | 1 | 0-3 | 33 |
| *Salix boothii* (Booth willow) | 10 | 0-20 | 67 |
| *Salix geyeriana* (Geyer willow) | 1 | 0-3 | 33 |
| *Sambucus cerulea* (blue elderberry) | <1 | 0-1 | 33 |
| *Shepherdia canadensis* (Canada buffaloberry) | 3 | 0-10 | 33 |
| *Spiraea betulifolia* (shiny-leaf spiraea) | 1 | 0-3 | 33 |
| *Symphoricarpos albus* (common snowberry) | 3 | 0-10 | 33 |
| *Vaccinium membranaceum* (big huckleberry) | <1 | 0-1 | 33 |
| **Graminoids** | | | |
| *Bromus carinatus* (mountain brome) | <1 | 0-1 | 33 |
| *Calamagrostis inexpansa* (northern reedgrass) | 8 | 0-20 | 67 |
| *Carex aquatilis* (water sedge) | 10 | 0-30 | 33 |
| *Carex disperma* (soft-leaved sedge) | 7 | 0-20 | 33 |
| *Carex* spp.(sedge) | 3 | 0-10 | 33 |
| *Carex raynoldsii* (Raynolds' sedge) | <1 | 0-1 | 33 |
| *Carex vesicaria* (inflated sedge) | 7 | 0-20 | 33 |
| *Elymus canadensis* (Canada wildrye) | 3 | 0-10 | 33 |
| *Festuca scabrella* (rough fescue) | 7 | 0-20 | 33 |
| *Grass annual* ((annual grass)) | 1 | 0-3 | 33 |
| *Poa pratensis* (Kentucky bluegrass) | 3 | 0-10 | 33 |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | 1 | 0-3 | 33 |
| *Aconitum columbianum* (Columbian monkshood) | <1 | 0-1 | 33 |
| *Actaea rubra* (baneberry) | 8 | 0-20 | 67 |
| *Allium brevistylum* (short-style onion) | 3 | 0-10 | 33 |
| *Arenaria lateriflora* (bluntleaf sandwort) | <1 | 0-1 | 33 |
| *Arnica cordifolia* (heart-leaf arnica) | 1 | 0-3 | 33 |
| *Asperula odorata* (sweet woodruff) | 1 | 0-3 | 33 |
| *Aster* spp. (aster) | 1 | 0-3 | 33 |
| *Astragalus miser* (weedy milk-vetch) | 1 | 0-3 | 33 |
| *Cardamine pensylvanica* (Pennsylvania bittercress) | <1 | 0-1 | 33 |
| *Cicuta maculata* (spotted water-hemlock) | 1 | 0-3 | 33 |
| *Epilobium ciliatum* (common willow-herb) | <1 | 0-1 | 33 |
| *Fragaria virginiana* (Virginia strawberry) | 5 | 3-10 | 100 |
| *Galium boreale* (northern bedstraw) | 1 | 0-3 | 33 |
| *Galium trifidum* (small bedstraw) | <1 | 0-1 | 33 |
| *Geranium richardsonii* (white geranium) | 1 | 0-3 | 33 |

| | | | |
|---|---|---|---|
| *Geranium viscosissimum* (sticky geranium) | 4 | 0-10 | 67 |
| *Geum macrophyllum* (larged-leaved avens) | 1 | 0-3 | 67 |
| *Heracleum lanatum* (cow-parsnip) | 7 | 0-20 | 33 |
| *Ligusticum filicinum* (fearn-leaf lovage) | <1 | 0-1 | 33 |
| *Mertensia ciliata* (mountain bluebell) | <1 | 0-1 | 33 |
| *Mitella pentandra* (five-stamened mitrewort) | 3 | 0-10 | 33 |
| *Osmorhiza purpurea* (purple sweet-cicely) | 1 | 0-3 | 33 |
| *Parnassia fimbriata* (fringed grass-of-parnassus) | 3 | 0-10 | 33 |
| *Pedicularis bracteosa* (bracted lousewort) | <1 | 0-1 | 33 |
| *Ranunculus gmelinii* (small yellow water-buttercup) | <1 | 0-1 | 33 |
| *Ranunculus* spp. (buttercup) | 3 | 0-10 | 33 |
| *Rudbeckia occidentalis* (black head) | 1 | 0-3 | 33 |
| *Saxifraga arguta* (brook saxifrage) | 10 | 0-30 | 33 |
| *Senecio crassulus* (thick-leaved groundsel) | 7 | 0-20 | 33 |
| *Senecio triangularis* (arrowleaf groundsel) | 4 | 0-10 | 67 |
| *Smilacina racemosa* (false spikenard) | 1 | 0-3 | 33 |
| *Smilacina stellata* (starry Solomon-plume) | 1 | 0-3 | 67 |
| *Solidago* spp. (goldenrod) | 1 | 0-3 | 33 |
| *Streptopus amplexifolius* (twisted-stalk) | 3 | 0-10 | 33 |
| *Taraxacum officinale* (common dandelion) | 8 | 0-20 | 67 |
| *Thalictrum occidentale* (western meadowrue) | 8 | 0-20 | 67 |
| *Trifolium repens* (white clover) | 7 | 0-20 | 33 |
| *Veronica americana* (American speedwell) | 7 | 0-10 | 67 |
| *Viola nephrophylla* (northern bog violet) | 1 | 0-3 | 33 |
| **Ferns and Allies** | | | |
| *Equisetum arvense* (field horsetail) | 3 | 0-10 | 33 |
| *Equisetum laevigatum* (smooth scouring-rush) | 1 | 0-3 | 33 |
| *Equisetum palustre* (marsh horsetail) | 7 | 0-20 | 33 |

## SUCCESSIONAL INFORMATION

*Pseudotsuga menziesii* (Douglas fir), *Populus tremuloides* (quaking aspen), and *Populus trichocarpa* (black cottonwood) appear to act as seral stages within the *Picea* spp. (spruce) successional pathways. On wetter sites, *Salix* spp. (willows) may represent a major component, if not the dominant vegetation, preceding the eventual occupation by *Picea* spp. (spruce). Hansen and others (1995) indicate that *Picea* spp. (spruce) reestablishes quickly on disturbed sites but assumes dominance slowly. This pattern may result in mixed forested stands dominated by other tree species in which the *Picea* spp. (spruce) cover varies dramatically.

## SOILS

Rich, black, organic soils, indicative of Mollisols (Hansen and others 1995), may be 60 cm (24 in) or more deep. Due to suspected year round surface and subsurface flows, these soils may exhibit gleying, the reduction of iron under predominantly anaerobic conditions producing a bluish-green cast, or mottling, the presence of brown, yellow or reddish flecks of concentrated iron formed

through alternating oxidizing/ reducing conditions due to fluctuating water tables (Buol and others 1989). Soil textures are predominantly loamy silts and silts, but may exhibit a high component of decomposing woody debris. The presence of the organic material and coarser fragments may partially be the result of alluvial transport. Underlying substrates often consist of alluvial cobbles, gravels, and sands.

## ADJACENT COMMUNITIES

The *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type occupies an intermediate position along a moisture gradient within the *Picea* spp. (spruce) series. The *Picea/Equisetum arvense* (spruce/field horsetail) habitat type indicates saturated or wetter conditions while the *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type occurs on drier sites. Adjacent wetter communities are dominated by *Carex* spp. (sedges), *Salix* species (willow) and *Populus tremuloides* (quaking aspen). *Pseudotsuga menziesii* (Douglas fir) and *Pinus contorta* (lodgepole pine) occupy upland slopes.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Herbage production is low to moderate where the overstory is dense, and tends to limit forage availability for livestock. Where stands are more open, especially under late seral conditions, lush undergrowth may provide excellent forage. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high. Seasonally wet conditions, or year round saturation where this type is located adjacent to springs or seeps, may require special restrictions to prevent soil compaction (see the Soil Management and Rehabilitation Opportunities section) (Hansen and others 1995).

### Timber

Timber productivity ranges from moderate to high. However, streamside locations and high water tables may restrict timber harvest. Partial cutting will favor *Picea* spp. (spruce) while complete stand removal will result in mixed stands of *Pseudotsuga menziesii* (Douglas fir) and *Pinus contorta* (lodgepole pine) along with *Picea engelmannii* (Engelmann spruce). Uneven aged management should be considered as a possible silvicultural system in this habitat type (Hansen and others 1995).

**Wildlife**

Hansen and others (1995) indicate that deer and elk appear to use this type as winter range. Some of the broad, flat mountain valleys associated with this type may be prime year-long moose habitat. Some sites may show sustained heavy use by moose and elk. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by wildlife and livestock. Its utilization is a direct indication of past and current use levels.

**Fisheries**

Those stands of the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type adjacent to streams provide hiding, thermal cover, debris recruitment, and streambank stability for fish. *Cornus stolonifera* (red-osier dogwood) is an excellent shrub for controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

**Fire**

Fire susceptibility is low. However, *Picea engelmannii* (Engelmann spruce), including hybrids with *Picea glauca* (white spruce), is easily killed by fire (Fischer and Bradley 1987). The dead, dry, flammable lower limbs, low growing canopy, thin bark, and lichen growth in the branches contribute to the species' low resistance. The shallow root system is readily subject to injury from fire burning through the duff. Large older trees may occasionally survive one or more light fires, but deep accumulations of resinous needle litter around their bases usually make them very susceptible to fire damage (Hansen and others 1995).

*Cornus stolonifera* (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprouts from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

**Soil Management and Rehabilitation Opportunities**

Machinery and livestock easily compact or otherwise damage the soil during periods with high water tables. Poorly drained sites, stream side locations, or sites with organic soils should also warrant special concern. Roads and trails should be located on the adjacent uplands (Hansen and others 1995).

**Recreational Uses and Considerations**

Because of high water tables and the problems with road construction, campgrounds should not be located in this type.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded.

## OTHER STUDIES

Similar communities have been described for eastern Idaho and western Wyoming (Youngblood and others 1985b), for Utah and southeastern Idaho (Padgett and others 1989), and for Montana. (Hansen and other 1995).

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# *Picea/Galium triflorum* Habitat Type
# (Spruce/Sweetscented Bedstraw Habitat Type)

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**PICEA/GALTRI (PICEA/GATR)**
**Number Of Stands Sampled = 1**

## LOCATION AND ASSOCIATED LANDFORMS

The *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type is an incidental type at moderately high elevations, 2115 m (6980 ft), in the mountains of northeastern Idaho. This habitat type generally borders streams, occupying moist alluvial benches/terraces and narrow floodplains of U-shaped canyons.

## VEGETATION

Mature *Picea* spp. (spruce) may form a continuous, dense overstory, or may develop as clustered stands with scattered openings. *Abies lasiocarpa* (subalpine fir), *Populus tremuloides* (quaking aspen) and *Pinus flexilis* (limber pine) may frequent these sites, but with limited coverages. *Symphoricarpos oreophilus* (mountain snowberry) and *Lonicera involucrata* (twin-berry) occur as components of the inconsequential shrub understory. A diversity of herbaceous species may

include: *Calamagrostis rubescens* (pinegrass), *Arnica cordifolia* (heart-leaf arnica), *Erythronium grandiflorum* (glacier-lily), *Osmorhiza chilensis* (mountain sweet-cicely) and *Thalictrum occidentale* (western meadowrue). The herbaceous layer is sparse under the dense *Picea* spp. (spruce) canopy, but may be quite lush where the sporadic openings allow more light. Mosses may be prevalent on the ground surface under the graminoids and forbs. Although the signature species, *Galium triflorum* (sweetscented bedstraw), was not observed on site, the type matches the description for Montana by Hansen and others (1995) in most other respects. Additional sites should be recorded to determine whether this type description requires modification.

## SUCCESSIONAL INFORMATION

*Pseudotsuga menziesii* (Douglas fir), *Populus tremuloides* (quaking aspen), and *Pinus flexilis* (limber pine) are commonly associated with seral stands of *Picea* spp. (spruce). Where gaps occur in the canopy due to windfall, infestations or other disturbances, *Picea* spp. (spruce) establish quickly, out competing other species to form essentially homogeneous stands. Youngblood and others (1985b) suggest that on extremely well drained sites supporting the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) or *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community types, the *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type may represent the site's potential.

## SOILS

Surface soil textures of this habitat type range from sands to silts, although a minor clay component may be present. Gravels and cobbles are generally absent from the upper 30 cm (12 in). This type customarily occupies drier sites; therefore, soils do not display gleyed or mottled characteristics. Overlying leaf/needle litter and duff may be 2.5 cm (1 in) or more deep. Hansen and others (1995) state that these soils commonly develop from noncalcareous parent alluvium. Most soils have mollic epipedons, although those less developed are commonly Entisols. Some sites have histic characteristics, such as organic layers often exceeding 50 cm (20 in). Water tables are commonly within 1 m (39 in) of the surface throughout the growing season.

## ADJACENT COMMUNITIES

*Salix* spp. (willow) and *Carex* spp.(sedge) communities occupy wet sites adjacent to the *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type. *Populus tremuloides* (quaking aspen) may also form stringer communities

paralleling the stream bottoms or broader stands on moist slopes. Upland sites are dominated by *Abies lasiocarpa* (subalpine fir), *Pseudotsuga menziesii* (Douglas fir) and *Picea* spp. (spruce).

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Herbage production under dense *Picea* (spruce) canopies is low to nonexistent. Where openings form due to windthrow, disease or selective logging, forage availability may be better.

### Timber

Timber productivity ranges from moderate to very high. However, streamside locations and high water tables may restrict timber harvest. Partial cutting will favor *Picea* spp. (spruce) while complete stand removal will result in mixed stands of *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine) and *Picea engelmannii* (Engelmann spruce). Uneven aged management should be considered as a possible silvicultural system in this habitat type (Hansen and others 1995).

### Wildlife

Deer and elk use this type as winter range. Some of the broad, flat mountain valleys associated with this type may be prime year-long moose habitat. Some sites may show sustained heavy use by moose and elk. Great blue herons are known to nest in *Picea* spp. (spruce) stands, if a high degree of isolation during nesting is possible (Parker 1980). Osprey will nest in old growth *Picea* spp. (spruce) (Snow 1973).

### Fisheries

When associated with stream corridors, this habitat type may provide bank stability, enhance fish habitat requirements as windfall and deadfall trees offer cover and create plunge pools, and protect against thermal heating during summer months.

### Fire

Fire susceptibility is low. However, *Picea engelmannii* (Engelmann spruce), including hybrids with *Picea glauca* (white spruce), is easily killed by fire (Fischer and Bradley 1987). The dead, dry, flammable lower limbs, low growing canopy,

thin bark, and lichen growth in the branches contribute to the species' low resistance. The shallow root system is readily subject to injury from fire burning through the duff. Large older trees may occasionally survive one or more light fires, but deep accumulations of resinous needle litter around their bases usually make them very susceptible to fire damage (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

Machinery and livestock easily compact or otherwise damage the soil during periods with high water tables. Poorly drained sites, stream side locations, or sites with organic soils should also warrant special concern. Roads and trails should be located on the adjacent uplands (Hansen and others 1995).

**Recreational Uses and Considerations**

Because of high water tables and the problems with road construction, campgrounds should not be located in this type.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded.

## OTHER STUDIES

The *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type was first described by Pfister and others in their 1977 publication for Montana. Hansen and others (1995) also document this type for Montana. A similar habitat type was described by Steele and others (1981) for central Idaho, Steele and others (1983). Somewhat similar community types were also described by Youngblood and others (1985b) for eastern Idaho and western Wyoming and by Padgett and others (1989) for Utah and southeastern Idaho.

## *Pinus flexilis Community* Type
## (Limber Pine Community Type)

**PINFLE (PIFL)**
**Number Of Stands Sampled = 2**

### LOCATION AND ASSOCIATED LANDFORMS

The *Pinus flexilis* (limber pine) community type is an incidental type at mid elevations in mountain valleys of Idaho. Elevations of sampled sites range from 1,940 to 2,050 m (6,400 to 6,765 ft). The community type occupies alluvial benches along streams and rivers in U- and V-shaped canyons, or may be found on hillsides below seeps and springs. It is often found on drier, marginal riparian sites.

### VEGETATION

*Pinus flexilis* (limber pine) represents the dominate tree in the the tallest layer; however, lower growing species, such as *Populus tremuloides* (quaking aspen) and *Juniperus scopulorum* (Rocky Mountain juniper), may also be present with significant coverages. The *Pinus flexilis* (limber pine) community type forms open stands of scattered individuals in the overstory, but may be characterized by a well developed shrub layer of *Betula occidentalis* (water birch), *Symphoricarpos occidentalis* (western snowberry), or *Prunus virginiana* (common chokecherry). The herbaceous understory may be dominated by *Poa pratensis* (Kentucky bluegrass), *Bromus inermis* (smooth brome), *Equisetum arvense* (field horsetail), *Osmorhiza chilensis* (mountain sweet-cicely), and *Fragaria virginiana* (Virginia strawberry).

**Table 6.** Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands of the *Pinus flexilis* (limber pine) community type (number = 2 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Juniperus scopulorum* (Rocky Mountain juniper) | 17 | 3-30 | 100 |
| *Pinus flexilis* (limber pine) | 40 | 30-50 | 100 |
| *Populus tremuloides* (quaking aspen) | 15 | 0-30 | 50 |
| *Pseudotsuga menziesii* (Douglas fir) | 5 | 0-10 | 50 |
| **Shrubs** | | | |
| *Amelanchier alnifolia* (western serviceberry) | 5 | 0-10 | 50 |
| *Artemisia tridentata* (big sagebrush) | 2 | 1-3 | 100 |
| *Berberis repens* (creeping oregongrape) | 2 | 0-3 | 50 |
| *Betula occidentalis* (water birch) | 20 | 0-40 | 50 |
| *Chrysothamnus nauseosus* (common rabbitbrush) | <1 | 0-1 | 50 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Prunus virginiana* (common chokecherry) | 15 | 0-30 | 50 |
| *Ribes setosum* (Missouri gooseberry) | 5 | 0-10 | 50 |
| *Rosa wōodsii* (woods rose) | 5 | 1-10 | 100 |
| *Symphoricarpos occidentalis* (western snowberry) | 20 | 0-40 | 50 |
| **Graminoids** | | | |
| *Agropyron caninum* (bearded wheatgrass) | 2 | 0-3 | 50 |
| *Agropyron spicatum* (bluebunch wheatgrass) | <1 | 0-1 | 50 |
| *Agrostis exarata* (spike bentgrass) | 2 | 0-3 | 50 |
| *Agrostis stolonifera* (redtop) | <1 | 0-1 | 50 |
| *Bromus inermis* (smooth brome) | 5 | 0-10 | 50 |
| *Carex leptalea* (bristle-stalked sedge) | <1 | 0-1 | 50 |
| *Carex microptera* (small-winged sedge) | 2 | 0-3 | 50 |
| *Carex rostrata* (beaked sedge) | <1 | 0-1 | 50 |
| *Dactylis glomerata* (orchard-grass) | 2 | 0-3 | 50 |
| *Elymus flavescens* (yellow wildrye) | <1 | 0-1 | 50 |
| *Elymus glaucus* (blue wildrye) | 2 | 0-3 | 50 |
| *Glyceria striata* (fowl mannagrass) | <1 | 0-1 | 50 |
| *Juncus balticus* (baltic rush) | 2 | 0-3 | 50 |
| *Poa pratensis* (Kentucky bluegrass) | 7 | 3-10 | 100 |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | 2 | 1-3 | 100 |
| *Antennaria microphylla* (rosy pussy-toes) | <1 | 0-1 | 50 |
| *Aquilegia formosa* (sitka columbine) | 5 | 0-10 | 50 |
| *Arnica longifolia* (longleaf arnica) | <1 | 0-1 | 50 |
| *Aster eatonii* (Eaton's aster) | 5 | 0-10 | 50 |
| *Aster occidentalis* (western aster) | <1 | 0-1 | 50 |
| *Cicuta maculata* (spotted water-hemlock) | 2 | 0-3 | 50 |
| *Collomia linearis* (narrow-leaf collomia) | <1 | 0-1 | 50 |
| *Cynoglossum officinale* (common hound's-tongue) | <1 | 0-1 | 50 |
| *Fragaria virginiana* (Virginia strawberry) | 5 | 0-10 | 50 |
| *Geranium viscosissimum* (sticky geranium) | 2 | 0-3 | 50 |
| *Lupinus* spp. (lupine) | 2 | 0-3 | 50 |
| *Nepeta cataria* (catnip) | 2 | 0-3 | 50 |
| *Osmorhiza chilensis* (mountain sweet-cicely) | 5 | -10 | 50 |
| *Oxytropis viscida* (sticky crazyweed) | <1 | 0-1 | 50 |
| *Rudbeckia occidentalis* (black head) | 2 | 0-3 | 50 |
| *Silene menziesii* (Menzies' silene) | <1 | 0-1 | 50 |
| *Smilacina racemosa* (false spikenard) | <1 | 0-1 | 50 |
| *Smilacina stellata* (starry Solomon-plume) | 2 | 0-3 | 50 |
| *Taraxacum officinale* (common dandelion) | 2 | 0-3 | 50 |
| *Tragopogon dubius* (goat's beard) | <1 | 0-1 | 50 |
| *Urtica dioica* (stinging nettle) | 2 | 0-3 | 50 |
| *Viola orbiculata* (round-leaved violet) | <1 | 0-1 | 50 |
| **Ferns and Allies** | | | |
| *Equisetum arvense* (field horsetail) | 10 | 0-20 | 50 |

## SUCCESSIONAL INFORMATION

Seral stands of this type may be dominated by *Populus tremuloides* (quaking aspen), *Juniperus scopulorum* (Rocky Mountain juniper), or *Betula occidentalis* (water birch); however, *Pinus flexilis* (limber pine) will eventually surpass these species in the upper canopy layers and dominate the sites. When *Abies lasiocarpa* (subalpine fir) is present, *Pinus flexilis* (limber pine) may act as a seral stage of this species. Pfister and others (1977) indicate that on upland sites, *Pinus flexilis* (limber pine) is a codominant with *Pseudotsuga menziesii* (Douglas fir) and appears to continue to reproduce and flourish even under the presence of this taller species. The relationship between these two species in riparian zones is unknown at this time.

## SOILS

Approximately 2.5 cm (1 in) or more of needle/leaf litter may cover the ground surface. Where this type occurs along stream and river channels, substrates are predominantly alluvial. Mineral soils are composed of silts and sands with moderate clay components, and are probably classified as Entisols. River cobbles and gravels become prevalent at a depth of 30 cm (12 in) or more. Where this type occurs on hillsides below subsurface seeps, silts and clays tend to be occupy the upper soil layers. Gravels and cobbles are absent and larger rocks are uncommon.

## ADJACENT COMMUNITIES

Slightly wetter adjacent communities may include the *Betula occidentalis* (water birch) community type. Adjacent uplands are dominated by *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper) forests, shrubland communities such as *Artemisia tridentata* (big sagebrush), or mixed grasslands. The *Populus tremuloides/Wyethia* spp. (quaking aspen/mule's-ears) community type described by Mueggler (1988) may occupy nearby depressional areas as well.

## MANAGEMENT INFORMATION

### Livestock

Pfister and others (1973) indicate that forage production ranges from low to moderate for the *Pinus flexilis* (limber pine) series on upland sites. Characteristically sparse herbaceous understories observed on sites adjacent to stream corridors suggest low forage value in these locations. However, due to the presence of water and the xeric conditions of the surrounding upland communities, the *Pinus flexilis* (limber pine) community type may receive high

use. Where this community type occurs on hillsides below seeps and springs, the herbaceous understory is often more dense and may provide moderate forage for livestock.

**Timber**

Timber productivity is marginal. *Pinus flexilis* (limber pine) seldom obtain heights over 15 m(50 ft), and basal areas are considered to be low. Sites should be managed for uses other than timber (Pfister and others 1977).

**Wildlife**

Big game use may be moderate to high during winter months for certain types of the *Pinus flexilis* (limber pine) series on upland sites (Pfister and others 1973). As a riparian community, this type may provide cover and moderate forage for deer or elk. The *Pinus flexilis* (limber pine) community type may offer cover and nest sites for a variety of birds and mammals as well due to the multi-layered structure of the canopy.

**Fisheries**

This community type may be suitable for fisheries management. The overstory tree and shrub component should protect against elevated summer temperatures, offer bank stability and debris recruitment. However, bare ground may constitute 15 percent or more of the streambanks and compromise water quality during high flows.

**Fire**

Fire hazard is moderate to low for *Pinus flexilis* (limber pine) communities on upland sites (Pfister and others 1973). Mature *Pinus flexilis* (limber pine) appear able to withstand low intensity ground fires although fuel loading may promote more destructive, stand replacement fires. Fire frequency appears to be partially dependent on the understory species composition and density on site.

**Soil Management and Rehabilitation Opportunities**

Coarse textured substrates on sites adjacent to stream corridors are not susceptible to compaction. Streambank stabilization is dependent on a well developed shrub and herbaceous understory and should be managed accordingly.

**Recreational Uses and Considerations**

The recreational status of this type is currently undetermined. It is unsuitable for

camping or hiking where it occupies steep side slopes along narrow stream corridors, but may offer opportunities for wildlife observation or possibly fishing.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

This type has not been previously described for riparian communities. However, Pfister and others (1977) described a *Pinus flexilis* (limber pine) series for upland forests in Montana east of the Continental Divide.

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# *Pseudotsuga menziesii/Cornus stolonifera* Habitat Type (Douglas Fir/Red-Osier Dogwood Habitat Type)

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**PSEMEN/CORSTO (PSME/COST4)**
**Number Of Stands Sampled = 6**

## LOCATION AND ASSOCIATED LANDFORMS

The *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type is a major type from mid to higher elevations throughout the mountains and valleys of Idaho. Elevations of sampled sites range from 1,550 to 2,250 m (5,115 to 7,425 ft). This habitat type often occupies drier sites on alluvial benches of streams and rivers, and on sideslopes of narrow V-shaped drainages.

## VEGETATION

Sites are typically dominated by *Pseudotsuga menziesii* (Douglas fir), with *Populus tremuloides* (quaking aspen) and *Juniperus scopulorum* (Rocky Mountain juniper) occasionally associated as minor components. Where *Pseudotsuga menziesii* (Douglas fir) forms a dense canopy, the understory may be relatively sparse. Open stands of this type are often characterized by a more dense undergrowth.

The shrub layer usually consists of *Acer glabrum* (Rocky Mountain maple), *Rosa woodsii* (woods rose), *Cornus stolonifera* (red-osier dogwood), and *Prunus virginiana* (common chokecherry). The herbaceous layer is characterized by a variety of graminoids and forbs, including *Poa pratensis* (Kentucky bluegrass), *Arnica cordifolia* (heart-leaf arnica), *Geranium viscosissimum* (sticky geranium), *Thalictrum occidentale* (western meadowrue), and *Smilacina racemosa* (false spikenard). While species richness is relatively high within the lower canopy layers, canopy cover and constancy for the individual species are actually nominal. This pattern appears to be consistent for many of the conifer-dominated types in riparian zones.

**Table 7.** Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands of the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type (number = 6 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Juniperus scopulorum* (Rocky Mountain juniper) | 3 | 0-10 | 50 |
| *Populus tremuloides* (quaking aspen) | 3 | 0-10 | 33 |
| *Pseudotsuga menziesii* (Douglas fir) | 68 | 40-90 | 100 |
| **Shrubs** | | | |
| *Acer glabrum* (Rocky Mountain maple) | 12 | 0-20 | 83 |
| *Acer grandidentatum* (bigtooth maple) | 2 | 0-10 | 17 |
| *Alnus incana* (mountain alder) | 2 | 0-10 | 17 |
| *Amelanchier alnifolia* (western serviceberry) | 2 | 0-10 | 67 |
| *Berberis repens* (creeping oregongrape) | 3 | 0-10 | 50 |
| *Betula occidentalis* (water birch) | 3 | 0-20 | 17 |
| *Clematis ligusticifolia* (western virgins-bower) | 1 | 0-3 | 33 |
| *Cornus stolonifera* (red-osier dogwood) | 10 | 0-40 | 50 |
| *Pachistima myrsinites* (mountain-boxwood) | 2 | 0-10 | 17 |
| *Prunus virginiana* (common chokecherry) | 11 | 0-30 | 83 |
| *Ribes lacustre* (swamp currant) | 1 | 0-3 | 17 |
| *Ribes odoratum* (buffalo currant) | 2 | 0-10 | 17 |
| *Ribes viscosissimum* (sticky currant) | 1 | 0-3 | 17 |
| *Rosa woodsii* (woods rose) | 3 | 0-10 | 83 |
| *Rubus idaeus* (red raspberry) | <1 | 0-1 | 17 |
| *Rubus parviflorus* (thimbleberry) | 1 | 0-3 | 33 |
| *Salix bebbiana* (Bebb willow) | 1 | 0-3 | 17 |
| *Sambucus racemosa* (red elderberry) | 1 | 0-3 | 17 |
| *Spiraea betulifolia* (shiny-leaf spiraea) | 3 | 0-20 | 17 |
| *Symphoricarpos albus* (common snowberry) | 3 | 0-20 | 17 |
| *Symphoricarpos occidentalis* (western snowberry) | 1 | 0-3 | 50 |
| *Symphoricarpos oreophilus* (mountain snowberry) | 5 | 0-20 | 33 |
| **Graminoids** | | | |
| *Agropyron caninum* (bearded wheatgrass) | 2 | 0-10 | 50 |
| *Bromus carinatus* (mountain brome) | <1 | 0-1 | 33 |
| *Calamagrostis rubescens* (pinegrass) | 10 | 0-30 | 33 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Carex crawfordii* (Crawford's sedge) | <1 | 0-1 | 17 |
| *Carex disperma* (soft-leaved sedge) | 1 | 0-3 | 17 |
| *Carex geyeri* (elk sedge) | <1 | 0-1 | 17 |
| *Carex microptera* (small-winged sedge) | 1 | 0-3 | 17 |
| *Carex petasata* (Liddon's sedge) | 2 | 0-10 | 17 |
| *Elymus cinereus* (basin wildrye) | 1 | 0-3 | 17 |
| *Elymus glaucus* (blue wildrye) | 3 | 0-20 | 17 |
| *Festuca scabrella* (rough fescue) | <1 | 0-1 | 17 |
| *Glyceria striata* (fowl mannagrass) | 2 | 0-10 | 33 |
| Grass perennial (perennial grass) | <1 | 0-1 | 17 |
| *Melica bulbosa* (oniongrass) | <1 | 0-1 | 17 |
| *Poa pratensis* (Kentucky bluegrass) | 4 | 0-20 | 50 |
| *Poa scabrella* (pine bluegrass) | <1 | 0-1 | 17 |
| *Stipa occidentalis* (western needlegrass) | <1 | 0-1 | 17 |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | 1 | 0-3 | 50 |
| *Aconitum columbianum* (Columbian monkshood) | <1 | 0-1 | 17 |
| *Actaea rubra* (baneberry) | 1 | 0-3 | 17 |
| *Antennaria parvifolia* (nuttall's pussy-toes) | <1 | 0-1 | 17 |
| *Apocynum androsaemifolium* (spreading dogbane) | 3 | 0-20 | 17 |
| *Aquilegia formosa* (sitka columbine) | 3 | 0-20 | 33 |
| *Arabis* spp.(rockcress) | <1 | 0-1 | 17 |
| *Arctium minus* (common burdock) | 1 | 0-3 | 17 |
| *Arnica cordifolia* (heart-leaf arnica) | 4 | 0-20 | 67 |
| *Artemisia ludoviciana* (prairie sagewort) | <1 | 0-1 | 17 |
| *Aster* spp. (aster) | 2 | 0-10 | 50 |
| *Cicuta maculata* (spotted water-hemlock) | <1 | 0-1 | 17 |
| *Cirsium arvense* (Canada thistle) | 2 | 0-10 | 33 |
| *Cirsium vulgare* (bull thistle) | <1 | 0-1 | 17 |
| *Collomia linearis* (narrow-leaf collomia) | <1 | 0-1 | 17 |
| *Collinsia parviflora* (small-flowered blue-eyed mary) | 1 | 0-3 | 33 |
| *Crepis acuminata* (tapertip hawksbeard) | <1 | 0-1 | 17 |
| *Cynoglossum officinale* (common hound's-tongue) | 1 | 0-3 | 33 |
| *Disporum trachycarpum* (wartberry fairy-bell) | 1 | 0-3 | 17 |
| *Epilobium ciliatum* (common willow-herb) | 1 | 0-3 | 17 |
| *Epilobium minutum* (small-flowered willow-herb) | <1 | 0-1 | 17 |
| *Erigeron speciosus* (showy fleabane) | <1 | 0-1 | 17 |
| *Fragaria virginiana* (Virginia strawberry) | 1 | 0-3 | 50 |
| *Galium aparine* (goose-grass) | 3 | 0-10 | 50 |
| *Galium triflorum* (sweetscented bedstraw) | 1 | 0-3 | 33 |
| *Geranium viscosissimum* (sticky geranium) | 7 | 1-20 | 100 |
| *Geum macrophyllum* (larged-leaved avens) | 1 | 0-3 | 50 |
| *Habenaria unalascensis* (Alaska rein-orchid) | <1 | 0-1 | 17 |
| *Heuchera grossulariifolia* (gooseberry-leaved alumroot) | <1 | 0-1 | 17 |
| *Hydrophyllum capitatum* (ballhead waterleaf) | 1 | 0-3 | 17 |
| *Lactuca oblongifolia* (blue lettuce) | <1 | 0-1 | 17 |
| *Lactuca serriola* (prickly lettuce) | <1 | 0-1 | 33 |
| *Lupinus argenteus* (silvery lupine) | <1 | 0-1 | 17 |

| Species | % Canopy Cover | | Constancy |
|---|---|---|---|
| | Average | Range | |
| *Mentha arvensis* (field mint) | 1 | 0-3 | 17 |
| *Mertensia ciliata* (mountain bluebell) | <1 | 0-1 | 17 |
| *Mimulus guttatus* (common monkey-flower) | <1 | 0-1 | 17 |
| *Nepeta cataria* (catnip) | 1 | 0-3 | 50 |
| *Osmorhiza chilensis* (mountain sweet-cicely) | 3 | 0-10 | 50 |
| *Osmorhiza depauperata* (blunt-fruit sweet-cicely) | 1 | 0-3 | 17 |
| *Osmorhiza occidentalis* (western sweet-cicely) | <1 | 0-1 | 17 |
| *Rumex crispus* (curly dock) | 1 | 0-3 | 17 |
| *Senecio canus* (woolly groundsel) | 1 | 0-3 | 33 |
| *Senecio cymbalarioides* (few-leaved groundsel) | <1 | 0-1 | 17 |
| *Senecio* spp. (groundsel; ragwort; butterweed) | <1 | 0-1 | 17 |
| *Senecio serra* (tall butterweed) | 3 | 0-10 | 83 |
| *Silene menziesii* (Menzies' silene) | 1 | 0-3 | 50 |
| *Smilacina racemosa* (false spikenard) | 7 | 0-10 | 83 |
| *Solidago canadensis* (Canada goldenrod) | 1 | 0-3 | 17 |
| *Taraxacum officinale* (common dandelion) | 1 | 0-3 | 50 |
| *Thalictrum occidentale* (western meadowrue) | 3 | 0-10 | 83 |
| *Tragopogon dubius* (goat's beard) | <1 | 0-1 | 17 |
| *Urtica dioica* (stinging nettle) | 1 | 0-3 | 33 |
| *Veronica americana* (American speedwell) | <1 | 0-1 | 17 |
| *Verbascum thapsus* (common mullein) | <1 | 0-1 | 17 |
| *Viola adunca* (hook violet) | <1 | 0-1 | 17 |
| **Ferns and Allies** | | | |
| *Cystopteris fragilis* (brittle bladder-fern) | 1 | 0-3 | 17 |
| *Equisetum arvense* (field horsetail) | 1 | 0-3 | 17 |
| *Equisetum laevigatum* (smooth scouring-rush) | <1 | 0-1 | 17 |

## SUCCESSIONAL INFORMATION

Stands of *Populus tremuloides* (quaking aspen), and a variety of shrub-dominated communities, typically *Salix* spp. (willow), *Alnus incana* (mountain alder), or *Betula occidentalis* (water birch), represent seral stages of this habitat type. *Pseudotsuga menziesii* (Douglas fir) will be present and successfully reproducing, although only as an understory component, often as seedlings or saplings, in the initial phases of this type. Pole-sized and mature individuals become more prevalent as the site shifts toward climax. On slightly drier riparian sites, *Juniperus scopulorum* (Rocky Mountain juniper) may function as a seral stage.

The degree of disturbance on a particular site can often be determined by the composition of the understory species present. *Cornus stolonifera* (red-osier dogwood), *Acer glabrum* (Rocky Mountain maple), and *Prunus virginiana* (common chokecherry) may be preferentially browsed by livestock and big game. As grazing intensifies, these species may be replaced by more disturbance

tolerant shrubs such as *Symphoricarpos* spp. (snowberry) and *Rosa* spp. (rose). Continued grazing pressure may result in the loss of the shrub constituency altogether and the invasion of disturbance induced herbaceous species such as *Poa pratensis* (Kentucky bluegrass). This shift from a shrub-dominated to a herbaceous-dominated understory may cause the overall site to dry out. Once the shrub layer disappears from an area, it may be difficult and costly to recover. Management should consider strategies to avoid this advanced state before irreversible conditions prevail (Hansen and others 1995).

## SOILS

The overlying litter/duff layer is variable and may be moderately extensive or practically non-existent depending on the particular site. The texture of soils in the upper layers range from fine sands to silts and clays. When present, an organic horizon, often with distinguishable Oa, Oe, and Oi subhorizons, may be 30 cm (12 in) deep, but is generally not more than 5-10 cm (2-4 in) in depth. Loams are often dominant in the upper 25 cm (10 in). The underlying substrate is generally alluvium, composed of coarse sands, gravels and cobbles. Large rocks may be present where this type occupies locations at the base of scree slopes. Sites tend to be well-drained due to this unconsolidated layer.

## ADJACENT COMMUNITIES

Adjacent riparian communities may be dominated by *Salix* spp. (willow), *Betula occidentalis* (water birch), *Alnus incana* (mountain alder), and *Populus tremuloides* (quaking aspen). Upland *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper) forests may border the riparian *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type. *Artemisia tridentata* (big sagebrush) shrublands and grasslands may occupy the plateaus above riverine canyons.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Forage production is low to moderate. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

Access to this type by livestock may be limited due to steep canyon walls, narrow riparian zones and unstable scree slopes. Where access is available, livestock may remain in the riparian zone for extended periods of time where water and forage are available. Managers should attempt to limit full access to to these areas in order to avoid the removal of the shrub layer (see Successional Information section).

**Timber**

Limited information is available on this type. Timber productivity is estimated to be moderate. Because of at least seasonally high water tables, these sites probably represent some of the better timber producing sites for *Pseudotsuga menziesii* (Douglas fir). Clearcutting will set the site back to seral shrub stages and new regeneration of *Pseudotsuga menziesii* (Douglas fir) may be slow due to increased competition from forbs, graminoids, and shrubs. A three step shelterwood cut may be the best method to use in achieving harvest regeneration (Hansen and others 1995).

**Wildlife**

The *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type provides valuable hiding cover and shade for a variety of species. Big game use may be high, depending upon the time of year. Whitetail deer may use this type year round as cover, while other big game species may use this type as cover only in the winter (Hansen and others 1995)

*Cornus stolonifera* (red-osier dogwood) is favored by moose (Costain 1989) and beaver (Allen 1983) when present. Canada geese occasionally use the nests previously built in *Pseudotsuga menziesii* (Douglas fir) by bald eagles and osprey. In Montana, if a high degree of isolation during nesting is possible, great blue herons also nest in *Pseudotsuga menziesii* (Douglas fir) stands (Parker 1980). A variety of birds and mammals, such as woodpeckers, wood ducks, and raccoons, nest in the trunk cavities.

**Fisheries**

The stream side location of this type is important in providing thermal cover, debris recruitment, and streambank stability. *Cornus stolonifera* (red-osier dogwood) is an excellent shrub for controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

**Fire**

Fire potential is moderate, especially in late summer or during open, dry winters. Mature *Pseudotsuga menziesii* (Douglas fir) is a relatively fire resistant tree (Fischer and Bradley 1987). However, seedlings and saplings are vulnerable to surface fires because of their thin, photosynthetically active bark, resin blisters, closely spaced flammable needles, and thin twigs and bud scales. The moderately low and dense branching characteristic of saplings allows surface fires to be carried into the crown layer. Older trees develop a relatively unburnable, thick layer of insulative corky bark that provides protection against cool to moderately severe fires. Fire resistant bark takes about 40 years to develop on moist sites. *Pseudotsuga menziesii* (Douglas fir) regeneration is favored by fire which eliminates competition and creates favorable seedbeds (Hansen and others 1995).*Cornus stolonifera* (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprouts from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

**Soil Management and Rehabilitation Opportunities**

Coarse textured substrates are not susceptible to compaction, yet this type is subject to infrequent flooding. Soils are relatively stable due to the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer for streambank stabilization.

Where revegetation with woody species is desired, *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willow) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings are effective stabilizers of alluvial soil deposits (Hansen and others 1995).

**Recreational Uses and Considerations**

Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and bird watching (Hansen and others 1995)

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define

riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification**
**- (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

### OTHER STUDIES

The *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type was described by Hansen and others (1995) for Montana.

## DECIDUOUS FOREST TYPES

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## *Acer negundo /Prunus virginiana* Habitat Type
## (Box-Elder/ Common Chokecherry Habitat Type)

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**ACENEG/PRUVIR (ACNE2/PRVI)**
**Number Of Stands Sampled = 2**

### LOCATION AND ASSOCIATED LANDFORMS

The *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type, a minor type in central and eastern Idaho, is recorded at elevations of 1,450 to 1600 m (4,785 to 5,280 ft). This habitat type occurs on active and secondary (upper) floodplains along streams and rivers in ravines and broader U-shaped canyons. Sites may be occasionally flooded by overland flows during spring runoff.

### VEGETATION

Stands of the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type are dominated by *Acer negundo* (box-elder) in the overstory, but may contain *Juniperus scopulorum* (Rocky Mountain juniper) or *Fraxinus pennsylvanica* (green ash) as minor components. *Acer grandidentatum*(bigtooth maple) or *Betula occidentalis* (water birch) are present in the upper shrub layer while *Cornus stolonifera* (red-osier dogwood) and *Rosa woodsii* (woods rose) occupy the lower shrub levels. The indicator species, *Prunus virginiana* (common chokecherry), may occur in the general area, but is often dead/decadent or present only in trace amounts. Additional sites need to be surveyed to determine whether this

type in Idaho matches the type described by Hansen and others (1995) in Montana, or whether it needs modification. Where mature *Acer negundo* (box-elder) and taller shrubs form a dense canopy, the understory may be sparse and exhibit low vigor. Where stands are more open, prominent understory herbaceous species consist of *Poa pratensis* (Kentucky bluegrass), *Osmorhiza chilensis* (mountain sweet-cicely), and *Arctium minus* (common burdock).

The predominance of certain disturbance-induced understory species indicates that these sampled sites have undergone disturbance historically, probably from grazing. Users of this classification should consider this when comparing species composition between sampled sites and this text, and examine their stands for indications of disturbance, or lack there of, where discrepancies occur.

**Table 8.** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type (number = 2 stands)

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Acer negundo* (Box-elder) | 80 | 70-90 | 100 |
| **Shrubs** | | | |
| *Acer grandidentatum* (bigtooth maple) | 5 | 0-10 | 50 |
| *Betula occidentalis* (water birch) | 10 | 0-20 | 50 |
| *Clematis ligusticifolia* (western virgins-bower) | 5 | 0-10 | 50 |
| *Cornus stolonifera* (red-osier dogwood) | 12 | 3-20 | 100 |
| *Crataegus douglasii* (black hawthorn) | 10 | 0-20 | 50 |
| *Ribes lacustre* (swamp currant) | <1 | 0-1 | 50 |
| *Ribes odoratum* (buffalo currant) | 2 | 0-3 | 50 |
| *Rosa* spp. (rose) 5 | 0-10 | 50 | |
| *Rosa woodsii* (woods rose) | <1 | 0-1 | 50 |
| *Salix bebbiana* (Bebb willow) | 2 | 0-3 | 50 |
| *Salix exigua* (sandbar willow)) | 5 | 0-10 | 50 |
| **Graminoids** | | | |
| *Agrostis stolonifera* (redtop) | 2 | 0-3 | 50 |
| *Bromus tectorum* (cheatgrass) | 2 | 0-3 | 50 |
| *Poa pratensis* (Kentucky bluegrass) | 12 | 3-20 | 100 |
| **Forbs** | | | |
| *Arctium minus* (common burdock) | 27 | 3-50 | 100 |
| *Brassica kaber* (charlock) | <1 | 0-1 | 50 |
| *Cirsium arvense* (Canada thistle) | 2 | 0-3 | 50 |
| *Cynoglossum officinale* (common hound's-tongue) | 2 | 1-3 | 100 |
| *Galium triflorum* (sweetscented bedstraw) | 2 | 0-3 | 50 |
| *Geum macrophyllum* (larged-leaved avens) | <1 | 0-1 | 50 |
| *Lactuca serriola* (prickly lettuce) | 2 | 0-3 | 50 |
| *Osmorhiza chilensis* (mountain sweet-cicely) | 5 | 0-10 | 50 |
| *Osmorhiza occidentalis* (western sweet-cicely) | <1 | 0-1 | 50 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Rumex occidentalis* (western dock) | <1 | 0-1 | 50 |
| *Smilacina racemosa* (false spikenard) | 2 | 0-3 | 50 |
| *Solidagō canadensis* (Canada goldenrod) | 2 | 0-3 | 50 |
| *Taraxacum officinale* (common dandelion) | <1 | 0-1 | 50 |

## SUCCESSIONAL INFORMATION

*Acer grandidentatum* (bigtooth maple), *Salix exigua* (sandbar willow), and *Betula occidentalis* (water birch) may represent seral stages of the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type in Idaho. The presence of small, discontinuous stands of *Populus tremuloides* (quaking aspen) and *Populus acuminata* (lanceleaf cottonwood) associated with this habitat type suggest that either of these communities may also act as a seral stage.
Hansen and others (1995) indicate that primary successional stages of the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type in Montana may be dominated by a variety of types including cottonwoods, *Salix exigua* (sandbar willow), or *Salix amygdaloides* (peach-leaf willow) community types. As a cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, primary succession will continue from multi-layered cottonwood forests, dominated by the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type or the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type, to the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type.

Hansen and others (1995) have noted that under heavy grazing pressures in Montana, *Acer negundo* (box-elder) reproduction is either severely restricted or completely eliminated. At this stage, most of the saplings and pole sized trees have either been eliminated by trampling and/or rubbing, or browsed back until they are dead. High levels of grazing cause the stand to open up allowing the more sun tolerant, less desirable species such as *Symphoricarpos occidentalis* (western snowberry), *Rosa woodsii* (woods rose), *Crataegus succulenta* (succulent hawthorn), and *Poa pratensis* (Kentucky bluegrass) to dominate. In fact, many of the sites that support the *Acer negundo/Prunus virginiana* (box-elder/common choke-cherry) habitat type in the northern Great Plains of Montana are in this state or in the severe overgrazed state.

When a stand is at this severely degraded stage, the prospect of returning the site to its former state is very difficult if not impossible. (Restoration would be extremely expensive in terms of both labor and money.) Therefore, if a manager wants to maintain the stand of trees, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

## SOILS

Soils of this habitat type are characteristic of floodplains, with the upper horizon dominated by alluvial sands, silts, and clays. Surface soils, 7.5 to 13 cm (3 to 5 in) deep, are generally silt loams or sandy clay loams. Fine or coarse sands, often intermixed with bands or pockets of small, medium, and large gravels and cobbles, are present in underlying layers 45 cm (18 in ) or more deep, and occasionally reaching depths of 1.5 m (5 ft). Gravels, cobbles, and rocks form a matrix at the lowest level. Soils tend to be well drained and may be exposed to infrequent flooding. Hansen and others (1995) note that *Acer negundo* (box-elder) is very tolerant to prolonged flooding.

## ADJACENT COMMUNITIES

*Acer negundo* (box-elder) often forms a mosaic pattern along stream corridors with the *Betula occidentalis* (water birch), *Acer grandidentatum* (bigtooth maple), and *Salix exigua* (sandbar willow) community types. When present, *Acer negundo* (box-elder) is the dominant species on the site, but one or more of these associated shrub communities may occur in the understory with significant canopy coverage. *Artemisia tridentata* (big sagebrush) steppe and *Juniperus scopulorum* (Rocky Mountain juniper) savannas occupy adjacent uplands.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

If the long term management objective is the maintenance of the tree stand on the site, then managers need to key in on the seedling reproduction by *Acer negundo* (box-elder) or the stand will eventually be eliminated (Hansen and others 1995).

On relatively undisturbed sites, dense stands of the *Acer negundo/Prunus virginiana* (box-elder/common choke-cherry) habitat type limit access by livestock. As the stands open up, livestock use may go up proportionally. This habitat type is valuable to livestock managers because of the following benefits they provide: 1) thermal cover (shade), 2) water source, 3) palatable forage, 4)

protection from seasonal storms, and 5) calving grounds. Because the *Acer negundo/Prunus virginiana* (box-elder/common choke-cherry) habitat type covers a small portion of the landscape and because of their high wildlife value (see the Wildlife section), these sites are becoming focal points for livestock and wildlife management conflicts in this region (Hansen and others 1995).

Livestock managers should reduce or eliminate hot season use in this type. This can be accomplished by placing salt blocks on the uplands away from the woody draws, moving water sources out of the draws, and in some instances, by using cross fences (or drift fences) that are placed perpendicular to the linear stand at appropriate intervals. This method is most appropriate for those stands located in V-shaped draws or ravines. These short fences will discourage livestock from trailing down the center of the stand. In disturbed sites, it may be necessarily to fence out a portion of the stand for a period of five or more years in order to allow regeneration by the tree and shrub species. After the appropriate time frame, the fence could be moved to a different portion of the stand (Hansen and others 1995).

The use of these sites as winter feeding grounds can have a variety of results. In many instances, proper winter use will have minimal impacts on the stand. However, if livestock numbers are high, trampling and rubbing can have a detrimental impact on the woody species. If livestock use is high when the frost melts, softening the ground, a great deal of soil churning and compaction can occur (Hansen and others 1995).

Over the years there has been some debate whether *Prunus virginiana* (common chokecherry) leaves are poisonous to livestock. The leaves and seeds do have sugars that contain cyanide. These cyanide sugars are not poisonous themselves, but when plant material is crushed, eaten or decomposed, enzymes cause hydrogen cyanide to be released (Hansen and others 1995). In high concentrations hydrogen cyanide is a metabolic poison to most animals, including humans. It has recently been shown that livestock can acquire the ability to detoxify hydrogen cyanide if they consume limited amounts of it over an extended period of time. Therefore, *Prunus virginiana* (common chokecherry) will poison livestock only if it is consumed in large quantities without prior exposure (Hansen and others 1995).

The high values associated with the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type should elicit special consideration by livestock operators.

**Wildlife**

In the arid portions of southeastern and central Idaho, woody draws are very important to wildlife even though they represent a very small fraction of the total area (around 1-2 percent of the total landscape). Located in areas of greater than normal moisture, they are more productive than the surrounding upland vegetation (Thomas and others 1979). Woody draws attract wildlife for thermal cover, nesting habitat, water source, late summer and winter forage, travel corridors, and hiding cover (Ames 1977, Hansen and others 1984, Hansen and Hoffman 1988, Severson and Boldt 1978). Woody draws are an important year round habitat for mule deer, provides critical winter habitat for whitetail deer (Severson and Carter 1978, Swenson 1981), and is an important fawning area for both whitetail and mule deer. During fall and winter, woody draws provide critical habitat for sharptailed grouse (Hansen and others 1995).

Woody draws provide essential habitat for a large number of non-game species. Grosz and others (1981) found that this habitat type is the center of activity for many species and is of critical importance to many species during the stressful winter months. They also found that these sites support a greater diversity and density of birds when compared to adjacent uplands. In northwestern North Dakota, Hopkins (1985) censused species of birds nesting in woody draws and found that although they had lower species diversity than cottonwood forests, the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type supported a much higher density of breeding pairs. Finally, these woody draws provide important habitat for such nongame mammals as coyote, weasel, bobcat, and red fox (Swenson 1981, Sieg and others 1985).

If the long term management objective is the maintenance of the tree stand on the site, then managers need to key in on the seedling reproduction by *Acer negundo* (box-elder) or the stand will eventually be eliminated.

**Fisheries**

The woody species associated with the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type provide valuable streambank stability and thermal cover (Hansen and others 1995).

**Fire**

*Acer negundo* (box-elder) and most of the important shrub species in the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type produce sprouts from the root crown when the main trunk is damaged. The ability of the woody species to sprout prolifically suggests that this habitat type is adapted to fire and perhaps to periodic stand regeneration by fire. However, the role of fire in this habitat type is not well known (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

Sites adjacent to streams are extremely vulnerable to streambank sloughing, particularly when soils are moist. Excessive livestock use will increase levels of soil compaction and decrease stability. Management should emphasize the importance of the understory shrub communities for streambank stabilization (Hansen and others 1995).

Where revegetation with woody species is desired, *Acer negundo* (box-elder), *Prunus virginiana* (common choke-cherry), and *Ribes odoratum* (buffalo currant) are well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are moderate to rapid and the roots of established seedlings are effective stabilizers of alluvial soil deposits (Hansen and others 1995).

**Recreational Uses and Considerations**

Because of its proximity to streams, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

The fruit of *Prunus virginiana* (common chokecherry) is highly regarded for making wine and jelly, but one must harvest ahead of the birds (Johnson and Nichols 1982). Indians ate the fruit fresh or preserved it by drying. In addition they combined it with venison and buffalo meat to make mincemeat. They also used the berries for medicinal purposes.

Care must be taken when locating structures within this type due to flood hazard.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define

riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

Hansen and others (1995) document this habitat type for the Northern Great Plains of Montana. A somewhat similar community type was described by Szaro (1989) for riparian and wetland sites in Arizona and New Mexico.

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## *Elaeagnus angustifolia* Community Type (Russian Olive Community Type)

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**ELAANG (ELAN)**
**Number Of Stands Sampled = 1**

## LOCATION AND ASSOCIATED LANDFORMS

The *Elaeagnus angustifolia* (Russian olive) community type is an incidental type at low elevations in southern and eastern Idaho. Sites range in elevation from 909 to 1,340 m (3,000 to 4,422 ft). This community type typically forms stringer communities on upper floodplain terraces adjacent to streams and rivers at the bottom of deep canyons. It may also be found in low depressional areas capable of retaining water near the surface for much of the year, especially potholes and abandoned river oxbows.

## VEGETATION

*Elaeagnus angustifolia* (Russian olive), a tree native to southern Europe and western Asia, was introduced into North America during colonial times (Elias 1980). *Elaeagnus angustifolia* (Russian olive) was planted in shelterbelts throughout the prairie states and provinces due to its dense growth form, hardiness, and adaptability to a wide range of soil and moisture conditions (Olson and Knopf 1986). It has also been used for ornamental and wildlife habitat plantings, erosion control, and highway beautification (Christensen 1963). Currently, *Elaeagnus angustifolia* (Russian olive) has naturalized throughout the 17 western states bounded on the east by North and South Dakota, Nebraska,

Kansas, Oklahoma, and Texas. Personal observations and a review of the literature indicates that *Elaeagnus angustifolia* (Russian olive) naturalization is rapidly increasing, especially in the riparian zone. The potential impacts of the spread of *Elaeagnus angustifolia* (Russian olive) to floodplain forests are substantial. Even though *Elaeagnus angustifolia* (Russian olive) may have a high value for wildlife, it can interfere with agricultural practices and has the potential to displace native riparian or wetland vegetation. In fact, the displacement of native floodplain forests by *Elaeagnus angustifolia* (Russian olive) can result in a 30 percent reduction of breeding bird species (Knopf 1991).

*Elaeagnus angustifolia* (Russian olive) spreads from introduced plantings with the help of birds, and to a lesser degree, small mammals (Olson and Knopf 1986). The seeds, ingested with the fruits, pass through the digestive tract of birds and may be deposited in new locations. Small mammals help spread the seeds by building food caches, sometimes up to 150 m (approx. 450 ft) from the original sources.

Two conditions that tend to favor the establishment of *Elaeagnus angustifolia* (Russian olive) are spring moisture and slightly alkaline soil (Olson and Knopf 1986). Carmen and Brotherson (1982) reported that *Elaeagnus angustifolia* (Russian olive) preferred sites with low to medium concentrations (100-3,500 ppm) of soluble salts, whereas *Tamarix chinensis* (salt cedar) occurred on sites of higher (700-15,000 ppm) salt concentrations.

*Elaeagnus angustifolia* (Russian olive) has a dense growth form and tolerates a wide range of temperature, soil, and moisture conditions (Borell 1976, Elias 1980). Stands in Idaho may be associated with *Populus trichocarpa* (black cottonwood) and establish open communities with widely spaced individuals. The shrub component may be sparse or robust depending on local site factors, and may include *Salix* spp. (willow), *Rosa woodsii* (woods rose), *Crataegus* spp. (hawthorn) and *Ribes* spp. (currant). Graminoids, particularly *Agropyron repens* (quackgrass), *Hordeum jubatum* (foxtail barley), and *Poa pratensis* (Kentucky bluegrass), may dominate the herbaceous understory, forming a dense root network at the surface. The remainder of the herbaceous component, which may be poorly represented, includes *Scirpus* (bulrush) and *Typha* spp. (cattail) on wet sites and *Iris missouriensis* (Rocky Mountain Iris) and *Aster eatonii* (Eaton's Aster) on drier sites.

## SUCCESSIONAL INFORMATION

The *Elaeagnus angustifolia* (Russian olive) community type may represent a seral stage of the *Acer negundo/Prunus virginiana* (box-elder/common choke-cherry) habitat type (Hansen and others 1995). *Populus trichocarpa* (black cottonwood), *Salix* spp. (willow), and *Crataegus* spp. (hawthorn) may act as seral communities for the *Elaeagnus angustifolia* (Russian olive) community type. Due to the limited number of observations in Idaho, the successional status of this community type needs to be explored more fully.

## SOILS

Soils are generally Entisols (Torrifluvents) or Mollisols (Haploborolls and Argiborolls). Soil texture ranges from clay loam to sandy loam. Water tables are generally near the soil surface during spring runoff or after storm events, but may fall below 1 m (39 in) during dry periods. These sites experience periodic flooding but duration is usually brief (Hansen and others 1995).

As discussed earlier, two situations that appear to favor the establishment of *Elaeagnus angustifolia* (Russian olive) seedlings are favorable spring moisture and slightly alkaline soils (Olson and Knopf 1986). Carmen and Brotherson (1982) reported that *Elaeagnus angustifolia* (Russian olive) preferred sites with low to medium concentrations (100-3,500 ppm) of soluble salts, whereas *Tamarix chinensis* (salt cedar) occurred on sites of higher (700-15,000 ppm) salt concentrations.

## ADJACENT COMMUNITIES

*Populus trichocarpa* (black cottonwood), *Salix* spp. (willow), or *Crataegus* spp. (hawthorn) communities often occupy associated riparian zones. Saturated sites may be dominated by *Typha* spp. (cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed canarygrass). Adjacent upland communities include grasslands, *Ribes* spp. (currant) dominated thickets, or *Artemisia tridentata* (big sagebrush) steppe.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Open stands of *Elaeagnus angustifolia* (Russian olive) may offer moderate to high grazing potential for livestock, especially where the the understory is dominated by graminoids; however, spines prevalent on branches throughout the canopy

may act as a deterrent where stands are more densely clustered (Hansen and others 1995).

**Wildlife**

The high structural diversity of the *Elaeagnus angustifolia* (Russian olive) community type provides excellent thermal and hiding cover, but provides only limited forage for wildlife species. The fruits of *Elaeagnus angustifolia* (Russian olive) are eaten by pheasants, sharp-tailed grouse, squirrels, raccoons, whitetail deer, and a variety of nongame birds such as flickers, grosbeaks, warblers, and flycatchers. In southeastern Oregon, beaver have used *Elaeagnus angustifolia* (Russian olive) for dam material (Olson and Knopf 1986). However, the displacement of native floodplain forests by *Elaeagnus angustifolia* (Russian olive) can result in a 30 percent reduction of breeding bird species (Knopf 1991).

*Elaeagnus angustifolia* (Russian olive) stands can interfere with farming operations. They also hinder management activities on national wildlife refuges and occasionally block irrigation canals (Olson and Knopf 1986). Once established, *Elaeagnus angustifolia* (Russian olive) is difficult to control and nearly impossible to eradicate. Efforts to control unwanted stands have included mowing seedlings, cutting, burning, spraying, girdling, and bulldozing. Considering its adaptability and resistance to control efforts, *Elaeagnus angustifolia* (Russian olive) has become a management concern for both public agencies and private landowners (Hansen and others 1995).

**Fisheries**

*Elaeagnus angustifolia* (Russian olive) enhance fisheries by stabilizing streambanks, providing cover and moderating temperature highs during summer months.

**Soil Management and Rehabilitation Opportunities**

During spring runoff or after storm events when water tables are high, these soils are most susceptible to compaction by vehicular traffic or livestock. Sites with well drained soils and coarse textures are less susceptible to compaction, yet activities should be scheduled to avoid high water periods (Hansen and others 1995).

Considering its adaptability and resistance to control efforts, *Elaeagnus angustifolia* (Russian olive) has become a major management concern for both public agencies and private landowners. As indicated earlier, once established,

*Elaeagnus angustifolia* (Russian olive) is difficult to control and nearly impossible to eradicate. Efforts to control unwanted stands have included mowing seedlings, cutting, burning, spraying, girdling, and bulldozing. Therefore the planting of *Elaeagnus angustifolia* (Russian olive) should be eliminated due to the aggressive nature of *Elaeagnus angustifolia* (Russian olive) and the inevitable costs that will be associated with the long term control of this species (Hansen and others 1995).

**Recreational Uses and Considerations**

The *Elaeagnus angustifolia* (Russian olive) community type provides excellent opportunities for observing a variety of wildlife including big game, small mammals, songbirds and upland game birds. In the spring, the flowers of *Elaeagnus angustifolia* (Russian olive) are quite fragrant (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

The *Elaeagnus angustifolia* (Russian olive) community type was described by Hansen and others (1995) for Montana.

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# *Populus angustifolia/Cornus stolonifera* Community Type (Narrowleaf Cottonwood/Red-Osier Dogwood Community Type)

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**POPANG/CORSTO (POAN3/COST4)**
**Number Of Stands Sampled = 4**

## LOCATION AND ASSOCIATED LANDFORMS

The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type is a major type at low to mid elevations in eastern Idaho, ranging from 1,455 to 2,061 m (4,800 to 6,800 ft). *Populus angustifolia*

(narrowleaf cottonwood) tends to occupy broad, level floodplains and islands associated with major stream and river systems. While stands often occur on point bars, side bars, mid channel bars, and delta bars, they may be located well away from the river on drier secondary floodplains as a result of channel migration over time. Hansen and others (1995) indicate that *Populus angustifolia* (narrowleaf cottonwood) generally occurs at lower elevations than *Populus trichocarpa* (black cottonwood) in Montana. Additional samples need to be collected to determine if this trend holds true in Idaho.

## VEGETATION

*Populus angustifolia* (narrowleaf cottonwood) forms a thick canopy over a dense shrub understory . Associated tree species, *Elaeagnus angustifolia* (Russian olive), *Acer negundo* (box-elder), and *Populus trichocarpa* (black cottonwood), are present in trace amounts in the overstory. The shrub understory may be extensive, and is generally dominated by *Cornus stolonifera* (red-osier dogwood), *Rosa woodsii* (woods rose), and *Salix spp.* (willow). Common herbaceous species include *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), and *Dactylis glomerata* (orchard-grass); however, the herbaceous layer may be sparse and exhibit low vigor due to the substantial shrub component.

**Table 9.** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type that are relatively undisturbed by livestock or wildlife (number = 4 stands)

| Species | % Canopy Cover | | Constancy |
|---|---|---|---|
| | Average | Range | |
| **Trees** | | | |
| *Elaeagnus angustifolia* (Russian olive) | 1 | 0-3 | 50 |
| *Populus angustifolia* (narrowleaf cottonwood) | 65 | 50-80 | 100 |
| *Populus trichocarpa* (black cottonwood) | <1 | 0-1 | 25 |
| **Shrubs** | | | |
| *Clematis ligusticifolia* (western virgins-bower) | 8 | 0-20 | 75 |
| *Cornus stolonifera* (red-osier dogwood) | 45 | 10-80 | 100 |
| *Elaeagnus commutata* (silverberry) | 3 | 0-10 | 50 |
| *Ribes lacustre* (swamp currant) | <1 | 0-1 | 25 |
| *Rosa woodsii* (woods rose) | 23 | 0-40 | 75 |
| *Salix exigua* (sandbar willow)) | 8 | 0-30 | 25 |
| *Salix lutea* (yellow willow) | 8 | 0-20 | 75 |
| **Graminoids** | | | |
| *Aegilops cylindrica* (goatgrass) | <1 | 0-1 | 25 |
| *Agrostis stolonifera* (redtop) | 20 | 0-40 | 75 |
| *Alopecurus pratensis* (meadow foxtail) | 3 | 0-10 | 25 |
| *Bromus anomalus* (nodding brome) | <1 | 0-1 | 25 |
| *Bromus* spp. (brome) | 3 | 0-10 | 25 |
| *Dactylis glomerata* (orchard-grass) | 10 | 0-40 | 25 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Phalaris arundinacea* (reed canarygrass) | 5 | 0-20 | 50 |
| *Poa pratensis* (Kentucky bluegrass) | 10 | 0-20 | 50 |
| **Forbs** | | | |
| *Arctium minus* (common burdock) | <1 | 0-1 | 25 |
| *Cirsium arvense* (Canada thistle) | 3 | 0-10 | 75 |
| *Cirsium vulgare* (bull thistle) | 1 | 0-3 | 25 |
| *Medicago sativa* (alfalfa) | 3 | 0-10 | 25 |
| *Rumex crispus* (curly dock) | <1 | 0-1 | 25 |
| *Smilacina stellata* (starry Solomon-plume) | 3 | 0-10 | 50 |
| *Taraxacum officinale* (common dandelion) | 3 | 0-10 | 50 |

## SUCCESSIONAL INFORMATION

The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type represents a mid-seral stage of primary succession (Hansen and others 1995).

### Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. 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. Typically, rivers

meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

**Early Seral Stage**—The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

**Mid-Seral Stage**—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus angustifolia* (narrowleaf cottonwood) stand is dominated by conifers such as *Picea* spp. (spruce), *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus angustifolia* (narrowleaf cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers or *Acer negundo* (box-elder) are ready to replace them (Hansen and others 1995).

**Late Seral to Climax (PNC) Stage**—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, succession continues from the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier

dogwood) habitat type or the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type (Hansen and others 1995).

**Secondary Successional Stages**

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus angustifolia* (narrowleaf cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This represents the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused secondary succession is called the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type. If the 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* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus* spp. (brome), and a variety of "weedy" forbs (e.g., the *Populus angustifolia*/Herbaceous [narrowleaf cottonwood/ Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to a herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site *BEFORE* the site is too degraded (Hansen and others 1995).

## SOILS

Alluvial soils are generally fine textured, primarily silt but with moderate quantities of clay and fine grain sand. This layer may be as shallow as 5 cm (2 in) but may extend to depths of 60 cm (24 in) or more. A matrix of gravels and cobbles occupies the zone below this horizon. Although neither mottled nor gleyed soil characteristics were observed, fluctuating water tables increase the potential for oxidation/reduction processes. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and islands. Water tables are high in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus angustifolia* (narrowleaf cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although moisture may be present closer to the surface due to capillary action. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols, Entisols, or Mollisols.

## ADJACENT COMMUNITIES

Saturated sites may be dominated by *Typha* spp. (cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed canarygrass). The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type or the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type may occur on adjacent disturbed sites, while the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type may be present on newly deposited alluvium. Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush) and *Poa pratensis* (Kentucky bluegrass).

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

**Livestock**
Forage production ranges from low to moderate due to the dense nature of the stands. Stands in good to excellent health (condition) often support dense thickets of shrubs, limiting the amount of available forage. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

Most sites are presently subjected to heavy grazing pressures because of their topographic location and ease of access. With moderate to heavy prolonged grazing pressures, most shrubs will be eliminated leaving the shrubs *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa woodsii* (woods rose) as the dominate understory. At this point, the stand has been converted to the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) disturbance-caused community type. If disturbance is severe, the shrubs will also be eliminated and the stand has converted to the *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) disturbance-caused community type (Hansen and others 1995).

**Timber**
Timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites receive new alluvial deposits with spring flooding to act as seedbeds for the next generation of cottonwoods, the future timber potential is lost.

**Wildlife**
Ungulates, especially moose and whitetail deer, are common residents of these communities. Songbirds, raptors, and small mammals are also common, due to the high structural diversity and abundant food sources. *Populus angustifolia* (narrowleaf cottonwood) and *Cornus stolonifera* (red-osier dogwood) are often eaten by moose (Costain 1989) and used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

**Fisheries**

The stream-side location of this *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type is important in providing thermal cover, debris recruitment, and streambank stability. Its importance can not be emphasized enough (see discussion in the Soil Management and Rehabilitation Opportunities section). *Cornus stolonifera* (red-osier dogwood) and associated shrub species are excellent in controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

**Fire**

The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type is susceptible to fire during the late summer and fall. *Populus angustifolia* (narrowleaf cottonwood) and other shrubs of this type are adapted to light and in some instances to moderate intensity fires and may produce new sprouts following burns. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) The particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood) . 2) The age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited. 3) The location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire *MAY BE* used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

*Cornus stolonifera* (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprout from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

**Soil Management and Rehabilitation Opportunities**

Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting

action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the site still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) ***MAY*** allow the remnant shrub population to sprout and re-invade the site. However, if the water table has dropped dramatically and the shrubs have been completely eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995). Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and

next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

**Recreational Uses and Considerations**

Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

Care must be taken when locating structures on active floodplains due to flood hazard.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

This community was described by and Hansen and others (1995) for Montana. A similar community type was documented by Youngblood and others (1985b) for eastern Idaho and western Wyoming and by Padgett and others (1989) for Utah and southeastern Idaho. Major undergrowth shrubs were *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Salix bebbiana* (Bebb willow). A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

## *Populus angustifolia*/Herbaceous Community Type
## (Narrowleaf Cottonwood/Herbaceous Community Type)

**POPANG (POAN3)**
**Number Of Stands Sampled = 9**

### LOCATION AND ASSOCIATED LANDFORMS

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type is a major type at low to mid elevations in eastern Idaho, ranging from 1,455 to 2,061 m (4,800 to 6,800 ft). *Populus angustifolia* (narrowleaf cottonwood) tends to occupy broad, level floodplains and islands associated with major stream and river systems. While stands often occur on point bars, side bars, mid channel bars, and delta bars, they may be located well away from the river on drier secondary floodplains as a result of channel migration over time. Hansen and others (1995) indicate that *Populus angustifolia* (narrowleaf cottonwood) generally occurs at lower elevations than *Populus trichocarpa* (black cottonwood) in Montana. Additional samples need to be collected to determine if this trend holds true in Idaho.

### VEGETATION

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type is a grazing or browsing disclimax of the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Stands are two-tiered, characterized by mature, widely spaced *Populus angustifolia* (narrowleaf cottonwood) in the overstory and herbaceous species, such as *Poa pratensis* (Kentucky bluegrass), *Agropyron smithii* (western wheatgrass), and *Dactylis glomerata*(orchard-grass) dominating the understory. The sparse forb component may be represented by *Tragopogon dubius* (goat's beard) and *Erigeron glabellus* (smooth daisy). Disturbance tolerant shrub species, commonly *Crataegus douglasii* (black hawthorn) or *Rosa woodsii* (woods rose), are essentially absent or present with low coverages.

**Table 10.** Provides the average canopy cover, the range of canopy cover, and the constancy of the sampled stands of the grazing or browsing disclimax for the *Populus angustifolia*/ Herbaceous (narrowleaf cottonwood/Herbaceous) community type in Idaho (number = 9 stands)

| Species | % Canopy Cover | | Constancy |
|---|---|---|---|
| | Average | Range | |
| **Trees** | | | |
| *Juniperus scopulorum* (Rocky Mountain Juniper) | <1 | 0-1 | 11 |
| *Populus angustifolia* (narrowleaf cottonwood) | 41 | 10-80 | 100 |
| **Shrubs** | | | |
| *Clematis ligusticifolia* (western virgins-bower) | <1 | 0-1 | 11 |
| *Crataegus douglasii* (black hawthorn) | 4 | 0-20 | 22 |
| *Elaeagnus commutata* (silverberry) | 2 | 0-20 | 11 |
| *Ribes lacustre* (swamp currant) | <1 | 0-1 | 11 |
| *Rosa woodsii* (woods rose) | 2 | 0-20 | 22 |
| **Graminoids** | | | |
| *Agropyron repens* (quackgrass) | 3 | 0-30 | 11 |
| *Agropyron smithii* (western wheatgrass) | 12 | 0-40 | 44 |
| *Agrostis stolonifera* (redtop) | 5 | 0-40 | 44 |
| *Dactylis glomerata* (orchard-grass) | 12 | 0-40 | 44 |
| *Eleocharis palustris* (common spikesedge) | 2 | 0-20 | 11 |
| *Elymus* spp. (wildrye) | <1 | 0-1 | 11 |
| Grass (unknown grass) | <1 | 0-1 | 11 |
| *Muhlenbergia asperifolia* (alkali muhly) | 1 | 0-10 | 11 |
| *Phleum pratense* (common timothy) | <1 | 0-3 | 11 |
| *Poa pratensis* (Kentucky bluegrass) | 33 | 0-90 | 78 |
| *Sporobolus airoides* (alkali sacaton) | <1 | 0-3 | 11 |
| *Stipa comata* (needle-and-thread) | 1 | 0-10 | 11 |
| *Stipa* spp. (needlegrass) | 1 | 0-10 | 11 |
| **Forbs** | | | |
| *Arctium minus* (common burdock) | <1 | 0-1 | 11 |
| *Artemisia ludoviciana* (prairie sagewort) | <1 | 0-3 | 22 |
| *Bidens vulgata* (tall beggar-ticks) | <1 | 0-1 | 11 |
| *Cynoglossum officinale* (common hound's-tongue) | <1 | 0-1 | 11 |
| *Erigeron glabellus* (smooth daisy) | 2 | 0-10 | 78 |
| Forb (unknown forb) | <1 | 0-1 | 11 |
| *Glycyrrhiza lepidota* (American licorice) | 3 | 0-30 | 11 |
| *Gnaphalium chilense* (cotton-batting plant) | <1 | 0-3 | 11 |
| *Lupinus argenteus* (silvery lupine) | <1 | 0-3 | 11 |
| *Melilotus alba* (white sweet-clover) | 2 | 0-20 | 11 |
| *Melilotus* spp. (sweet-clover) | <1 | 0-1 | 11 |
| *Rorippa palustris* (marsh yellowcress) | <1 | 0-1 | 11 |
| *Solidago canadensis* (Canada goldenrod) | <1 | 0-1 | 11 |
| *Solidago occidentalis* (western goldenrod) | 2 | 0-10 | 33 |
| *Taraxacum officinale* (common dandelion) | <1 | 0-1 | 22 |
| *Tragopogon dubius* (goat's beard) | <1 | 0-1 | 67 |
| *Trifolium dubium* (least hop clover) | 1 | 0-10 | 11 |
| **Ferns and Allies** | | | |
| *Equisetum laevigatum (smooth scouring-rush)* | <1 | 0-3 | 22 |

## SUCCESSIONAL INFORMATION

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type represents a severely disturbed secondary successional stage of the mid-seral *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/ red-osier dogwood) community type (Hansen and others 1995).

**Primary Successional Stages**

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995). The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. 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. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they

are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen and others 1985).

**Early Seral Stage**—The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

**Mid-Seral Stage**—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus angustifolia* (narrowleaf cottonwood) stand is dominated by conifers such as *Picea* spp. (spruce), *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus angustifolia* (narrowleaf cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers or *Acer negundo* (box-elder) are ready to replace them (Hansen and others 1995).

**Late Seral to Climax (PNC) Stage**—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, succession continues from the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type or the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type (Hansen and others 1995).

**Secondary Successional Stages**

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus angustifolia* (narrowleaf cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This represents the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. With

moderate levels of grazing or browsing, there will be an increase in *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused secondary succession is called the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type. If the 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* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus* spp. (brome), and a variety of "weedy" forbs (e.g., the *Populus angustifolia*/Herbaceous [narrowleaf cottonwood/ Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to a herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

## SOILS

Alluvial soils are generally fine textured, primarily silt but with moderate quantities of clay and fine grain sand. This layer may be as shallow as 5 cm (2 in) but may extend to depths of 60 cm (24 in) or more. A matrix of gravels and

cobbles occupies the zone below this horizon. Although neither mottled nor gleyed soil characteristics were observed, fluctuating water tables increase the potential for oxidation/reduction processes. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and islands. Water tables are high in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus angustifolia* (narrowleaf cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although moisture may be present closer to the surface due to capillary action. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols, Entisols, or Mollisols (Hansen and others 1995).

## ADJACENT COMMUNITIES

Saturated sites may be dominated by *Typha* spp. (cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed canarygrass). The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type may occupy adjacent relatively undisturbed sites while the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type may occur on moderately disturbed sites. The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type may be present on locally deposited alluvium. Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush), and *Poa pratensis* (Kentucky bluegrass).

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type provides moderate levels of spring and summer forage. Heavy grazing and trampling tend to maintain the open structure of this community type and continued dominance of the undergrowth by *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), *Agropyron repens* (quackgrass), *Phleum pratense* (common timothy), and a variety of "weedy" forbs. This community type is commonly used as a winter feed ground by ranchers. *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), *Agropyron repens* (quackgrass), and *Phleum pratense* (common timothy) are palatable and moderately productive grasses, especially when soil moisture levels are high, and tolerates a high degree

of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

**Timber**

Timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites receive new alluvial deposits with spring flooding to act as seedbeds for the next generation of cottonwoods, the future timber potential is lost.

**Wildlife**

This type is a source of early spring forage for moose, deer and elk. Cover value is limited because of the typically open, two layered structure. Birds are common, and larger cottonwoods provide nest sites. Large accipiters and cavity nesters may inhabit this type (Youngblood and others 1985b). Great blue herons nest in large cottonwood stands if isolation during the nesting period is possible Colonial nest sites are used for many years if left undisturbed (Parker 1980). Osprey will also use this type for nesting (Zarn 1974).

**Fisheries**

The stream side location of this type is important in providing thermal cover, debris recruitment, and streambank stability. However, the reestablishment of the shrub layer will offer greater bank stability and cover, further enhancing the existing conditions (Hansen and others 1995).

**Fire**

This type will burn when conditions are dry, such as fall or in late winter if snow accumulations are minimal. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) The particular species of cottonwood present in the stand. In general, *Populus angustifolia*

(narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood). 2) The age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited. 3) The location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire *MAY BE* used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

*Poa pratensis* (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

**Soil Management and Rehabilitation Opportunities**
Coarse textured soils are not as susceptible to compaction problems. However, this community type is subject to recurring scouring by floods and alluvium deposition. Management should emphasize the importance of restoring the deep-rooted understory shrub layer along streambanks for stabilization purposes. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters. If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) *MAY* allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been completely eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), , *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and

gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

**Recreational Uses and Considerations**

Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species.

Care must be taken when locating structures on active floodplains due to flood hazard

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

This community was described by and Hansen and others (1995) for Montana. A similar community type was identified by Youngblood and others (1985b) for eastern Idaho and western Wyoming, by Padgett and others (1989) for Utah and southeastern Idaho, and by Chadde and others (1988) for northern Yellowstone National Park. A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

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# *Populus angustifolia/Symphoricarpos occidentalis* Community Type (Narrowleaf Cottonwood/Western Snowberry Community Type)

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**POPANG/SYMOCC (POAN3/SYOC)**
**Number Of Stands Sampled = 1**

## LOCATION AND ASSOCIATED LANDFORMS

The *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/ western snowberry) community type is a minor type at low to mid elevations in eastern Idaho, ranging from 1,455 to 2,061 m (4,800 to 6,800 ft). *Populus angustifolia* (narrowleaf cottonwood) tends to occupy broad, level floodplains and islands associated with major stream and river systems. While stands often occur on point bars, side bars, mid channel bars, and delta bars, they may be located well away from the river on drier secondary floodplains as a result of channel migration over time. Hansen and others (1995) indicate that *Populus angustifolia* (narrowleaf cottonwood) generally occurs at lower elevations than *Populus trichocarpa* (black cottonwood) in Montana. Additional samples need to be collected to determine if this trend holds true in Idaho.

## VEGETATION

The *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type is a grazing disclimax. *Populus angustifolia* (narrowleaf cottonwood) dominates the overstory, with the occasional presence of *Juniperus scopulorum* (Rocky Mountain juniper) and *Populus trichocarpa* (black cottonwood). The shrub component consists of *Rosa woodsii* (woods rose), *Prunus virginiana* (common chokecherry), *Crataegus douglasii* (black hawthorn),*Clematis ligusticifolia* (western virgins-bower) and other disturbance tolerant shrubs. The herbaceous understory generally consists of disturbance-caused species as well, notably *Poa pratensis* (Kentucky bluegrass), *Bromus inermis* (smooth brome) ,*Agrostis stolonifera* (redtop), and *Smilacina stellata* (starry Solomon-plume). Although *Symphoricarpos occidentalis* (western snowberry) is the indicator species and represents one of the main understory species for this type in Montana, it was not observed in the stand sampled in Idaho. This discrepancy may be the result of the limited number of stands observed; however, during the pilot study in 1994, *Rhus aromatica* (fragrant sumac) was observed in regular association with this community type. Additional sites need to be surveyed to determine if this trend continues, requiring modification to the type description developed by Hansen and others (1995).

## SUCCESSIONAL INFORMATION

Hansen and others (1995) state that the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type represents a moderately disturbed secondary successional stage of the mid-seral *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type.

### Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the

stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. 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. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

**Early Seral Stage**—The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

**Mid-Seral Stage**—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus angustifolia* (narrowleaf cottonwood) stand is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus angustifolia*

(narrowleaf cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers or *Acer negundo* (box-elder) are ready to replace them (Hansen and others 1995).

**Late Seral to Climax (PNC) Stage**—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, succession continues from the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type or the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type (Hansen and others 1995).

**Secondary Successional Stages**

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus angustifolia* (narrowleaf cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This represents the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused secondary succession is called the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type. If the 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* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus* spp. (brome), and a variety of "weedy" forbs (e.g., the *Populus angustifolia*/Herbaceous [narrowleaf cottonwood/ Herbaceous] community type). During the process of converting from a diverse, dense shrub

understory to a herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

## SOILS

Alluvial soils are generally fine textured, primarily silt but with moderate quantities of clay and fine grain sand. This layer may be as shallow as 5 cm (2 in) but may extend to depths of 60 cm (24 in) or more. A matrix of gravels and cobbles occupies the zone below this horizon. Although neither mottled nor gleyed soil characteristics were observed, fluctuating water tables increase the potential for oxidation/reduction reactions. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and islands. Water tables are high in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus angustifolia* (narrowleaf cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although moisture may be present closer to the surface due to capillary action. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols, Entisols or Mollisols (Hansen and others 1995).

## ADJACENT COMMUNITIES

Saturated sites may be dominated by *Typha* spp. (cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed canarygrass). Associated riparian shrub communities may be dominated by *Betula occidentalis* (water birch), *Salix exigua*

(sandbar willow), *Crataegus douglasii* (Black Hawthorn and *Salix spp.* (willow). The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type may occupy adjacent relatively undisturbed sites while the *Populus angustifolia*/ Herbaceous (narrowleaf cottonwood /Herbaceous) community type may occur on severely disturbed sites. The *Populus angustifolia*/ Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type may be present on locally deposited alluvium. Nearby uplands are often dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush) and *Poa pratensis* (Kentucky bluegrass).

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Forage production ranges from low to moderate due to the dense shrub understory within the stands. Forage production from dense thickets of *Symphoricarpos occidentalis* (western snowberry), when present, *Rhus aromatica* (fragrant sumac) and *Rosa woodsii* (woods rose) is low. Stands may be so dense that they exclude most livestock use. As the shrub understory is eliminated by continual prolonged heavy grazing or browsing, stands open and forage production increases accordingly due to the presence and amount of *Poa pratensis* (Kentucky bluegrass), *Phleum pratense* (common timothy), or *Bromus* spp. (brome). The palatability of *Symphoricarpos occidentalis* (western snowberry) ranges from low to fair for cattle and sheep (Wasser 1982, Johnson and Nichols 1982), and the leaves of *Rosa woodsii* (woods rose) are considered fair to fairly good livestock forage, particularly for sheep (Johnson and Nichols 1982). The forage value of *Rhus aromatica* (fragrant sumac) rates poorly for all forms of livestock. In some cases, stands may become so dense as to exclude most livestock. However, in arid regions where palatable species are scarce, this species may represent some of the only forage available and may be browsed heavily (Sampson and Jespersen 1963).

### Timber

Timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites receive new alluvial deposits with spring flooding to act as seedbeds for the next generation of cottonwoods, the future timber potential is lost.

**Wildlife**

Ungulates, especially moose and whitetail deer, are common residents of these communities. Songbirds, raptors, and small mammals are also common, due to the high structural diversity and abundant food sources. *Populus angustifolia* (narrowleaf cottonwood) and *Rosa woodsii* (woods rose) are used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

The moderate structural understory diversity of *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) provides thermal and hiding cover for big game and upland bird species. The palatability of *Symphoricarpos occidentalis* (western snowberry) is rated as good for deer and elk (Wasser 1982, Johnson and Nichols 1982). Deer and elk may browse heavily on *Rosa woodsii* (woods rose), while the persistent fruit (rose hips) provides fall and winter food for birds, small mammals, and bears, which disperse the seeds. *Rosa woodsii* (woods rose) is strongly grazing tolerant but can be dwarfed and thinned by intense browsing or defoliation by season long use (Hansen and others 1995).

**Fisheries**

The stream side location of this *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type is important in providing thermal cover, debris recruitment, and streambank stability. Its importance can not be emphasized enough (see discussion in the Soil Management and Rehabilitation Opportunities section). *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) are excellent in controlling erosion along streams due to their rhizomatous nature. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

**Fire**

The *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type is susceptible to fire during the late summer and fall. *Populus angustifolia* (narrowleaf cottonwood) and other shrubs of this type are adapted to light and in some instances to moderate intensity fires and may produce new sprouts following burns. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) The particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood). 2) The age of the trees in

the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited. 3) The location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

*Symphoricarpos occidentalis* (western snowberry) is tolerant of fire. It can be injured by fire but usually sprouts, with stands becoming denser afterward. It is such a strong competitor, particularly in dense colonies, that it is not very compatible with most herbaceous vegetation. *Rosa woodsii* (woods rose) is strongly fire tolerant, except for smoldering fires with heavy volumes of surface fuel. The species has a shallow and much branched rhizomatous root system that will readily sprout and sucker. This sprouting capability of *Rosa woodsii* (woods rose) make it a good soil stabilizer (Hansen and others 1995). Sampson and Jespersen (1963) indicate that *Rhus aromatica* (fragrant sumac) is a sprouting species with a shallow and much branched rhizomatous root system. This not only makes it a good soil stabilizer and allows it to colonize large areas, but permits it to actually increase overall coverage after a fire.

**Soil Management and Rehabilitation Opportunities**
Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) *MAY* allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been completely eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the

cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

*Symphoricarpos occidentalis* (western snowberry) is well adapted for revegetating sites. Commonly growing in dense colony stands makes it suitable for disturbed land stabilization. It does best on moist, well drained soils which have not been excessively disturbed. Once established, it grows at a moderate rate and spreads rapidly by root sprouts. Nursery grown seedlings, rooted cuttings, or wildlings are the preferred planting materials. Critical, erosive sites may need complete exclusion from grazing during establishment, and animal populations and stacking rates should be balanced with forage supply on noncritical sites after establishment (Wasser 1982).

*Rosa woodsii* (woods rose) is valuable for revegetating disturbed sites along streambanks and seeps. It is easily established from nursery grown stock, root cuttings, or transplanted materials (Hansen and others 1995).

**Recreational Uses and Considerations**
Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

Care must be taken when locating structures within this type due to flood hazard.

*Symphoricarpos occidentalis* (western snowberry) is an important food source for upland birds due to fruits that persist into the winter. Native Americans made extensive use of *Rosa woodsii* (woods rose) roots, stems, leaves, flowers, and rose hips for food and therapeutic materials (US Forest Service 1975). The persistent rose hips are edible, and are one of the best natural sources of vitamin C. They can be dried for use in flavoring teas, jellies, fruitcakes, and puddings.

Nature trails should be routed around dense stands of the *Rosa woodsii* (woods rose) community type. However, *Rosa woodsii* (woods rose) is useful for planting in recreation areas as a biological barrier to protect physical structures, young and delicate plants, and to direct traffic (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification**
**(Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

This community type has been documented for Montana (Hansen and others 1995). A similar community type was described by Youngblood and others (1985b) for eastern Idaho and western Wyoming, and by Padgett and others (1989) for Utah and southeastern Idaho. Major undergrowth shrubs were *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Salix bebbiana* (Bebb willow). A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

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## *Populus tremuloides/Cornus stolonifera* Habitat Type
## (Quaking Aspen/Red-Osier Dogwood Habitat Type)

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**POPTRE/CORSTO (POTR10/COST4)**
**Number Of Stands Sampled = 12**

## LOCATION AND ASSOCIATED LANDFORMS

The *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type is a major type from moderately low to high elevations throughout the mountains and valleys of eastern Idaho. Sites range in elevation from 1,455 to 2,200 m (4,800 to 7,260 ft). This habitat type typically occurs on alluvial terraces adjacent to streams and rivers in U- and V-shaped canyon drainages, or adjacent to hillside springs and seeps.

## VEGETATION

*Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat types in Idaho may contain *Juniperus scopulorum* (Rocky Mountain juniper), *Pseudotsuga menziesii* (Douglas fir), or *Populus angustifolia* (narrowleaf cottonwood) in trace amounts scattered throughout an overstory dominated by

*Populus tremuloides* (quaking aspen). Although this habitat type is generally characterized by a remarkably diverse understory both at the middle and lower levels, constancy and covers for many species tend to be low. *Cornus stolonifera* (red-osier dogwood) and *Rosa woodsii* (woods rose) share codominance in the shrub-understory with a variety of other less well represented species, such as *Salix* spp. (willow), *Symphoricarpos occidentalis* (western snowberry), or *Crataegus douglasii* (black hawthorn). Graminoids may include *Phalaris arundinacea* (reed canarygrass), *Agropyron repens* (quackgrass), and *Poa pratensis* (Kentucky bluegrass), while forbs consist of species such as *Glycyrrhiza lepidota* (American licorice), *Polygonum* spp. (smartweed), or *Equisetum* spp. (horsetail).

**Table 11.** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type (number = 12 stands)

| Species | % Canopy Cover | | Constancy |
|---|---|---|---|
| | Average | Range | |
| **Trees** | | | |
| *Juniperus scopulorum* (Rocky Mountain juniper) | 1 | 0-1 | 8 |
| *Populus angustifolia* (narrowleaf cottonwood) | 4 | 0-50 | 8 |
| *Populus tremuloides* (quaking aspen) | 63 | 30-90 | 100 |
| *Pseudotsuga menziesii* (Douglas fir) | <1 | 0-1 | 17 |
| **Shrubs** | | | |
| *Acer glabrum* (Rocky Mountain maple) | <1 | 0-3-8 | |
| *Alnus incana* (mountain alder) | 6 | 0-70 | 8 |
| *Amelanchier alnifolia* (western serviceberry) | <1 | 0-3 | 17 |
| *Berberis repens* (creeping Oregongrape) | <1 | 0-3 | 8 |
| *Betula occidentalis* (water birch) | 3 | 0-30 | 8 |
| *Cornus stolonifera* (red-osier dogwood) | 23 | 0-80 | 67 |
| *Crataegus douglasii* (black hawthorn) | 5 | 0-40 | 42 |
| *Lonicera involucrata* (twin-berry) | <1 | 0-3 | 8 |
| *Prunus virginiana* (common chokecherry) | <1 | 0-3 | 8 |
| *Rhus aromatica* (fragrant sumac) | <1 | 0-3 | 8 |
| *Ribes hudsonianum* (stinking currant) | <1 | 0-1 | 8 |
| *Ribes lacustre* (swamp currant) | <1 | 0-3 | 8 |
| *Ribes odoratum* (buffalo currant) | <1 | 0-3 | 8 |
| *Rosa woodsii* (woods rose) | 20 | 1-50 | 100 |
| *Rubus parviflorus* (thimbleberry) | 4 | 0-50 | 8 |
| *Salix exigua* (sandbar willow)) | 1 | 0-3 | 25 |
| *Salix lutea* (yellow willow) | 2 | 0-20 | 8 |
| *Solanum dulcamara* (climbing nightshade) | 2 | 0-10 | 33 |
| *Symphoricarpos occidentalis* (western snowberry) | 10 | 0-60 | 50 |
| *Symphoricarpos* spp. (Snowberry) | 3 | 0-40 | 8 |
| *Toxicodendron rydbergii* (Poison Ivy) | 1 | 0-10 | 8 |
| **Graminoids** | | | |
| *Agropyron caninum* (bearded wheatgrass) | <1 | 0-3 | 8 |
| *Agropyron repens* (quackgrass) | 17 | 0-70 | 50 |
| *Agropyron smithii* (western wheatgrass) | <1 | 0-1 | 8 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Agrostis stolonifera* (redtop) | 4 | 0-30 | 17 |
| *Bromus inermis* (smooth brome) | 3 | 0-30 | 17 |
| *Carex atherodes* (awned sedge) | <1 | 0-1 | 8 |
| *Carex athrostachya* (Slender-beaked Sedge) | <1 | 0-3 | 8 |
| *Carex disperma* (soft-leaved sedge) | <1 | 0-3 | 8 |
| *Carex* spp.(sedge) | <1 | 0-1 | 17 |
| *Carex rostrata* (beaked sedge) | 3 | 0-40 | 25 |
| *Elymus glaucus* (blue wildrye) | <1 | 0-1 | 8 |
| *Glyceria striata* (fowl mannagrass) | <1 | 0-1 | 8 |
| Grass perennial (perennial grass) | 1 | 0-10 | 8 |
| *Hordeum jubatum* (foxtail barley) | <1 | 0-1 | 8 |
| *Muhlenbergia asperifolia* (alkali muhly) | 4 | 0-30 | 50 |
| *Phalaris arundinacea* (reed canarygrass) | 7 | 0-70 | 58 |
| *Poa pratensis* (Kentucky Bluegrass) | 3 | 0-30 | 25 |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | <1 | 0-3 | 8 |
| *Allium brevistylum* (short-style onion) | <1 | 0-1 | 8 |
| *Anthemis cotula* (dog fennel) | <1 | 0-1 | 8 |
| *Aquilegia flavescens* (yellow columbine) | 2 | 0-20 | 8 |
| *Arctium minus* (common burdock) | <1 | 0-3 | 8 |
| *Arctium* spp. (Burdock) | <1 | 0-1 | 8 |
| *Arnica longifolia* (longleaf arnica) | <1 | 0-3 | 8 |
| *Asparagus officinalis* (Asparagus) | <1 | 0-1 | 8 |
| *Aster campestris* (meadow aster) | <1 | 0-1 | 8 |
| *Aster eatonii* (Eaton's aster) | <1 | 0-1 | 8 |
| *Aster modestus* (few-flowered aster) | 1 | 0-10 | 8 |
| *Aster occidentalis* (western aster) | <1 | 0-1 | 33 |
| *Aster* spp. (aster) | <1 | 0-1 | 8 |
| *Bidens cernua* (nodding beggar-ticks) | <1 | 0-1 | 8 |
| *Bidens vulgata* (tall beggar-ticks) | <1 | 0-1 | 25 |
| *Cardamine* spp. (bittercress) | <1 | 0-3 | 8 |
| *Cicuta maculata* (spotted water-hemlock) | <1 | 0-3 | 8 |
| *Cirsium arvense* (Canada thistle) | 3 | 0-20 | 67 |
| *Cirsium vulgare* (bull thistle) | <1 | 0-1 | 8 |
| *Cynoglossum officinale* (common hound's-tongue) | <1 | 0-3 | 8 |
| *Epilobium latifolium* (Red Willow-herb) | <1 | 0-1 | 8 |
| Forb (unknown forb) | <1 | 0-1 | 17 |
| *Fragaria virginiana* (Virginia strawberry) | <1 | 0-1 | 8 |
| *Galium triflorum* (sweetscented bedstraw) | 1 | 0-3 | 17 |
| *Geranium viscosissimum* (sticky geranium) | 1 | 0-10 | 8 |
| *Geum macrophyllum* (larged-leaved avens) | 1 | 0-3 | 17 |
| *Glycyrrhiza lepidota* (American licorice) | 9 | 0-90 | 25 |
| *Helenium autumnale* (sneezeweed) | <1 | 0-1 | 8 |
| *Heracleum lanatum* (cow-parsnip) | <1 | 0-3 | 8 |
| *Hydrophyllum capitatum* (ballhead waterleaf) | <1 | 0-1 | 8 |
| *Lactuca serriola* (prickly lettuce) | <1 | 0--3 | 8 |
| *Lysimachia ciliata* (Fringed Loosestrife) | 3 | 0-30 | 25 |
| *Medicago sativa* (alfalfa) | <1 | 0-1 | 8 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Melilotus officinalis* (yellow sweet-clover) | <1 | 0-3 | 8 |
| *Mentha arvensis* (field mint) | <1 | 0-1 | 8 |
| *Mimulus guttatus* (common monkey-flower) | <1 | 0-1 | 8 |
| *Montia chamissoi* (water montia) | <1 | 0-1 | 8 |
| *Osmorhiza chilensis* (mountain sweet-cicely) | 1 | 0-10 | 8 |
| *Osmorhiza depauperata* (blunt-fruit sweet-cicely) | <1 | 0-3 | 8 |
| *Plantago major* (common plantain) | <1 | 0-1 | 17 |
| *Polygonum amphibium* (water smartweed) | 8 | 0-40 | 25 |
| *Polemonium occidentale* (Western Polemonium) | <1 | 0-1 | 8 |
| *Pyrola asarifolia* (pink wintergreen) | <1 | 0-1 | 8 |
| *Rumex crispus* (curly dock) | <1 | 0-3 | 25 |
| *Senecio canus* (woolly groundsel) | <1 | 0-3 | 8 |
| *Senecio hydrophilus* (Alkali-marsh Butterweed) | <1 | 0-1 | 17 |
| *Senecio serra* (tall butterweed) | <1 | 0-3 | 8 |
| *Smilacina racemosa* (false spikenard) | 1 | 0-10 | 8 |
| *Smilacina stellata* (starry Solomon-plume) | 1 | 0-3 | 17 |
| *Solidago canadensis* (Canada goldenrod) | 1 | 0-10 | 17 |
| *Solidago gigantea* (late goldenrod) | <1 | 0-3 | 8 |
| *Sonchus arvensis* (Field Milk-thistle) | <1 | 0-1 | 8 |
| *Stachys palustris* (swamp hedge-nettle) | 1 | 0-10 | 8 |
| *Taraxacum officinale* (common dandelion) | <1 | 0-3 | 17 |
| *Thalictrum occidentale* (western meadowrue) | 2 | 0-20 | 8 |
| *Tragopogon dubius* (goat's beard) | <1 | 0-1 | 8 |
| **Ferns and Allies** | | | |
| *Equisetum laevigatum* (smooth scouring-rush) | <1 | 0-3 | 17 |
| *Equisetum* spp. (horsetail; scouring-rush) | 1 | 0-10 | 25 |

## SUCCESSIONAL INFORMATION

Various shrub communities, particularly *Alnus incana* (mountain alder), *Salix lutea* (yellow willow), and *Salix exigua* (sandbar willow), or deciduous forests, dominated by *Populus trichocarpa* (black cottonwood) or *Populus angustifolia* (narrowleaf cottonwood), may act as transitional phases for the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type. If site conditions shift to favor conifer types, *Populus tremuloides* (quaking aspen) stands may in turn act as seral stages for *Picea* spp. (spruce), *Abies lasiocarpa* (subalpine fir) or *Pseudotsuga menziesii* (Douglas fir). Excessive utilization of this habitat type by wildlife or livestock may impact the regeneration of both *Populus tremuloides* (quaking aspen) and the shrub understory, shifting the site toward the disclimax *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type (Hansen and others 1995).

## SOILS

An organic layer, indicative of Mollisols, may be present to a depth of 25 cm (10 in) or more. Where sites occur below seeps and springs, this layer typically forms a saturated muck at the surface mixed with fine alluvial silts and sands. Where the organic layer is essentially absent, a sandy loam of similar dimensions may occur. Mottles may be in evidence, although infrequent, on sites that occupy active floodplains. Underlying horizons may be composed of fine and coarse sands. The deeper substrate are often dominated by gravels, cobbles and rocks with fines filling the interstitial spaces. Litter and duff layers occur where flooding or disturbance is absent or infrequent and may be 45 cm (18 in) deep, but are generally only a few centimeters in depth. Water tables may be at or near the surface where sites occur below seeps and springs, or 2 m (6.5 ft) or more deep on upper floodplains although moisture may be present closer to the surface due to capillary action.

## ADJACENT COMMUNITIES

*Typha* spp. (cattail), *Scirpus* spp. (bulrush), *Eleocharis palustris* (common spikesedge), and *Phalaris arundinacea* (reed canarygrass) may occupy saturated sites adjacent to the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type. Other associated riparian communities include *Alnus incana* (mountain alder), *Salix* spp. (willow) and *Populus* spp. (cottonwood). Drier uplands may be dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), and *Pinus contorta* (lodgepole pine), or by steppe vegetation such as *Artemisia tridentata* (big sagebrush) or mixed grasslands.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Forage production varies from low to moderate, depending on the density of the tree and shrub layer. Palatability of the various herbaceous species associated with this type are often high, and cattle use may be heavy as upland vegetation cures and animals spend much of their time in the shade provided by these communities. Livestock will use this type for forage, shade, and as bedding ground. They also browse young suckers and, combined with trampling and soil compaction, can alter both the age structure and herbaceous layer of this type (Hansen and others 1995).

*Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high. Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

**Timber**

Most timber harvest is salvage for fuelwood. Overstory removal will result in sprouting of young aspen that are susceptible to grazing pressure (Hansen and others 1995).

**Wildlife**

The *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type, although often covering only small areas, has high value as wildlife cover and feeding areas. Beaver, if present, may make heavy use of *Populus tremuloides* (quaking aspen) stands (Allen 1983). Wild ungulates such as moose, deer and elk browse young suckers and occasionally feed on the bark of older trees. Use by elk during spring, fall, and winter periods is often moderate to heavy (Kufeld 1973). *Populus tremuloides* (quaking aspen) and *Cornus stolonifera* (red-osier dogwood) are highly preferred by moose (Costain 1989). Use of this type as bedding grounds by wildlife is also common.

Numerous bird species frequent communities dominated by *Populus tremuloides* (quaking aspen). Common species nesting and feeding in this type include flickers, chickadees, sap suckers, and woodpeckers (Flack 1976).

**Fisheries**

Where adjacent to streams, stands of this type enhance fisheries by stabilizing banks and providing overhanging cover. *Cornus stolonifera* (red-osier dogwood) is an excellent shrub for controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

**Fire**

Wet conditions in the spring and summer tend to limit successful burning to the drier fall period. Fire, sometimes in combination with cutting, is becoming an increasingly important tool in regenerating decadent stands of *Populus tremuloides* (quaking aspen) (Jones and DeByle 1985). Brown (1984) provides

information for using prescribed fire in stands of *Populus tremuloides* (quaking aspen). Protection of newly burned or cleared sites from beaver and grazing animals may be necessary for successful reproduction.

*Cornus stolonifera* (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprouts from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

**Soil Management and Rehabilitation Opportunities**
Soils compaction is likely when repeated animal use occurs on moist soils. Grazing should be deferred to periods when soils and streambanks are drier (Marlow 1984).

*Populus tremuloides* (quaking aspen) may be useful in revegetating disturbed sites having moist, well drained soils. Best results are obtained using rooted cuttings or nursery grown stock. Once established, growth rates are rapid. The quickly spreading roots of *Populus tremuloides* (quaking aspen) effectively stabilize soils (Hansen and others 1995).

Where revegetation with woody shrub species is desired, *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings are effective stabilizers of alluvial soil deposits (Hansen and others 1995).

**Recreational Uses and Considerations**
Fishing and birding opportunities are often good. Campsites should be located away from stands of this type because of wet soils and large mosquito populations (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

This habitat type has been described by Hansen and others (1995) for the state of Montana and Manning and Padgett (1992) for Nevada and eastern California.

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# *Populus tremuloides/Osmorhiza occidentalis* Habitat Type (Quaking Aspen/Western Sweet-Cicely Habitat Type)

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**POPTRE/OSMOCC (POTR10/OSCC)**
**Number Of Stands Sampled = 3**

## LOCATION AND ASSOCIATED LANDFORMS

The *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type is a minor type occurring in broad, gentle mountain valleys and foothills of eastern Idaho. *Populus tremuloides* (quaking aspen) stands may occupy alluvial terraces adjacent to small streams in U-shaped canyons, or hillsides below springs and seeps. Sites range in elevation from 1,700 to 2,182 m (5,610 to 7,200 ft).

## VEGETATION

*Populus tremuloides* (quaking aspen) essentially dominates the overstory of this habitat type. The modest shrub component may consist of *Symphoricarpos oreophilus* (mountain snowberry), *Amelanchier alnifolia* (western serviceberry) or *Rosa woodsii* (woods rose). The herbaceous layer is often dense and exhibits a high diversity of graminoids and forbs such as *Carex* spp.(sedge), *Thalictrum occidentale* (western meadowrue), *Ranunculus* spp. (buttercup), *Osmorhiza occidentalis* (western sweet-cicely), and *Wyethia helianthoides* (white-head mule's-ears). Moss may form a dense carpet over the ground surface below the herbaceous layer where sufficient moisture is present.

**Table 12** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type (number = 3 stands)

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Pinus contorta* (Lodgepole Pine) | 1 | 0-3 | 33 |
| *Populus tremuloides* (quaking aspen) | 63 | 40-80 | 100 |
| **Shrubs** | | | |
| *Amelanchier alnifolia* (western serviceberry) | 7 | 0-20 | 33 |
| *Berberis repens* (creeping oregongrape) | 3 | 0-10 | 33 |
| *Prunus virginiana* (common chokecherry) | 1 | 0-3 | 33 |
| *Rosa woodsii* (woods rose) | 7 | 0-20 | 33 |
| *Symphoricarpos oreophilus* (mountain snowberry) | 10 | 0-30 | 67 |
| **Graminoids** | | | |
| *Agrostis stolonifera* (redtop) | <1 | 0-1 | 33 |
| *Bromus inermis* (smooth brome) | <1 | 0-1 | 33 |
| *Carex* spp.(sedge) | <1 | 0-1 | 33 |
| *Carex geyeri* (elk sedge) | 7 | 0-20 | 33 |
| *Carex hoodii* (Hood's Sedge) | 7 | 0-20 | 33 |
| *Carex raynoldsii* (Raynolds' sedge) | <1 | 0-1 | 67 |
| *Elymus glaucus* (blue wildrye) | 7 | 0-20 | 33 |
| Grass perennial (perennial grass) | 7 | 0-20 | 33 |
| *Melica spectabilis* (Showy Oniongrass) | <1 | 0-1 | 67 |
| *Phleum alpinum* (Alpine Timothy) | 7 | 0-20 | 33 |
| *Phleum pratense* (common timothy) | 1 | 0-3 | 33 |
| *Poa pratensis* (Kentucky bluegrass) | 1 | 0-3 | 33 |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | 10 | 1-20 | 100 |
| *Actaea rubra* (baneberry) | <1 | 0-1 | 33 |
| *Agoseris glauca* (Pale Agoseris) | 1 | 0-3 | 33 |
| *Allium geyeri* (Geyer's onion) | <1 | 0-1 | 33 |
| *Angelica arguta* (sharptooth angelica) | 1 | 0-3 | 33 |
| *Arnica cordifolia* (heart-leaf arnica) | 7 | 0-20 | 33 |
| *Barbarea orthoceras* (American Wintercress) | <1 | 0-1 | 33 |
| *Erythronium grandiflorum* (glacier-lily) | 4 | 0-10 | 67 |
| *Fragaria virginiana* (Virginia strawberry) | 10 | 0-20 | 67 |
| *Galium aparine* (goose-grass) | 7 | 0-20 | 33 |
| *Geranium viscosissimum* (sticky geranium) | 7 | 1-10 | 100 |
| *Heracleum lanatum* (cow-parsnip) | <1 | 0-1 | 33 |
| *Hydrophyllum capitatum* (ballhead waterleaf) | <1 | 0-1 | 33 |
| *Lithophragma parviflorum* (Smallflower Woodlandstar) | <1 | 0-1 | 67 |
| *Lomatium ambiguum* (Swale Desert-parsley) | <1 | 0-1 | 33 |
| *Lupinus argenteus* (silvery lupine) | 1 | 0-3 | 33 |
| *Myosotis sylvatica* (wood forget-me-not) | <1 | 0-1 | 33 |
| *Nepeta cataria* (catnip) | 1 | 0-3 | 33 |
| *Osmorhiza chilensis* (mountain sweet-cicely) | 7 | 0-20 | 33 |
| *Osmorhiza occidentalis* (western sweet-cicely) | 4 | 0-10 | 67 |
| *Pedicularis bracteosa* (bracted lousewort) | 2 | 0-3 | 67 |
| *Perideridia bolanderi* (Bolander's yampah) | <1 | 0-1 | 33 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Perideridia gairdneri* (Gairdner's Yampah) | <1 | 0-1 | 33 |
| *Polygonum bistortoides* (American Bistort) | <1 | 0-1 | 33 |
| *Potentilla diversifolia* (diverse-leaved cinquefoil) | 7 | 0-20 | 33 |
| *Potentilla gracilis* (Slender Cinquefoil) | 4 | 0-10 | 67 |
| *Ranunculus* spp. (buttercup) | 10 | 0-20 | 67 |
| *Ranunculus uncinatus* (Little Buttercup) | 8 | 0-20 | 67 |
| *Rumex paucifolius* (Mountain Sorrel) | 4 | 0-10 | 67 |
| *Saxifraga integrifolia* (Swamp Saxifrage) | 7 | 0-20 | 33 |
| *Senecio foetidus* (Sweet-marsh Butterweed) | 7 | 0-10 | 6 |
| *Senecio serra* (tall butterweed) | 3 | 0-10 | 33 |
| *Smilacina stellata* (starry Solomon-plume) | 4 | 0-10 | 67 |
| *Taraxacum officinale* (common dandelion) | 1 | 1-1 | 100 |
| *Thalictrum occidentale* (western meadowrue) | 8 | 1-20 | 100 |
| *Tragopogon dubius* (goat's beard) | <1 | 0-1 | 33 |
| *Trifolium longipes* (long-stalked clover) | 3 | 0-10 | 33 |
| *Valeriana occidentalis* (Western Valerian) | <1 | 0-1 | 33 |
| *Viola nuttallii* (Yellow Prairie Violet) | <1 | 0-1 | 33 |
| *Wyethia helianthoides* (White-head Mule's-ears) | 17 | 0-30 | 67 |

## SUCCESSIONAL INFORMATION

*Salix* spp. (willow) communities may act as seral stages for the *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type. If site conditions shift to favor conifer types, *Populus tremuloides* (quaking aspen) stands may in turn act as seral stages for *Picea* spp. (spruce), *Abies lasiocarpa* (subalpine fir), or *Pseudotsuga menziesii* (Douglas fir). Although the *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type exhibits varying degrees of livestock impacts, prolonged, high intensity grazing may result in an increase in the proportion of disturbance tolerant species and a shift to the grazing or browsing disclimax *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type (Hansen and others 1995).

## SOILS

Fine textured soils, often rich in nutrients and organic materials, are present near the surface. Soils are probably classified as Mollisols or Entisols. The upper horizon, 30 cm (12 in) or more in depth, is predominantly silt or silt loam. Alluvial gravels and sands may be present in association with channel or overland flow, but are generally absent in the upper layers. Unconsolidated rocks, in the medium and large size class range, may compose underlying layers. Water tables may be at or near the surface for some sites but may be as deep as 1 m (39 in) or more in others.

## ADJACENT COMMUNITIES

Other communities dominated by Populus *tremuloides* (quaking aspen) tend to occupy adjacent riparian zones. The *Populus tremuloides/Poa pratensis* (quaking aspen/Kentucky bluegrass) community type (Hansen and others 1995) occurs on disturbed sites while the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type may establish on less disturbed locations. *Salix* spp. (willow) communities often form dense stands bordering stream channels while *Wyethia* spp. (mule's-ears) meadows may dominant moist hillsides. Adjacent drier upland sites are generally uplands, dominated by *Pinus contorta* (lodgepole pine), *Abies lasiocarpa* (subalpine fir), or *Pseudotsuga menziesii* (Douglas fir) forests or *Artemisia tridentata* (big sagebrush) steppe.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Palatability of the various herbaceous species associated with this type are often high, and cattle use may be heavy as upland vegetation cures and animals spend much of their time in the shade provided by these communities. Livestock will use this type for forage, shade, and as bedding ground. They also browse young suckers and, combined with trampling and soil compaction, can alter both the age structure and herbaceous layer of this type (Hansen and others 1995).
The *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type rates high for forage production. In a similar type in western Wyoming, Youngblood and Mueggler (1981) found forage production to be approximately 1,072 kg/ha (1,200 lbs/acre).

### Wildlife

The *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type has high value as wildlife cover and feeding areas. These sites are important winter and summer grounds for big game. Beaver, if present, may make heavy use of *Populus tremuloides* (quaking aspen) stands (Allen 1983). Wild ungulates such as deer and elk browse young suckers and occasionally feed on the bark of older trees. Use by elk during spring, fall, and winter periods is often moderate to heavy (Kufeld 1973). *Populus tremuloides* (quaking aspen) is a highly preferred species by moose (Costain 1989). Use of this type as bedding grounds by wildlife is also common.

Numerous bird species frequent communities dominated by *Populus tremuloides* (quaking aspen). Common species nesting and feeding in this type include flickers, chickadees, sap suckers, and woodpeckers (Flack 1976).

**Fisheries**

Where adjacent to streams, stands of this type enhance fisheries by stabilizing banks and providing overhanging cover (Hansen and others 1995).

**Fire**

Wet conditions in the spring and summer tend to limit successful burning until the drier fall period. Fire, sometimes in combination with cutting, is becoming an increasingly important tool in regenerating decadent stands of *Populus tremuloides* (quaking aspen) (Jones and DeByle 1985). Brown (1984) provides information for using prescribed fire in stands of *Populus tremuloides* (quaking aspen). Protection of newly burned or cleared sites from beaver and grazing animals may be necessary for successful reproduction.

**Soil Management and Rehabilitation Opportunities**

Soils compaction is likely when repeated animal use occurs on moist soils. Grazing should be deferred to periods when soils and streambanks are drier (Marlow 1984). *Populus tremuloides* (quaking aspen) can be useful in revegetating disturbed sites having moist, well drained soils. Best results are obtained using rooted cuttings or nursery grown stock. Once established, growth rates are rapid with spreading roots quickly stabilizing the soil Mueggler and Campbell (1982).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

This habitat type represents the *Populus tremuloides-Populus trichocarpa/Osmorhiza occidentalis* (quaking aspen-black cottonwood/western sweet-cicely) community type described by Cooper (1981) for the Blackfeet Indian Reservation. A similar

type was described by Lynch (1955) for Glacier County, Montana, and by Youngblood and Mueggler (1981) for western Wyoming. Hansen and others (1995) documented this habitat type for Montana

## *Populus trichocarpa/Cornus stolonifera* Community Type (Black Cottonwood/Red-Osier Dogwood Community Type)

**POPTRI/CORSTO (POTR6/COST4)**
**Number Of Stands Sampled = 7**

### LOCATION AND ASSOCIATED LANDFORMS

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type is a major type from low to higher elevations throughout the foothills and valleys of eastern Idaho. *Populus trichocarpa* (black cottonwood) stands occupy floodplains and islands of major streams and rivers, developing as extensive forests, as narrow, stringer communities paralleling minor stream courses, or as mosaics of smaller clustered stands. This community type may be located on stream banks and alluvial bars immediately adjacent to flowing channels or stranded on upper, secondary floodplains as natural river dynamics cause channels to migrate across valley bottoms. Sites range from 1,394 to 2,121 m (4,600 to 7,000 ft). Hansen and others (1995) indicate that *Populus trichocarpa* (black cottonwood) generally occurs at higher elevations than *Populus angustifolia* (narrowleaf cottonwood) in Montana. Additional samples need to be collected to determine if this trend holds true in Idaho.

### VEGETATION

In Idaho, *Populus trichocarpa* (black cottonwood) is the principal overstory species for this type. *Salix amygdaloides* (peach-leaf willow), *Populus angustifolia* (narrowleaf cottonwood) and *Populus acuminata* (lanceleaf cottonwood) may also be present in the upper strata as subordinates with minimal coverages. *Cornus stolonifera* (red-osier dogwood), the diagnostic shrub for this type, may form a dense understory with other shrub species such as *Betula occidentalis* (water birch), *Salix exigua* (sandbar willow), *Salix lutea* (yellow willow), and *Rosa woodsii* (woods rose). Grasses and forbs vary widely depending on the type and level of disturbance, and may be dense or sparse depending on the nature of the overlying shrub layer. The herbaceous element typically contains *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), *Phalaris arundinacea* (reed canarygrass), *Polygonum* spp. (smartweed), and *Equisetum* spp. (horsetail).

Deadwood may be prominent on the ground surface as mature stands become decadent with age.

**Table 13.** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type that are relatively undisturbed by livestock or wildlife (number = 7 stands)

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Populus acuminata* (lanceleaf cottonwood) | 1 | 0-10 | 14 |
| *Populus trichocarpa* (black cottonwood) | 61 | 30-90 | 100 |
| *Salix amygdaloides* (peach-leaf willow) | 11 | 0-80 | 14 |
| **Shrubs** | | | |
| *Cornus stolonifera* (red-osier dogwood) | 41 | 3-90 | 100 |
| *Crataegus douglasii* (black hawthorn) | 7 | 0-30 | 43 |
| *Crataegus succulenta* (succulent hawthorn) | 3 | 0-20 | 14 |
| *Ribes lacustre* (swamp currant) | 1 | 0-3 | 71 |
| *Rosa woodsii* (woods rose) | 30 | 0-70 | 86 |
| *Salix lutea* (yellow willow) | 3 | 0-10 | 29 |
| *Solanum dulcamara* (climbing nightshade) | 4 | 0-10 | 43 |
| *Symphoricarpos occidentalis* (western snowberry) | 4 | 0-20 | 29 |
| **Graminoids** | | | |
| *Agropyron repens* (quackgrass) | <1 | 0-3 | 14 |
| *Agrostis stolonifera* (redtop) | 5 | 0-30 | 71 |
| *Calamagrostis canadensis* (bluejoint reedgrass) | <1 | 0-1 | 14 |
| *Carex stipata* (sawbeak sedge) | <1 | 0-1 | 14 |
| *Elymus virginicus* (Virginia wildrye) | 3 | 0-20 | 14 |
| *Glyceria striata* (fowl mannagrass) | <1 | 0-1 | 14 |
| *Muhlenbergia asperifolia* (alkali muhly) | <1 | 0-1 | 14 |
| *Phalaris arundinacea* (reed canarygrass) | 3 | 0-20 | 57 |
| *Poa bolanderi* (bolander's bluegrass) | 1 | 0-10 | 14 |
| *Poa pratensis* (Kentucky bluegrass) | 9 | 0-60 | 29 |
| **Forbs** | | | |
| *Arctium minus* (common burdock) | <1 | 0-1 | 14 |
| *Bidens cernua* (nodding beggar-ticks) | 1 | 0-10 | 14 |
| *Bidens vulgata* (tall beggar-ticks) | <1 | 0-1 | 14 |
| *Cirsium arvense* (Canada thistle) | 6 | 0-20 | 71 |
| *Epilobium glaberrimum* (smooth willow-herb) | <1 | 0-1 | 14 |
| Forb (unknown forb) | <1 | 0-1 | 29 |
| *Lycopus uniflorus* (northern bugleweed) | <1 | 0-1 | 14 |
| *Lysimachia thyrsiflora* (tufted loosestrife) | <1 | 0-1 | 14 |
| *Mentha arvensis* (field mint) | 3 | 0-20 | 29 |
| *Polygonum amphibium* (water smartweed) | 3 | 0-10 | 29 |
| *Polygonum punctatum* (water smartweed) | 1 | 0-10 | 14 |
| *Rumex crispus* (curly dock) | <1 | 0-3 | 14 |
| *Scutellaria galericulata* (marsh skullcap) | <1 | 0-1 | 14 |
| *Sium suave* (hemlock water-parsnip) | <1 | 0-1 | 14 |
| *Solidago gigantea* (late goldenrod) | <1 | 0-3 | 14 |
| *Trifolium* spp. (clover) | <1 | 0-1 | 14 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Ferns and Allies** | | | |
| *Equisetum arvense* (field horsetail) | 1 | 0-10 | 14 |
| *Equisetum* spp. (horsetail; scouring-rush) | 4 | 0-30 | 29 |

## SUCCESSIONAL INFORMATION

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type represents a mid-seral stage of primary succession (Hansen and others 1995).

### Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995). The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. 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. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even

aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

**Early Seral Stage**—The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

**Mid-Seral Stage**—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus trichocarpa* (black cottonwood) stand is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir) and *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus trichocarpa* (black cottonwood) overstory matures, becomes open, and finally, becomes decadent, the conifers are ready to replace them (Hansen and others 1995).

**Late Seral to Climax (PNC) Stage**—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at low to mid elevations succession continues from the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type to wetland habitat types dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir) and *Juniperus scopulorum* (Rocky Mountain juniper).

**Secondary Successional Stages**

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus trichocarpa* (black cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Prunus*

*virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This stage is called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused succession is called the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type (Hansen and others 1995). If the 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* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus inermis* (smooth brome), and a variety of "weedy" forbs (e.g., the *Populus trichocarpa*/Herbaceous [black cottonwood/Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to a herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site *BEFORE* the site is too degraded (Hansen and others 1995).

## SOILS

Fine textured mineral soils, composed of varying degrees of silts, clays and fine grain sands, form the surface layers of sites occupied by this community type. These alluvial layers may extend to depths exceeding well beyond 90 cm (36 in). Mottled and gleyed soil characteristics occur where the flux of near surface water tables facilitate oxidation and reduction reactions. Gravels and cobbles may be present in pockets and ill-defined layers throughout this zone. Underlying layers tend to be composed of coarse grain materials and large cobbles or rocks. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and on islands. Water tables are near the surface in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus trichocarpa* (black cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although capillary action may promote greater moisture availability upward in the soil solum. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols, Entisols, or Mollisols.

## ADJACENT COMMUNITIES

Saturated sites may be dominated by *Typha* spp. (cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed canarygrass). Other types in the *Populus trichocarpa* (Black cottonwood) series may border the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type where disturbance has altered the composition of the understory component and/or the physical site features. Additional adjacent riparian communities may be dominated by *Crataegus douglasii* (black hawthorn) or a diversity of *Salix* spp. (willow). Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush), and *Poa pratensis* (Kentucky bluegrass).

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Forage production ranges from low to moderate due to the dense nature of the stands. Stands in good to excellent health (condition) often support dense thickets of shrubs, limiting the amount of available forage. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas,

livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

Most sites are presently subjected to heavy grazing pressures because of their topographic location and ease of access. With moderate to heavy prolonged grazing pressures, most shrubs will be eliminated leaving the shrubs *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) as the dominate understory. At this point, the stand has been converted to the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) disturbance-caused community type (Hansen and others 1995). If disturbance is severe, the shrubs will also be eliminated and the stand has converted to the *Populus trichocarpa*/Herbaceous (black cottonwood/ Herbaceous) disturbance-caused community type (Hansen and others 1995).

**Timber**

Due to the favorable moisture relationship of this type, timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites are prone to at least occasional alluvial deposition through flooding, new seedbeds will not develop and the timber potential will be lost.

**Wildlife**

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) 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* (black cottonwood) provides sites for huge platform like stick nests of bald eagles and ospreys (Arno and Hammerly 1984) and for great blue herons (Parker 1980). Canada geese occasionally use the nests previously built by bald eagles and osprey. A variety of birds and mammals, such as woodpeckers, great horned owls, wood ducks, and raccoons, nest in trunk cavities. *Populus trichocarpa* (black cottonwood) and *Cornus stolonifera* (red-osier dogwood) are often eaten by moose (Costain 1989) and used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

**Fisheries**

The stream side location of the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type is very important in providing thermal cover, debris recruitment, and streambank stability. Its importance can not be emphasized enough (see discussion in the Soil Management and Rehabilitation Opportunities section). *Cornus stolonifera* (red-osier dogwood) and associated shrub species are excellent in controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

**Fire**

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type is susceptible to fire during the late summer and fall. *Populus trichocarpa* (black cottonwood) and associated shrubs are adapted to light and in some instances to moderate intensity fires and may produce new sprouts following burns. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) The particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood). 2) The age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited. 3) The location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

*Cornus stolonifera* (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprouts from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

**Soil Management and Rehabilitation Opportunities**

Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting

action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus trichocarpa* (black cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) *MAY* allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been completely eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Salix* spp. (willows) and *Ribes* spp. (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings

that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed

**Recreational Uses and Considerations**
Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

Similar communities have been reported for western Montana (Foote 1965), Montana (Hansen and others 1995), central Oregon (Kovalchik 1987), and central Idaho (Tuhy and Jensen 1982).

## *Populus trichocarpa*/Herbaceous Community Type (Black Cottonwood/Herbaceous Community Type)

**POPTRI (POTR6)**
**Number Of Stands Sampled = 2**

### LOCATION AND ASSOCIATED LANDFORMS

The *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type is a major type from low to moderately high elevations throughout the foothills and valleys of eastern Idaho. *Populus trichocarpa* (black cottonwood) stands occupy floodplains and islands of major streams and rivers, establishing extensive forests, narrow, stringer communities paralleling minor stream courses, or matrices of smaller clustered stands. This community type may be located on stream banks and alluvial bars immediately adjacent to flowing channels or stranded on upper, secondary floodplains as natural river dynamics cause channels to migrate across valley bottoms. Sites range in elevation from 1,394 to 2,121 m (4,600 to 7,000 ft). Hansen and others (1995) indicate that *Populus trichocarpa* (black cottonwood) generally occurs at higher elevations than *Populus angustifolia* (narrowleaf cottonwood) in Montana. Additional samples need to be collected to determine if this trend holds true in Idaho.

### VEGETATION

The *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type in Idaho forms essentially a two-tiered structure, dominated by *Populus trichocarpa* (black cottonwood) in the overstory, and *Poa pratensis* (Kentucky bluegrass) and other disturbance induced species in the understory. This type is a grazing or browsing disclimax, the result of prolonged, intense utilization by livestock and, to a lesser degree, wildlife. *Populus trichocarpa* (black cottonwood) may form a dense, closed canopy, or a more open overstory of widely scattered individuals, often with limited coverages of *Populus angustifolia* (narrowleaf cottonwood). The shrub component is essentially absent, or when present, only as a remnant, represented by disturbance tolerant species such as *Rosa woodsii* (woods rose) and *Crataegus douglasii* (black hawthorn). *Agrostis stolonifera* (redtop), *Agropyron caninum* (bearded wheatgrass), *Aster laevis* (smooth aster), and *Anthemis cotula* (dog fennel) are common herbaceous species.

**Table 14.** Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands of the grazing or browsing disclimax *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type (number = 2 stands)

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Populus trichocarpa* (black cottonwood) | 80 | 80-80 | 100 |
| **Shrubs** | | | |
| *Rosa woodsii* (woods rose) | 2 | 1-3 | 100 |
| *Solanum dulcamara* (climbing nightshade) | <1 | 0-1 | 50 |
| **Graminoids** | | | |
| *Agropyron caninum* (bearded wheatgrass) | 10 | 0-20 | 50 |
| *Agropyron smithii* (western wheatgrass) | <1 | 0-1 | 50 |
| *Agrostis stolonifera* (redtop) | 10 | 0-20 | 50 |
| *Bromus tectorum* (cheatgrass) | <1 | 0-1 | 50 |
| *Carex microptera* (small-winged sedge) | 2 | 0-3 | 50 |
| *Eleocharis palustris* (common spikesedge) | <1 | 0-1 | 50 |
| *Hordeum brachyantherum* (meadow barley) | 2 | 0-3 | 50 |
| *Hordeum jubatum* (foxtail barley) | 2 | 1-3 | 100 |
| *Phalaris arundinacea* (reed canarygrass) | <1 | 0-1 | 50 |
| *Poa palustris* (fowl bluegrass) | 2 | 0-3 | 50 |
| *Poa pratensis* (Kentucky bluegrass) | 70 | 60-80 | 100 |
| **Forbs** | | | |
| *Anthemis cotula* (dog fennel) | 7 | 3-10 | 100 |
| *Aster campestris* (meadow aster) | <1 | 0-1 | 50 |
| *Aster laevis* (smooth aster) | 10 | 0-20 | 50 |
| *Aster occidentalis* (western aster) | <1 | 0-1 | 50 |
| *Castilleja linariifolia* (narrow-leaved paintbrush) | 2 | 0-3 | 50 |
| *Cirsium arvense* (Canada thistle) | <1 | 0-1 | 50 |
| Forb (unknown forb) | <1 | 0-1 | 50 |
| *Glycyrrhiza lepidota* (American licorice) | 2 | 1-3 | 100 |
| *Grindelia squarrosa* (curlycup gumweed) | <1 | 0-1 | 50 |
| *Iva axillaris* (poverty-weed) | 2 | 0-3 | 50 |
| *Lactuca ludoviciana* (western lettuce) | <1 | 1 | 50 |
| *Medicago sativa* (alfalfa) | <1 | 0-1 | 50 |
| *Melilotus officinalis* (yellow sweet-clover) | 2 | 0-3 | 50 |
| *Polygonum amphibium* (water smartweed) | <1 | 0-1 | 50 |
| *Polygonum sawatchense* (sawatch knotweed) | <1 | 0-1 | 50 |
| *Rumex crispus* (curly dock) | <1 | 0-1 | 50 |
| *Taraxacum officinale* (common dandelion) | 5 | 0-10 | 50 |
| *Trifolium* spp. (clover) | <1 | 0-1 | 50 |
| **Ferns and Allies** | | | |
| *Equisetum laevigatum* (smooth scouring-rush) | 2 | 0-3 | 50 |

## SUCCESSIONAL INFORMATION

The *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type represents a severely disturbed secondary successional stage of the mid-

seral *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type (Hansen and others 1995).

**Primary Successional Stages**

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, side bars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

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## SOILS

Fine textured mineral soils, composed of varying degrees of silts, clays and fine grain sands, form the surface layers of sites occupied by this community type. These alluvial layers may extend to depths exceeding well beyond 90 cm (36 in). Mottled and gleyed soil characteristics occur where the flux of near surface water tables facilitate oxidation and reduction reactions. Gravels and cobbles may be present in pockets and ill-defined layers throughout this zone. Underlying layers tend to be composed of coarse grain materials and large cobbles or rocks. Substrates tend to be well-drained, and are prone to flooding where sites occur

on the active floodplain and on islands. Water tables are near the surface in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus trichocarpa* (black cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although capillary action may promote greater moisture availability upward in the soil solum. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols, Entisols, or Mollisols.

## ADJACENT COMMUNITIES

Saturated sites may be dominated by *Typha* spp. (cattail), *Scirpus* spp. (bulrush), and *Phalaris arundinacea* (reed canarygrass). Other types in the *Populus trichocarpa* (black cottonwood) series may border the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type depending on the level of disturbance on a site. Additional adjacent riparian communities may be dominated by *Crataegus douglasii* (black hawthorn) or a diversity of *Salix* spp. (willow). Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush), and *Poa pratensis* (Kentucky bluegrass).

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

The *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type provides moderate levels of spring and summer forage. Heavy grazing and trampling tend to maintain the open (park-like) structure of this community type and continued dominance of the undergrowth by *Poa pratensis* (Kentucky bluegrass) *Phleum pratense* (common timothy), *Bromus* spp. (brome), and a variety of "weedy" forbs. This community type has been and in many instances, still is used by the ranching community as a winter feeding ground. *Poa pratensis* (Kentucky bluegrass), *Phleum pratense* (common timothy), and *Bromus* spp. (brome) are palatable and moderately productive, especially when soil moisture levels are high, and tolerate a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground

biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

**Timber**

Due to the favorable moisture relationship of this type, timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a graminoid dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites are prone to at least occasional alluvial deposition through flooding, new seedbeds will not develop and the timber potential will be lost.

**Wildlife**

This type is a source of early spring forage for moose, deer and elk. Cover value is limited because of the typically open, two layered structure. All kinds of birds are common since food and cover is available both on the ground and in the trees. Great blue herons nest in large cottonwood stands if isolation during the nesting period is possible. Colonial nest sites are used for many years if left undisturbed (Parker 1980). Osprey will also use this type for nesting (Zarn 1974).

**Fisheries**

The stream-side location of this type is important in providing thermal cover, debris recruitment, and streambank stability. Its importance can not be emphasized enough (Hansen and others 1995).

**Fire**

This type will burn when conditions are dry, such as fall or in late winter if snow accumulations are minimal. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) The particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood) 2) The age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited. 3) The location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire *MAY BE* used as a tool in the pole to early mature stage of development. If

fire is used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

*Poa pratensis* (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

**Soil Management and Rehabilitation Opportunities**

Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus trichocarpa* (black cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) ***MAY*** allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been completely eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of

revegetation with desirable woody species will be low (Hansen and others 1995). For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand be excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

**Recreational Uses and Considerations**

Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

Similar communities have been reported for western Montana (Foote 1965), Montana (Hansen and others 1995), central Oregon (Kovalchik 1987), and central Idaho (Tuhy and Jensen 1982)

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## *Salix amygdaloides* Community Type
## (Peach-Leaf Willow Community Type)

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**SALAMY (SAAM2)**
**Number Of Stands Sampled = 2**

## LOCATION AND ASSOCIATED LANDFORMS

The *Salix amygdaloides* (peach-leaf willow) community type is an incidental type at lower elevations throughout valleys of southern and eastern Idaho. It occurs in narrow bands along oxbows, islands and on floodplains adjacent to major streams and rivers. Sites occur at lower elevations, around 1,455 m (4,800 ft).

## VEGETATION

*Salix amygdaloides* (peach-leaf willow), an arborescent shrub or small tree rarely exceeding 12 m (36 ft) in height (Hitchcock and others 1973), dominates the overstory in this community type, although *Populus trichocarpa* (black cottonwood) may actually be present in the tallest layer. Associated shrubs include *Salix lutea* (yellow willow) and *Cornus stolonifera* (red-osier dogwood). In mature stands of this type, the often dense overstory created by *Salix amygdaloides* (peach-leaf willow) and the upper shrub layer results in a sparse herbaceous understory characterized by low vigor. Graminoids and forbs may include *Phalaris arundinacea* (reed canarygrass) and *Equisetum* spp. (horsetail). In some cases, *Salix amygdaloides* (peach-leaf willow) may sprout from horizontal or fallen trunks.

**Table 15.** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Salix amygdaloides* (peach-leaf willow) community type that are relatively undisturbed by livestock or wildlife (number = 2 stands)

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Populus trichocarpa* (black cottonwood) | 5 | 0-10 | 50 |
| *Salix amygdaloides* (peach-leaf willow) | 98 | 98-98 | 100 |
| **Shrubs** | | | |
| *Cornus stolonifera* (red-osier dogwood) | 35 | 0-70 | 50 |
| *Salix lutea* (yellow willow) | 5 | 0-10 | 50 |
| **Graminoids** | | | |
| *Phalaris arundinacea* (reed canarygrass) | 10 | 1-20 | 100 |
| **Forbs** | | | |
| *Aster* spp. (aster) | <1 | 0-1 | 50 |
| *Aster occidentalis* (western aster) | <1 | 0-1 | 50 |
| Forb (unknown forb) | <1 | 0-1 | 50 |
| *Mentha arvensis* (field mint) | <1 | 0-1 | 50 |
| **Ferns and Allies** | | | |
| *Equisetum* spp. (horsetail; scouring-rush) | 2 | 1-3 | 100 |

## SUCCESSIONAL INFORMATION

Hansen and others (1995) indicate that the *Salix amygdaloides* (peach-leaf willow) community type represents a successional stage of the *Fraxinus pennsylvanica/Prunus virginiana* (green ash/common chokecherry) habitat type or the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type in Montana. Decadent *Populus trichocarpa* (black cottonwood) and *Populus angustifolia* (narrowleaf cottonwood) forests may act as potential seral stages for the *Salix amygdaloides* (peach-leaf willow) community type, as well as other, shorter *Salix* spp. (willow) dominated stands. Additional sites will be surveyed to determine the specific successional pathways in which this community type is involved.

### Disturbance Stages

Increased levels of disturbance tend to increase those disturbance-caused species already present. If the disturbance includes trampling and/or rubbing by livestock, the weak, multi-stemmed nature of *Salix amygdaloides* (peach-leaf willow) will result in a great deal of downed woody material. When this happens, the stands tend to limit livestock use. In other situations, the sites may be too wet so as to preclude most types of disturbances (Hansen and others 1995).

## SOILS

Hansen and others (1995) note that soils for this type are commonly Entisols (Aquents and Fluvents) or Mollisols (Aquolls and Borolls). This community type occurs on a wide range of soil textures except heavy clay. Underlying layers may consist of coarse sands and gravels. Water tables are usually within 1 m (39 in) of the soil surface throughout the growing season, facilitating the development of mottles in the upper soil horizons. *Salix amygdaloides* (peach-leaf willow) can tolerate weak saline and alkali soils, poorly drained soils, and prolonged flooding.

## ADJACENT COMMUNITIES

*Carex* spp.(sedge) and *Phalaris arundinacea* (reed canarygrass) communities may border the *Salix amygdaloides* (peach-leaf willow) community type on wetter riparian sites while *Populus trichocarpa* (black cottonwood) and *Populus angustifolia* (narrowleaf cottonwood) often dominant drier floodplain locations. Hansen and others (1995) observed in Montana that drier sites may be occupied by the *Fraxinus pennsylvanica/Prunus virginiana* (green ash/common chokecherry) habitat type and *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type, or the *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheatgrass) habitat type.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

**Livestock**

Wet conditions and the limited size and extent of stands of this type generally limit livestock use. However, livestock use during wet periods can either lead to the churning of soil or soil compaction (Hansen and others 1995).

**Wildlife**

The high structural diversity of stands of the *Salix amygdaloides* (peach-leaf willow) community type provide excellent thermal and hiding cover for all categories of wildlife (Hansen and others 1995).

**Fisheries**

The *Salix amygdaloides* (peach-leaf willow) community type provides limited thermal cover for fish. However, it is an effective stabilizer of streambanks and managers should attempt to protect them whenever possible (Hansen and others 1995).

### Fire
Limited information is available on the effects of fire on *Salix amygdaloides* (peach-leaf willow). However, based on our understanding of other willow species, we would assume *Salix amygdaloides* (peach-leaf willow) to be a prolific sprouter after all but the hottest fires (Hansen and others 1995).

### Soil Management and Rehabilitation Opportunities
High water tables and seasonal flooding should limit activities and development in most of these stands. Care must be taken in the placement of roads and other developments in sites that permit these activities (Hansen and others 1995).

### Recreational Uses and Considerations
Stands of this community type provide excellent opportunities for viewing wildlife species. However, the dense nature of most stands and the high water tables associated with them tend to limit access. The large mosquito populations may also reduce he use of this type (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS
One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

### USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded.

## OTHER STUDIES
The *Salix amygdaloides* (peach-leaf willow) community type has been described by Hansen and others (1995) for Montana.

## WILLOW SHRUB TYPES

## *Salix bebbiana* Community Type (Bebb Willow Community Type)

**SALBEB (SABE2)**
**Number Of Stands Sampled = 2**

### LOCATION AND ASSOCIATED LANDFORMS

The *Salix bebbiana* (Bebb willow) community type is a minor type at moderately high elevations throughout foothills and mountain valleys of eastern Idaho, ranging from 1,950 to 2,121 m (6,435 to 7,000 ft). This community type often persists as stringer communities paralleling abandoned oxbows on upper (secondary) floodplains; however, it may occur on streambanks immediately adjacent to active channels along major rivers, in proximity to seeps or springs, or on alluvial terraces in U-shaped canyons.

### VEGETATION

The *Salix bebbiana* (Bebb willow) community type, a browsing or grazing disclimax, generally perseveres under an intense disturbance regime unsuitable for other *Salix spp.* (willow). Long-lived *Salix bebbiana* (Bebb willow) often appear as short, thick-trunk shrubs in widely scattered or clumped stands depending on local topography. Due to the impact of livestock, mature individuals take on an umbrelled or umbrella-like appearance. Where grazing is intense, associated shrubs may be virtually nonexistent, although as pressure by livestock diminishes, a diverse shrub component may reestablish. Disturbance-induced herbaceous species may include *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Agrostis stolonifera* (redtop), and *Solidago canadensis* (Canada goldenrod). On less disturbed sites, *Osmorhiza chilensis* (mountain sweet-cicely), *Galium triflorum* (sweetscented bedstraw), *Smilacina racemosa* (false spikenard) may be present.

**Table 16.** Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands of the grazing disclimax *Salix bebbiana* (Bebb willow) community type (number = 2 stands)

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Juniperus scopulorum* (Rocky Mountain juniper) | <1 | 0-1 | 50 |
| **Shrubs** | | | |
| *Alnus incana* (mountain alder) | 2 | 0-3 | 50 |
| *Amelanchier alnifolia* (western serviceberry) | 2 | 0-3 | 50 |
| *Cornus stolonifera* (red-osier dogwood) | 20 | 1-40 | 100 |
| *Lonicera involucrata* (twin-berry) | 5 | 0-10 | 50 |
| *Ribes lacustre* (swamp currant) | 2 | 1-3 | 100 |
| *Rosa woodsii* (woods rose) | 25 | 20-30 | 100 |
| *Salix bebbiana* (Bebb willow) | 75 | 60-90 | 100 |
| *Salix exigua* (sandbar willow)) | 2 | 0-3 | 50 |
| *Salix lasiandra* (Pacific willow) | 2 | 0-3 | 50 |
| *Salix lutea* (yellow willow) | 2 | 1-3 | 100 |
| *Symphoricarpos occidentalis* (western snowberry) | <1 | 0-1 | 50 |
| **Graminoids** | | | |
| *Agropyron caninum* (bearded wheatgrass) | 2 | 0-3 | 50 |
| *Agrostis stolonifera* (redtop) | 5 | 0-10 | 50 |
| *Carex lanuginosa* (woolly sedge) | <1 | 0-1 | 50 |
| *Carex microptera* (small-winged sedge) | <1 | 0-1 | 50 |
| *Elymus glaucus* (blue wildrye) | 5 | 0-10 | 50 |
| *Festuca subulata* (bearded fescue) | 2 | 0-3 | 50 |
| *Phleum pratense* (common timothy) | 2 | 0-3 | 50 |
| *Poa pratensis* (Kentucky bluegrass) | 12 | 3-20 | 100 |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | 1 | 1-1 | 100 |
| *Actaea rubra* (baneberry) | 2 | 0-3 | 50 |
| *Aster eatonii* (Eaton's aster) | <1 | 0-1 | 50 |
| *Aster modestus* (few-flowered aster) | <1 | 0-1 | 50 |
| *Cirsium arvense* (Canada thistle) | <1 | 0-1 | 50 |
| *Epilobium ciliatum* (common willow-herb) | <1 | 0-1 | 50 |
| *Galium triflorum* (sweetscented bedstraw) | 3 | 3-3 | 100 |
| *Geranium viscosissimum* (sticky geranium) | 3 | 3-3 | 100 |
| *Geum macrophyllum* (larged-leaved avens) | 1 | 1-1 | 100 |
| *Heracleum lanatum* (cow-parsnip) | 2 | 0-3 | 50 |
| *Lactuca serriola* (prickly lettuce) | <1 | 0-1 | 50 |
| *Mertensia ciliata* (mountain bluebell) | 1 | 1-1 | 100 |
| *Osmorhiza chilensis* (mountain sweet-cicely) | 7 | 3-10 | 100 |
| *Pyrola asarifolia* (pink wintergreen) | <1 | 0-1 | 50 |
| *Senecio serra* (tall butterweed) | 2 | 1-3 | 100 |
| *Smilacina racemosa* (false spikenard) | 5 | 0-10 | 50 |
| *Smilacina stellata* (starry Solomon-plume) | <1 | 0-1 | 50 |
| *Solidago canadensis* (Canada goldenrod) | 2 | 0-3 | 50 |
| *Taraxacum officinale* (common dandelion) | 3 | 3-3 | 100 |
| *Thalictrum occidentale* (western meadowrue) | 1 | 1-1 | 100 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Thermopsis montana* (mountain thermopsis) | <1 | 0-1 | 50 |
| *Urtica dioica* (stinging nettle) | 2 | 0-3 | 50 |
| **Ferns and Allies** | | | |
| *Equisetum arvense* (field horsetail) | 2 | 0-3 | 50 |

## SUCCESSIONAL INFORMATION

Hansen and others (1995) indicate that the *Salix bebbiana* (Bebb willow) community type represents a browsing/grazing disclimax of the *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), or *Salix drummondiana* (Drummond willow) dominated habitat types.

*Salix bebbiana* (Bebb willow) seems to be a highly palatable willow. However, this high level of palatability does not tend to negatively affect the status of *Salix bebbiana* (Bebb willow) on a site. In fact, *Salix bebbiana* (Bebb willow) seems to have evolved a physiological tolerance to browsing and remains on a site under all but the most severe conditions, such as sustained long-term browsing. This tolerance to repeated browsing allows *Salix bebbiana* (Bebb willow) to increase at the expense of less browsing-tolerant willow species such as *Salix geyeriana* (Geyer willow), *Salix boothii* (Booth willow), *Salix lutea* (yellow willow), and *Salix drummondiana* (Drummond willow). On severely degraded sites with prolonged levels of browsing, *Salix bebbiana* (Bebb willow) is typically the last willow to remain on the site. The dominance of the undergrowth by introduced species can aid in determining the extent of the disturbance (Hansen and others 1995).

## SOILS

A litter/duff layer generally less than 10 cm (4 in) deep covers a nutrient-rich, organic layer, indicative of Mollisols, up to 45 cm (18 in) or more in depth. Surface soil textures range from silt loams to clay loams. Alluvial coarse sands, gravels and small, medium and large cobbles comprise the lower horizons. Occasionally, large rocks are present as well. Water tables probably occur within 60 cm (24 in) of the surface, but can vary according to local site features.

## ADJACENT COMMUNITIES

The *Salix bebbiana* (Bebb willow) community type may be associated with a mosaic of other *Salix* spp. (willow) communities along riparian corridors and across large floodplains where disturbance is minimal. *Populus tremuloides*

(quaking aspen), *Betula occidentalis* (water birch), or *Alnus incana* (mountain alder) stands may also be present as well as *Wyethia* spp. (mule's-ears) meadows. Excessive disturbance tends to limit the diversity of other shrub species, resulting in a savannah-like environment with sporadic stands of *Salix bebbiana* (Bebb willow) over a grass, or where sufficient moisture persists, a *Carex* (sedge) understory. Uplands are dominated by *Pseudotsuga menziesii* (Douglas fir), *Abies lasiocarpa* (subalpine fir), or *Artemisia tridentata* (big sagebrush)/grassland steppe.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Stands are usually characterized by widely spaced shrubs, allowing for easy livestock access. Forage production is moderate to high, composed primarily of introduced species. As a result, heavy use by livestock is common. In some stands the willows may have a reduced vigor, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

### Wildlife

Where this community type occurs on winter game ranges, browsing of *Salix bebbiana* (Bebb willow) is often high enough to reduce both plant vigor and regeneration. Gaffney (1941) reported that *Salix bebbiana* (Bebb willow) is a highly valuable browse for elk, with heavy utilization common. Continued use may lead to a conversion to herbaceous communities such as the *Poa palustris* (fowl bluegrass) and *Poa pratensis* (Kentucky bluegrass) community types. Moose and beaver heavily utilize most species of willow.

**Fisheries**

*Salix* spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion, provide cover in the form of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. Although not a source of large woody debris, willows may trap large trees borne downstream, creating deeper pools and additional cover for fish species. *Carex* spp.(sedge) and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows.

**Fire**

*Salix bebbiana* (Bebb willow) sprouts rapidly following fire (Haeussler and Coates 1986). Quick, hot fires maximize sprouting, while slower burns cause more damage to plants. Prescribed burning is a commonly used wildlife management tool to rejuvenate decadent communities dominated by *Salix bebbiana* (Bebb willow).

**Soil Management and Rehabilitation Opportunities**

The *Salix bebbiana* (Bebb willow) community type is a browsing/grazing disclimax and has historically received high use by wildlife and cattle. Soils and streambanks are highly susceptible to trampling damage, especially when soils are fine textured or wet. Deferring grazing until sites are drier can reduce trampling and compaction problems (Marlow 1984).

Unless water tables are restored, these sites will for all practical purposes remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will help raise the water table thereby allowing the willows and sedges to reclaim a degraded site (Hansen and others 1995).

*Salix bebbiana* (Bebb willow) is valuable for revegetating streambanks. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results with the cuttings rooting freely along the entire length of the stem. Roots and shoots from cuttings can be expected to appear 10-20 days after planting. However, the use of rooted cuttings and nursery grown stock will produce the best results (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

## OTHER STUDIES

Hansen and others 1995 describe this community type for Montana. A similar *Salix bebbiana* (Bebb willow) community type was identified by Padgett and others (1989) in Utah, with an undergrowth dominated by *Poa pratensis* (Kentucky bluegrass) and other mesic grasses. Chadde and others (1988) defined a *Salix bebbiana/Agrostis stolonifera* (Bebb willow/redtop) community type for northern Yellowstone National Park. A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

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# *Salix drummondiana/Calamagrostis canadensis* Habitat Type (Drummond Willow/Bluejoint Reedgrass Habitat Type)

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**SALDRU/CALCAN (SADR/CACA4)**
**Number Of Stands Sampled = 1**

## LOCATION AND ASSOCIATED LANDFORMS

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type is an incidental type at mid to moderately high elevations in the mountainous regions throughout eastern Idaho, ranging from 2,060 to 2,273 m (6,800 to 7,500 ft). This habitat type may occur on level outwash plains of mountain streams, below hillside seeps and springs, or adjacent to beaver-dammed impoundments. In general, communities dominated by *Salix drummondiana* (Drummond willow) appear to occupy sites at higher elevations while communities dominated by *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow) occur at moderate elevations. Lower elevational foothill sites are dominated more often by the *Salix lutea* (yellow willow) types.

## VEGETATION

*Salix drummondiana* (Drummond willow) may form dense, impenetrable stands in the absence of grazing or browsing pressure. Other *Salix* spp. (willow), particularly *Salix geyeriana* (Geyer willow), *Salix boothii* (Booth willow), and *Salix lutea* (yellow willow), may be present with reduced coverages. Lower shrub layers may be composed of *Rubus parviflorus* (thimbleberry) and *Ribes* spp. (currant). The herbaceous undergrowth is characterized primarily by *Calamagrostis canadensis* (bluejoint reedgrass), although a diversity of other graminoids and forbs, such as *Actaea rubra* (baneberry), *Senecio triangularis* (arrowleaf groundsel), *Agrostis stolonifera* (redtop), and *Heracleum lanatum* (cow-parsnip), may be present to a minor degree.

## SUCCESSIONAL INFORMATION

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type tends to occupy moist to slightly saturated sites. However, if physical site alterations cause the riparian zone to become moderately drier, coniferous or deciduous tree dominated communities, notably *Picea* spp. (spruce), *Pseudotsuga menziesii* (Douglas fir), *Abies lasiocarpa* (subalpine fir), and *Populus tremuloides* (quaking aspen) types, may represent the new climax vegetation. Similarly, where sites become inundated for longer periods of time due to beaver dams or other impoundments, *Carex* spp.(sedge) dominated communities may prevail. Utilization may influence the direction of succession as well as physiological changes. Prolonged grazing pressure by livestock may ultimately eliminate the presence of native species, causing a shift toward the drier *Salix drummondiana* (Drummond willow) community type.

## SOILS

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type may occur over a range of soil types. Some sites are primarily sandy soils underlain by gravels, cobbles, and various larger sized rocks. Slightly elevated zones above the active floodplain may have 2.5 to 5 cm (1 to 2 in) of litter/duff above a silt loam extending to a depth of 25 cm (10 in) or more over the dominant sand/gravel substrate. In regions characterized by fines and silts, organic horizons, often with a high component of root/fibrous plant material, may reach 45 cm (18 in) or more below the surface. When saturated, these soils may take on a muck-like consistency. Fine and coarse sands often compose the underlying layers with a moderate gravel element. A shallow litter and duff layer may develop where flood disturbance is infrequent. This habitat type tends to occupy moist sites with water tables generally near (60 cm /24 in),

if not at, the soil surface. Although mottled and gleyed soils, the result of oxidation/reduction reactions, were not observed, they are expected to be present due to shallow water tables.

## ADJACENT COMMUNITIES

The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type may occupy slightly wetter sites while the *Salix drummondiana* (Drummond willow) community type may be present on drier, disturbed sites. Willows often establish along riparian corridors with an assortment of other shrub and tree communities, forming a mosaic of mixed vegetation types. Generally, a variety of willow and shrub types, such as *Salix exigua* (sandbar willow), *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), *Cornus stolonifera* (red-osier dogwood) and *Prunus virginiana* (common chokecherry), are present with scattered stands of tree-dominated communities represented by *Picea* spp. (spruce), *Pseudotsuga menziesii* (Douglas fir), and *Populus tremuloides* (quaking aspen) types. Uplands may be dominated by *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine), or mixed grasslands.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Forage production is high, and where extensive, this type may be an important source of summer forage. Palatability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) varies from moderate to high, depending upon season and availability of other species (USDA Forest Service 1937). Foliage is most palatable when young, but wet conditions early in the grazing season limits use by livestock, especially sheep. Due to the high forage production and highly palatable grasses, many of these sites have heavy summer and fall use, especially after uplands have been grazed. Sustained grazing decreases the vigor, reproductive success, and competitive ability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) (Volland 1985). Under season long grazing, they may be replaced by *Poa pratensis* (Kentucky bluegrass). 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 a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse,

willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

**Wildlife**

Abundant food, cover, and proximity to water provide habitat for numerous wildlife species such as mammals and songbirds. Summer and winter use by elk may be moderate (Gaffney 1941). Big game use of *Salix drummondiana* (Drummond willow) shoots, especially during the winter, may be heavy. The linear nature of many of these communities along waterways serve as important corridors for wildlife movement. Moose and beaver tend to heavily utilize most species of willows. Elk may make moderate summer use of *Calamagrostis canadensis* (bluejoint reedgrass) (Kufeld 1973).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. 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 and others 1995).

**Fisheries**

*Salix* spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that armor streambanks against lateral cutting and erosion, provide cover in the form

of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. Although not a source of large woody debris, willows may trap large trees borne downstream, creating deeper pools and additional cover for fish species. *Carex* spp.(sedge) and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows.

**Fire**

Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts. After burning, sites should be removed from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth (Hansen and others 1995).

*Calamagrostis canadensis* (bluejoint reedgrass) propagates itself by both seeds and rhizomes, making this species an aggressive invader of moist, burned sites (Crane and Fischer 1986). These features also make it a valuable species for stabilizing or rehabilitating mountain streams.

**Soil Management and Rehabilitation Opportunities**

Wet, fine textured soils are highly susceptible to trampling damage by cattle. Grazing should be deferred until soils are drier to protect streambanks and minimize damage (Marlow 1984). Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

*Salix drummondiana* (Drummond willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cut stems of *Salix drummondiana* (Drummond willow) produce an abundance of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995).

**Recreational Uses and Considerations**

Fishing opportunities are good in streams associated with this type. Moist soils and streambanks are subject to trampling damage. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated to temporarily flooded.

## OTHER STUDIES

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type has been documented for Montana in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995). In addition, communities containing high constancies and coverages of *Salix drummondiana* (Drummond willow) have been described. These include the *Salix boothii* (Booth willow) dominated communities described by Padgett and others (1989) for Utah and southeastern Idaho, the *Salix geyeriana* (Geyer willow) dominated communities types described by Hansen and others (1989) for Montana, and the *Salix boothii* (Booth willow) dominated communities described by Youngblood and others (1985b) for eastern Idaho and western Wyoming.

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# *Salix exigua* Community Type
# (Sandbar Willow Community Type)

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**SALEXI (SAEX)**
**Number Of Stands Sampled = 15**

## LOCATION AND ASSOCIATED LANDFORMS

The *Salix exigua* (sandbar willow) community type is a major type associated with rivers and streams in valleys and foothills throughout central and eastern

Idaho. Sites range in elevation from 1,091 to 1,818 m (3,600 to 6,000 ft). This community type may occur as stringer communities on floodplains in U- and V-shaped canyons and as isolated clusters in wet depressions on grassy benches. On more extensive riverine systems, *Salix exigua* (sandbar willow) colonizes islands and alluvial bars prone to periodic flooding.

## VEGETATION

*Salix exigua* (sandbar willow) may form extremely dense stands, essentially excluding other shrub species, or, where utilization is higher, may develop more open, scattered communities with greater shrub diversity. Subordinate shrubs, when present, may consist of *Rosa* spp. (rose), *Cornus stolonifera* (red-osier dogwood), and *Salix lutea* (yellow willow). The herbaceous segment is extremely diverse and quite dense, regardless of the growth form of the overstory *Salix exigua* (sandbar willow). Due to the regular disturbance regime of sites occupied by this community type, pioneer and weedy species are prevalent. Dominant graminoids are represented by *Agrostis stolonifera* (redtop), *Agropyron repens* (quackgrass), and *Poa pratensis* (Kentucky bluegrass) while the forb element may be comprised of *Aster* spp. (aster), *Glycyrrhiza lepidota* (American licorice), *Cirsium arvense* (Canada thistle), *Rumex* spp. (dock; sorrel), and *Equisetum* spp. (horsetail). Moss may also be present where sufficient moisture is available.

**Table 17.** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Salix exigua* (sandbar willow) community type that are relatively undisturbed by livestock or wildlife (number = 15 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Populus angustifolia* (narrowleaf cottonwood) | <1 | 0-1 | 13 |
| **Shrubs** | | | |
| *Cornus stolonifera* (red-osier dogwood) | 2 | 0-20 | 20 |
| *Crataegus douglasii* (black hawthorn) | <1 | 0-1 | 7 |
| *Ribes odoratum* (buffalo currant) | <1 | 0-1 | 7 |
| *Ribes setosum* (Missouri gooseberry) | <1 | 0-3 | 7 |
| *Rosa woodsii* (woods rose) | 6 | 0-30 | 53 |
| *Salix exigua* (sandbar willow)) | 79 | 40-98 | 100 |
| *Salix lutea* (yellow willow) | <1 | 0-1 | 7 |
| *Solanum dulcamara* (climbing nightshade) | 2 | 0-30 | 7 |
| *Symphoricarpos occidentalis* (western snowberry) | <1 | 0-1 | 7 |
| **Graminoids** | | | |
| *Agropyron intermedium* (intermediate wheatgrass) | <1 | 0-1 | 7 |
| *Agropyron repens* (quackgrass) | 5 | 0-40 | 33 |
| *Agrostis stolonifera* (redtop) | 10 | 0-40 | 53 |
| *Carex atherodes* (awned sedge) | 2 | 0-30 | 7 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Carex lanuginosa* (woolly sedge) | 1 | 0-10 | 7 |
| *Carex rostrata* (beaked sedge) | 1 | 0-10 | 13 |
| *Carex* spp.(sedge) | <1 | 0-3 | 13 |
| *Eleocharis palustris* (common spikesedge) | 6 | 0-60 | 20 |
| *Elymus virginicus* (Virginia wildrye) | <1 | 0-1 | 7 |
| *Hordeum brachyantherum* (meadow barley) | <1 | 0-1 | 7 |
| *Hordeum jubatum* (foxtail barley) | <1 | 0-1 | 13 |
| *Juncus balticus* (baltic rush) | <1 | 0-3 | 7 |
| *Muhlenbergia asperifolia* (alkali muhly) | 2 | 0-20 | 20 |
| *Muhlenbergia minutissima* (annual muhly) | <1 | 0-1 | 7 |
| *Phalaris arundinacea* (reed canarygrass) | 5 | 0-30 | 40 |
| *Phalaris* spp. (canarygrass) | 1 | 0-10 | 7 |
| *Phleum pratense* (common timothy) | <1 | 0-1 | 7 |
| *Poa pratensis* (Kentucky bluegrass) | 5 | 0-40 | 33 |
| *Sporobolus airoides* (alkali sacaton) | <1 | 0-1 | 7 |
| **Forbs** | | | |
| *Amaranthus powellii* (Powell's amaranthus) | <1 | 0-1 | 7 |
| *Anthemis cotula* (dog fennel) | <1 | 0-1 | 13 |
| *Arctium minus* (common burdock) | <1 | 0-3 | 7 |
| *Artemisia ludoviciana* (prairie sagewort) | 3 | 0-20 | 20 |
| *Asclepias speciosa* (showy milkweed) | <1 | 0-1 | 7 |
| *Aster campestris* (meadow aster) | <1 | 0-1 | 7 |
| *Aster* spp. (aster) | <1 | 0-3 | 7 |
| *Aster foliaceus* (leafy aster) | <1 | 0-1 | 7 |
| *Aster laevis* (smooth aster) | 3 | 0-40 | 7 |
| *Aster occidentalis* (western aster) | <1 | 0-1 | 7 |
| *Cicuta maculata* (spotted water-hemlock) | <1 | 0-3 | 7 |
| *Cirsium arvense* (Canada thistle) | 2 | 0-10 | 47 |
| *Conium maculatum* (poison hemlock) | <1 | 0-3 | 7 |
| *Cynoglossum officinale* (common hound's-tongue) | <1 | 0-3 | 7 |
| *Descurainia richardsonii* (Richardson's tansymustard) | <1 | 0-1 | 7 |
| *Epilobium ciliatum* (common willow-herb) | 1 | 0-10 | 20 |
| *Euphorbia esula* (leafy spurge) | 2 | 0-20 | 13 |
| Forb (unknown forb) | 9 | 0-60 | 53 |
| *Geranium viscosissimum* (sticky geranium) | 1 | 0-10 | 7 |
| *Geum macrophyllum* (larged-leaved avens) | 1 | 0-10 | 7 |
| *Glycyrrhiza lepidota* (American licorice) | 3 | 0-40 | 13 |
| *Helenium autumnale* (sneezeweed) | <1 | 0-1 | 7 |
| *Heracleum lanatum* (cow-parsnip) | 1 | 0-20 | 7 |
| *Iva axillaris* (poverty-weed) | 3 | 0-40 | 20 |
| *Lactuca ludoviciana* (western lettuce) | <1 | 0-3 | 7 |
| *Lactuca serriola* (prickly lettuce) | <1 | 0-1 | 7 |
| *Melilotus alba* (white sweet-clover) | <1 | 0-1 | 7 |
| *Polygonum amphibium* (water smartweed) | 2 | 0-30 | 13 |
| *Ranunculus sceleratus* (blister buttercup) | <1 | 0-1 | 7 |
| *Rumex crispus* (curly dock) | 2 | 0-20 | 33 |
| *Senecio serra* (tall butterweed) | <1 | 0-1 | 7 |
| *Mentha arvensis* (field mint) | 1 | 0-10 | 27 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Sium suave* (hemlock water-parsnip) | <1 | 0-1 | 7 |
| *Smilacina stellata* (starry Solomon-plume) | 2 | 0-20 | 13 |
| *Solidago canadensis* (Canada goldenrod) | 2 | 0-20 | 13 |
| *Stachys palustris* (swamp hedge-nettle) | <1 | 0-1 | 7 |
| *Taraxacum officinale* (common dandelion) | <1 | 0-3 | 7 |
| *Thalictrum occidentale* (western meadowrue) | <1 | 0-3 | 7 |
| *Urtica dioica* (stinging nettle) | <1 | 0-3 | 13 |
| *Veronica americana* (American speedwell) | <1 | 0-3 | 13 |
| **Ferns and Allies** | | | |
| *Equisetum arvense* (field horsetail) | <1 | 0-3 | 13 |
| *Equisetum laevigatum* (smooth scouring-rush) | 5 | 0-70 | 13 |

## SUCCESSIONAL INFORMATION

*Salix exigua* (sandbar willow) is a pioneer species which colonizes barren, alluvial deposits on floodplains, islands and river bars. It thrives under conditions of frequent, and sometimes prolonged, flooding. *Salix exigua* (sandbar willow) may germinate with *Populus trichocarpa* (black cottonwood) or *Populus angustifolia* (narrowleaf cottonwood), and may dominate newly deposited sediments for the first few seasons. However, as cottonwoods overtake the willows to dominate the site, the shade intolerant *Salix exigua* (sandbar willow) will eventually decline. Where cottonwoods are not present, other willow species, particularly *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), or *Salix drummondiana* (Drummond willow), may become the climax vegetation. *Salix exigua* (sandbar willow) communities promote bank building and soil development, preparing inhospitable sites for later successional stages. The *Acer negundo/ Prunus virginiana* (box-elder/common chokecherry) habitat type may also represent a climax on these sites in some areas.

## SOILS

Padgett and others (1989) indicate that soils of this type are classified as Entisols, Inceptisols, Mollisols or even Histosols. Soil textures range over a broad spectrum from silty clays to sandy loams. Nutrient rich surface horizons may extend to a depth of 45 cm (18 in) on some sites, while other sites may be characterized solely by mineral deposits such as fine or coarse sands. Underlying layers are comprised of sands, gravels, cobbles or various sized rocks. Fluctuating subsurface water tables foster conditions suitable for oxidation/reduction reactions resulting in mottled and gleyed soil characteristics in the upper horizons. Water tables are generally at or near the surface, but may

occur at depths of 60 cm (24 in) or more. Surface soils are expected to be moist throughout most of the year.

## ADJACENT COMMUNITIES

Because *Salix exigua* (sandbar willow) is capable of germinating on sites characterized by a broad range of substrates, it is often encountered with a variety of other vegetation communities. *Eleocharis* spp. (spikesedge) and *Phalaris arundinacea* (reed canarygrass) tend to occupy adjacent inundated and/or saturated sites. Neighboring riparian shrub communities, typically mid seral stages, associated with the *Salix exigua* (sandbar willow) community type include *Crataegus douglasii* (black hawthorn), *Betula occidentalis* (water birch), *Salix geyeriana* (Geyer willow), *Salix lasiandra* (Pacific willow), *Salix lutea* (yellow willow), *Salix bebbiana* (Bebb willow), and *Salix boothii* (Booth willow) types. Tree-dominated types, represented by *Pseudotsuga menziesii* (Douglas fir), *Populus tremuloides* (quaking aspen), *Acer negundo* (box-elder), *Populus trichocarpa* (black cottonwood) and *Populus angustifolia* (narrowleaf cottonwood), may be present as well. Uplands are often dominated by *Artemisia tridentata* (big sagebrush) steppe or *Juniperus scopulorum* (Rocky Mountain juniper)/grassland communities.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Although the dense formation of *Salix exigua* (sandbar willow) communities suggests that forage production is low to occasionally moderate (Hansen and others 1995), the dense undergrowth accompanying all stands surveyed in Idaho indicate that forage value may be high, both from the willow and herbaceous components.

Overuse by livestock will result in reduced vigor of willows, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site. However, release from heavy grazing pressure will allow it to reestablish itself, provided it has not been totally removed from the site (Hansen and others 1995).
Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction,

and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

**Wildlife**

Stands of this community type provide excellent thermal and hiding cover for many species of wildlife. *Salix exigua* (sandbar willow) is normally not as heavily browsed as other willow species. Beaver tends to heavily utilize *Salix exigua* (sandbar willow) (Hansen and others 1995).

**Fisheries**

Although *Salix exigua* (sandbar willow) typically provides only a limited amount of overhanging shade due to the up right growth form, it may function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion and provide cover in the form of overhanging banks. Although not a source of large woody debris, *Salix exigua* (sandbar willow) may trap large trees borne downstream, creating deeper pools and additional cover for fish species. *Carex* spp.(sedge) and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows.

**Fire**

The use of fire in this type as an improvement technique has been little studied. However, limited information indicates this type tends to sprout vigorously following fire. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tend to result in fewer sprouts (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

Soil compaction is usually not a problem on coarse textured substrates. Fine textured soils are subject to compaction when moist. Unlike most other willows, *Salix exigua* (sandbar willow) can send up individual stems from a complex underground root system, making it an excellent woody species for stabilizing streambanks. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

*Salix exigua* (sandbar willow) is a pioneering species commonly located along irrigation ditches, cutbanks, and wet areas adjacent to roads. It has an excellent

capability to rapidly colonize and spread on disturbed areas, making it useful in streambank stabilization and revegetation projects at low to mid elevations. Once *Salix exigua* (sandbar willow) has stabilized soils, other shrub and herbaceous species become established. Because of this characteristic, it would be wise for farmers, ranchers, and other land managers to maintain these stands. Once degradation occurs, rapid erosion of the streambank can occur with devastating results (Hansen and others 1995).

*Salix exigua* (sandbar willow) is highly adapted to most forms of disturbance. It is a prolific sprouter and will reestablish itself following release from heavy grazing pressure; provided it has not been totally removed from the site (Hansen and others 1995).

Revegetating degraded sites or exposed sand/gravel bars is feasible using *Salix exigua* (sandbar willow). Cuttings should be rooted and grown in a nursery to insure survival. *Salix exigua* (sandbar willow) produces an abundance of roots along the entire stem. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10 days after planting (Hansen and others 1995).

**Recreational Uses and Considerations**

*Salix exigua* (sandbar willow) often forms dense, impenetrable stands, prohibiting access to streambanks in some locations for fishermen. This type offers little shade for campers as it is only a medium sized shrub, and may be subject to intense mosquito infestation.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

## OTHER STUDIES

Similar *Salix exigua* (sandbar willow) community types have been described by Hansen and others (1995; Montana), Norton and others (1981; Greys River, Wyoming), Mutz and Queiroz (1983; southeastern Idaho), Tuhy and Jensen (1982; central Idaho), Youngblood and others (1985b; eastern Idaho and western Wyoming), Padgett and others (1989; Utah and southeastern Idaho), Chadde and others (1988; northern Yellowstone National Park), and Szaro (1989; Arizona and New Mexico). Undergrowth composition varied widely but was often composed of introduced grasses such as *Agrostis stolonifera* (redtop), *Poa palustris* (fowl bluegrass), and *Poa pratensis* (Kentucky bluegrass).

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## *Salix geyeriana/Carex rostrata* Habitat Type
## (Geyer Willow/Beaked Sedge Habitat Type)

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**SALGEY/CARROS (SAGE2/CARO6)**
**Number Of Stands Sampled = 2**
**Note: The *Salix geyeriana* (Geyer willow) habitat type includes all combinations of *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) due to similarities in environmental conditions and management concerns.**

## LOCATION AND ASSOCIATED LANDFORMS

The *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type is a major type throughout mountains and valleys of Idaho, ranging in elevation from from 1,576 to 2,182 m (5,200 to 7,200 ft). This habitat type occupies broad, level floodplains of riverine systems, or may be found in narrow bands along smaller streams in open, U-shaped canyons. Salix geyeriana (Geyer willow) may colonize grassy sites associated with seeps and springs, or dominate the periphery of beaver ponds. *Salix geyeriana* - *Salix boothii* (Geyer willow - Booth willow) communities occupy intermediate elevations on the landscape, between higher elevational communities dominated by *Salix drummondiana* (Drummond willow) and lower elevational communities dominated by *Salix lutea* (yellow willow).

## VEGETATION

In Idaho, the shrub overstory is generally dominated by *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow); however, in some cases, only one of these species may be present. As indicated earlier, these two willows occupy similar positions on the landscape with similar environmental conditions and are

combined in this habitat type for the purposes of this classification. Other shrub species which assume only a subordinate role in this type include *Betula occidentalis* (water birch), *Alnus incana* (mountain alder), *Salix exigua* (sandbar willow), and *Salix drummondiana* (Drummond willow). The understory is dominated by *Carex rostrata* (beaked sedge) and/or *Carex aquatilis* (water sedge), although similar to the diagnostic willows, these species occupy essentially the same location on the landscape and only one may be present on site. A variety of herbaceous species may be found in this community type, including *Aster eatonii* (Eaton's aster), *Mentha arvensis* (field mint), and *Equisetum arvense* (field horsetail). Understory species variations are often subject to the types and levels of disturbance. Undisturbed stands of this type may display a dense and nearly impenetrable shrub element.

**Table 18.** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type (number = 2 stands)

| Species | % Canopy Cover | | Constancy |
|---|---|---|---|
| | Average | Range | |
| **Shrubs** | | | |
| *Ribes lacustre* (swamp currant) | 2 | 0-3 | 50 |
| *Salix boothii* (Booth willow) | 40 | 10-70 | 100 |
| *Salix drummondiana* (Drummond willow) | 15 | 0-30 | 50 |
| *Salix exigua* (sandbar willow)) | 5 | 0-10 | 50 |
| *Salix geyeriana* (Geyer willow) | 35 | 0-70 | 50 |
| **Graminoids** | | | |
| *Agrostis stolonifera* (redtop) | 15 | 0-30 | 50 |
| *Carex aquatilis* (water sedge) | 15 | 0-30 | 50 |
| *Carex rostrata* (beaked sedge) | 17 | 3-30 | 100 |
| *Poa palustris* (fowl bluegrass) | <1 | 0-1 | 50 |
| **Forbs** | | | |
| *Aster eatonii* (Eaton's aster) | 5 | 0-10 | 50 |
| *Cirsium arvense* (Canada thistle) | <1 | 0-1 | 50 |
| *Epilobium watsonii* (daisy; fleabane) | 2 | 0-3 | 50 |
| *Erigeron* spp. (daisy; fleabane) | 2 | 0-3 | 50 |
| *Geum macrophyllum* (larged-leaved avens) | 2 | 0-3 | 50 |
| *Mentha arvensis* (field mint) | 2 | 1-3 | 100 |
| *Pyrola asarifolia* (pink wintergreen) | 2 | 0-3 | 50 |
| *Smilacina stellata* (starry Solomon-plume) | 2 | 0-3 | 50 |
| *Thalictrum occidentale* (western meadowrue) | 2 | 0-3 | 50 |
| **Ferns and Allies** | | | |
| *Equisetum arvense* (field horsetail) | 5 | 0-10 | 50 |

## SUCCESSIONAL INFORMATION

The *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type indicates saturated or wetter conditions. Prolonged, intense utilization by livestock and wild ungulates may shift the site potential to the drier grazing disclimax, the *Salix geyeriana* (Geyer willow) community type. This type is characterized by more open stands with an understory dominated by *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), and other disturbance induced species. Beaver may exert a significant influence on the sites as well, especially concerning physical parameters. Active dams raise water tables as impoundments develop, increasing the potential for the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type. However, sustained removal of willows by beaver for forage and dam materials reduce the site to a *Carex* spp.(sedge) community. When beaver abandon a site, dams eventually deteriorate. Water tables drop as ponds disappear and sites dry out, shifting the site potential to favor the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type (Hansen and others 1995).

Hansen and others (1995) observed trends that indicate that *Salix geyeriana* (Geyer willow) is less tolerant of browsing pressures when compared to *Salix boothii* (Booth willow). This may account for the reduced abundance and canopy cover of *Salix geyeriana* (Geyer willow) in select stands of the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type.

## SOILS

Youngblood and others (1985) indicate that *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow) dominated communities may occur over a range of soil types generally classified as Mollisols and Histosols, or, where less soil development has occurred, Inceptisols and Entisols. Deeper alluvial mineral deposits are comprised of coarse and fine sands and gravels. Organic surface horizons, often extending to a depth of 45 cm (18 in) or more, are riddled with fibrous root and plant material. Soil textures are categorized as fines, generally silts and clays. Water tables are found at or just below the surface and usually not below 60 cm (2 ft). Although mottled and gleyed soil characteristics were not observed, they are thought to be present due to presence of water throughout the soil solum for much of the growing season.

## ADJACENT COMMUNITIES

*Carex rostrata* (beaked sedge), *Eleocharis* spp. (spikesedge), and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is

readily available. The *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix geyeriana* (Geyer willow) community type may occupy adjacent drier sites, depending on the level of disturbance. Due to differences in moisture, substrate composition, flooding frequency and a variety of other physical site factors, riparian corridors are often characterized by a diversity of species forming a mosaic of distinct, localized communities. The *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type may be associated with a variety of other *Salix* spp. (willow) communities, or *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Populus tremuloides* (quaking aspen) types. Uplands are dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine), and *Abies lasiocarpa* (subalpine fir), or by *Artemisia tridentata* (big sagebrush) steppe and grasslands.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

**Livestock**

Forage value of *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) is variable, depending upon season, previous grazing use, and the extent of the site. On narrow riparian or wetland sites within extensive rangelands, sedge species are heavily utilized, particularly when upland species are cured, or stock distribution is poor. Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Myers (1989) found that deferred and rest rotation grazing systems generally favor sedge species over willow species since woody species are vulnerable to longer duration treatments and to late summer/fall treatments. Woody species are vulnerable to pruning damage, while sedges are protected by a root reserve. Late summer and fall grazing should be carefully controlled with duration of treatments limited to less than 30 days and frequency of this treatment to about one year in three or four (Myers 1989).

Marlow (Hansen and others 1995) also feels that fall (October) grazing will have a negative impact on willows due to limited regrowth at the end of the growing season. However, he feels that rest and deferred rotation can have a positive

effect on willows when cattle are properly managed. High use by wildlife in the fall can limit the amount of regrowth.

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

**Wildlife**

A diversity of wildlife species, ranging from large mammals to rodents and songbirds, use this type for food, cover, and nesting (Dittberner and Olson 1983). Moose and beaver have been observed to use *Salix* spp. (willow) extensively in places.

Both *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) are used as browse by wildlife and livestock. However, *Salix geyeriana* (Geyer willow) seems to be less tolerant of repeated browsing than *Salix boothii* (Booth willow). This may account for the reduced canopy cover and occurrence of *Salix geyeriana* (Geyer willow) in select stands of the *Salix geyeriana* (Geyer willow) dominated types (Hansen and others 1995).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. 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 and others 1995).

**Fisheries**

*Salix* spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion, provide cover in the form of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. *Carex* spp.(sedge) and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows, and strengthening overhanging banks. As a source of food and building material *Salix* spp. (willow) attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags.

**Fire**

Prescribed burning in the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tend to result in fewer sprouts (Hansen and others 1995).

Burning of this type can temporarily increase productivity of *Carex rostrata* (beaked sedge), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge). However, nonuse by livestock during the year prior to burning is essential. Residual cover burns well in the spring, prior to the growing season. After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth. Care should be taken when burning stands along streambanks because of the excellent erosion protection provided by the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

The wet nature of these soils makes them highly susceptible to damage by livestock and heavy machinery. These disturbances often lead to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil

surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

*Salix geyeriana* (Geyer willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted, then grown in a nursery to insure survival. *Salix geyeriana* (Geyer willow) cuttings, however, may be more difficult to root than *Salix boothii* (Booth willow) cuttings. Cut stems of *Salix geyeriana* (Geyer willow) produce low to moderate numbers of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995).

*Carex rostrata* (beaked sedge), and *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge) all form a dense, thick sod that is highly resistant to erosion. Along the stream, the sod may be undercut and sag into the water, providing additional protection to streambanks. However, if grazing or trailing impacts are severe, the heavy weight of the sod makes it susceptible to damage, and streambank sloughing can occur (Hansen and others 1995).

**Recreational Uses and Considerations**

This habitat type is commonly adjacent to fisheries and streamside trails may develop. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995). Elevated mosquito populations may discourage campers from using these sites.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

### USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated.

## OTHER STUDIES

Similar communities, codominated by *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow), have been described by a number of researchers: Hansen and others (1995; Montana), Norton and others (1981; Greys River, Wyoming), Mutz and Queiroz (1983; southeastern Idaho), Youngblood and others (1985b; eastern Idaho and western Wyoming), Chadde and others (1988; Yellowstone National Park), and Padgett and others (1989; Utah).

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## *Salix geyeriana* Community Type
## (Geyer Willow Community Type)

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**SALGEY (SAGE2)**
**Number Of Stands Sampled = 2**

**NOTE: The *Salix geyeriana* (Geyer willow) community type includes all combinations of *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) due to similarities in environmental conditions and management concerns.**

## LOCATION AND ASSOCIATED LANDFORMS

The *Salix geyeriana* (Geyer willow) community type is a major type throughout mountains and valleys of Idaho, ranging in elevation from from 1,576 to 2,182 m (5,200 to 7,200 ft). This community type prospers on broad, level floodplains of riverine systems and in narrow bands along smaller streams in open, U-shaped canyons. Salix geyeriana (Geyer willow) may colonize grassy alpine sites associated with seeps and springs, or dominate the periphery of beaver ponds. *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow) communities occupy intermediate elevations on the landscape, between higher elevational *Salix drummondiana* (Drummond willow) communities and lower elevational *Salix lutea* (yellow willow) communities.

## VEGETATION

In Idaho, the *Salix geyeriana* (Geyer willow) community type may contain a variety of shrub species, particularly *Rosa woodsii* (woods rose) and *Ribes* spp. (currant), in addition to the dominant *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow). Due to wildlife and livestock utilization, this grazing/browsing disclimax tends to develop more open stands. Numerous, diverse graminoids and forbs, such as *Poa pratensis* (Kentucky bluegrass), *Bromus*

*vulgaris* (Columbia brome), *Achillea millefolium* (common yarrow), and *Angelica arguta* (sharptooth angelica), may be present (See Table 18). The levels and types of disturbances may account for the species composition and variability.

**Table 19.** Average canopy cover, range of canopy cover, and constancy for those species recorded in sampled stands of the grazing disclimax *Salix geyeriana* (Geyer willow) community type (number = 2 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Shrubs** | | | |
| *Lonicera involucrata* (twin-berry) | 2 | 0-3 | 50 |
| *Ribes inerme* (whitestem gooseberry) | 2 | 0-3 | 50 |
| *Ribes lacustre* (swamp currant) | 10 | 0-20 | 50 |
| *Ribes odoratum* (buffalo currant) | 2 | 0-3 | 50 |
| *Rosa woodsii* (woods rose) | 5 | 0-10 | 50 |
| *Salix boothii* (Booth willow) | 17 | 3-30 | 100 |
| *Salix geyeriana* (Geyer willow) | 70 | 60-80 | 100 |
| **Graminoids** | | | |
| *Agrostis stolonifera* (redtop) | 2 | 0-3 | 50 |
| *Bromus vulgaris* (Columbia brome) | 15 | 0-30 | 50 |
| *Carex aquatilis* (water sedge) | <1 | 0-1 | 50 |
| *Carex crawfordii* (Crawford's sedge) | <1 | 0-1 | 50 |
| *Carex praticola* (meadow sedge) | <1 | 0-1 | 50 |
| *Carex rostrata* (beaked sedge) | 2 | 0-3 | 50 |
| *Grass perennial* (perennial grass) | 10 | 0-20 | 50 |
| *Poa pratensis* (Kentucky bluegrass) | 15 | 0-30 | 50 |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | 10 | 0-20 | 50 |
| *Allium geyeri* (Geyer's onion) | 10 | 0-20 | 50 |
| *Angelica arguta* (sharptooth angelica) | 10 | 0-20 | 50 |
| *Aster* spp. (aster) | <1 | 0-1 | 50 |
| *Aster laevis* (smooth aster) | 5 | 0-10 | 50 |
| *Castilleja miniata* (scarlet paintbrush) | <1 | 0-1 | 50 |
| *Cirsium arvense* (Canada thistle) | 5 | 0-10 | 50 |
| *Cynoglossum officinale* (common hound's-tongue) | <1 | 0-1 | 50 |
| *Fragaria virginiana* (Virginia strawberry) | 10 | 0-20 | 50 |
| *Geranium viscosissimum* (sticky geranium) | 5 | 0-10 | 50 |
| *Geum macrophyllum* (larged-leaved avens) | 3 | 3-3 | 100 |
| *Mentha arvensis* (field mint) | <1 | 0-1 | 50 |
| *Myosotis sylvatica* (wood forget-me-not) | <1 | 0-1 | 50 |
| *Osmorhiza occidentalis* (western sweet-cicely) | <1 | 0-1 | 50 |
| *Perideridia bolanderi* (Bolander's yampah) | <1 | 0-1 | 50 |
| *Polygonum bistortoides* (American bistort) | <1 | 0-1 | 50 |
| *Potentilla diversifolia* (diverse-leaved cinquefoil) | 5 | 0-10 | 50 |
| *Ranunculus* spp. (buttercup) | 5 | 0-10 | 50 |
| *Senecio serra* (tall butterweed) | 2 | 0-3 | 50 |
| *Smilacina stellata* (starry Solomon-plume) | 2 | 0-3 | 50 |
| *Taraxacum officinale* (common dandelion) | <1 | 0-1 | 50 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Thalictrum occidentale* (western meadowrue) | 12 | 3-20 | 100 |
| *Trifolium longipes* (long-stalked clover) | 5 | 0-10 | 50 |
| **Ferns and Allies** | | | |
| *Equisetum hyemale* (common scouring-rush) | 2 | 0-3 | 50 |

## SUCCESSIONAL INFORMATION

The *Salix geyeriana* (Geyer willow) community type represents the driest of those communities dominated by *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow). Prolonged, intense utilization by livestock and wild ungulates have probably shifted the site potential from the wetter *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type, or the slightly drier *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type (Hansen and others 1995). Continued grazing pressure may eliminate the willow component entirely. resulting in *Carex* spp.(sedge) dominated communities on saturated sites and *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass) and other disturbance -induced species dominating communities in drier locations.

Hansen and others (1995) indicate that personal observations tend to indicate that *Salix geyeriana* (Geyer willow) is less tolerant of browsing pressures when compared to *Salix boothii* (Booth willow). This may account for the reduced abundance and canopy cover of *Salix geyeriana* (Geyer willow) in select stands of the *Salix geyeriana* (Geyer willow) community type.

## SOILS

Youngblood and others (1985b) indicate that *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow) dominated communities may occur over a range of soil types generally classified as Mollisols and Histosols, or, where less soil development has occurred, Inceptisols and Entisols. Deeper alluvial mineral deposits are comprised of coarse and fine sands and gravels. Organic surface horizons, often extending to a depth of 45 cm (18 in) or more, may be riddled with fibrous root and plant material. Soil textures are categorized as fines, generally silts and clays. Water tables may be at or just below the surface, or may be as deep as 1 m (39 in). Although mottled and gleyed soil characteristics were not observed, they are thought to be present where water tables are near the surface.

## ADJACENT COMMUNITIES

*Carex rostrata* (beaked sedge), *Eleocharis* spp. (spikesedge), and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is readily available. The *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type may occupy adjacent less disturbed sites. Due to differences in moisture, substrate composition, flooding frequency and a variety of other physical site factors, riparian corridors are often characterized by a diversity of species forming a mosaic of distinct, localized communities. The *Salix geyeriana* (Geyer willow) community type may be associated with a variety of other *Salix* spp. (willow) communities, or *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), or *Populus tremuloides* (quaking aspen) types. Uplands are dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine), and *Abies lasiocarpa* (subalpine fir) or by *Artemisia tridentata* (big sagebrush) steppe and grasslands.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

**Livestock**

Stands of this type are often open, allowing for easy livestock access. Forage productivity is also high, resulting in potentially heavy utilization, especially as upland vegetation dries. *Poa pratensis* (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

Overuse by livestock will result in reduced vigor of willows, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a

sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

**Wildlife**

The species and structural diversity of this type make it a valuable cover and food source for a wide range of wildlife species, including deer, moose, waterfowl, upland game, songbirds, and small mammals (Dittberner and Olson 1983). Moose and beaver have been observed to use *Salix* spp. (willow) extensively in places.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. 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 and others 1995).

**Fisheries**
*Salix* spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion, provide cover in the form of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. Although not a source of large woody debris, willows may trap large trees borne downstream, creating deeper pools and additional cover for fish species. As a source of food and building material *Salix* spp. (willow) attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags.

**Fire**
Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands (Kovalchik 1986 and 1987). Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts.

*Poa pratensis* (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**
Soils and streambanks are subject to trampling damage, particularly if fine textured and wet. Grazing should be deferred until sites are drier to reduce trampling and compaction problems (Marlow 1984). Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Unless water tables are restored, these sites will for all practical purposes remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the

rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will help raise the water table thereby allowing the willows and sedges to reclaim a degraded site (Hansen and others 1995).

*Salix geyeriana* (Geyer willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cuttings, however, may be more difficult to root than *Salix boothii* (Booth willow). Cut stems of *Salix geyeriana* (Geyer willow) produce low to moderate numbers of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995).

**Recreational Uses and Considerations**
When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

## OTHER STUDIES

This type has been documented for Montana in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995). In eastern Idaho and western Wyoming, Youngblood and others (1985b) identified several similar community types (*Salix geyeriana/Poa palustris* (Geyer willow/fowl bluegrass), *Salix boothii/Poa palustris* (Booth willow/fowl bluegrass) community types) indicating disturbed conditions.

## *Salix lasiandra* Community Type (Pacific Willow Community Type)

**SALLAS (SALA5)**
**Number Of Stands Sampled = 5**

### LOCATION AND ASSOCIATED LANDFORMS

The *Salix lasiandra* (Pacific willow) community type is an minor type at low to mid elevations in southern and eastern Idaho. Sites range from 1,394 to 2,000 m (4,600 to 6,600 ft). Stands of this community type may be located in proximity to seeps and low, moist depressional areas or, more frequently, occur as part of a diverse mosaic with other willow species in riparian corridors. *Salix lasiandra* (Pacific willow) appears in U- and V-shaped drainages on narrow swaths of alluvial deposits or establishes as more extensive stands on broader, level, riverine floodplains.

### VEGETATION

*Salix lasiandra* (Pacific willow) exhibits two major growth forms in Idaho: medium, tree-sized shrubs with boles up to 45 cm (18 in) in diameter that may reach heights upwards of 7 m (21 ft), or multi-trunk shrubs. Brunsfeld and Johnson (1985) indicate that the single-trunk form is more prevalent at lower elevations while the multi-trunk form predominates at moderately higher elevations. This willow represents one of the taller *Salix* spp. (willow) and typically forms extremely dense overhead canopies, often precluding the development of lush understory shrub or herbaceous layers. Stands of the *Salix lasiandra* (Pacific willow) community type may contain trace amounts of a variety of other shrub species, including *Salix bebbiana* (Bebb willow), *Salix lutea* (yellow willow), *Salix exigua* (sandbar willow), *Salix geyeriana* (Geyer willow), *Rosa* spp. (rose) and *Ribes* spp. (currant). The sparse herbaceous component may be composed of *Agropyron repens* (quackgrass), *Poa pratensis* (Kentucky bluegrass), *Aster occidentalis* (western aster), *Mentha arvensis* (field mint) and *Heracleum lanatum* (cow-parsnip). Local disturbances may cause species compositions to diverge between sites. The ground surface may be littered with woody debris, and patches of moss may occur sporadically where sufficient moisture is available.

**Table 20.** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Salix lasiandra* (Pacific willow) community type that are relatively undisturbed by livestock or wildlife (number = 5 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Shrubs** | | | |
| *Cornus stolonifera* (red-osier dogwood) | 12 | 0-40 | 40 |
| *Ribes lacustre* (swamp currant) | 2 | 0-10 | 20 |
| *Salix lasiandra* (Pacific willow) | 91 | 80-98 | 100 |
| *Salix lutea* (yellow willow) | 2 | 0-10 | 40 |
| *Solanum dulcamara* (climbing nightshade) | 4 | 0-20 | 40 |
| **Graminoids** | | | |
| *Agropyron caninum* (bearded wheatgrass) | 1 | 0-3 | 20 |
| *Agrostis exarata* (spike bentgrass) | 2 | 0-10 | 20 |
| *Agropyron repens* (quackgrass) | 12 | 0-60 | 40 |
| *Agrostis stolonifera* (redtop) | 4 | 0-20 | 20 |
| *Alopecurus aequalis* (short-awn foxtail) | <1 | 0-1 | 20 |
| *Carex aquatilis* (water sedge) | 1 | 0-3 | 20 |
| *Carex lanuginosa* (woolly sedge) | <1 | 0-1 | 20 |
| *Carex microptera* (small-winged sedge) | <1 | 0-1 | 20 |
| *Carex rostrata* (beaked sedge) | 1 | 0-3 | 20 |
| *Carex vesicaria* (inflated sedge) | <1 | 0-1 | 20 |
| *Glyceria striata* (fowl mannagrass) | <1 | 0-1 | 20 |
| *Juncus balticus* (baltic rush) | 2 | 0-10 | 20 |
| *Muhlenbergia asperifolia* (alkali muhly) | <1 | 0-1 | 20 |
| *Phalaris arundinacea* (reed canarygrass) | <1 | 0-1 | 20 |
| *Poa pratensis* (Kentucky bluegrass) | 1 | 0-3 | 40 |
| **Forbs** | | | |
| *Actaea rubra* (baneberry) | 1 | 0-3 | 20 |
| *Artemisia ludoviciana* (prairie sagewort) | <1 | 0-1 | 20 |
| *Asclepias speciosa* (showy milkweed) | 16 | 0-80 | 20 |
| *Aster occidentalis* (western aster) | 1 | 0-3 | 40 |
| *Bidens vulgata* (tall beggar-ticks) | 2 | 0-10 | 20 |
| *Cardamine breweri* (brewer's bittercress) | <1 | 0-1 | 20 |
| *Cicuta maculata* (spotted water-hemlock) | 1 | 0-3 | 20 |
| *Cirsium arvense* (Canada thistle) | <1 | 0-1 | 20 |
| *Epilobium ciliatum* (common willow-herb) | <1 | 0-1 | 40 |
| Forb (unknown forb) | 2 | 0-10 | 20 |
| *Galium triflorum* (sweetscented bedstraw) | <1 | 0-1 | 20 |
| *Geum macrophyllum* (larged-leaved avens) | 1 | 0-3 | 20 |
| *Helenium autumnale* (sneezeweed) | <1 | 0-1 | 20 |
| *Heracleum lanatum* (cow-parsnip) | 6 | 0-30 | 20 |
| *Lycopus americanus* (cut-leaved water horehound) | 2 | 0-10 | 20 |
| *Mentha arvensis* (field mint) | 3 | 0-10 | 40 |
| *Mimulus guttatus* (common monkey-flower) | 1 | 0-3 | 20 |
| *Montia chamissoi* (water montia) | <1 | 0-1 | 20 |
| *Plantago major* (common plantain) | 1 | 0-3 | 20 |
| *Polygonum amphibium* (water smartweed) | 1 | 0-3 | 20 |
| *Scutellaria galericulata* (marsh skullcap) | <1 | 0-1 | 20 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Senecio serra* (tall butterweed) | 1 | 0-3 | 20 |
| *Smilacina stellata* (starry Solomon-plume) | 1 | 0-3 | 20 |
| *Urtica dioica* (stinging nettle) | 1 | 0-3 | 20 |
| *Veronica americana* (American speedwell) | 1 | 0-3 | 20 |
| **Ferns and Allies** | | | |
| *Equisetum arvense* (field horsetail) | <1 | 0-1 | 20 |

## SUCCESSIONAL INFORMATION

Brunsfeld and Johnson (1985) indicate that at lower elevations where *Salix lasiandra* (Pacific willow) forms a medium sized, tree-like shrub, it is common in open *Populus trichocarpa* (black cottonwood) stands or as a fringe around dense cottonwood stands. *Salix lasiandra* (Pacific willow) appears to be an early to mid-seral species and may favor environmental site conditions similar to those of cottonwoods and *Salix exigua* (sandbar willow). In Montana, many stands seem to represent an early seral stage of the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type (Hansen and others (1995). *Salix geyeriana* (Geyer willow) and *Salix lutea* (yellow willow) are often associated with *Salix lasiandra* (Pacific willow) and might represent climax types on certain sites. Due to the limited number of observations in Idaho, the successional status of this community type has yet to be determined.

## SOILS

*Salix lasiandra* (Pacific willow) germinates on a variety of alluvial materials. Soil textures range from silty clay loam to fine sand. Where infrequent disturbance allows its accumulation, a litter/duff layer may be up to 15 cm (6 in) deep and contributes to the high concentration of organic matter often present in the upper surface horizons. Underlying layers, composed of coarse grain sands, gravels, and cobbles of assorted sizes, form irregular bands and pockets in an unconsolidated matrix. Soils are classified as Entisols, or occasionally Mollisols (Hansen and others 1995). Water tables are commonly at the surface, but may be 60 cm (24 in) or more in depth and are thought to provide moisture to the upper horizons throughout the growing season. Mottled and gleyed soil characteristics may be present due to the elevated water tables which promote oxidation/reduction reactions.

## ADJACENT COMMUNITIES

Shrubs typically form mosaic patterns throughout drainages such that individual species dominate particular microsites. *Salix lasiandra* (Pacific willow) is often accompanied by *Salix bebbiana* (Bebb willow), *Salix lutea* (yellow willow), *Salix exigua* (sandbar willow), *Salix geyeriana* (Geyer willow) and/or *Salix boothii* (Booth willow) in riparian zones. Other affiliated shrubs include *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), or *Alnus incana* (mountain alder). Cottonwoods may be present as well on broader floodplains. *Populus tremuloides* (quaking aspen) and *Pseudotsuga menziesii* (Douglas fir) may integrate into these riparian complexes, but may also dominate drier, adjacent upland sites. Rangelands dominated by *Artemisia tridentata* (big sagebrush) and sand dunes may border riparian zones vegetated with the *Salix lasiandra* (Pacific willow) community type.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Stands of the *Salix lasiandra* (Pacific willow) community type typically form narrow, often discontinuous bands of limited extent. Forage productivity is often low due to disturbance by frequent flooding (Hansen and others 1995).

Stands of the *Salix lasiandra* (Pacific willow) community type are typically heavily impacted by livestock. Because of their location, most stands at lower elevations receive season long grazing and are commonly used as a winter feed ground by ranchers. Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

**Wildlife**

The *Salix lasiandra* (Pacific willow) community type provides browse and cover for moose, deer, birds, and small mammals. Beaver tend to heavily utilize most species of willows. It is also provides diversity for other mammals and songbirds (Hansen and others 1995).

**Fisheries**

*Salix* spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. *Salix lasiandra* (Pacific willow) 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 temperature fluctuations. It may be a source of large woody debris or may trap large trees borne downstream, creating deeper pools and additional cover for fish. Where the herbaceous layer is dense, it may act to trap sediments, essentially building streambanks and filtering steam flows. As a source of food and building material *Salix* spp. (willow) attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags.

**Fire**

The response of *Salix lasiandra* (Pacific willow) to fire and its sprouting capabilities are poorly documented (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

Coarse textured soils generally do not have compaction problems. However, many stands are currently heavily impacted by livestock resulting in large amounts of bare ground. These degraded stands are vulnerable to erosion problems during high water periods. Management should emphasize the importance of willows in protecting the streambank. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient streambank protection (Hansen and others 1995).

Use of *Salix lasiandra* (Pacific willow) for stabilizing streambanks is recommended on appropriate sites. It is easily rooted and forms abundant roots on planted cuttings approximately 10 days after planting (Platts and others 1987).

**Recreational Uses and Considerations**

The *Salix lasiandra* (Pacific willow) community type may provide access to rivers and streams for recreational fishing. When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites

that may be prone to disturbance. However, the often open understory and shade offered by *Salix lasiandra* (Pacific willow) provides excellent opportunities for picnicking and primitive camping.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

## OTHER STUDIES

This type has been documented for Montana in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995).

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# *Salix lutea* Community Type (Yellow Willow Community Type)

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**SALLUT (SALU2)**
**Number Of Stands Sampled = 7**

## LOCATION AND ASSOCIATED LANDFORMS

The *Salix lutea* (yellow willow) community type ranges in elevation from 1,364 to 1,818 m (4,600 to 6000 ft), and is a major type at low to mid elevations throughout the foothills and valleys of central and eastern Idaho. This community type may be part of a diverse mosaic of shrub and tree communities occupying riparian corridors along streams in U- and V-shaped canyons, or as broader stands on wide floodplains associated with riverine systems. It may also occupy grassy, upper floodplains with high water tables or be be found associated with beaver dams. The habitat requirements of *Salix lutea* (yellow willow) generally correspond with those of *Salix drummondiana* (Drummond willow) and *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow). However, these three species appear to be distributed across an elevational gradient, with the *Salix lutea* (yellow willow) type occupying the lowest elevations, the *Salix geyeriana - Salix boothii* (Geyer willow - Booth willow) types generally appearing at

intermediate ranges and *Salix drummondiana* (Drummond willow) type dominating higher altitudes.

## VEGETATION

*Salix lutea* (yellow willow) has two growth forms: it may occur as single-trunk, tree-sized shrubs, or as multi-stalked shrubs. However, the individual trunks of the arborescent form may be tree-sized themselves, arising from a single base up to 1 m (39 in) in diameter before diverging into separate boles. This community type represents a grazing disclimax. *Salix lutea* (yellow willow) dominates the upper shrub layer, with varying amounts of *Salix exigua* (sandbar willow), *Cornus stolonifera* (red-osier dogwood), *Ribes* spp. (currant) and *Rosa* spp. (rose) composing the lower shrub level. Common herbaceous species include *Agrostis stolonifera* (redtop), *Phalaris arundinacea* (reed canarygrass), *Polygonum* spp. (smartweed), and *Equisetum* spp. (horsetail)

**Table 21** Average canopy cover, range of canopy cover, and constancy for those species recorded in the sampled stands of the grazing disclimax *Salix lutea* (yellow willow) community type (number = 7 stands)

| Species | % Canopy Cover | | Constancy |
|---|---|---|---|
| | Average | Range | |
| **Trees** | | | |
| *Populus angustifolia* (narrowleaf cottonwood) | <1 | 0-1 | 29 |
| *Populus trichocarpa* (black cottonwood) | 1 | 0-10 | 14 |
| **Shrubs** | | | |
| *Cornus stolonifera* (red-osier dogwood) | 10 | 0-30 | 71 |
| *Elaeagnus commutata* (silverberry) | 5 | 0-30 | 17 |
| *Ribes lacustre* (swamp currant) | 2 | 0-10 | 29 |
| *Ribes odoratum* (buffalo currant) | 1 | 0-3 | 43 |
| *Ribes setosum* (Missouri gooseberry) | <1 | 0-1 | 14 |
| *Rosa woodsii* (woods rose) | 7 | 0-20 | 57 |
| *Salix exigua* (sandbar willow)) | 17 | 0-70 | 71 |
| *Salix lasiandra* (Pacific willow) | 13 | 0-80 | 33 |
| *Salix lutea* (yellow willow) | 49 | 10-90 | 100 |
| *Solanum dulcamara* (climbing nightshade) | 1 | 0-10 | 14 |
| **Graminoids** | | | |
| *Agropyron caninum* (bearded wheatgrass) | <1 | 0-3 | 14 |
| *Agrostis stolonifera* (redtop) | 23 | 0-80 | 29 |
| *Carex rostrata* (beaked sedge) | <1 | 0-1 | 14 |
| *Carex* spp.(sedge) | <1 | 0-1 | 14 |
| Grass (Grass) <1 | 0-1 | 14 | |
| *Muhlenbergia asperifolia* (alkali muhly) | 1 | 0-10 | 14 |
| *Muhlenbergia cuspidata* (plains muhly) | <1 | 0-3 | 14 |
| *Phalaris arundinacea* (reed canarygrass) | 6 | 0-40 | 29 |
| *Phleum pratense* (common timothy) | <1 | 0-1 | 14 |
| *Poa pratensis* (Kentucky bluegrass) | 1 | 0-3 | 29 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | <1 | 0-1 | 14 |
| *Aster laevis* (smooth aster) | <1 | 0-3 | 14 |
| *Aster occidentalis* (western aster) | <1 | 0-3 | 14 |
| *Cardamine* spp. (bittercress) | 1 | 0-10 | 14 |
| *Cirsium arvense* (Canada thistle) | 2 | 0-10 | 57 |
| *Cynoglossum officinale* (common hound's-tongue) | <1 | 0-3 | 14 |
| *Erigeron glabellus* (smooth daisy) | <1 | 0-1 | 14 |
| Forb (unknown forb) | 1 | 0-10 | 14 |
| *Galium aparine* (goose-grass) | 1 | 0-10 | 14 |
| *Geranium viscosissimum* (sticky geranium) | <1 | 0-1 | 14 |
| *Mentha arvensis* (field mint) | <1 | 0-3 | 14 |
| *Plantago major* (common plantain) | <1 | 0-3 | 14 |
| *Polygonum amphibium* (water smartweed) | 11 | 0-80 | 14 |
| *Rumex crispus* (curly dock) | <1 | 0-3 | 14 |
| *Smilacina racemosa* (false spikenard) | <1 | 0-1 | 14 |
| *Smilacina stellata* (starry Solomon-plume) | 2 | 0-10 | 29 |
| *Solidago canadensis* (Canada goldenrod) | 1 | 0-3 | 43 |
| *Stachys palustris* (swamp hedge-nettle) | <1 | 0-1 | 14 |
| *Urtica dioica* (stinging nettle) | 1 | 0-10 | 14 |
| **Ferns and Allies** | | | |
| *Equisetum hyemale* (common scouring-rush) | 1 | 0-10 | 14 |
| *Equisetum laevigatum* (smooth scouring-rush) | 2 | 0-10 | 29 |

## SUCCESSIONAL INFORMATION

The *Salix lutea* (yellow willow) community type represents an early/mid-seral grazing disclimax of the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type or the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type (Hansen and others 1995). Physiological site changes may shift the potential climax vegetation to types in the *Populus tremuloides* (quaking aspen) series or the *Juniperus scopulorum* (Rocky Mountain juniper) series.

## SOILS

Brichta (1987) indicates that soils may be classified as Entisols (Fluvents) or Mollisols. Soil textures of the upper surface horizons range from silty clays to sandy loams. Surface layers may be 45 cm (18 in) or more deep and are often integrated with high quantities of organic material. Underlying substrates are generally fine or coarse sands and gravels. Water tables may be at the surface or as deep as 1 m (39 in), but are expected to provide soil moisture to the upper horizons for the majority of the growing season. Oxidation/reduction reactions

produce mottled or gleyed features in the soil solum where groundwater is prevalent. Litter/duff layers occur on sites with infrequent disturbance, and may be 5 cm (2 in) or more thick.

## ADJACENT COMMUNITIES

*Carex* spp.(sedge), *Juncus* spp. (rush), *Eleocharis* spp. (spikesedge), and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is readily available. Less disturbed sites may be occupied by either the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, or, under more saturated conditions, the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type. The *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type or the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type may occur on drier, upper floodplains. Where *Salix lutea* (yellow willow) is present as part of a mosaic, other *Salix* spp. (willow) and a variety of shrubs such as *Crataegus douglasii* (black hawthorn) and *Betula occidentalis* (water birch), may be present. Uplands may be dominated by *Juniperus scopulorum* (Rocky Mountain juniper)/grassland or *Artemisia tridentata* (big sagebrush)/grassland.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

**Livestock**

Where stands of this type are open and allow access for livestock, forage productivity may be high, resulting in potentially heavy utilization, especially as upland vegetation dries. *Poa pratensis* (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

**Wildlife**

Big game utilize this type for both summer and winter forage and browse. Winter elk use may be heavy (Gaffney 1941).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. 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 and others 1995)

**Fisheries**
*Salix* spp. (willow) communities function in a variety of capacities to promote stream health and enhance fisheries. *Salix lutea* (yellow willow) 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 temperature fluctuations. It may act as a source of large woody debris or may trap large trees borne downstream, creating deeper pools and additional cover for fish species. Herbaceous understory species trap sediments, essentially building streambanks and filtering steam flows. As a source of food and building material *Salix* spp. (willow) attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags.

**Fire**
Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts (Hansen and others 1995).

*Poa pratensis* (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth.

**Soil Management and Rehabilitation Opportunities**
Soils are easily damaged from trampling by livestock if grazed when moist. This disturbance often leads to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995). *Salix lutea* (yellow willow) is useful in streambank stabilization and revegetation projects (Platts and others 1987). Cuttings should be first rooted then grown in a nursery to insure survival. *Salix lutea* (yellow willow) produces an abundance of

roots, mostly along the lower one-third of the cut stem. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and >1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10 days after planting.

**Recreational Uses and Considerations**

*Salix lutea* (yellow willow) may form dense stands, preventing fishing access to anglers. However, where disturbance is prevalent, stands may become more open and provide greater opportunities for recreational activities When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

## OTHER STUDIES

Youngblood and others (1985b) identified a comparable *Salix lutea* (yellow willow) community type in eastern Idaho and western Wyoming. Hansen and others (1995) also document this type for the state of Montana in the *Classification and Management of Montana's Riparian and Wetland Sites*.

## NON-WILLOW SHRUB TYPES

### *Acer grandidentatum* Community Type
### (Bigtooth Maple Community Type)

**ACEGRA(ACGR)**
**Number Of Stands Sampled = 4**
**CAUTION—Not all sites currently dominated by *Acer grandidentatum* (bigtooth maple) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.**

### LOCATION AND ASSOCIATED LANDFORMS

The *Acer grandidentatum* (bigtooth maple) community type is an incidental type at mid elevations throughout foothills and valleys across eastern and southern Idaho. Stands may be located on hillsides immediately below springs and seeps or on upper floodplains of narrow canyon drainages characterized by surface or ephemeral flow. This community type occupies marginally riparian zones as small dense thickets, narrow stingers, or irregular patches, and appears intolerant of prolonged or frequent flooding. Sites range in elevation from 1,600 to 1,950 m (5,280 to 6,435 ft).

### VEGETATION

An arborescent (tree-like) shrub, *Acer grandidentatum* (bigtooth maple) may reach heights of 10 m (33 ft) or more, often forming a dense, overhead canopy. Understory layers are extremely variable. *Urtica dioica* (stinging nettle), *Osmorhiza chilensis* (mountain sweet-cicely), and *Heracleum lanatum* (cow-parsnip) may exhibit extremely dense growth on some sites, while on other sites, understory species such as *Thalictrum occidentale* (western meadowrue) or *Smilacina stellata* (Solomon's seal) may occur only in trace amounts. The levels and types of disturbances may account for the variability of species between sites. *Galium* spp. (bedstraw) are a fairly constant understory species, and *Prunus virginiana* (common choke-cherry) appears in most stands, although often in a decadent state.

**Table 22** Average canopy cover, range of canopy cover, and constancy for indicator species of the sampled stands of the *Acer grandidentatum*(bigtooth maple) community type (number = 4 stands)

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Populus tremuloides* (quaking aspen) | <1 | 0-1 | 25 |
| **Shrubs** | | | |
| *Acer glabrum* (Rocky Mountain maple) | <1 | 0-1 | 25 |
| *Acer grandidentatum* (bigtooth maple) | 89 | 80-98 | 100 |
| *Amelanchier alnifolia* (western serviceberry) | 3 | 0-10 | 25 |
| *Berberis repens* (creeping oregongrape) | 6 | 0-10 | 75 |
| *Cornus stolonifera* (red-osier dogwood) | <1 | 0-1 | 25 |
| *Prunus virginiana* (common chokecherry) | 9 | 3-20 | 100 |
| *Ribes lacustre* (swamp currant) | <1 | 0-1 | 25 |
| *Ribes setosum* (Missouri gooseberry) | 1 | 0-3 | 25 |
| *Rosa woodsii* (woods rose) | <1 | 0-1 | 25 |
| *Rubus parviflorus* (thimbleberry) | 5 | 0-20 | 25 |
| *Sambucus racemosa* (red elderberry) | 1 | 0-3 | 25 |
| *Symphoricarpos oreophilus* (mountain snowberry) | 1 | 0-3 | 25 |
| **Graminoids** | | | |
| *Bromus inermis* (smooth brome) | 2 | 0-3 | 50 |
| *Bromus tectorum* (cheatgrass) | 1 | 0-3 | 25 |
| *Carex backii* (Back's sedge) | <1 | 0-1 | 25 |
| *Elymus glaucus* (blue wildrye) | 3 | 0-10 | 50 |
| *Festuca subulata* (bearded fescue) | <1 | 0-1 | 25 |
| *Grass perennial* (perennial grass) | 1 | 0-3 | 25 |
| *Poa bulbosa* (bulbous bluegrass) | 1 | 0-3 | 25 |
| **Forbs** | | | |
| *Actaea rubra* (baneberry) | 1 | 0-3 | 25 |
| *Epilobium ciliatum* (common willow-herb) | <1 | 0-1 | 25 |
| *Galium aparine* (goose-grass) | 15 | 0-50 | 50 |
| *Galium triflorum* (sweetscented bedstraw) | 8 | 0-30 | 25 |
| *Geum aleppicum* (yellow avens) | 1 | 0-3 | 25 |
| *Heracleum lanatum* (cow-parsnip) | 5 | 0-20 | 25 |
| *Lactuca serriola* (prickly lettuce) | 1 | 0-3 | 50 |
| *Leonurus cardiaca* (motherwort) | 1 | 0-3 | 25 |
| *Montia perfoliata* (Miner's lettuce) | 1 | 0-3 | 25 |
| *Onopordum acanthium* (Scotch thistle) | <1 | 0-1 | 25 |
| *Osmorhiza chilensis (mountain sweet-cicely)* | 8 | 0-20 | 50 |
| *Rudbeckia occidentalis* (black head) | 1 | 0-3 | 25 |
| *Silene menziesii* (Menzies' silene) | 1 | 0-3 | 25 |
| *Smilacina racemosa* (false spikenard) | 3 | 0-10 | 50 |
| *Smilacina stellata* (starry Solomon-plume) | 1 | 0-3 | 25 |
| *Taraxacum officinale* (common dandelion) | 1 | 0-3 | 25 |
| *Thalictrum occidentale* (western meadowrue) | 2 | 0-3 | 50 |
| *Tragopogon dubius* (goat's beard) | <1 | 0-1 | 25 |
| *Urtica dioica* (stinging nettle) | 5 | 0-20 | 50 |

## SUCCESSIONAL INFORMATION

The *Acer grandidentatum* (bigtooth maple) community type appears to be a successional phase of the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type at mid elevations where their ranges overlap. At higher elevations, it may act as an early to mid-seral stage for Populus tremuloides (quaking aspen) types, the Pseudotsuga menziesii/Cornus stolonifera (Douglas fir/red-osier dogwood) habitat type or the Juniperus scopulorum/ Cornus stolonifera (Rocky Mountain juniper/red-osier dogwood) habitat type . Acer grandidentatum (bigtooth maple) grows taller than Prunus virginiana (common chokecherry) and may replace it completely in locations where these species converge. Due to the limited number of observations in Idaho, the successional status of this community type has yet to be determined.

## SOILS

On sites where disturbance is infrequent, a comprehensive litter/duff layer 5 cm (2 in) or more thick, composed of leaf material and twigs, blends into an organic ($O_a$ or $O_e$) horizon. Surface soil textures range from silt loams to silty clay loams, although *Acer grandidentatum* (bigtooth maple) appears able to occupy sandy sites outside of the riparian zone as well. Alluvial sand, gravel, and cobble occur sporadically at the surface and generally constitute the main body of subsurface materials. *Acer grandidentatum* (bigtooth maple) may prefer well drained, older, more developed soils that afford good rooting depth and higher fertility, similar to sites occupied by *Prunus virginiana* (common chokecherry). Water tables are generally well below the surface, but may occur within 60 cm (24 in) on some sites. *Acer grandidentatum* (bigtooth maple) appears to be intolerant of frequent or prolonged flooding.

## ADJACENT COMMUNITIES

Riparian corridors are often characterized by a diversity of species forming a mosaic of distinct, localized communities, in response to differences in moisture regimes, substrate composition, flooding frequency and a variety of other physical site factors. The *Acer grandidentatum* (bigtooth maple) community type may be associated with a variety of other shrub communities dominated by *Salix* spp. (willow), *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Crataegus douglasii* (black hawthorn). *Populus tremuloides* (quaking aspen), *Pseudotsuga menziesii* (Douglas fir), *Populus angustifolia* (narrowleaf cottonwood) and *Acer negundo* (box-elder) types may occupy neighboring sites along riparian corridors as well. Adjacent

drier communities are typically dominated by *Juniperus scopulorum* (Rocky Mountain juniper) and *Artemisia tridentata* (big sagebrush)/grasslands.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

The forage potential of the *Acer grandidentatum* (bigtooth maple) community type is unknown, but probably ranges from low to moderate depending on the composition and coverage of the understory species. Although *Acer glabrum* (Rocky Mountain maple) is browsed by elk and moose (Lackschewitz 1991), *Acer grandidentatum* (bigtooth maple) appears to be less palatable .

### Wildlife

The literature is limited regarding the use of the *Acer grandidentatum* (bigtooth maple) community type by wildlife. *Acer glabrum* (Rocky Mountain maple) provides valuable browse for elk and moose and the seeds are eaten by grosbeaks and small mammals (Lackschewitz 1991). The *Acer grandidentatum* (bigtooth maple) community type may provide cover and possibly minor browsing opportunities for wild ungulates and small mammals as well as a seed source for small birds and rodents.

### Fisheries

*Acer grandidentatum* (bigtooth maple) stands forms dense overhead canopies and should maintain cooler water temperatures during hot summer months where they occur adjacent to stream channels. The understory component varies considerably, and although root systems of *Acer grandidentatum* (bigtooth maple) may stabilize streambanks, a sparse understory component may not contribute to sediment filtering or erosion control.

### Fire

Fire tolerance for this community type is unknown at this time. However, *Prunus virginiana* (common chokecherry) will survive all but a hot, intense fire and has an aggressive root system that sprouts vigorously from surviving root crowns after fire (Hansen and others 1995). *Acer grandidentatum* (bigtooth maple) and *Prunus virginiana* (common chokecherry) seem to occupy somewhat similar locations on the landscape and may have developed similar strategies to survive fires.

**Soil Management and Rehabilitation Opportunities**
The litter/duff layer may protect surface soils from minor compaction; however, during the spring when soils are saturated and susceptible to compaction, livestock and vehicle use should be restricted in riparian zones.

Hansen and others (1995) indicate that *Acer negundo* (box-elder) is well adapted to planting on disturbed sites. The *Acer grandidentatum* (bigtooth maple) community type may be a seral stage to the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type. Where disturbance has reduced the vigor and density of stands of *Acer grandidentatum* (bigtooth maple), rooted cuttings of *Acer negundo* (box-elder) and possibly *Acer grandidentatum* (bigtooth maple) may be planted on moist, well-drained soils to restabilize riparian corridors.

**Recreational Uses and Considerations**
*Acer grandidentatum* (bigtooth maple) produces seeds and provides cover attractive to a variety of wildlife species and may offer decent viewing opportunities for bird watchers and other naturalists. A member of the maple family, *Acer grandidentatum* (bigtooth maple) may exhibit vibrant fall foliage. Where the understory is sparse, picnicking and primitive camping are also an option on this type.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

This community has not been described in other classifications.

# *Alnus incana* Community Type
# (Mountain Alder Community Type)

**ALNINC (ALIN2)**
**Number Of Stands Sampled = 2**

## LOCATION AND ASSOCIATED LANDFORMS

The *Alnus incana* (mountain alder) community type appears throughout mountains, foothills, and valleys of eastern Idaho. This major type ranges in elevation from 1,576 to 2,100 m (5,200 to 6,930 ft). It forms narrow stringers on banks and floodplains of fast moving streams in canyon bottoms, irregular clusters near hillside springs and seeps, or bands along the perimeter of beaver ponds. The *Alnus incana* (mountain alder) community type generally represents one of any number of discreet riparian communities that occupy microsites along stream and riverine systems and form the mosaic pattern of vegetation common to so many riparian corridors.

## VEGETATION

In Idaho, *Alnus incana* (mountain alder) establishes a dense overstory canopy in the upper layer of the two-layered shrub segment characteristic of this community type. Less well-represented shrubs in the lower strata include *Cornus stolonifera* (red-osier dogwood) and *Ribes lacustre* (swamp currant). A variety of graminoids and forbs compose the undergrowth, including, but not limited to, *Carex* spp.(sedge), *Poa pratensis* (Kentucky bluegrass), *Heracleum lanatum* (cow-parsnip), and *Actaea rubra* (baneberry). Moss may be present in scattered pockets where sufficient moisture is available. Trunks of *Alnus incana* (mountain alder) often parallel the ground for a number of feet before attaining a more vertical growth form, developing nearly impenetrable stands in some locations.

**Table 23.** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Alnus incana* (mountain alder) community type that are relatively undisturbed by livestock or wildlife (number = 2 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Juniperus scopulorum* (Rocky Mountain juniper) | <1 | 0-1 | 50 |
| **Shrubs** | | | |
| *Alnus incana* (mountain alder) | 84 | 70-98 | 100 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Betula occidentalis* (water birch) | <1 | 0-1 | 50 |
| *Cornus stolonifera* (red-osier dogwood) | 15 | 0-30 | 50 |
| *Ribes inerme* (whitestem gooseberry) | <1 | 0-1 | 50 |
| *Ribes lacustre* (swamp currant) | 25 | 1-50 | 100 |
| *Ribes odoratum* (buffalo currant) | 2 | 0-3 | 50 |
| *Rosa woodsii* (woods rose) | 5 | 0-10 | 50 |
| *Symphoricarpos occidentalis* (western snowberry) | 2 | 0-3 | 50 |
| **Graminoids** | | | |
| *Agropyron repens* (quackgrass) | 5 | 0-10 | 50 |
| *Carex* spp.(sedge) | 2 | 0-3 | 50 |
| *Carex microptera* (small-winged sedge) | 2 | 0-3 | 50 |
| *Glyceria striata* (fowl mannagrass) | <1 | 0-1 | 50 |
| *Poa palustris* (fowl bluegrass) | 2 | 0-3 | 50 |
| *Poa pratensis* (Kentucky bluegrass) | 5 | 0-10 | 50 |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | 2 | 0-3 | 50 |
| *Actaea rubra* (baneberry) | 1 | 1-1 | 100 |
| *Cardamine oligosperma* (few-seeded bittercress) | <1 | 0-1 | 50 |
| *Cynoglossum officinale* (common hound's-tongue) | <1 | 0-1 | 50 |
| *Epilobium watsonii* (daisy; fleabane) | <1 | 0-1 | 50 |
| *Geranium viscosissimum* (sticky geranium) | 5 | 0-10 | 50 |
| *Geum macrophyllum* (larged-leaved avens) | <1 | 0-1 | 50 |
| *Heracleum lanatum* (cow-parsnip) | 5 | 0-10 | 50 |
| *Lactuca serriola* (prickly lettuce) | <1 | 0-1 | 50 |
| *Lappula redowskii* (western stickseed) | <1 | 0-1 | 50 |
| *Mimulus guttatus* (common monkey-flower) | <1 | 0-1 | 50 |
| *Montia chamissoi* (water montia) | <1 | 0-1 | 50 |
| *Nepeta cataria* (catnip) | 2 | 0-3 | 50 |
| *Smilacina stellata* (starry Solomon-plume) | <1 | 0-1 | 50 |
| *Stellaria calycantha* (northern starwort) | <1 | 0-1 | 50 |
| *Taraxacum officinale* (common dandelion) | 2 | 0-3 | 50 |
| *Thalictrum occidentale* (western meadowrue) | <1 | 0-1 | 50 |
| **Ferns and Allies** | | | |
| *Equisetum hyemale* (common scouring-rush) | 2 | 0-3 | 50 |

## SUCCESSIONAL INFORMATION

*Populus tremuloides* (quaking aspen) communities or *Salix geyeriana* (Geyer willow) communities may represent the climax vegetation on wetter sites occupied by the *Alnus incana* (mountain alder) community type. However, where beaver have decimated stands of either of these types, *Alnus incana* (mountain alder) may persist as the dominant species for longer periods of time. Slightly drier locations occupied by the *Alnus incana* (mountain alder) community type may be successional to either the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas

fir/red-osier dogwood) habitat type or the *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. *Alnus incana* (mountain alder) often remains present as an understory component for both of these types. Hansen and others (1995) indicate that the *Alnus incana* (mountain alder) community type appears to be a mid-seral disturbance community type and tends to established after severe disturbance. Stands in Montana are located along mined streams (placer mining), streams with yearly ice jam problems, or streams that were used historically in transporting logs to mills (streams with a high occurrence of splash dams).

## SOILS

Soils are typically Entisols (Fluvents) and Mollisols (Borolls), although Inceptisols (Ochrepts) may be present on some sites (Padgett and others 1989). Nutrient rich surface horizons, extending to depths of 25 cm (10 in) or more, have a silty clay or silty clay loam texture. Underlying substrates are predominantly alluvial sands, gravels and cobbles, or in some cases, bedrock. *Alnus incana* (mountain alder) may tolerate frequent or prolonged flooding, and seems to prefer sites containing unconsolidated coarse fragments in the lower soil profile that promote subsurface flow of aerated ground water (Padgett and others 1989). *Alnus* spp. (alder) cycle nitrogen into the soil through root nodules and nitrogen-rich leaf litter, increasing soil fertility. Where sites occur above the active floodplain, leaf litter may accumulate in excess of 5 cm (2 in).

## ADJACENT COMMUNITIES

*Alnus incana* (mountain alder) seldom dominates an entire drainage as a single monotype, but is generally distributed throughout riparian corridors with a variety of other species, each occupying specific microsites according to moisture, substrate and a variety of other physical factors. Associated shrub communities may include *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), *Salix geyeriana* (Geyer willow), *Salix lasiandra* (Pacific willow), and *Salix boothii* (Booth willow). *Carex* spp.(sedge) and *Eleocharis* spp. (spikesedge) types colonize the streamside zone and immediate shallows. *Pseudotsuga menziesii* (Douglas fir) and *Populus tremuloides* (quaking aspen) forests may occupy both the riparian corridors or the adjacent drier uplands. *Juniperus scopulorum* (Rocky Mountain juniper)/grasslands and *Artemisia tridentata* (big sagebrush) steppe establish on upland hillsides and plains.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

**Livestock**

Hansen and others (1995) note that this type is of limited value for livestock because of the typically dense shrub layer. More open stands provide moderate amounts of forage, and are used as a source of summer shade. *Alnus incana* (mountain alder) is infrequently browsed by livestock but is susceptible to trampling damage as animals search for palatable plants (Kovalchik 1986, Kovalchik 1987). Dense stands of *Alnus incana* (mountain alder) hinder access by cattle, but heavy grazing can result in the loss of this type by creating a dish-shaped stream channel and a water regime unsuitable for *Alnus incana* (mountain alder).

**Wildlife**

Browsing of older *Alnus incana* (mountain alder) stems is typically low but use of young twigs, sprouts, and associated shrubs and grasses may be heavy. The high structural diversity of this community type provides thermal and hiding cover for ungulates such as whitetail and mule deer (Healy and Gill 1974). Elk may make light to moderate use of *Alnus incana* (mountain alder) community type during the summer and fall (Kufeld 1973). Associated shrub and herbaceous species also provide browse and forage. Numerous bird species use this type for both food and nesting (Hansen and others 1995).

**Fisheries**

*Alnus incana* (mountain alder), more than other shrub species, exhibits a horizontal growth form at the ground level that provides excellent cover and shade for fisheries. This community type helps to stabilize streambanks, creates overhanging banks, and lessens erosion caused by spring floods. Streams lined with this community type may develop deep and narrow channels, providing cover, spawning sites, food, and the cool temperatures favored by trout and other salmonoids (Hansen and others 1995).

**Fire**

In the *Alnus incana* (mountain alder) community type, all but light ground fires should be avoided. Intense burns will kill the shrub, leaving only a sparse herbaceous understory to protect the site from erosion and bank destabilization (Kovalchik 1986, Kovalchik 1987). However, *Alnus incana* (mountain alder) sprouts readily and retains its vigor when cut at four or five year intervals. Cutting in spring and winter results in rapid growth of sprouts, while cutting in mid summer produces fewer, slower growing sprouts. (Hansen and others 1995)

### Soil Management and Rehabilitation Opportunities

Coarse textured soils and high coarse fragment contents minimize most soil compaction problems associated with development. Management should greatly consider maintaining this type because of its excellent streambank stabilization values (Hansen and others 1995)

### Recreational Uses and Considerations

Recreational values of this community type are primarily connected with the associated high quality fishery. Dense stands limit canoe or raft access, and camping sites are often unsuitable due to moist or wet conditions (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

### USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

## OTHER STUDIES

Similar communities have been described for Idaho and western Wyoming by Tuhy and Jensen (1982), Mutz and Queiroz (1983), Youngblood and others (1985b), and Chadde and others (1988). *Alnus incana* (mountain alder) dominated communities were also described for Utah and southeastern Idaho by Padgett and others (1989), and for portions of Oregon by Kovalchik (1987), and Montana by Hansen and others (1995). Finally, a somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

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## *Betula occidentalis* Community Type
## (Water Birch Community Type)

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**BETOCC (BEOC2)**
**Number Of Stands Sampled = 7**

## LOCATION AND ASSOCIATED LANDFORMS

The *Betula occidentalis* (water birch) community type is a major type at low to mid elevations throughout valleys and foothills of central and eastern Idaho. Sites range from 1,550 to 1,879 m (5,200 to 6,200 ft). This community type develops on a wide range of landforms, from islands and broad floodplains associated with riverine systems to alluvial terraces along fast-flowing streams at the bottom of narrow U-and V-shaped canyons. In some instances, it is also located below springs and seeps on rocky hillsides. Stands of *Betula occidentalis* (water birch) may appear as irregular clusters near seeps, occur as bands along narrow alluvial shelves or develop into broader copses on extensive riverine floodplains.

## VEGETATION

The *Betula occidentalis* (water birch) community type may exhibit a diversity of growth forms. *Betula occidentalis* (water birch) may appear as a multi-trunk shrub in some locales or as a single-trunk, medium tree-sized shrub elsewhere. Where a dense, secondary shrub layer is present, this type may display a two-layered profile, yet where it occurs on disturbed sites, such as active floodplains, understory species may be essentially absent. In general, however, *Betula occidentalis* (water birch) appears in shrub form, establishing a closed overhead canopy. *Rosa woodsii* (woods rose), *Salix exigua* (sandbar willow), and *Cornus stolonifera* (red-osier dogwood) are commonly associated shrubs. The graminoid and forb component, which is quite diverse, is usually dominated by disturbance-induced species, often represented by *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), *Smilacina stellata* (starry Solomon-plume), *Glycyrrhiza lepidota* (American licorice), and *Equisetum* spp. (horsetail).

**Table 24.** Average canopy cover, range of canopy cover, and constancy for species recorded in sampled stands of the *Betula occidentalis* (water birch) community type (number = 7 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Juniperus scopulorum* (Rocky Mountain juniper) | <1 | 0-1 | 14 |
| *Populus angustifolia* (narrowleaf cottonwood) | <1 | 0-3 | 14 |
| *Pseudotsuga menziesii* (Douglas fir) | <1 | 0-1 | 14 |
| **Shrubs** | | | |
| *Amelanchier alnifolia* (western serviceberry) | <1 | 0-1 | 14 |
| *Berberis repens* (creeping oregongrape) | <1 | 0-1 | 14 |
| *Betula occidentalis* (water birch) | 78 | 40-98 | 100 |
| *Clematis ligusticifolia* (western virgins-bower) | 1 | 0-10 | 14 |
| *Cornus stolonifera* (red-osier dogwood) | 19 | 0-50 | 86 |
| *Ribes lacustre* (swamp currant) | 2 | 0-10 | 29 |
| *Ribes odoratum* (buffalo currant) | <1 | 0-1 | 14 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Ribes setosum* (Missouri gooseberry) | <1 | 0-3 | 14 |
| *Rosa woodsii* (woods rose) | 8 | 0-30 | 57 |
| *Salix bebbiana* (Bebb willow) | <1 | 0-3 | 14 |
| *Salix boothii* (Booth willow) | 1 | 0-10 | 14 |
| *Salix exigua* (sandbar willow)) | 3 | 0-20 | 29 |
| *Salix lutea* (yellow willow) | 2 | 0-10 | 29 |
| **Graminoids** | | | |
| *Agrostis exarata* (spike bentgrass) | <1 | 0-1 | 14 |
| *Agropyron smithii* (western wheatgrass) | <1 | 0-1 | 14 |
| *Agrostis stolonifera* (redtop) | 20 | 0-70 | 43 |
| *Carex* spp.(sedge) | <1 | 0-1 | 14 |
| *Carex microptera* (small-winged sedge) | <1 | 0-1 | 14 |
| *Dactylis glomerata* (orchard-grass) | <1 | 0-1 | 14 |
| *Elymus cinereus* (basin wildrye) | <1 | 0-1 | 14 |
| *Elymus glaucus* (blue wildrye) | <1 | 0-3 | 14 |
| Grass perennial (perennial grass) | 1 | 0-10 | 14 |
| *Juncus balticus* (baltic rush) | <1 | 0-3 | 14 |
| *Phalaris arundinacea* (reed canarygrass) | 1 | 0-10 | 14 |
| *Poa pratensis* (Kentucky bluegrass) | 25 | 0-70 | 71 |
| *Stipa viridula* (green needlegrass) | <1 | 0-3 | 14 |
| **Forbs** | | | |
| *Aquilegia flavescens* (yellow columbine) | <1 | 0-3 | 14 |
| *Arctium minus* (common burdock) | <1 | 0-3 | 14 |
| *Artemisia ludoviciana* (prairie sagewort) | <1 | 0-3 | 14 |
| *Astragalus cicer* (chick-pea milk-vetch) | <1 | 0-1 | 14 |
| *Aster eatonii* (Eaton's aster) | <1 | 0-3 | 14 |
| *Aster* spp. (aster) | <1 | 0-1 | 14 |
| *Aster laevis* (smooth aster) | <1 | 0-3 | 14 |
| *Aster modestus* (few-flowered aster) | 1 | 0-10 | 14 |
| *Astragalus* spp. (milk-vetch; orophaca) | <1 | 0-1 | 14 |
| *Berula erecta* (cut-leaved water-parsnip) | <1 | 0-1 | 14 |
| *Cicuta maculata* (spotted water-hemlock) | <1 | 0-3 | 14 |
| *Cirsium arvense* (Canada thistle) | 2 | 0-10 | 71 |
| *Cirsium vulgare* (bull thistle) | <1 | 0-3 | 14 |
| *Cynoglossum officinale* (common hound's-tongue) | <1 | 0-3 | 14 |
| *Epilobium alpinum* (alpine willow-herb) | <1 | 0-1 | 14 |
| *Epilobium ciliatum* (common willow-herb) | <1 | 0-3 | 14 |
| *Erigeron glabellus* (smooth daisy) | <1 | 0-1 | 29 |
| *Galium aparine* (goose-grass) | <1 | 0-1 | 14 |
| *Geranium viscosissimum* (sticky geranium) | 1 | 0-3 | 29 |
| *Geum macrophyllum* (larged-leaved avens) | <1 | 0-3 | 14 |
| *Glycyrrhiza lepidota* (American licorice) | 6 | 0-40 | 14 |
| *Lactuca serriola* (prickly lettuce) | <1 | 0-1 | 29 |
| *Mertensia ciliata* (mountain bluebell) | <1 | 0-1 | 14 |
| *Myosotis scorpioides* (common forget-me-not) | <1 | 0-1 | 14 |
| *Nasturtium officinale* (water-cress) | <1 | 0-1 | 14 |
| *Osmorhiza chilensis* (mountain sweet-cicely) | <1 | 0-3 | 14 |
| *Rumex obtusifolius* (bitterdock) | <1 | 0-1 | 14 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Senecio serra* (tall butterweed) | 1 | 0-10 | 14 |
| *Silene menziesii* (Menzies' silene) | <1 | 0-1 | 29 |
| *Smilacina stellata* (starry Solomon-plume) | 3 | 0-10 | 43 |
| *Solidago canadensis* (Canada goldenrod) | 3 | 0-10 | 29 |
| *Taraxacum officinale* (common dandelion) | <1 | 0-3 | 14 |
| *Tragopogon dubius* (goat's beard) | <1 | 0-1 | 14 |
| *Trifolium dubium* (least hop clover) | 2 | 0-10 | 29 |
| *Trifolium* spp. (clover) | <1 | 0-1 | 14 |
| *Urtica dioica* (stinging nettle) | <1 | 0-3 | 14 |
| **Ferns and Allies** | | | |
| *Equisetum arvense* (field horsetail) | 5 | 0-30 | 29 |
| *Equisetum laevigatum* (smooth scouring-rush) | <1 | 0-1 | 43 |

## SUCCESSIONAL INFORMATION

The *Betula occidentalis* (water birch) community type may function as a seral stage for a variety of different climax communities. The presence of species representing climax vegetation types generally indicates the successional potential for a particular site, and should be noted. Conifers, particularly in the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type or *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) type, may eventually dominate slightly drier riparian zones. On alluvial shelves of mountain streams and saturated zones adjacent to beaver ponds, types in the *Populus tremuloides* (quaking aspen) series, the *Salix lutea* (yellow willow) series or the *Salix geyeriana* (Geyer willow) series may represent the climax vegetation. *Betula occidentalis* (water birch) may in turn function as a later seral stage, succeeding shorter-statured riparian shrubs such as *Alnus incana* (mountain alder), *Cornus stolonifera* (red-osier dogwood), or *Prunus virginiana* (common chokecherry).

## SOILS

Padgett and others (1989) indicate that this community type typically occupies soils classified as Entisols (Fluvents) and Mollisols (Borolls). Sites located above the active floodplain may be covered with a litter/duff layer up to 15 cm (6 in) thick. Surface horizons vary considerably both in composition and depth; nutrient rich silty clay soils may extend to depths of 75 cm (30 in) or more at one location, while fine sands comprise a surface layer only 20 cm (8 in) thick in another. Subsurface layers are consistently sands, gravels and cobbles, or occasionally rock. Sporadic bands or pockets of alluvial coarse-grained material

may be scattered throughout the soil profile. Water tables, which may be present at the surface, are generally 30 to 60 cm (12 to 24 in) deep, but may be lower. *Betula occidentalis* (water birch) appears able withstand periodic flooding.

## ADJACENT COMMUNITIES

*Betula occidentalis* (water birch) may colonize riparian corridors with a variety of other species, often creating patchy mosaics of distinct, individual communities. Associated communities may include *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), *Salix* spp. (willow), or *Populus angustifolia* (narrowleaf cottonwood) types. *Pseudotsuga menziesii* (Douglas fir), *Juniperus scopulorum* (Rocky Mountain juniper) and *Populus tremuloides* (quaking aspen) forests may occupy sites both in the riparian corridors or on the adjacent drier uplands. *Carex* spp.(sedge) and *Phalaris arundinacea* (reed canarygrass) types establish on the adjacent streamside zones. *Artemisia tridentata* (big sagebrush) steppe and grasslands dominate upland hillsides and plateaus.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Hansen and others (1995) indicate that forage productivity varies with the density of the stand. Dense stands limit livestock use. Herbaceous species such as *Agrostis stolonifera* (redtop) and *Poa pratensis* (Kentucky bluegrass) provide spring forage. *Poa pratensis* (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater.

*Agrostis stolonifera* (redtop) is rated as fairly good to good forage for livestock (USDA Forest Service 1937). It is tolerant of close use due to its somewhat prostrate growth form, rhizomatous growth habit, and lower palatability than associated species.

## Wildlife
Linear communities of *Betula occidentalis* (water birch) provide shade and hiding cover and travel corridors for numerous wildlife species. *Betula occidentalis* (water birch) is normally only lightly browsed, but if other woody species are scarce, use will occur (Hansen and others 1995). Its structural diversity also has high wildlife habitat values, especially for avian species (Youngblood and others 1985a).

## Fisheries
*Betula occidentalis* (water birch) may function in a variety of capacities to promote stream health and enhance fisheries. It 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. *Betula occidentalis* (water birch) may serve as a source of large woody debris or may trap large trees borne downstream, creating deeper pools and additional cover for fish species. *Carex* spp.(sedge) and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows.

## Fire
Shoots of the thin barked *Betula occidentalis* (water birch) are readily killed by fire but plants resprout from uninjured basal buds. *Poa pratensis* (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

## Soil Management and Rehabilitation Opportunities
Coarse textured soils and high coarse fragment contents minimize most soil compaction problems associated with development. Management should greatly consider maintaining this type because of its excellent streambank stabilization values (Hansen and others 1995).

## Recreational Uses and Considerations
This community type offers excellent camping opportunities where it occurs on level ground and the understory is sparse. More dense stands may limit streamside access to anglers.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

## OTHER STUDIES

Chadde and others (1988) and Hansen and others (1995) described a *Betula occidentalis* (water birch) community type having a variety of undergrowth species. Padgett and others (1989) identified several *Betula occidentalis* (water birch) community types for Utah. They are *Betula occidentalis/Cornus stolonifera* (water birch/red-osier dogwood), *Betula occidentalis*/Mesic Forb (water birch/Mesic Forb), and *Betula occidentalis/Poa pratensis* (water birch/Kentucky bluegrass) community types.

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# *Cornus stolonifera* Community Type
# (Red-Osier Dogwood Community Type)

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**CORSTO (COST4)**
**Number Of Stands Sampled = 5**

## LOCATION AND ASSOCIATED LANDFORMS

The *Cornus stolonifera* (red-osier dogwood) community type is an incidental type throughout foothills and valleys of Idaho. Sites range in elevation from 1,152 to 1,879 m (3,800 to 6,200 ft). It occupies a diversity of landforms and may appear as linear bands on alluvial benches of narrow canyon drainages or broad thickets on islands and floodplains of major stream and riverine systems. In some cases, it may even develop as a dense fringe around beaver ponds.

## VEGETATION

*Cornus stolonifera*(red-osier dogwood) generally forms a closed canopy, often excluding understory shrub and herbaceous species. Disturbed stands tend to exhibit a more open structure and a greater diversity of species, although many of these are considered weedy varieties. *Rosa woodsii* (woods rose), *Salix exigua*

(sandbar willow), and *Prunus virginiana* (common chokecherry) are common associated shrubs associated with this type. The herbaceous layer may be dominated by graminoids, particularly *Muhlenbergia asperifolia* (alkali muhly), *Poa pratensis* (Kentucky bluegrass), *Elymus glaucus* (blue wildrye) or *Agrostis stolonifera* (redtop), although forbs such as *Smilacina racemosa* (false spikenard) are also present with low coverages.

**Table 25** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Cornus stolonifera* (red-osier dogwood) community type that are relatively undisturbed by livestock or wildlife (number = 5 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Shrubs** | | | |
| *Alnus incana* (mountain alder) | 2 | 0-10 | 20 |
| *Berberis repens* (creeping oregongrape) | 2 | 0-10 | 20 |
| *Betula occidentalis* (water birch) | 1 | 0-3 | 20 |
| *Clematis ligusticifolia* (western virgins-bower) | 1 | 0-3 | 20 |
| *Cornus stolonifera* (red-osier dogwood) | 81 | 30-98 | 100 |
| *Prunus virginiana* (common chokecherry) | <1 | 0-1 | 40 |
| *Ribes odoratum* (buffalo currant) | <1 | 0-1 | 20 |
| *Rosa woodsii* (woods rose) | 1 | 0-3 | 60 |
| *Salix exigua* (sandbar willow)) | <1 | 0-1 | 40 |
| *Salix lutea* (yellow willow) | 1 | 0-3 | 20 |
| **Graminoids** | | | |
| *Agrostis stolonifera* (redtop) | 6 | 0-30 | 40 |
| *Bromus inermis* (smooth brome) | 2 | 0-10 | 40 |
| *Bromus tectorum* (cheatgrass) | <1 | 0-1 | 20 |
| *Carex* spp.(sedge) | <1 | 0-1 | 20 |
| *Elymus glaucus* (blue wildrye) | 9 | 0-40 | 40 |
| *Elymus virginicus* (Virginia wildrye) | <1 | 0-1 | 20 |
| *Muhlenbergia asperifolia* (alkali muhly) | 10 | 0-50 | 20 |
| *Poa pratensis* (Kentucky bluegrass) | 5 | 0-20 | 60 |
| *Stipa occidentalis* (western needlegrass) | 4 | 0-20 | 20 |
| **Forbs** | | | |
| *Arctium minus* (common burdock) | <1 | 0-1 | 20 |
| *Cirsium arvense* (Canada thistle) | 2 | 0-10 | 80 |
| *Cirsium vulgare* (bull thistle) | <1 | 0-1 | 20 |
| *Euphorbia esula* (leafy spurge) | <1 | 0-1 | 20 |
| Forb (unknown forb) | <1 | 0-1 | 20 |
| *Galium triflorum* (sweetscented bedstraw) | <1 | 0-1 | 40 |
| *Geranium viscosissimum* (sticky geranium) | 1 | 0-3 | 40 |
| *Geum macrophyllum* (larged-leaved avens) | 1 | 0-3 | 20 |
| *Heracleum lanatum* (cow-parsnip) | <1 | 0-1 | 20 |
| *Lactuca serriola* (prickly lettuce) | 1 | 0-3 | 20 |
| *Senecio serra* (tall butterweed) | <1 | 0-1 | 20 |
| *Smilacina racemosa* (false spikenard) | 2 | 0-10 | 20 |
| *Smilacina stellata* (starry Solomon-plume) | 1 | 0-3 | 60 |
| *Solidago occidentalis* (western goldenrod) | 2 | 0-10 | 20 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Taraxacum officinale* (common dandelion) | <1 | 0-1 | 20 |
| *Urtica dioica* (stinging nettle) | 1 | 0-3 | 40 |

## SUCCESSIONAL INFORMATION

*Cornus stolonifera* (red-osier dogwood) is the diagnostic shrub species associated with a variety of coniferous and deciduous tree habitat types. An early primary successional stage, it may colonize stream banks, adjacent floodplains and other disturbed sites characterized by alluvial materials and available moisture. Moderate soil development may alter the potential of the site to favor the gradual succession of climax stands, such as the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type, the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) or the *Populus tremuloides / Cornus stolonifera* (quaking aspen/red-osier dogwood). Willow communities, particularly *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), or *Salix drummondiana* (Drummond willow) habitat types, may represent climax stands at some sites as well.

## SOILS

Soils of the *Cornus stolonifera* (red-osier dogwood) community type are classified as Inceptisols, Entisols or Mollisols (Padgett and others 1989). Where sites are located outside of the active floodplain, a litter/duff layer 5 cm (2 in) 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 1.5 m (5 ft) in some locations. 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 of this type. Water availability ranges from high, where this type occupies floodplains immediately adjacent to active channels, to low on upper, remote floodplain sites where water tables may be 1 m (39 in) below the surface. Mottled and gleyed soil characteristics may be observed where near surface water tables promote oxidation /reduction reactions.

## ADJACENT COMMUNITIES

On riverine systems, the *Cornus stolonifera* (red-osier dogwood) community type may border *Populus angustifolia* (narrowleaf cottonwood) forests on expansive

floodplains or monotypic stands of *Phalaris arundinacea* (reed canarygrass) at the water's edge. *Pseudotsuga menziesii* (Douglas fir), *Juniperus scopulorum* (Rocky Mountain juniper), or *Populus tremuloides* (quaking aspen) may occupy adjacent sites in narrow canyon defiles. Beaver impoundments may exhibit a variety of *Salix* spp. (willow) communities interspersed with a variety of other shrub types in addition to the *Cornus stolonifera* (red-osier dogwood) community type.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Forage production is moderate to high. Dense stands may limit access by livestock. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife and its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

### Wildlife

*Cornus stolonifera* (red-osier dogwood) is often eaten by moose (Costain 1989) and is heavily utilized by deer. Beaver may use it for food and building materials (Allen 1983). The dense shrub stratum provides hiding and thermal cover for small mammals and avian species.

### Fisheries

*Cornus stolonifera* (red-osier dogwood) may function in a variety of capacities to promote stream health and enhance fisheries. It 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. Understory species trap sediments, essentially building streambanks and filtering stream flows.

### Fire

*Cornus stolonifera* (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprouts from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

### Soil Management and Rehabilitation Opportunities

Sites characterized with predominantly fine-textured soils should be avoided

during periods of saturation during the spring and late fall. Coarse textured soils and high coarse fragment contents minimize most soil compaction problems associated with development. This community type is subject to recurring scouring by floods and alluvial deposition. Stands are relatively stable because of strong roots and stems. Management should emphasize the importance of *Cornus stolonifera* (red-osier dogwood) for streambank stabilization. This is particularly important on higher gradient stream channels with scouring seasonal floods (Hansen and others 1995).

For revegetation of degraded sites, *Cornus stolonifera* (red-osier dogwood) is valuable as it is readily established along stream edges by direct seeding or by transplanting rooted cuttings or nursery grown seedlings. Its rapid growth quickly stabilizes deteriorated streambanks (Hansen and others 1995).

### Recreational Uses and Considerations

The *Cornus stolonifera* (red-osier dogwood) community type may offer excellent opportunities for viewing wildlife, but is often dense, restricting streambank access to anglers and placement of camping and picnicking sites.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

### USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

Youngblood and others (1985b) described two similar community types for eastern Idaho and western Wyoming. Padgett and others (1989) described a *Cornus stolonifera* (red-osier dogwood) community type for Utah and southeastern Idaho, and Hansen and others (1995) described this type for Montana.

# *Crataegus succulenta* Community Type (Succulent Hawthorn Community Type)

**CRASUC (CRSU5)**
**Number Of Stands Sampled = 6**

**CAUTION—Not all sites currently dominated by *Crataegus succulenta* (succulent hawthorn) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.**

**NOTE—The *Crataegus succulenta* (succulent hawthorn) community type includes all combinations of *Crataegus succulenta* (succulent hawthorn) and *Crataegus douglasii* (Douglas hawthorn) due to similarities in environmental conditions and management concerns.**

## LOCATION AND ASSOCIATED LANDFORMS

The *Crataegus succulenta* (succulent hawthorn) community type is an incidental type that ranges in elevation from 1,340 to 1,727 m (4,422 to 5,700 ft.) across foothills and valleys of central and southeastern Idaho. It occurs along major stream and riverine systems, occupying islands and upper floodplains or bordering oxbows and active channels. Stands may also be located on alluvial terraces in V-shaped ravines with a variety of other vegetation types to form a complex mosaic pattern.

## VEGETATION

The presence of *Crataegus* spp. (hawthorn) indicates past or present disturbance on a site. This community type, considered a grazing disclimax, is dominated by *Crataegus* spp. (hawthorn) which is armored with sharp spines and often forms dense, impenetrable thickets that are able to withstand heavy grazing pressures. *Rosa woodsii* (woods rose) and *Cornus stolonifera* (red-osier dogwood) may be present in the interior of dense thickets where they are protected from browsing. Over time, physical abuse may cause stands to open, resulting in a two-layered profile with umbrelled *Crataegus* spp. (hawthorn) in the overstory and herbaceous species such as *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), *Urtica dioica* (stinging nettle), and *Arctium minus* (common burdock) dominating the understory.

**Table 26.** Average canopy cover, range of canopy cover, and constancy for species recorded in the sampled stands of the grazing disclimax *Crataegus succulenta* (succulent hawthorn) community type (number = 6 stands)

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Populus angustifolia* (narrowleaf cottonwood) | <1 | 0-1 | 17 |
| **Shrubs** | | | |
| *Amelanchier alnifolia* (western serviceberry) | 3 | 0-20 | 17 |
| *Clematis ligusticifolia* (western virgins-bower) | 1 | 0-3 | 17 |
| *Cornus stolonifera* (red-osier dogwood) | 9 | 0-40 | 67 |
| *Crataegus douglasii* (black hawthorn) | 73 | 20-98 | 100 |
| *Crataegus succulenta* (succulent hawthorn) | 1 | 0-3 | 17 |
| *Ribes lacustre* (swamp currant) | 4 | 0-10 | 50 |
| *Ribes odoratum* (buffalo currant) | 1 | 0-3 | 17 |
| *Rosa woodsii* (woods rose) | 15 | 0-30 | 83 |
| *Rubus idaeus* (red raspberry) | 2 | 0-10 | 17 |
| *Salix lutea* (yellow willow) | 3 | 0-20 | 17 |
| *Solanum dulcamara* (climbing nightshade) | 15 | 0-70 | 50 |
| *Symphoricarpos occidentalis* (western snowberry) | 2 | 0-10 | 17 |
| **Graminoids** | | | |
| *Agrostis stolonifera* (redtop) | 4 | 0-20 | 50 |
| *Bromus inermis* (smooth brome) | 2 | 0-10 | 33 |
| *Dactylis glomerata* (orchard-grass) | 2 | 0-10 | 33 |
| *Elymus cinereus* (basin wildrye) | <1 | 0-1 | 17 |
| *Elymus virginicus* (Virginia wildrye) | 1 | 0-3 | 33 |
| *Phalaris arundinacea* (reed canarygrass) | 10 | 0-60 | 17 |
| *Phleum pratense* (common timothy) | 3 | 0-20 | 17 |
| *Poa pratensis* (Kentucky bluegrass) | 27 | 0-80 | 33 |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | <1 | 0-1 | 17 |
| *Arctium minus* (common burdock) | 7 | 0-30 | 83 |
| *Aster laevis* (smooth aster) | 1 | 0-3 | 17 |
| *Campanula rotundifolia* (lady's-thimble) | <1 | 0-1 | 17 |
| *Carduus nutans* (musk thistle) | 1 | 0-3 | 17 |
| *Cirsium arvense* (Canada thistle) | 9 | 0-30 | 67 |
| *Cynoglossum officinale* (common hound's-tongue) | <1 | 0-1 | 17 |
| *Echinocystis lobata* (wild cucumber) | <1 | 0-1 | 17 |
| *Epilobium alpinum* (alpine willow-herb) | <1 | 0-1 | 17 |
| *Erigeron glabellus* (smooth daisy) | <1 | 0-1 | 17 |
| Forb (unknown forb) | 1 | 0-3 | 17 |
| *Galium aparine* (goose-grass) | 5 | 0-30 | 17 |
| *Galium triflorum* (sweetscented bedstraw) | 5 | 0-20 | 33 |
| *Geum macrophyllum* (larged-leaved avens) | 1 | 0-3 | 17 |
| *Heracleum lanatum* (cow-parsnip) | 5 | 0-30 | 33 |
| *Osmorhiza chilensis* (mountain sweet-cicely) | 1 | 0-3 | 17 |
| *Rumex crispus* (curly dock) | <1 | 0-1 | 17 |
| *Senecio serra* (tall butterweed) | 1 | 0-3 | 17 |
| *Smilacina stellata* (starry Solomon-plume) | 4 | 0-10 | 67 |
| *Solidago canadensis* (Canada goldenrod) | 1 | 0-3 | 17 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Tanacetum vulgare* (common tansy) | <1 | 0-1 | 17 |
| *Taraxacum officinale* (common dandelion) | <1 | 0-1 | 33 |
| *Thalictrum occidentale* (western meadowrue) | 2 | 0-10 | 17 |
| *Tragopogon dubius* (goat's beard) | <1 | 0-1 | 17 |
| *Trifolium* spp. (clover) | <1 | 0-1 | 17 |
| *Urtica dioica* (stinging nettle) | 6 | 0-20 | 67 |
| **Ferns and Allies** | | | |
| *Equisetum laevigatum* (smooth scouring-rush) | <1 | 0-1 | 33 |

## SUCCESSIONAL INFORMATION

The *Crataegus succulenta* (succulent hawthorn) community type occurs on more disturbed sites along riparian corridors in a mosaic with a variety of other communities. It may act as a seral stage for *Salix lutea* (yellow willow) or *Populus tremuloides* (quaking aspen) types under these conditions. On wider floodplains, it may be associated with *Populus trichocarpa* (black cottonwood) or *Populus angustifolia* (narrowleaf cottonwood) stands which may climax to the *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/Red-osier Dogwood) habitat type. Trace amounts of later seral and climax species in the immediate area may reveal the potential of a site.

## SOILS

Approximately 2.5 to 5 cm (1 to 2 in) of leaf litter may accumulate over a nutrient rich surface horizon on relatively undisturbed sites above active floodplains. Upper layers may be black or brown and range in texture from silty clays to silt loams, extending to depths of 60 cm (24 in) or more. On active floodplains and other sites characterized by more frequent disturbance where a litter/duff is absent, soil textures range from silt loams to sandy loams. Fines generally dominate the underlying layers, probably throughout most of the rooting zone. Soils appear to be placed into the Entisol or Mollisol categories. Water tables were observed within 30 cm (12 in) from the surface, but may be as deep as 2 m (6.5 ft) or more for part of the year. Neither mottled nor gleyed soil features were observed in the soil profiles, although they might be present where water tables occur near the surface.

## ADJACENT COMMUNITIES

*Phalaris arundinacea* (reed canarygrass) and *Typha* spp. (cattail) occupy adjacent streamside zones. *Populus trichocarpa* (black cottonwood) or *Populus angustifolia*

(narrowleaf cottonwood) forests may occur as adjacent communities on broad floodplains. In riparian corridors where the *Crataegus succulenta* (succulent hawthorn) community type integrates with a diversity of other communities to form a mosaic pattern, *Salix* spp. (willow), *Rosa* spp. (rose), *Cornus stolonifera* (red-osier dogwood), and *Betula occidentalis* (water birch) are common. *Juniperus scopulorum* (Rocky Mountain juniper)/grasslands and *Artemisia tridentata* (big sagebrush) steppe may dominate upland hillsides and plateaus.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Forage production from dense thickets is low. Stands may be so dense as to preclude most livestock use. However, cattle will eat *Crataegus succulenta* (succulent hawthorn) foliage that is within reach, as well as the associated herbaceous layer. Heavy grazing and browsing pressures will cause an increase in *Rosa woodsii* (woods rose), *Symphoricarpos occidentalis* (western snowberry), and *Poa pratensis* (Kentucky bluegrass). Excessive disturbance may result in large amounts of exposed soil (Hansen and others 1995).

### Wildlife

Stands of the *Crataegus succulenta* (succulent hawthorn) community type have a high structural diversity, providing both thermal and hiding cover for deer and moose. Numerous trails can be observed in most stands. This community type also supports a rich bird population even during the winter. Berries of *Crataegus succulenta* (succulent hawthorn) dry on the twigs and supply food for birds and small mammals. The characteristic branching of *Crataegus succulenta* (succulent hawthorn) is especially attractive for cover and as nesting sites for birds such as magpies and thrushes. Upland game birds such as grouse and pheasants frequently use this community type (Hansen and others 1995).

### Fire

*Crataegus succulenta* (succulent hawthorn) is fire tolerant. The species has a shallow and much branched rhizomatous root system that will sprout and sucker following removal of the above ground stems (Hansen and others 1995).

### Soil Management and Rehabilitation Opportunities

The sprouting capability of *Crataegus succulenta* (succulent hawthorn), along with the strongly rhizomatous nature of many of the associated species makes the

*Crataegus succulenta* (succulent hawthorn) community type an excellent soil stabilizer (Hansen and others 1995). However, fine textured soils may be subject to compaction when saturated during the spring run-off and should be avoided where possible.

**Recreational Uses and Considerations**

In terms of recreation, nature trails should be routed around dense stands of this community type. However, *Crataegus succulenta* (succulent hawthorn) may be valuable for planting in recreation areas as a biological barrier to protect physical structures, fragile natural areas, and to direct foot traffic (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

This type has been documented for Montana in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995).

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# *Prunus virginiana* Community Type (Common Chokecherry Community Type)

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**PRUVIR (PRVI)**
**Number Of Stands Sampled = 3**

## LOCATION AND ASSOCIATED LANDFORMS

The *Prunus virginiana* (common chokecherry) community type is an incidental type throughout eastern Idaho, ranging in elevation from 1,091 to 1,950 m (3,600 to 6,435 ft). Stands may be located on side slopes of hillsides immediately below springs and seeps, on the upper terraces of V-shaped canyon drainages and on wide floodplains of riverine systems. *Prunus virginiana* (common chokecherry)

generally occupies riparian zones with a variety of other communities, creating a patchwork matrix of individual species dominating microsites.

## VEGETATION

*Prunus virginiana* (common choke-cherry) forms dense, monotypic stands upwards of 3.5 m (12 ft) in height. Standing deadwood is common on longer-lived stands. The full canopy tends to limit the presence of other shrub species and often results in a sparse herbaceous layer. *Smilacina stellata* (starry Solomon-plume) seems to be one of the few understory species that thrives under these conditions. Stands may become more open with livestock utilization, resulting in a greater diversity of shrubs. The herbaceous layer generally reflects the level and type of disturbance on a site, and may include a diversity of disturbance-induced species such as *Poa pratensis* (Kentucky bluegrass), *Bromus tectorum* (cheatgrass), *Rumex crispus* (curly dock), and *Verbascum thapsus* (common mullein).

**Table 27.** Average canopy cover, range of canopy cover, and constancy for species of the sampled stands of the grazing disclimax *Prunus virginiana* (common chokecherry) community type (number = 3 stands)

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Trees** | | | |
| *Juniperus scopulorum* (Rocky Mountain juniper) | <1 | 0-1 | 33 |
| *Populus angustifolia* (narrowleaf cottonwood) | <1 | 0-1 | 33 |
| **Shrubs** | | | |
| *Amelanchier alnifolia* (western serviceberry) | <1 | 0-1 | 33 |
| *Berberis repens* (creeping oregongrape) | 1 | 0-3 | 33 |
| *Clematis ligusticifolia* (western virgins-bower) | 1 | 0-3 | 33 |
| *Cornus stolonifera* (red-osier dogwood) | <1 | 0-1 | 33 |
| *Pachistima myrsinites* (mountain-boxwood) | 3 | 0-10 | 33 |
| *Prunus virginiana* (common chokecherry) | 98 | 98-98 | 100 |
| *Ribes lacustre* (swamp currant) | <1 | 0-1 | 33 |
| *Rosa woodsii* (woods rose) | 1 | 0-3 | 67 |
| *Salix exigua* (sandbar willow)) | <1 | 0-1 | 33 |
| *Sambucus cerulea* (blue elderberry) | 1 | 0-3 | 33 |
| **Graminoids** | | | |
| *Agropyron caninum* (bearded wheatgrass) | <1 | 0-1 | 33 |
| *Elymus cinereus* (basin wildrye) | <1 | 0-1 | 33 |
| *Elymus glaucus* (blue wildrye) | <1 | 0-1 | 33 |
| **Forbs** | | | |
| *Cirsium arvense* (Canada thistle) | <1 | 0-1 | 33 |
| *Cynoglossum officinale* (common hound's-tongue) | 2 | 0-3 | 67 |
| *Galium triflorum* (sweetscented bedstraw) | <1 | 0-1 | 33 |
| *Heracleum lanatum* (cow-parsnip) | <1 | 0-1 | 33 |
| *Osmorhiza chilensis* (mountain sweet-cicely) | 1 | 0-3 | 33 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Smilacina racemosa* (false spikenard) | 1 | 0-3 | 67 |
| *Smilacina stellata* (starry Solomon-plume) | 14 | 3-20 | 100 |

## SUCCESSIONAL INFORMATION

The grazing disclimax *Prunus virginiana* (common chokecherry) community type often occurs in riparian zones as irregular dense thickets or bands with a complex of other vegetation communities. Successional trends may be difficult to predict as a result of this pattern. *Salix lutea* (yellow willow) types or *Populus tremuloides* (quaking aspen) types may represent the successional climax in these cases. *Prunus virginiana* (common chokecherry) may be a seral stage within the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type as well but could actually represent a grazing disclimax under certain circumstances (Hansen and others 1995). On slightly drier sites, the *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/Red-osier Dogwood) habitat type or the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/Red-osier Dogwood) habitat type may develop as the final successional stage. The vegetative potential of a site is dependent on physical site features and the presence of later successional/climax species; both factors should be considered when determining the succession direction of a site.

## SOILS

Hansen and others (1995) indicate that this type may prefer well drained, older, more developed soils that afford good rooting depth and higher fertility, generally classified as Entisols (Torrifluvents) and Mollisols (Haploborolls and Argiborolls). Surface horizons are characterized by a rich, organic component that is fed by an overlying litter/duff layer. Soil textures are generally silty loams or silt clay loams and may be 60 cm (24 in) or more deep. Underlying substrates are generally rock and sand, although fines may be present to a depth of 1 m (39 in) or more in some locales. Water tables are generally at least 1 m (39 in) below the surface. The *Prunus virginiana* (common chokecherry) community type appears unable to tolerate prolonged or frequent flooding.

## ADJACENT COMMUNITIES

*Betula occidentalis* (water birch), *Cornus stolonifera* (red-osier dogwood), and *Salix* spp. (willow) communities often occur in conjunction with the *Prunus virginiana* (common chokecherry) community type in riparian zones. *Carex* spp.(sedge) are

typically present along adjacent streambanks in saturated zones. Cottonwoods may occupy adjacent, broader floodplains. Conifers, such as *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper), may develop in the riparian zone or on drier hillsides. *Artemisia tridentata* (big sagebrush)/grasslands occur on adjacent uplands.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

In dense, monotypic stands, forage production from the *Prunus virginiana* (common chokecherry) community type is low. The palatability of *Prunus virginiana* (common chokecherry) ranges from poor to fair for both cattle and sheep, although livestock losses due to poisoning sometimes occur. Livestock normally do not eat fatal quantities except when other forage is scarce (Wasser 1982, Johnson and Nichols 1982).

Over the years there has been some debate whether *Prunus virginiana* (common chokecherry) leaves are poisonous to livestock. The leaves and seeds do have sugars that contain cyanide. These cyanide sugars are not poisonous themselves, but when plant material is crushed, eaten or decomposed, enzymes cause hydrogen cyanide to be released. In high concentrations hydrogen cyanide is a metabolic poison to most animals, including humans. It has recently been shown that livestock can acquire the ability to detoxify hydrogen cyanide if they consume limited amounts of it over an extended period of time. Therefore, *Prunus virginiana* (common chokecherry) will poison livestock only if it is consumed in large amounts without prior exposure (Hansen and others 1995).

### Wildlife

The moderate structural diversity of the *Prunus virginiana* (common chokecherry) community type provides thermal and hiding cover for livestock, big game, and upland bird species. *Prunus virginiana* (common chokecherry) rates fair to good as palatable browse for big game. In some instances, dwarfed and thinned communities can occur as the result of concentrations of game in winter. As stands open and herbaceous species establish due to increasing disturbance, the forage value for both livestock and wildlife increases accordingly. *Prunus virginiana* (common chokecherry) is moderately tolerant of browsing (Hansen and others 1995).

*Prunus virginiana* (common chokecherry) is among one of our most important wildlife food plants. The fruits are relished by both birds and mammals. The leaves and twigs of *Prunus virginiana* (common chokecherry) are also nutritious for browsing animals, and this shrub is rated as one of the best sources of winter browse for deer and elk. This is due to the increase of protein content in the stems during the fall and winter. The leaves and stems are also higher in carbohydrates, calcium, and phosphorus than other native shrubs (Hansen and others 1995).

**Fisheries**

*Prunus virginiana* (common chokecherry) is an excellent shrub for providing thermal cover for fish and for controlling erosion along streams (Hansen and others 1995).

**Fire**

*Prunus virginiana* (common chokecherry) will survive all but a hot, intense fire. *Prunus virginiana* (common choke-cherry) has an aggressive root system and vigorously sprouts from surviving root crowns after fire (or occasionally from rhizomes) (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

Disturbed areas can be revegetated with *Prunus virginiana* (common chokecherry) with nursery grown stock or rooted cuttings. Adapted to a wide variety of sites, transplant success rates are typically high (Hansen and others 1995).

**Recreational Uses and Considerations**

The fruit of *Prunus virginiana* (common chokecherry) is highly regarded for making wine and tasty jelly, but one must harvest ahead of the birds (Johnson and Nichols 1982). Indians ate the fruit fresh or preserved it by drying. In addition they combined it with venison and buffalo meat to make mincemeat. They also used the berries for medicinal purposes.

Because of the density of branches, twigs, and heavy foliage, communities dominated by *Prunus virginiana* (common chokecherry) provide excellent screens in recreation areas. Because of their fruits, they also provide excellent opportunities for viewing a variety of wildlife (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

This type has been documented for Montana in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995).

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# *Rosa woodsii* Community Type
# (Woods Rose Community Type)

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**ROSWOO (ROWO)**
**Number Of Stands Sampled = 1**

**CAUTION—Not all sites currently dominated by *Rosa woodsii* (woods rose) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.**

**NOTE: The *Rosa woodsii* (woods rose) community type includes all combinations of *Rosa woodsii* (woods rose) and *Rosa acicularis* (prickly rose) due to similarities in environmental conditions and management concerns.**

## LOCATION AND ASSOCIATED LANDFORMS

The *Rosa woodsii* (woods rose) community type is a major type across hillsides and valleys of eastern Idaho. It occurs as dense thickets on alluvial floodplain terraces adjacent to streams and rivers of V-shaped canyons. Stands may also be located on the side slopes of hillsides immediately below springs and seeps or on upper floodplains of broad, level drainages. Sites range in elevation from 1,091 to 1,818 m (3,600 to 6,000 ft).

## VEGETATION

The *Rosa woodsii* (woods rose) community type represents a grazing disclimax in Idaho. Stands are often dense and may be nearly impenetrable due to thorns on the stems and branches. This type may be comprised of an assortment of other minor shrub species scattered throughout the stand in addition to the predominant *Rosa woodsii* (woods rose). These species may include: *Ribes odoratum* (buffalo currant), *Ribes setosum* (Missouri gooseberry), and *Artemisia tridentata* (big sagebrush). Herbaceous species are quite diverse and are generally represented by disturbance types such as *Poa pratensis* (Kentucky bluegrass), *Cirsium arvense* (Canada thistle), and *Urtica dioica* (stinging nettle).

## SUCCESSIONAL INFORMATION

The *Rosa woodsii* (woods rose) community type plays the role of the generalist, growing on a range of disturbed sites and representing a mid-seral grazing disclimax for a variety of *Salix* spp. (willow) types. However, with the absence of utilization, it may in turn act as a successional sere for these same *Salix* spp. (willow) communities. The *Juniperus scopulorum /Cornus stolonifera* (Rocky Mountain juniper/Red-osier Dogwood) habitat type probably represents the climax vegetation on drier riparian sites. *Rosa woodsii* (woods rose) may be one of the first species to invade an upland site that has acquired greater soil moisture as a result of beaver activity or channel migration. Hansen and others (1995) indicate that careful observation of site characteristics and remnant plant species will assist in the determination of the site potential.

## SOILS

Manning and Padgett (1992) indicate that this community type occupies soils classified as Inceptisols, Entisols, or on sites with greater soil development, Mollisols. Surface horizons may be 60 cm (24 in) or more deep with textures ranging from silty clays to sandy loams. Gravels, cobbles and rocks are common in deeper horizons.Wasser (1982) notes that the *Rosa woodsii* (woods rose) community type is intolerant of poor drainage, high water tables, and prolonged flooding, although Manning and Padgett (1992) observed mottles on some sites in Nevada, indicative of seasonally shallow water tables. This disturbance community type may be capable of establishing over a range of sites with variable substrates and moisture regimes.

## ADJACENT COMMUNITIES

*Carex* spp.(sedge) and *Juncus balticus* (baltic rush)inhabit saturated sites along streambanks and active channels. *Salix* spp. (willow), *Betula occidentalis* (water

birch) and *Cornus stolonifera* (red-osier dogwood) may occupy adjacent sites in riparian corridors where grazing is less severe. Neighboring upland communities are predominantly *Artemisia tridentata* (big sagebrush) shrubland, and grasslands with *Juniperus scopulorum* (Rocky Mountain juniper) sporadically interspersed.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Forage production from dense thickets of the *Rosa woodsii* (woods rose) community type is low. Stands may be so dense that they exclude most livestock use. However, the leaves of *Rosa woodsii* (woods rose) are considered fair to fairly good livestock forage, particularly for sheep (Johnson and Nichols 1982).

### Wildlife

Stands of the *Rosa woodsii* (woods rose) community type provide good structural diversity for both thermal and hiding cover. Deer and elk may browse heavily on *Rosa woodsii* (woods rose), while the persistent fruit (rose hips) provides fall and winter food for birds, small mammals, and bears, which disperse the seeds. *Rosa woodsii* (woods rose) is strongly grazing tolerant but can be dwarfed and thinned by intense browsing or defoliation by season long use (Hansen and others 1995).

### Fire

*Rosa woodsii* (woods rose) is strongly fire tolerant, except for smoldering fires with heavy volumes of surface fuel. The species has a shallow and much branched rhizomatous root system that will readily sprout and sucker. This sprouting capability of *Rosa woodsii* (woods rose) make it a good soil stabilizer. This is especially important given the severe disturbance common to areas colonized by this community type (Hansen and others 1995).

### Soil Management and Rehabilitation Opportunities

*Rosa woodsii* (woods rose) is valuable for revegetating disturbed sites along streambanks and seeps. It is easily established from nursery grown stock, root cuttings, or transplanted materials (Hansen and others 1995).

### Recreational Uses and Considerations

Native Americans made extensive use of *Rosa woodsii* (woods rose) roots, stems, leaves, flowers, and rose hips for food and therapeutic materials (US Forest Service 1975). The persistent rose hips are edible, and are one of the best natural

sources of vitamin C. They can be dried for use in flavoring teas, jellies, fruitcakes, and puddings.

Nature trails should be routed around dense stands of *Rosa woodsii* (woods rose) community type. However, *Rosa woodsii* (woods rose) is useful for planting in recreation areas as a biological barrier to protect physical structures, young and delicate plants, and to direct traffic (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

This type has been documented in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995). Manning and Padgett (1992) have also described this type for Nevada and eastern California.

# SEDGE TYPES

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## *Carex nebrascensis* Community Type (Nebraska Sedge Community Type)

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**CARNEB (CANE2)**
**Number Of Stands Sampled = 1**

## LOCATION AND ASSOCIATED LANDFORMS

The *Carex nebrascensis* (Nebraska sedge) community type occurs across east central and southern Idaho, ranging in elevations from 1,576 to 1,825 m (5,200 to 6,023 ft). This minor type colonizes level, gently sloping benches with high water tables, probably associated with seeps, establishing broad meadows or narrow belts. It may also border streams and rivers on floodplains in U-shaped canyons.

## VEGETATION

*Carex nebrascensis* (Nebraska sedge) forms essentially a monoculture at some locations, but may contain *Juncus balticus* (Baltic rush), *Carex praegracilis* (clustered field sedge) or *Carex rostrata* (beaked sedge) as lesser components on other sites. Depending on the level of disturbance, a variety of other graminoids and forbs, including *Agrostis stolonifera* (redtop), *Glyceria striata* (fowl mannagrass) and *Poa pratensis* (Kentucky bluegrass), may be present. The *Carex nebrascensis* (Nebraska sedge) community type represents a grazing disclimax in Idaho, and is generally found on heavily disturbed sites.

## SUCCESSIONAL INFORMATION

Hansen and others (1995) indicate that the *Carex nebrascensis* (Nebraska sedge) community type is a grazing disclimax typically representing an early/mid-seral secondary successional type. Numerous fence line contrasts illustrate that *Carex nebrascensis* (Nebraska sedge) acts as an increaser and/or invader. It is strongly rhizomatous with high underground biomass that, while being highly palatable to livestock, appears to withstand moderate to heavy grazing pressures. Under continued season long grazing, *Carex nebrascensis* (Nebraska sedge) acts as an increaser, replacing former climax dominants (Youngblood and others 1985b, Kovalchik 1986, Kovalchik 1987). However, due to its tolerance to grazing and soil holding root mat, replacement of *Carex nebrascensis* (Nebraska sedge) by former climax species may not occur, or will occur gradually, over a long period of time.

The *Carex nebrascensis* (Nebraska sedge) community type occupies positions intermediate to the *Carex rostrata* (beaked sedge) and *Deschampsia cespitosa* (tufted hairgrass) habitat types (Youngblood and others 1985b). In some cases it represents a grazing disclimax of the *Typha latifolia* (common cattail) habitat type.

## SOILS

Mollisols seem to be the most common soil order occupied by this type, although Inceptisols and Histosols are occasionally present (Youngblood and others 1985a, Padgett and others 1989). Surface soil textures may be silty clay loams or silt loams. Although Padgett and others (1989) indicate that this type seldom occurs on organic soils, in Idaho this type may prosper on organic, nutrient rich soils 45 cm (18 in) or more in depth, which is consistent with the findings of Youngblood and others (1985a). Soils often remain saturated throughout summer months, but water tables occasionally drop below 1 m (39 in) of the soil surface towards the end of the growing season. Available water holding capacities are estimated to

be moderate to high (Padgett and others 1989). Shallow water tables often present on sites may provide optimal conditions for oxidation and reduction reactions.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Because forage production is high for this community type, livestock utilization may be intense. *Carex nebrascensis* (Nebraska sedge) is palatable to both cattle and horses, especially in the spring and early summer when stems and leaves are tender (Lewis 1958, Hermann 1970). *Carex nebrascensis* (Nebraska sedge) withstands heavy utilization without apparent damage, primarily due to its rhizomatous habit and favorable moisture conditions on site (USDA Forest Service 1937). However, repeated defoliation during the period of early shoot growth depletes root carbohydrate reserves and lessens plant vigor (Steele and others 1984).

Late season grazing of this type after surface soils have begun to dry will lessen trampling damage to plant rhizomes and will allow degraded streambanks to stabilize. However, on those stands adjacent to streams, residual cover should be left to filter out sediments during the fall rains or spring runoff. Removing cattle to allow at least 30 days for the sedge regrowth should provide sufficient residual cover (Myers 1989).

### Wildlife

The resource value of *Carex nebrascensis* (Nebraska sedge) rates high to moderate for elk and medium for mule deer (Manning and Padgett 1992). It may also provide food and cover for waterfowl and small game (Youngblood and others 1985a).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is

excellent waterfowl and fish habitat. 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 and others 1995).

**Fire**

Hansen and others (1995) indicate that preliminary information suggests that the *Carex nebrascensis* (Nebraska sedge) community type is suited to prescribed burning. Nonuse by livestock during the year prior to burning is essential. Residual cover burns well in spring, prior to the growing season. Fire will reduce litter accumulations and temporarily increase productivity. However, species composition probably will not drastically change away from dominance by *Carex nebrascensis* (Nebraska sedge).

Care should be taken when burning stands along streambanks because of the excellent erosion protection this type provides. Removal of *Carex nebrascensis* (Nebraska sedge) may increase the susceptibility of soil erosion from overland flows during fall rains or spring runoff (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

The strongly rhizomatous nature of this type makes it valuable for streambank stabilization and provides protective overhanging sod on undercut banks. These fine textured soils are typically saturated to the surface in spring and early summer, making them highly susceptible to compaction by livestock and mechanical damage. Human trampling damage also occurs around popular fishing areas. Heavy machinery use should be avoided (Hansen and others 1995)

## ADJACENT COMMUNITIES

Adjacent wetter sites may be inhabited by the *Scirpus acutus* (hardstem bulrush) and *Carex rostrata* (beaked sedge) habitat types or various *Salix* spp. (willow) types. Drier wetland communities include the *Agrostis stolonifera* (redtop), *Deschampsia cespitosa* (tufted hairgrass), *Juncus balticus* (Baltic rush), and *Poa pratensis* (Kentucky bluegrass) types. Upland communities are often dominated by *Artemisia* spp. (sagebrush) steppe.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

## OTHER STUDIES

Similar *Carex nebrascensis* (Nebraska sedge) communities have been identified by Norton and others (1981), Ratliff (1982), Mutz and Queiroz (1983), Youngblood and others (1985b), Kovalchik (1987), Padgett and others (1989), Manning and Padgett (1992), and by Hansen and others (1995).

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# *Carex rostrata* Habitat Type (Beaked Sedge Habitat Type)

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**CARROS (CARO6)**
**Number Of Stands Sampled = 2**

## LOCATION AND ASSOCIATED LANDFORMS

The *Carex rostrata* (beaked sedge) habitat type, a major type throughout eastern and southern Idaho, ranges in elevation from 1,061 to 2,000 m (3,500 to 6,600 ft). This habitat type, representing one of the wettest riparian and wetland communities, may occupy sites inundated with a few inches of standing/slowly flowing water or may establish on somewhat drier, saturated sites lacking surface water for part of the year. *Carex rostrata* (beaked sedge) stands typically colonize wet meadow/seeps with subsurface flow and are often associated with active or abandoned beaver complexes. They may also colonize banks adjacent to active channels, appearing in U-and V-shaped canyon drainages or on islands, oxbows, bars and floodplains of major riverine systems. Where overland flow is present, *Carex rostrata* (beaked sedge) may form hummocks or tussocks which develop over time as individual sod clusters that are able to resist the gradual erosion and downcutting of associated, numerous micro-channels.

## VEGETATION

The diagnostic species, *Carex rostrata* (beaked sedge), dominates this habitat type, essentially forming a monoculture on most sites. The rhizomatous root network forms a dense mat, often precluding the establishment of competing graminoids and forbs. Other herbaceous species that may be present, generally characterized by low coverages and constancies, may include *Agrostis stolonifera* (redtop), *Myosotis scorpioides* (common forget-me-not), or assorted *Carex* spp.(sedge). Hansen and others (1995) include all combinations of *Carex atherodes* (awned sedge), *Carex vesicaria* (inflated sedge) and *Carex rostrata* (beaked sedge) as a part of this habitat type for Montana. Neither of these species was observed with *Carex rostrata* (beaked sedge) during the 1994 and 1995 field seasons in Idaho, although Youngblood and others (1985) noted that these three *Carex* spp.(sedge) communities may grade into one another in eastern Idaho and western Wyoming. The discrepancies in species composition may be attributed to differences in the levels and types of disturbances, particulars about physical site parameters, or the limited number of observations of this habitat type. Careful inspection of sites in the field may explain some of these disparities.

**Table 28.** Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Carex rostrata* (beaked sedge) habitat type (number = 6 stands)

| Species | % Canopy Cover | | Constancy |
|---|---|---|---|
| | Average | Range | |
| **Shrubs** | | | |
| *Salix boothii* (Booth willow) | <1 | 0-1 | 17 |
| *Salix exigua* (sandbar willow)) | <1 | 0-1 | 17 |
| **Graminoids** | | | |
| *Agrostis stolonifera* (redtop) | 3 | 0-20 | 33 |
| *Alopecurus alpinus* (alpine foxtail) | <1 | 0-1 | 17 |
| *Carex nebrascensis* (Nebraska sedge) | <1 | 0-1 | 17 |
| *Carex raynoldsii* (Raynolds' sedge) | 5 | 0-30 | 17 |
| *Carex rostrata* (beaked sedge) | 83 | 70-98 | 100 |
| *Eleocharis palustris* (common spikesedge) | 2 | 0-10 | 33 |
| *Glyceria grandis* (American mannagrass) | <1 | 0-1 | 17 |
| *Juncus balticus* (baltic rush) | 5 | 0-30 | 17 |
| *Phalaris arundinacea* (reed canarygrass) | 1 | 0-3 | 33 |
| *Phleum pratense* (common timothy) | <1 | 0-1 | 17 |
| *Poa palustris* (fowl bluegrass) | <1 | 0-1 | 17 |
| *Scirpus acutus* (hardstem bulrush) | 3 | 0-10 | 33 |
| **Forbs** | | | |
| *Cirsium arvense* (Canada thistle) | <1 | 0-1 | 17 |
| *Erigeron glabellus* (smooth daisy) | <1 | 0-1 | 17 |
| Forb (unknown forb) | <1 | 0-1 | 17 |
| *Hippuris vulgaris* (common mare's-tail) | <1 | 0-1 | 17 |
| *Mentha arvensis* (field mint) | 2 | 0-10 | 17 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Mimulus guttatus* (common monkey-flower) | <1 | 0-1 | 17 |
| *Myosotis scorpioides* (common forget-me-not) | 12 | 0-70 | 17 |
| *Nuphar polysepalum* (spatter-dock) | <1 | 0-1 | 17 |
| *Ranunculus pensylvanicus* (Pennsylvania buttercup) | <1 | 0-1 | 17 |
| *Senecio hydrophilus* (alkali-marsh butterweed) | <1 | 0-1 | 17 |
| *Typha latifolia* (common cattail) | <1 | 0-1 | 33 |

## SUCCESSIONAL INFORMATION

*Carex rostrata* (beaked sedge) may colonize newly deposited mineral soils on saturated sites associated with beaver ponds (Padgett and others 1989), functioning as a pioneer species, yet remain as the climax vegetation with the development of a thick, rhizomatous mat that, in combination with high water tables, precludes the invasion and establishment of other species. Shoot density was observed to be higher on seasonally flooded sites than on sites characterized by year round surface water (Sjoberb and Danell 1983), indicating that stands may recede over time with prolonged inundation. Hansen and others (1995) note that high water tables throughout the growing season tend to limit access by livestock and thereby reduce impacts from various forms of disturbance. Nevertheless, severe grazing pressures can greatly decrease the cover of *Carex rostrata* (beaked sedge) while increasing the cover of disturbance-caused herbaceous species such as *Carex nebrascensis* (Nebraska sedge), *Juncus nodosus* (tuberous rush), *Potentilla palustris* (purple cinquefoil), *Equisetum arvense* (field horsetail), and others. Where physical site alterations, such as the deterioration of beaver dams, cause drying trends, certain species, especially willow shrubs or other *Carex* spp.(sedge), may dominate sites.

## SOILS

The *Carex rostrata* (beaked sedge) habitat type occupies a wide range of soil types, with surface textures ranging from silt loams or silty clays to loamy sands. On long-lived stands where surface water is present, rich, black organic soils may form a fine muck, potentially to depths of 1 m (39 in) or more. Mollisols and Histosols are the most common soil orders present on older sites often associated with beaver ponds and meadow seeps (Padgett and others 1989), while more recently occupied sites with less developed soils are typically classified as Entisols (Youngblood and others 1985a). High water tables facilitate oxidation/reduction reactions which produce mottled or gleyed soil characteristics according to the dominant water regimes. Water tables are

generally at or near the surface, but may be as deep as 1 m (39 in ) or as high as a few inches above the ground level (Youngblood and others 1985a). Padgett and others (1989) speculate that soils of this type tend to be more anaerobic than those of the *Carex aquatilis* (water sedge) habitat type.

## ADJACENT COMMUNITIES

*Scirpus acutus* (hardstem bulrush) and *Typha latifolia* (common cattail) may occupy adjacent streamside zones, and may colonize deeper waters where more anaerobic conditions preclude *Carex rostrata* (beaked sedge). Slightly drier sites support a variety of types, including *Juncus balticus* (Baltic rush), other *Carex* spp.(sedge), especially *Carex aquatilis* (water sedge), or shrub species, such as *Salix geyeriana* (Geyer willow) or *Betula occidentalis* (water birch). Uplands may be dominated by *Artemisia tridentata* (big sagebrush) shrubland, grasslands or by *Pinus contorta* (lodgepole pine) or *Pseudotsuga menziesii* (Douglas fir) forests.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Livestock forage value of *Carex rostrata* (beaked sedge) varies, depending upon season, previous grazing use, and the extent of the site. On narrow riparian or wetland sites within extensive rangelands, sedge species are heavily utilized, particularly when upland plants are cured, or where livestock distribution and stocking rate problems occur. On expansive *Carex rostrata* (beaked sedge) sites, livestock can sometimes select more palatable species (Hansen and others 1995).

In general, sedges should respond satisfactorily to the more traditional grazing systems designed for upland species. However, on those sites adjacent to a stream, residual cover should be left to filter out sediments during the fall rains or spring runoff. Removing cattle to allow at least 30 days for sedge regrowth should provide sufficient residual cover (Myers 1989).

Wet soils may deter animal use until soils have dried, allowing *Deschampsia cespitosa* (tufted hairgrass) to replenish its carbohydrate reserves and persist within these communities. However, if heavy grazing does occur, there will be a marked decrease in the highly palatable *Deschampsia cespitosa* (tufted hairgrass) and an increase in the less palatable *Juncus balticus* (Baltic rush). *Juncus balticus* (baltic rush)is considered palatable early in the growing season when plants are

young and tender. As stems mature and toughen, palatability declines (Hermann 1975).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

**Wildlife**

Elk and moose may graze stands of this type although palatability may be poor due to the coarse, tough herbage of *Carex rostrata* (beaked sedge) (Youngblood and others 1985b).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment which is excellent waterfowl and fish habitat. 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 and others 1995).

**Fisheries**

The rhizomatous, sod forming root growth of *Carex rostrata* (beaked sedge) makes it an exceptional choice for streambank stabilization. Moreover, the dense shoot growth may act to slow flows and filter sediments where stands occur immediately adjacent to streambanks, and undercut sod mats that overhang channels may provide excellent cover for various fish species (Hansen and others 1995).

**Fire**

The *Carex rostrata* (beaked sedge) type is suited to prescribed burning. Nonuse by livestock during the year prior to burning is essential. Residual cover burns well in the spring, prior to the growing season. Fire will reduce litter accumulations and temporarily increase productivity. However, species composition will not drastically shift from dominance by *Carex rostrata* (beaked sedge) (DeBenedetti and Parsons 1984).

Care should be taken when burning stands along streambanks because of the excellent erosion protection this type provides.

**Soil Management and Rehabilitation Opportunities**

Organic soils are easily trampled and compacted by grazing animals. Mineral soils are also easily damaged if use occurs when soils are moist. Rutting can be severe with packstock or hiker use, often resulting in multiple parallel trails. Off road vehicles cause serious long term damage. Care should be taken to maintain existing roads to help discourage off road travel. New trails or roads should be located on adjacent uplands (Hansen and others 1995).

In general, sedges offer better streambank stability than grasses, primarily due to their rhizomatous growth form. *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) tend to form a dense, thick sod that is highly resistant to erosion. Along the stream, the sod may be undercut and sag into the water, providing additional protection to streambanks. However, if grazing or trailing impacts are severe, the heavy weight of the sod makes it susceptible to damage, and streambank sloughing can occur (Hansen and others 1995).

The low stream gradient and well developed floodplain associated with this type results in high rates of recovery through the bank building process. This requires residual spring cover to filter sediments. Removing cattle to allow at least 30 days for sedge regrowth should provide sufficient residual cover (Myers 1989).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded to seasonally flooded to saturated.

### OTHER STUDIES

Numerous other studies have identified similar communities, reflective of the widespread distribution of this type: Hansen and others (1995), Norton and others (1981), Ratliff (1982), Tuhy and Jensen (1982), Mutz and Queiroz (1983), Mattson (1984), Youngblood and others (1985b), Kovalchik (1987), Chadde and others (1988), Padgett and others (1989), Manning and Padgett (1992).

## NON-SEDGE TYPES

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## *Agrostis stolonifera* Community Type (Redtop Community Type)

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**AGRSTO (AGST)**
**Number Of Stands Sampled = 1**

### LOCATION AND ASSOCIATED LANDFORMS

The *Agrostis stolonifera* (redtop) community type is an incidental type at mid elevations, ranging from 1,650 to 1,727 m (5,445 to 5,700 ft). Stands may colonize recently deposited alluvial bars and wet meadows associated with level floodplains of minor stream systems.

### VEGETATION

This community type may develop as essentially homogeneous stands of *Agrostis stolonifera* (redtop), but more often appears as mixed stands of graminoids and forbs dominated by *Agrostis stolonifera* (redtop). Associated species may include *Carex* spp.(sedge), *Juncus* spp. (rush), *Scirpus* spp. (bulrush), *Trifolium* spp. (clover) and *Poa pratensis* (Kentucky bluegrass). Hansen and others (1995) note that where sites occur on recently deposited alluvial bars, the total canopy cover of all species may be relatively low.

## SUCCESSIONAL INFORMATION

Hansen and others (1995) report that *Agrostis stolonifera* (redtop) is an early seral (pioneer) species, often colonizing recently exposed sediment deposits. This species may be considered an increaser and is indicative of past or present disturbance on locations where it is found. Overgrazing by herbivores can produce drastic changes on sites formerly dominated by native graminoids (Volland 1978). Once a suitable site is disturbed, the extensive rhizome system of *Agrostis stolonifera* (redtop) allows it to rapidly spread and establish on these areas. It also withstands high levels of utilization, making replacement by former dominants questionable. Close observation of associated species on similar locations may provide insight to the potential climax communities, such as various *Salix* spp. (willow).

## SOILS

Hansen and others (1995) state that soils occupied by this type are typically Entisols (Fluvents) or Mollisols (Borolls). The *Agrostis stolonifera* (redtop) community type thrives best on moist to semi-wet soils. It is tolerant of poorly drained wetlands and subirrigated sites, submergence, and frequent flooding. It will occur on most soil textures, provided moisture is not limiting. If moisture is limiting, it grows best on clay loam and loam soils. It is tolerant of medium acid (pH 5.5) and nutritionally poor soils low in calcium, phosphorus, and potassium (Wasser 1982). This type is also fairly tolerant of saline soils and is moderately tolerant of drought.

## ADJACENT COMMUNITIES

*Carex* spp.(sedge), *Scirpus* spp. (bulrush), and occasionally *Juncus* spp. (rush) generally dominate zones along streambanks and channels. Adjacent drier riparian sites support a diversity of communities including those within the *Populus* spp. (cottonwood), *Salix* spp. (willow), and *Juniperus* spp. (juniper) types. Uplands may be dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush), and mixed grasslands.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

According to Hansen and others (1995), the *Agrostis stolonifera* (redtop) community type is moderately productive, and provides a significant amount of forage. Although *Agrostis stolonifera* (redtop) is not as palatable as other species,

the community type provides forage throughout the summer due to high water tables. It is rated as having good palatability in the spring and early summer, with fair palatability after heads seed out. Palatability is rated as poor in the winter. *Agrostis stolonifera* (redtop) is rated as fairly good to good forage for livestock (USDA Forest Service 1937).

In pastures, close grazing, followed by rest in a rotation system, is recommended to keep plants producing palatable growth throughout the growing season (Vallentine 1967). *Agrostis stolonifera* (redtop) is tolerant of close use due to its somewhat prostrate growth form, rhizomatous growth habitat, and lower palatability than associated species. Plants should be cut during the early flowering stage to obtain highest quality hay (Hansen and others 1995).

**Wildlife**
Elk and deer make use of the grasses and forbs of this type. Waterfowl utilize *Agrostis stolonifera* (redtop) for food and cover (Hansen and others 1995).

**Fisheries**
The *Agrostis stolonifera* (redtop) community type is moderately effective in stabilizing streambanks due to its typically dense network of intertwining root and rhizomes. However, bank undercutting and sloughing may occur, especially when soils are wet or stands weakened by excessive grazing (Hansen and others 1995). Mixed stands with higher densities of non-rhizomatous species offer poor bank stabilization.

**Fire**
*Agrostis stolonifera* (redtop) is rated as only having a fair tolerance to fire (Wasser 1982).

**Soil Management and Rehabilitation Opportunities**
Potential for soil compaction is greatest in spring when soils are moist. The associated graminoids of this type provide limited streambank protection, making the potential for erosional problems quite high. Managers need to pay close attention to streambanks associated with the *Agrostis stolonifera* (redtop) community type in order to detect early signs of streambank collapse. If there is no change in management, once the stream bank starts to degrade, there is little that can be done to save it short of expensive riprap (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = saturated to temporarily flooded.

## OTHER STUDIES

A similar community type has been defined for the Upper Salmon/Middle Fork Salmon River drainages, Idaho, by Tuhy and Jensen (1982), for meadows of the Sierra Nevada, California, by Ratliff (1982), and by Hansen and others (1995) for Montana.

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# *Butomus umbellatus* Community Type (Flowering Rush Community Type)

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**BUTUMB (BUUM)**
**Number Of Stands Sampled = 1**

## LOCATION AND ASSOCIATED LANDFORMS

The *Butomus umbellatus* (flowering rush) community type is an incidental type in southeastern Idaho, occurring at low elevations, approximately 1,340 m (4,422 ft). Sites are located in low-lying, saturated environments along marshes, reservoirs or in wet meadows where pooled or slowly moving surface water is prevalent. Sites appear similar to locations occupied by *Carex* spp.(sedge) and are generally classified as temporarily flooded or overflow sites.

## VEGETATION

*Butomus umbellatus* (flowering rush), an introduced species from Eurasia now well established in parts of North America (Hitchcock and others 1969), may reach 1 m in height, creating often dense, monotypic stands. Vigorous rhizomes and high water tables reduce invasions by other species on sites dominated by this community type. Associated species include Eleocharis *palustris* (common spikesedge) and *Juncus balticus* (baltic rush)

## SUCCESSIONAL INFORMATION

*Butomus umbellatus* (flowering rush) appears to occupy some of the wetter positions on the landscape, prospering on muddy sites along streambanks and lakeshores in as much as 30 cm (1 ft) or more of water. The successional status of this type is unknown, but it may be a seral to the *Carex rostrata* (beaked sedge) or *Carex aquatilis* (water sedge) habitat types due to comparable site requirements. An introduced species, *Butomus umbellatus* (flowering rush) may be gradually colonizing areas in Idaho on sites where high water tables and dense sod formation allow it to displace other species. *Salix* spp. (willow), such as *Salix exigua* (sandbar willow), may establish on drier sites.

## SOILS

Soil textures are predominantly clays. High water tables that may be at or above the soil surface throughout most of the the year foster oxidation/reduction reactions and the development of mottled and gleyed soil features. Soils probably classify to Histosols or Mollisols.

## ADJACENT COMMUNITIES

*Phalaris arundinacea* (reed canarygrass), *Eleocharis palustris* (common spikesedge) and *Polygonum* spp. (smartweed) stands may colonize wet zones adjacent to the *Butomus umbellatus* (flowering rush) community type, while *Salix exigua* (sandbar willow) occupies slightly drier sites. *Elaeagnus angustifolia* (Russian olive) and *Populus trichocarpa* (black cottonwood) may form scattered forests on upper floodplains. Adjacent uplands may be dominated by *Agropyron* spp. (wheatgrass) grasslands or a variety of other upland communities.

## MANAGEMENT INFORMATION

### Livestock

Herbage production and palatability for cattle is unknown for the *Butomus umbellatus* (flowering rush) community type. Palatability is probably greatest in the spring when young plants are actively growing and still tender; however, sites are generally quite wet at this time, thereby limiting access to livestock. As the plants mature, the palatability probably decreases and may limit livestock use during most of the growing season. Unless water levels drop and upland forage browns out, livestock use is thought to be low. Utilization was not observed on sites in Idaho.

**Wildlife**
Palatability of the *Butomus umbellatus* (flowering rush) community type is unknown for wild ungulates. Except in the spring when shoots are tender or when other forage dies back, utilization is probably low.

Waterfowl may nest and feed in stands of *Butomus umbellatus* (flowering rush), and dams in the general area suggest moderate use of this type by beaver.

**Soil Management and Rehabilitation Opportunities**
*Butomus umbellatus* (flowering rush) is a rhizomatous species that forms dense stands. As an introduced species, it may out compete native vegetation and should be controlled where possible.

**Recreational Uses and Considerations**
*Butomus umbellatus* (flowering rush) inhabits lakeshores, streamsides and other areas often heavily infested by mosquitoes. Camping is not recommended, although stands may provide access to open water for anglers.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

## OTHER STUDIES

Similar communities have not been described elsewhere.

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## *Eleocharis palustris* Habitat Type
## (Common Spikesedge Habitat Type)

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**ELEPAL (ELPA3)**
**Number Of Stands Sampled = 5**

## LOCATION AND ASSOCIATED LANDFORMS

The *Eleocharis palustris* (common spikesedge) habitat type is a major type throughout southeastern and central Idaho, ranging in elevation from 1,424 to 2,000 m (4,700 to 6,600 ft). This habitat type typically occurs on sites prone to yearly flooding or persistent surface water. It appears in and adjacent to low gradient stream and river corridors in open valleys or U-shaped drainages, and along the periphery of beaver impoundments, sloughs, lakes margins, and reservoirs.

## VEGETATION

*Eleocharis palustris* (common spikesedge) clearly dominates sites occupied by this type, often forming a monoculture. A diversity of associated graminoids and forbs which may be present, generally characterized by low coverage and constancy, include *Phalaris arundinacea* (reed canarygrass), *Juncus balticus* (Baltic rush), *Carex* spp.(sedge), *Scirpus* spp. (bulrush), and *Sium suave* (hemlock water-parsnip). Types and levels of disturbances may account for significant discrepancies in species diversity and cover. Hansen and others (1995) observed *Eleocharis acicularis* (needle spike-rush) typically accompanying this habitat type in Montana, although this species was absent for stands in Idaho. Additional sites may need to be surveyed to further understand the ecology of this habitat type.

**Table 29.** Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Eleocharis palustris* (common spikesedge) habitat type (number = 5 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Graminoids** | | | |
| *Carex retrorsa* (retrorse sedge) | 1 | 0-3 | 20 |
| *Carex rostrata* (beaked sedge) | 1 | 0-3 | 20 |
| *Carex vesicaria* (inflated sedge) | <1 | 0-1 | 20 |
| *Eleocharis palustris* (common spikesedge) | 79 | 60-98 | 100 |
| *Phalaris arundinacea* (reed canarygrass) | 4 | 0-20 | 40 |
| *Scirpus acutus* (hardstem bulrush) | 1 | 0-3 | 20 |
| **Forbs** | | | |
| *Alisma triviale* (American waterplantain) | 1 | 0-3 | 20 |
| *Hippuris vulgaris* (common mare's-tail) | <1 | 0-1 | 20 |
| *Myosotis scorpioides* (common forget-me-not) | 1 | 0-3 | 20 |
| *Polygonum amphibium* (water smartweed) | <1 | 0-1 | 20 |
| *Polygonum hydropiperoides* (waterpepper) | <1 | 0-1 | 20 |
| *Rorippa curvipes* (blunt-leaved yellowcress) | <1 | 0-1 | 20 |
| *Rumex crispus* (curly dock) | <1 | 0-1 | 20 |
| *Sium suave* (hemlock water-parsnip) | 4 | 0-20 | 20 |

## SUCCESSIONAL INFORMATION

*Eleocharis palustris* (common spikesedge) represents an early seral species on ponds and streambanks where water is at or above the ground surface. Due to the continually saturated site conditions and the dense growth form of *Eleocharis palustris* (common spikesedge), once formed, stands appear to be difficult to displace and may persist as the climax vegetation (Padgett and others 1989, Hansen and others 1995).

Hansen and others (1995) observed in Montana that disturbance can drastically shift the the vegetative composition of this type toward increaser or invader species such as *Hordeum jubatum* (foxtail barley).

## SOILS

Sites are generally saturated or inundated with surface water for much of the growing season. Litter accumulations at the surface may blend into rich, black organic muck soils on some sites. Upper horizons, typically categorized as fine silts or clays which may be 1 m (39 in) or more in depth, often arise from alluvial deposition. Sands, gravels and cobbles usually constitute the main body of deeper subsurface materials. Soils orders may be classified as Histosols, Mollisols, and occasionally Entisols (Padgett and others 1989).

## ADJACENT COMMUNITIES

*Scirpus* spp. (bulrush), and *Typha* spp. (cattail) may reside in deeper water adjacent to the *Eleocharis palustris* (common spikesedge) habitat type, while *Phalaris arundinacea* (reed canarygrass), *Juncus balticus* (Baltic rush), and *Carex* spp.(sedge) may occupy similar or slightly drier zones. *Glyceria* spp. (mannagrass) and *Wyethia* spp. (mule's-ears) may establish mixed meadows where moisture is available along the edges of marshes or sloughs. *Salix* spp. (willow), *Populus tremuloides* (quaking aspen), and *Populus trichocarpa* (black cottonwood) form clusters and stringer communities along active and older floodplains. *Artemisia tridentata* (big sagebrush) scrub/grasslands or *Pseudotsuga menziesii* (Douglas fir) forests may appear on adjacent hillsides and draws.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Seasonally wet conditions and low palatability of *Eleocharis palustris* (common spikesedge) limit the grazing value of this type for livestock, even during

drought years when upland forage dries early and dies back (Kovalchik 1987), although use is probably slightly higher at these times.

### Wildlife

Broad zones of this type along streams, rivers, lakes, and reservoirs provide valuable feeding and nesting areas for waterfowl. *Eleocharis palustris* (common spikesedge) and associated plants are a valuable source of food and cover for waterfowl (Hansen and others 1995). Wild ungulates seldom browse this habitat type due to its low palatability (Kovalchik 1987).

### Soil Management and Rehabilitation Opportunities

Sites occupied by this type are typically inundated or at least saturated for much of the year 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* (foxtail barley), *Carex nebrascensis* (Nebraska sedge) or *Juncus balticus* (Baltic rush).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

### USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded to seasonally flooded.

## OTHER STUDIES

Similar communities have been described by Kovalchik (1987), Ratliff (1982), Chadde and others (1988), Padgett and others (1989), and by Hansen and others (1995).

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## *Hordeum jubatum* Community Type
## (Foxtail Barley Community Type)

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**HORJUB (HOJU)**
**Number Of Stands Sampled = 2**

## LOCATION AND ASSOCIATED LANDFORMS

The *Hordeum jubatum* (foxtail barley) community type is a minor type at low to mid elevations in eastern Idaho, ranging from 1,272 to 1,600 m (4,200 to 5,200 ft). This community type occurs most frequently in the drawdown zone of ponds or temporary ponds with moderately saline or alkali water. This drawdown zone is flooded during the early part of the growing season but the water table falls to below the soil surface by late spring or early summer. The drawdown zone takes on the appearance of narrow bands encircling the open water. The soil surface may be covered with white salt crusts (Hansen and others 1995). *Hordeum jubatum* (foxtail barley) may also colonize wet meadows where surface water may be present for much of the growing season.

## VEGETATION

The *Hordeum jubatum* (foxtail barley) community type is often characterized as a monotypic stand dominated by *Hordeum jubatum* (foxtail barley). On some sites, it may form a dense root network, essentially creating a thick mat at the surface that excludes other species. However, depending on the types and levels of disturbance, a diversity of other graminoids and forbs may be associated with this type, although generally with low cover and constancy.

**Table 30.** Average canopy cover, range of canopy cover, and constancy for species recorded in sampled stands of the *Hordeum jubatum* (foxtail barley) community type (number = 2 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Graminoids** | | | |
| *Agrostis stolonifera* (redtop) | 2 | 0-3 | 50 |
| *Alopecurus aequalis* (short-awn foxtail) | <1 | 0-1 | 50 |
| *Carex nebrascensis* (Nebraska sedge) | 2 | 0-3 | 50 |
| *Eleocharis palustris* (common spikesedge) | 15 | 0-30 | 50 |
| *Hordeum jubatum* (foxtail barley) | 89 | 80-98 | 100 |
| *Juncus balticus* (baltic rush) | 3 | 3-3 | 100 |
| *Polypogon monspeliensis* (rabbitfoot polypogon) | 10 | 0-20 | 50 |
| *Scirpus acutus* (hardstem bulrush) | 2 | 0-3 | 20 |
| **Forbs** | | | |
| *Aster campestris* (meadow aster) | <1 | 0-1 | 50 |
| *Chenopodium album* (lambsquarter) | <1 | 0-1 | 50 |
| *Cirsium arvense* (Canada thistle) | <1 | 0-1 | 50 |
| *Mentha arvensis* (field mint) | <1 | 0-1 | 50 |
| *Rumex obtusifolius* (bitterdock) | 2 | 0-3 | 50 |

## SUCCESSIONAL INFORMATION

*Hordeum jubatum* (foxtail barley) is an early successional, pioneer species establishing bands along the perimeter of ponds and reservoirs or wider swathes in wet meadow environments. *Eleocharis* spp. (spikesedge), *Scirpus acutus* (hardstem bulrush), and *Carex* spp.(sedge) may represent climax types on wetter sites. Hansen and others (1995) suggest that the *Hordeum jubatum* (foxtail barley) community type may represent an early/mid-seral grazing disclimax of the *Agropyron smithii* (western wheatgrass) habitat type in Montana. Due to the limited number of observations in Idaho, the successional status of this community type is not fully documented. Careful observation of surrounding communities may provide insights to the potential climax vegetation.

## SOILS

Soils probably classify to Mollisols, or possibly Entisols, on most sites. Soil textures are predominantly fines, commonly clays, silty clays, or silty clay loams. These poorly drained soils, in combination with seasonally high water tables, generally exhibit mottled or gleyed soil characteristics as a result of oxidation/reduction reactions common to these saturated environments. *Hordeum jubatum* (foxtail barley) appears tolerant of seasonal flooding and possibly long term inundation.

## ADJACENT COMMUNITIES

*Eleocharis* spp. (spikesedge), *Scirpus acutus* (hardstem bulrush), *Typha* spp. (cattail) and *Carex* spp.(sedge) may occupy adjacent wetter zones. In many cases, the *Hordeum jubatum* (foxtail barley) community type inhabits sites abutting open water. *Betula occidentalis* (water birch) or *Salix* spp. (willow) may occur on the periphery of wet meadows associated with streams corridors. Adjacent drier communities may be dominated by grasslands or *Artemisia tridentata* (big sagebrush) steppe.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Herbage production from the *Hordeum jubatum* (foxtail barley) community type is low. Palatability of *Hordeum jubatum* (foxtail barley) when young is fair for livestock, but little use occurs after seed heads develop (USDA Forest Service 1937, Johnson and Nichols 1982). Consuming the awned seed heads can cause

severe mouth sores and occasionally death. Injuries to wildlife such as elk, deer, and pronghorn antelope have also been documented (USDA Forest Service 1937).

*Hordeum jubatum* (foxtail barley) acts as an increaser under excessive grazing pressure and also quickly invades suitable sites (USDA Forest Service 1937). Moderate grazing may allow desired forage plants to regain dominance.

**Wildlife**
Low herbage production and palatability makes this community type of limited value for wildlife. Consuming the mature awned seed heads can cause severe mouth sores and occasionally death. Injuries to wildlife such as elk, deer, and pronghorn have also been documented (USDA Forest Service 1937).

**Soil Management and Rehabilitation Opportunities**
Most management concerns associated with this type are centered around the increasing saline seep problems. The presence or expansion of seep areas may indicate that upland vegetation, small grains, fallow fields, or excess irrigation are not allowing the water table to drop to levels these sites have routinely experienced in the past. Excess water then flows through the soil, gathering soluble salts before evaporating in depressions. The salts remain, increasing in concentration with time, thereby restricting the types of plants able to tolerate this environment. However, it is important to note that saline areas occur naturally due to the arid climate, parent material, and local topography (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = saturated to temporarily flooded.

## OTHER STUDIES

A similar community was described by Lesica and Shelly (1988) for the Blackfeet Indian Reservation and Hansen and others (1995) for Montana.

## *Phalaris arundinacea* Habitat Type (Reed Canarygrass Habitat Type)

**PHAARU (PHAR3)**
**Number Of Stands Sampled = 8**

### LOCATION AND ASSOCIATED LANDFORMS

The *Phalaris arundinacea* (reed canarygrass) habitat type is a minor type in eastern Idaho. It occurs at low to mid elevations, ranging from 1,030 to 1,697 m (3,400 to 5,600 ft). This type is located along streams, rivers, oxbows, lake and pond margins, ditches, irrigation channels, and in wet meadows. Although a native species, *Phalaris arundinacea* (reed canarygrass) has been widely distributed for the purposes of forage, and readily escapes from pastures into riparian or wetland areas, displacing more desirable species (Hansen and others 1995).

### VEGETATION

*Phalaris arundinacea* (reed canarygrass) may reach heights of 2 m (6.5 ft) or more and often forms dense, rhizomatous root mats in the upper few inches of the soil solum. Coupled with the seasonal die-back of leaves and stalks which form a thick carpet of litter over the ground surface, *Phalaris arundinacea* (reed canarygrass) is able to form dense, monotypic stands, virtually excluding other riparian species. The occasional graminoids and forbs that are found on sites are poorly represented and exhibit low vigor.

**Table 31.** Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Phalaris arundinacea* (reed canarygrass) habitat type (number = 8 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Shrubs** | | | |
| *Salix exigua* (sandbar willow)) | <1 | 0-3 | 25 |
| **Graminoids** | | | |
| *Agrostis stolonifera* (redtop) | 1 | 0-10 | 38 |
| *Phalaris arundinacea* (reed canarygrass) | 97 | 90-98 | 100 |
| *Poa pratensis* (Kentucky bluegrass) | <1 | 0-3 | 12 |
| *Scirpus acutus* (hardstem bulrush) | <1 | 0-1 | 12 |
| **Forbs** | | | |
| *Bidens cernua* (nodding beggar-ticks) | <1 | 0-1 | 12 |
| Forb (unknown forb) | <1 | 0-1 | 12 |
| *Lemna minor* (water lentil) | <1 | 0-1 | 12 |
| *Myosotis scorpioides* (common forget-me-not) | <1 | 0-1 | 12 |
| *Polygonum amphibium* (water smartweed) | 1 | 0-10 | 12 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Polygonum lapathifolium* (willow weed) | <1 | 0-1 | 12 |
| *Rumex salicifolius* (willow dock) | <1 | 0-1 | 12 |
| *Sagittaria cuneata* (arumleaf arrowhead) | <1 | 0-1 | 12 |
| *Taraxacum officinale* (common dandelion) | <1 | 0-1 | 12 |

## SUCCESSIONAL INFORMATION

Hansen and others (1995) note that *Phalaris arundinacea* (reed canarygrass) has a strong tolerance to grazing except in the early growth stages. However, if stands are severely impacted, species such as *Bromus inermis* (smooth brome), *Mentha arvensis* (field mint), and *Poa palustris* (fowl bluegrass) may invade and dominate sites. Increasing water levels due to beaver activity or other impoundments may shift sites from the *Phalaris arundinacea* (reed canarygrass) habitat type to deep water types dominated by *Typha latifolia* (common cattail) or *Scirpus acutus* (hardstem bulrush).

## SOILS

Surface soils are fine textured, typically clays, silty clay loams, and loams, with pH measurements ranging from 6.5 (slightly acid) to 8.0 (moderately alkaline) (USDA Soil Conservation Service 1968). Upper horizons, which may be 1 m (39 in) or more in depth and may contain a significant organic component, often appear as thick, black muck soils where standing water is present. Underlying substrates are dominated by sands, gravels, cobbles and even rock. Soils are probably classified as Entisols (Fluvents) or Mollisols. Water tables may be at or above the ground surface throughout the early part of the growing season, although may drop below 30 cm (12 in) towards the later summer months. Mottled and gleyed soil features are common in the upper horizons. *Phalaris arundinacea* (reed canary grass) tolerates prolonged periods of flooding and may be one of the most flood tolerant of the cultivated grasses, yet is capable of withstanding short summer droughts (Apfelbaum and Sams 1987).

## ADJACENT COMMUNITIES

*Carex rostrata* (beaked sedge), *Typha latifolia* (common cattail), *Scirpus acutus* (hardstem bulrush), and *Eleocharis palustris* (common spikesedge) habitat types may form a patchwork mosaic with *Phalaris arundinacea* (reed canarygrass) communities along the margins of lakes and ponds or paralleling stream channels or oxbows. Scattered *Populus trichocarpa* (black cottonwood) stands may

appear throughout the upper floodplains and on islands. A variety of shrubs, such as *Cornus stolonifera* (red-osier dogwood), *Crataegus douglasii* (black hawthorn) , and *Salix* spp. (willow) may develop as stringer communities adjacent to riparian corridors. Drier hillsides and secondary floodplains may consist of mixed grasslands and *Artemisia tridentata* (big sagebrush) shrubs.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Hansen and others (1995) indicate that although herbage production from this habitat type is high, the palatability of the coarse-leaved *Phalaris arundinacea* (reed canarygrass) is only low to moderate. It is most palatable when actively growing, and becomes less palatable in fall and winter. *Phalaris arundinacea* (reed canarygrass) has a strong tolerance to grazing except in the early growth stages. Alkaloidal content and increasing fiber content with advancing maturity cause a gradual decline in palatability during the growing season. Grazing should begin when this species is about 30 cm (12 in) tall and soils have dried enough to minimize trampling damage (USDA Soil Conservation Service 1968). It is suggested that livestock operators graze it using an intense stocking and short rotation plan that leaves at least a 2-3 cm (5-8 in) stubble. Management may include mowing stands once a year and fencing to force cattle to consume *Phalaris arundinacea* (reed canarygrass). To maintain dense stands, plants should not be grazed to less than 10 cm (4 in) in height (Alberta Agriculture 1981).

This type is also suitable for hay production. However, harvest must usually be delayed until late in the season when soils are dry and plants mature. Nutritive quality at this time is low, especially where *Phalaris arundinacea* (reed canarygrass) completely dominates the stand (Hansen and others 1995).

### Wildlife

In many locations, the *Phalaris arundinacea* (reed canarygrass) habitat type is inundated long enough to provide limited nesting habitat for waterfowl and cover for muskrats. Stands of this habitat type are also used by big game, especially moose, for forage and cover (Hansen and others 1995).

### Fisheries

This habitat type may provide valuable spawning areas and hiding cover for many species of fish (Hansen and others 1995).

**Fire**

High water tables during the growing season make burning difficult. However, burning during the nongrowing season may be feasible. Fire management strategies based on two to three year burn rotations has shown limited success in controlling the spread of *Phalaris arundinacea* (reed canarygrass) (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

These sites are generally so wet as to preclude most development activities. Even sites that dry out near the end of the growing season are highly susceptible to compaction problems due to fine textured soils (Hansen and others 1995). Mosquito populations are generally high in these areas as well where standing or stagnant water provide prime breeding grounds.

Once established, *Phalaris arundinacea* (reed canarygrass) spreads rapidly and is extremely difficult to eliminate (Apfelbaum and Sams 1987). The resilient nature of this rhizomatous grass makes it an effective stabilizer of streambanks and ditches. ***However, its future use in revegetating degraded sites should be severely restricted.*** *Phalaris arundinacea* (reed canarygrass) is becoming a threat to wetland areas dominated by other native species. The effectiveness of control measures, such as burning and herbicide spraying, has not been determined. Chemical methods usually provide poor long term control and are not always acceptable. The proximity of water tables creates a high potential for water contamination. Even when chemical and mechanical control treatments are used, new seedlings can rapidly reestablish themselves from seeds in the soil (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

## OTHER STUDIES

This type has been documented in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995).

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## *Phragmites australis* Habitat Type
## (Common Reed Habitat Type)

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**PHRAUS (PHAU7)**
**Number Of Stands Sampled = 1**

## LOCATION AND ASSOCIATED LANDFORMS

The *Phragmites australis* (common reed) habitat type is an incidental type at mid to lower elevations throughout eastern Idaho, ranging from 970 to 1,600 m (3,200 to 5,280 ft). It occurs in swales, marshes, pond and lake margins, oxbow lakes, backwater areas, and on the banks of rivers and streams. Sites are classified as seasonally flooded (Hansen and others 1995).

## VEGETATION

*Phragmites australis* (common reed) is a strongly rhizomatous perennial that generally forms dense, monotypic stands up to 3 m (10 ft) in height. Some stands my be quite extensive in marshes and swales while other stands may appear as narrow swaths paralleling stream and river corridors. Understory graminoids and forbs, which may be more prevalent where disturbance occurs or at the edge of ecotones, include *Agrostis stolonifera* (redtop), *Scirpus acutus* (hardstem bulrush), *Solidago occidentalis* (western goldenrod) and *Mentha arvensis* (field mint).

## SUCCESSIONAL INFORMATION

*Phragmites australis* (common reed) is a strongly rhizomatous perennial that tends to out compete all but the most aggressive disturbance-induced herbaceous species. However, with increased disturbance, weedy species such as *Cirsium arvense* (Canada thistle) may invade the understory (Hansen and others 1995). *Typha latifolia* (common cattail) and *Scirpus acutus* (hardstem bulrush) generally occupy adjoining sites and appear to compete with *Phragmites australis* (common reed), although the specific physical site requirements that allow one community to dominate over another in a certain location is unknown.

## SOILS

Soils are generally classified as Entisols (Aquents) and Mollisols (Aquolls) (Hansen and others 1995). Soil textures range from clay to sandy loam, and often exhibit mottled or gleyed characteristics due to prolonged flooding common on most sites. Sands, or potentially gravels and cobbles, comprise the subsurface horizons. Hansen and others (1995) observed that water tables fluctuate tremendously, particularly in drawdown areas, ranging from 50 cm (20 in) above to 1 m (39 in) below the soil surface at the end of the growing season.

## ADJACENT COMMUNITIES

*Typha latifolia* (common cattail), *Carex* spp.(sedge), and *Scirpus acutus* (hardstem bulrush) habitat types often occupy adjacent wet zones. In some cases, *Phragmites australis* (common reed) communities may border open water. Slightly drier zones may be dominated by stands of *Salix* spp. (willow), *Betula occidentalis* (water birch) or even *Populus* spp. (cottonwood). *Agrostis stolonifera* (redtop), *Agropyron* spp. (wheatgrass) and *Poa pratensis* (Kentucky bluegrass) mixed grasslands with sporadic *Juniperus scopulorum* (Rocky Mountain juniper) scattered throughout may inhabit adjacent hillsides and valleys.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Hitchcock and others (1969) indicate that *Phragmites australis* (common reed) is too coarse to be a valuable forage species. However, Hansen and others (1995) state that herbage production in the *Phragmites australis* (common reed) habitat type is high to very high, and that *Phragmites australis* (common reed) is highly palatable to both livestock and wildlife, especially when the plants are young and growing vigorously. They suggest that *Phragmites australis* (common reed) is moderately tolerant of grazing, although heavy grazing pressure may reduce the size and extent of stands. *Phragmites australis* (common reed) may also produce good quality hay or silage.

### Wildlife

Hansen and others (1995) report that *Phragmites australis* (common reed) is highly palatable to both livestock and wildlife, especially when the plants are young and growing vigorously. The high structural diversity of *Phragmites australis* (common reed) provides excellent thermal and hiding cover for big game species and waterfowl may use this habitat type for nesting and hiding cover. Other

birds such as red-winged blackbirds and yellow-headed blackbirds are also common inhabitants.

**Fisheries**

The rhizomatous root network of *Phragmites australis* (common reed) provides exceptional streambank stabilization while the dense shoot growth slows high flows and helps trap and filter sediments from water columns.

**Soil Management and Rehabilitation Opportunities**

*Phragmites australis* (common reed) can provide excellent streambank protection. Rhizomes hold and stabilize the bank while the above ground vegetation helps trap and filter sediments. Once established, these characteristics help to stabilize sites (Hansen and others 1995).

**Recreational Uses and Considerations**

The *Phragmites australis* (common reed) habitat type provides excellent opportunities for viewing wildlife. Hitchcock and others (1969) note that this type may be used for thatching and matting as well.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification**
**(Cowardin and others 1979)**

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

## OTHER STUDIES

Similar communities were described by Ward (1942), Walker and Waygood (1968), Shay and Shay (1986), and Hansen and others (1995).

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## *Poa pratensis* Community Type
## (Kentucky Bluegrass Community Type)

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**POAPRA (POPR)**
**Number Of Stands Sampled = 4**

## LOCATION AND ASSOCIATED LANDFORMS

The *Poa pratensis* (Kentucky bluegrass) community type is a major, widespread type across broad, level valleys and foothills of eastern Idaho. Sites range in elevation from 1,455 to 1,909 m (4,800 to 6,300 ft). Stands occur on generally drier, marginally riparian zones of upper riverine floodplains that have been influenced by severe, often long term disturbance, such as historic grazing.

## VEGETATION

A native of Eurasia, *Poa pratensis* (Kentucky bluegrass) is widely used for lawns and hay meadows and has become naturalized across most of North America (Kovalchik 1987). The *Poa pratensis* (Kentucky bluegrass) community type represents a grazing disclimax and is often associated with a variety of other "weed" species. *Poa pratensis* (Kentucky bluegrass) will typically represent the dominant species on these stands, although, depending on the site and general region, the composition of "weed" species and other species will differ (Table 32). This community type occupies marginally riparian zones and is considered one of the drier riparian types in Idaho.

**Table 32.** Average canopy cover, range of canopy cover, and constancy for species recorded in sampled stands of the grazing disclimax *Poa pratensis* (Kentucky bluegrass) community type (number = 4 stands)

| Species | % Canopy Cover | | Constancy |
|---|---|---|---|
| | Average | Range | |
| **Shrubs** | | | |
| *Alnus incana* (mountain alder) | <1 | 0-1 | 33 |
| *Crataegus douglasii* (black hawthorn) | <1 | 0-1 | 33 |
| *Rosa woodsii* (woods rose) | <1 | 0-1 | 33 |
| *Salix lasiandra* (Pacific willow) | <1 | 0-1 | 33 |
| *Symphoricarpos occidentalis* (western snowberry) | <1 | 0-1 | 33 |
| **Graminoids** | | | |
| *Agropyron repens* (quackgrass) | <1 | 0-1 | 33 |
| *Agropyron smithii* (western wheatgrass) | 14 | 3-20 | 100 |
| *Agrostis stolonifera* (redtop) | 8 | 0-20 | 67 |
| *Carex atherodes* (awned sedge) | <1 | 0-1 | 33 |
| *Carex nebrascensis* (Nebraska sedge) | <1 | 0-1 | 33 |
| *Juncus* spp. (rush) | <1 | 0-1 | 33 |
| *Phalaris arundinacea* (reed canarygrass) | <1 | 0-1 | 67 |
| *Phleum pratense* (common timothy) | <1 | 0-1 | 33 |
| *Poa pratensis* (Kentucky bluegrass) | 67 | 40-90 | 100 |
| *Stipa occidentalis* ((western needlegrass) | 4 | 0-10 | 67 |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | 3 | 1-5 | 100 |
| *Artemisia ludoviciana* (prairie sagewort) | <1 | 0-1 | 33 |
| *Aster campestris* (meadow aster) | <1 | 0-1 | 67 |
| *Cirsium arvense* (Canada thistle) | <1 | 0-1 | 100 |

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| *Glycyrrhiza lepidota* (American licorice) | 1 | 0-3 | 33 |
| *Linaria vulgaris* (butter-and-eggs) | 1 | 0-3 | 67 |
| *Perideridia gairdneri* (Gairdner's yampah) | 3 | 0-10 | 33 |
| *Potentilla* spp. (cinquefoil) | <1 | 0-1 | 33 |
| *Potentilla gracilis* (slender cinquefoil) | <1 | 0-1 | 33 |
| *Rumex crispus* (curly dock) | 1 | 0-3 | 33 |
| *Tragopogon dubius* (goat's beard) | <1 | 0-1 | 33 |
| *Equisetum laevigatum* (smooth scouring-rush) | 1 | 0-3 | 33 |

## SUCCESSIONAL INFORMATION

The *Poa pratensis* (Kentucky bluegrass) community type represents a grazing disclimax of an early/mid-seral secondary successional stage. Overgrazing by herbivores has produced drastic changes on sites formerly dominated by native graminoids (Volland 1978). Once a suitable site is disturbed, the extensive rhizome system of *Poa pratensis* (Kentucky bluegrass) allows it to rapidly spread and establish on these areas. It also withstands high levels of utilization, making replacement by former dominants such as *Deschampsia cespitosa* (tufted hairgrass) or *Agropyron smithii* (western wheatgrass) unlikely. The *Poa pratensis* (Kentucky bluegrass) community type represents a seral stage of many types including the *Deschampsia cespitosa* (tufted hairgrass) and the *Agropyron smithii* (western wheatgrass) habitat types. Close observation of similar sites may give insight to the climax community for the site (Hansen and others 1995).

## SOILS

Youngblood and others (1985) indicate that this type typically establishes on Mollisols (Borolls) or Entisols (Fluvents). *Poa pratensis* (Kentucky bluegrass) survives on sands, dense clays, and thin, rocky soils when adequate moisture is available, but stands exhibit the greatest vigor on moist, fertile sandy to clay alluvial soils with a high organic component. *Poa pratensis* (Kentucky bluegrass) is generally intolerant of prolonged flooding, seasonally high water tables, or poor drainage. It is tolerant of mildly alkaline (pH 8.0), and saline soils (Hansen and others 1995).

## ADJACENT COMMUNITIES

*Populus* spp. (cottonwood) stands often appear in scattered clusters or extensive forests on upper floodplains adjacent to this type. Disturbance tolerant shrubs such as *Crataegus douglasii* (black hawthorn), *Rosa* spp. (rose), and *Symphoricarpos*

*occidentalis* (western snowberry) may also be present. *Salix* spp. (willow), *Carex rostrata* (beaked sedge), and *Juncus balticus* (baltic rush)types typically colonize streambanks on saturated sites. Upland communities may be dominated by grasslands, often with a significant *Artemisia tridentata* (big sagebrush) or *Juniperus scopulorum* (Rocky Mountain juniper) element.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Hansen and others (1995) note that the *Poa pratensis* (Kentucky bluegrass) community type is moderately productive, and provides a significant amount of early season forage. It is highly palatable in the rapid growth phase with palatability becoming greatly reduced during semidormancy of late summer and winter. Fall regrowth can occur provided moisture is sufficient and temperatures remain above freezing. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers or rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater. Streambanks associated with *Poa pratensis* (Kentucky bluegrass) stands are susceptible to sloughing (Hansen and others 1995).

### Wildlife

Elk and deer make use of the grasses and forbs of this type, especially in early spring when other forages have not yet greened. Waterfowl utilize *Poa pratensis* (Kentucky bluegrass) for food and cover. Upland game birds, small mammals and small nongame birds also use this type for cover (Dittberner and Olson 1983).

### Fisheries

The *Poa pratensis* (Kentucky bluegrass) community type is not very effective in stabilizing streambanks due to the shallow rhizomatous root system (Youngblood and others 1985b). Bank undercutting and sloughing may occur, especially when soils are wet or stands weakened by excessive grazing.

**Fire**

Hansen and others (1995) indicate that *Poa pratensis* (Kentucky bluegrass) is well adapted to fire, and is able to quickly resprout following burning because of its extensive network of rhizomes. However, it is intolerant of burning during the active growth stages and can be successfully controlled by late spring burning. Fire is an effective tool to remove excessive litter accumulations common on rested or lightly grazed stands. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967).

**Soil Management and Rehabilitation Opportunities**

The potential for soil compaction is greatest in the spring when soils are moist. *Poa pratensis* (Kentucky bluegrass) has an extensive rhizome system, but its shallow rooting characteristics make it only marginally effective in stabilizing streambanks. The potential for erosional problems associated with this community type can be quite high. Managers need to pay close attention to streambanks associated with *Poa pratensis* (Kentucky bluegrass) community type in order to detect early signs of streambank collapse. Once the streambank starts to degrade, with no change in management, there is little that can be done to save it short of expensive riprap (Hansen and others 1995).

Unless water tables are restored, these sites will remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will help raise the water table thereby allowing the willows and sedges to reclaim a degraded site.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = temporarily flooded.

## OTHER STUDIES

A number of other researchers have identified similar *Poa pratensis* (Kentucky bluegrass) communities, including Norton (1981; Greys River, Wyoming), Ratliff (1982; Sierra Nevada, California), Youngblood and others (1985b; eastern Idaho and western Wyoming), Padgett and others (1989; Utah and southeastern Idaho), and Hansen and others (1995; Montana).

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# *Polygonum amphibium* Community Type
# (Water Smartweed Community Type)

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**POLAMP (POAM8)**
**Number Of Stands Sampled = 1**

## LOCATION AND ASSOCIATED LANDFORMS

The *Polygonum amphibium* (water smartweed) community type is an incidental type at low to mid elevations in eastern Idaho, documented in the vicinity of 1,500 m (4,950 ft). This community type occupies shallow water along the edges of reservoirs, lakes, ponds, marshes, and other wet areas. Sites are classified as seasonally flooded.

## VEGETATION

The *Polygonum amphibium* (water smartweed) community type is an aggressive invader of shallow water and exposed mud flats where there is minimal wave action (Hansen and others 1995). A partially decumbent growth form and numerous stolons often result in the formation of dense, monotypic stands. Associated species may include Alisma *gramineum* (narrowleaf waterplantain).

## SUCCESSIONAL INFORMATION

The *Polygonum amphibium* (water smartweed) community type may represent an early seral stage for a host of climax communities. *Typha latifolia* (common cattail) or *Scirpus acutus* (hardstem bulrush) may prevail in deep water sites, while *Eleocharis palustris* (common spikesedge) or *Carex* spp.(sedge) may succeed *Polygonum amphibium* (water smartweed) on shallower, saturated sites. Physical site parameters and neighboring communities should aid in the identification of the potential climax community for most sites.

## SOILS

Water tables occur at or above the ground surface throughout most of the year on sites occupied by the *Polygonum amphibium* (water smartweed) community type. Surface soils are typically nutrient rich, black mucky clays with a high organic component, although Hansen and others (1995) indicate that this type may establish on a variety of soils with textures ranging from fine clays to sandy loams. It is considered to be intolerant of saline or alkaline conditions. Soils types should classify to Mollisols, or possibly Histosols or Entisols

## ADJACENT COMMUNITIES

*Typha latifolia* (common cattail) or *Scirpus acutus* (hardstem bulrush) habitat types often colonize zones in slightly deeper water, although stands of *Polygonum amphibium* (water smartweed) ordinarily appear immediately adjacent to open water. *Eleocharis palustris* (common spikesedge) is typically associated with this community type in shallow water while *Salix* spp. (willow) may form small clustered stands above the high water mark. Adjacent uplands may be dominated by *Artemisia tridentata* (big sagebrush)/grasslands.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Herbage production of the *Polygonum amphibium* (water smartweed) community type rates low to moderate. *Polygonum amphibium* (water smartweed) is of low palatability to livestock and wildlife (Hansen and others 1995).

### Wildlife

*Polygonum amphibium* (water smartweed) is of low palatability to wildlife (Hansen and others 1995), although waterfowl appear to use these areas for nesting, shelter and forage.

### Soil Management and Rehabilitation Opportunities

Shore vegetation around reservoirs is a mosaic of short lived plant communities that may survive from one to many years before being eliminated by a combination of high water or grazing. These shore communities are composed primarily of early successional species that become established either during the fall or spring when water levels are low. Repeated annual drawdowns perpetuate this disturbance and associated vegetation. Shore vegetation is important in providing habitat for terrestrial wildlife, certain fish species, and

livestock. These communities also protect shores from accelerated erosion, and enhance the aesthetic quality of the shore environment (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded.

## OTHER STUDIES

A number of authors have described similar communities for the prairie pothole region of North America (Van der Valk 1989). Hansen and others (1995) have also described this type for Montana,

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# *Scirpus acutus* Habitat Type
# (Hardstem Bulrush Habitat Type)

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**SCIACU (SCAC)**
**Number Of Stands Sampled = 6**

**NOTE: The *Scirpus acutus* (hardstem bulrush) habitat type includes all combinations of *Scirpus acutus* (hardstem bulrush) and *Scirpus validus* (softstem bulrush) due to similarities in environmental conditions and management concerns.**

## LOCATION AND ASSOCIATED LANDFORMS

The *Scirpus acutus* (hardstem bulrush) habitat type, ranging in elevation from 909 to 1,576 m (3,000 to 5,200 ft), is a major type occurring throughout southern and central Idaho. Stands may appear as fringes along the margins of ponds, lakes and reservoirs, stringers paralleling stream and river channels, or broad patches in backwater marshes and sloughs. This habitat type often inhabits relatively deep water and represents one of the wettest riparian types in Idaho.

## VEGETATION

The *Scirpus acutus* (hardstem bulrush) habitat type usually appears as an impenetrable monotypic stand often reaching heights of 2 m (6.5 ft) or more. *Scirpus* spp. (bulrush) 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 up to 1 m (39 in) or more in depth in some locations. Due to the dense growth form and flooded water regime, other species are largely absent, or if present, in limited amounts. Although Hansen and others (1995) observed high coverages of *Scirpus validus* (softstem bulrush) on some sites in Montana, it was present on only one site in Idaho.

**Table 33.** Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Scirpus acutus* (hardstem bulrush) habitat type (number = 6 stands)

| Species | % Canopy Cover Average | Range | Constancy |
|---|---|---|---|
| **Graminoids** | | | |
| *Eleocharis palustris* (common spikesedge) | 4 | 0-20 | 50 |
| Grass (unknown grass) | <1 | 0-1 | 17 |
| *Juncus balticus* (baltic rush) | <1 | 0-1 | 17 |
| *Scirpus acutus* (hardstem bulrush) | 94 | 90-98 | 100 |
| *Scirpus validus* (softstem bulrush) | 2 | 0-10 | 17 |
| **Forbs** | | | |
| *Chenopodium album* (lambsquarter) | 1 | 0-3 | 17 |
| *Lepidium virginicum* (tall pepperweed) | <1 | 0-1 | 17 |
| *Polygonum amphibium* (water smartweed) | 1 | 0-3 | 50 |
| *Rorippa curvipes* (blunt-leaved yellowcress) | <1 | 0-1 | 17 |
| *Rumex crispus* (curly dock) | <1 | 0-1 | 17 |

## SUCCESSIONAL INFORMATION

*Scirpus acutus* (hardstem bulrush) 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 aggressive species to colonize sites at an early successional stage and maintain dominance on undisturbed sites as the climax vegetation. However, *Scirpus acutus* (hardstem bulrush) is regularly accompanied by other hydrophilic species, such as *Sparganium emersum* (simplestem bur-reed), *Typha latifolia* (common cattail), and *Carex* spp.(sedge). 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 at the expense of another. Seasonal climatic changes may play a vital role in determining which species may dominate a site at a particular point in time.

## SOILS

The *Scirpus acutus* (hardstem bulrush) habitat type generally inhabits soils classified as Mollisols (Aquolls), Entisols (Aquents), or occasionally Histosols (Brichta 1987). 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 reactions on sites occupied by this type vary from almost neutral to moderately alkaline (pH 7.4 to 8.2) (Brichta 1987).

## ADJACENT COMMUNITIES

*Carex* spp.(sedge), *Typha latifolia* (common cattail), *Sparganium emersum* (simplestem bur-reed),, *Eleocharis palustris* (common spikesedge), *Phalaris arundinacea* (reed canarygrass) and *Scirpus acutus* (hardstem bulrush) may form a patchwork mosaic along the margins of lakes and ponds or parallel stream channels or oxbows. These communities generally occupy microsites according to moisture regimes, substrate composition, nutrient availability and a variety of other physical site parameters. *Salix* spp. (willow) occupy slightly drier sites at the waterline while *Elaeagnus angustifolia* (Russian olive) and *Populus trichocarpa* (black cottonwood) appear in scattered communities on upper floodplains. Hayfields and pastureland may represent the dominate upland communities, although *Artemisia tridentata* (big sagebrush)/grasslands are also common.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Wet conditions and the 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* (hardstem bulrush) (Hansen and others 1995).

### Wildlife

*Scirpus acutus* (hardstem bulrush) provides valuable nesting and roosting cover for a variety of songbirds and waterfowl, notably redwinged, yellow-headed

blackbirds and wrens. *Scirpus acutus* (hardstem bulrush) is a staple food for muskrats and is used in construction of their huts. Seeds of *Scirpus acutus* (hardstem bulrush) are eaten by a variety of birds. Waterfowl managers often attempt to increase the proportion of *Scirpus acutus* (hardstem bulrush) relative to *Typha* spp. (cattail) as a means of improving habitat. *Triglochin maritimum* (seaside arrow-grass), if present, may be heavily grazed by elk (Hansen and others 1995).

**Fire**

The *Scirpus acutus* (hardstem bulrush) habitat type will burn in either late fall or early spring if the water levels have dropped sufficiently (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

Soils are commonly wet throughout the growing season and easily damaged from trampling by livestock and wildlife. Vegetation can also be damaged by trampling.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = permanently flooded to semipermanently flooded.

## OTHER STUDIES

Similar communities dominated by *Scirpus acutus* (hardstem bulrush) have been identified by Pierce and Johnson (1986) for west central Montana, by Hansen and others (1995) for Montana, and by Chadde and others (1988) for northern Yellowstone National Park.

## *Scirpus pungens* Habitat Type
## (Sharp Bulrush Habitat Type)

**SCIPUN (SCPU3)**
**Number Of Stands Sampled = 1**

**NOTE: The *Scirpus pungens* (sharp bulrush) habitat type includes all combinations of *Scirpus pungens* (sharp bulrush) and *Scirpus americanus* (American bulrush) due to similarities in environmental conditions and management concerns.**

### LOCATION AND ASSOCIATED LANDFORMS

The *Scirpus pungens* (sharp bulrush) habitat type is an incidental type inhabiting broad, riverine valleys across eastern Idaho. Sites are located in wet areas along the margins of marshes and ponds or in backwater areas of floodplains proximal to streams and rivers. Sites range in elevation from 1,121 to 1,697 m (3,700 to 5,600 ft). This type often inhabits relatively deep water and represents one of the wettest riparian types in Idaho.

### VEGETATION

The *Scirpus pungens* (sharp bulrush) habitat type usually forms dense stands, up to 1 m (39 in) tall (Hitchcock and others 1969), that may be dominated by *Scirpus pungens* (sharp bulrush) or *Scirpus americanus* (American bulrush). Although both species may be present, they do not appear to codominate sites; there is generally only one dominant species. The rhizomatous root growth and saturated site conditions often preclude the invasion of other species, resulting in monotypic stands essentially devoid of other graminoids and forbs on undisturbed sites. Associated species include *Juncus balticus* (baltic rush)and *Triglochin maritimum* (seaside arrow-grass)

### SUCCESSIONAL INFORMATION

*Scirpus pungens* (sharp bulrush) occupies some of the wettest sites on the landscape and tolerates prolonged flooding better than most riparian species. These highly saturated conditions, coupled with an extremely dense rhizomatous root growth, allow this aggressive species to colonize sites at an early successional stage and maintain dominance on undisturbed sites as the climax vegetation. *Typha latifolia* (common cattail) and *Scirpus acutus* (hardstem bulrush) may border this habitat type, acting as competitors; however, the complex

interactions between these species and their individual site requirements are not well understood and, as yet, are unable to fully explain vegetation patterns observed on the landscape.

Disturbance can dramatically increase the amount of increaser and invader species such as *Hordeum jubatum* (foxtail barley) and *Juncus balticus* (baltic rush)(Hansen and others 1995).

## SOILS

Hansen and others (1995) state that soils are typically classified as Entisols (Fluvaquents) or Mollisols (Haplaquolls). Soil textures range from clay loam to sandy loam. Water tables are high, remaining within 1 m (39 in) of the soil surface throughout the year. Soils are rated as somewhat poorly drained to poorly drained. Soil reaction is typically alkali (pH 8.5). Saline soils are also common. Lesica and Shelly (1988) measured soil water conductivities of this type that range from 2,920 to 41,000 uhmos/cm (a median of 81,000 uhmos/cm) on the Blackfeet Indian Reservation in Montana.

## ADJACENT COMMUNITIES

*Typha latifolia* (common cattail) and *Scirpus acutus* (hardstem bulrush) habitat types occupy adjacent deep water sites, while *Eleocharis palustris* (common spike sedge) and *Juncus balticus* (baltic rush)may inhabit moderately shallow or merely saturated zones. Adjacent drier sites above the waterline may be dominated by *Elaeagnus angustifolia* (Russian olive) or *Populus trichocarpa* (black cottonwood). Mixed grasslands and *Artemisia tridentata* (big sagebrush) scrubland populate hillsides and drier uplands.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

Herbage production is high to very high. However, palatability is low to moderate. *Scirpus pungens* (sharp bulrush) is seldom grazed by livestock or wildlife, provided additional forage is available or the site is in fairly deep water. However, if water levels drop or upland forage is limited, livestock may heavily utilize these communities (Hansen and others 1995).

### Wildlife

The *Scirpus pungens* (sharp bulrush) habitat type is an important source of shade, hiding cover, and food for wildlife. *Scirpus pungens* (sharp bulrush) is used by

muskrats for construction of huts. Waterfowl use this site type for nesting and hiding cover. Other birds such as red-winged blackbirds and yellow-headed blackbirds are common inhabitants. Deer also use this site type for hiding cover (Hansen and others 1995).

**Fisheries**

The *Scirpus pungens* (sharp bulrush) habitat type buffers wind and wave action on bodies of water. Warm water fish may make use of this site type as spawning beds. Along streams, this site type helps to filter out sediments and build streambanks (Hansen and others 1995).

**Soil Management and Rehabilitation Opportunities**

The *Scirpus pungens* (sharp bulrush) habitat type helps filter sediments to build streambanks. This type is fairly drought tolerant being able to persist through several years of dry conditions. *Scirpus pungens* (sharp bulrush) is a prolific seed producer. Dissemination occurs by both wind and water. Seeds require moist, bare soil for germination. Rhizomes spread into exposed areas, rapidly colonizing mudflats and drawdown areas (Hansen and others 1995).

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded.

## OTHER STUDIES

Lesica and Shelly (1988) described a similar community for the Blackfeet Indian Reservation. Similar sites in the prairie pothole region of the northern Great Plains have been described by Van der Valk (1989) and for the state of Montana by Hansen and others (1995).

## *Sparganium emersum* Community Type
## (Simplestem Bur-reed Community Type)

**SPAPEC (SPPE)**
**Number Of Stands Sampled = 2**

### LOCATION AND ASSOCIATED LANDFORMS

The *Sparganium emersum* (simplestem bur-reed) community type, an incidental type ranging in elevation from 1,450 to 1,850 m (4,785 to 6,105 ft), appears in broad valleys in eastern Idaho. Sites are located in swales, wet meadows, and at the edges of marshes and ponds where pooled or slowly moving surface water is prevalent. This type occupies some of the wettest riparian sites in Idaho with *Carex* spp.(sedge), *Typha* spp. (cattail) and *Scirpus* spp. (bulrush).

### VEGETATION

*Sparganium emersum* (simplestem bur-reed) forms monotypic stands on saturated or inundated sites. The dense shoot growth, which may achieve 1 m (39 in) or more in height, thick rhizomatous root mat, and highly saturated site conditions deter most species from infringing on this community type. Associated graminoids and forbs that are present generally express poor coverage and low vigor.

**Table 34.** Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Sparganium emersum* (simplestem bur-reed) community type (number = 2 stands)

| Species | % Canopy Cover Average | % Canopy Cover Range | Constancy |
|---|---|---|---|
| **Graminoids** | | | |
| *Beckmannia syzigachne* (American sloughgrass) | <1 | 0-1 | 50 |
| **Forbs** | | | |
| *Alisma triviale* (American waterplantain) | 2 | 0-3 | 50 |
| *Hippuris vulgaris* (common mare's-tail) | <1 | 0-1 | 50 |
| *Sium suave* (hemlock water-parsnip) | 1 | 1-1 | 100 |
| *Sparganium emersum* (simplestem bur-reed), | 98 | 98-98 | 100 |
| *Typha* spp. (cattail) | 2 | 0-3 | 50 |

### SUCCESSIONAL INFORMATION

*Typha latifolia* (common cattail) and *Scirpus acutus* (hardstem bulrush) appear to be the main competitors of *Sparganium emersum* (simplestem bur-reed) and may

represent the climax vegetation on these sites. All three species form dense, monotypic stands with little overlap at the ecotones. Like its competitors, *Sparganium emersum* (simplestem bur-reed) is present in deeper water, 30 cm (12 in) or more, on moderately saturated sites that are wet at the surface for only part of the year, and at all locations between these extremes. Other than saturated conditions, trends are difficult to discern. This type may actually represent a habitat type on some locations, but additional surveys must be collected to better understand the ecology of this species.

## SOILS

Water tables appear at or above the surface for much of the growing season. Soil surface textures, predominantly fine, black silts characterized with a high organic component and decaying, fibrous plant material, may extend to a depth of 30 cm (12 in) or more. Clays, often exhibiting gleyed coloring as a result of anaerobic conditions associated with high water tables, constitute the underlying layers. Deeper subsurface horizons are suspected to be alluvial sands, gravels and cobbles. Soils should classify to Mollisols, or perhaps Histosols or Entisols.

## ADJACENT COMMUNITIES

Adjacent deep water sites may be dominated by the *Typha latifolia* (common cattail) or the *Scirpus acutus* (hardstem bulrush) habitat types. *Phalaris arundinacea* (reed canarygrass), *Eleocharis palustris* (common spikesedge), *Polygonum* spp. (smartweed) and *Carex* spp.(sedge) may occupy moderately shallow to saturated sites along the perimeter of these stands. Uplands are primarily grassland/pasturelands used for grazing and as hay fields. *Artemisia tridentata* (big sagebrush) steppe dominates nearby hillsides.

## MANAGEMENT INFORMATION

### Livestock

Although herbage production in stands of the *Sparganium emersum* (simplestem bur-reed) is high, palatability is probably low. It may be utilized in the spring when young plants are actively growing; however, sites are relatively wet at this time of the year and may limit livestock access.

### Wildlife

Forage potential for ungulates is thought to be low, although beaver or muskrat may use it for building materials or forage. The *Sparganium emersum* (simplestem bur-reed) habitat type may provide important shade and hiding cover for waterfowl. Perching birds also may make limited use of this type.

**Soil Management and Rehabilitation Opportunities**
The rhizomatous nature of *Sparganium emersum* (simplestem bur-reed) makes it an excellent species for rehabilitating disturbed saline or alkali sites.

**Recreational Uses and Considerations**
*Sparganium emersum* (simplestem bur-reed) inhabits lakeshores, marshes and other saturated areas often heavily infested by mosquitoes. Camping is not recommended, although stands may provide access to open water for anglers.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

**USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)**
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded.

## OTHER STUDIES

Similar communities have not been described elsewhere.

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# *Typha latifolia* Habitat Type
# (Common Cattail Habitat Type)

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**TYPLAT (TYLA)**
**Number Of Stands Sampled = 7**

**NOTE: The *Typha latifolia* (common cattail) habitat type includes all combinations of *Typha latifolia* (common cattail) and *Typha angustifolia* (narrow-leaved cattail) due to similarities in environmental conditions and management concerns.**

## LOCATION AND ASSOCIATED LANDFORMS

The *Typha latifolia* (common cattail) habitat type establishes as a fringe along the margins of ponds and reservoirs, as broad stands in marshes and sloughs, and in narrow bands along oxbows and adjacent to stream and river corridors.This major type, ranging in elevation from 909 to 1,750 m (3,000 to 5,775 ft), occurs on

wide, low gradient valleys across eastern Idaho. Often inhabiting relatively deep water and representing one of the wettest riparian types in Idaho, it occupies locations characterized by a permanently flooded to semipermanently flooded water regime.

## VEGETATION

Species diversity for stands within the *Typha latifolia* (common cattail) habitat type are generally low. An extensive rhizomatous root system, dense foliage obtaining heights of 2 m (6.5 ft) or more, thick mats of annually accumulating litter, and highly saturated site conditions result in a monoculture, dominated by *Typha latifolia* (common cattail) and/or *Typha angustifolia* (narrow-leaved cattail), on most sites. Affiliated herbaceous species are characteristically sparse and exhibit poor health.

**Table 35.** Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Typha latifolia* (common cattail) habitat type (number =7 stands)

| Species | % Canopy Cover | | Constancy |
|---|---|---|---|
| | Average | Range | |
| **Shrubs** | | | |
| *Salix lasiandra* (Pacific willow) | <1 | 0-1 | 14 |
| **Graminoids** | | | |
| *Agrostis stolonifera* (redtop) | <1 | 0-1 | 14 |
| *Carex vesicaria* (inflated sedge) | <1 | 0-1 | 29 |
| *Eleocharis palustris* (common spikesedge) | 3 | 0-20 | 29 |
| *Juncus balticus* (baltic rush) | 3 | 0-20 | 14 |
| *Phalaris arundinacea* (reed canarygrass) | <1 | 0-1 | 14 |
| **Forbs** | | | |
| *Alisma triviale* (American waterplantain) | <1 | 0-1 | 14 |
| *Bidens cernua* (nodding beggar-ticks) | 3 | 0-20 | 14 |
| *Chenopodium rubrum* (red goosefoot) | <1 | 0-1 | 14 |
| *Epilobium ciliatum* (common willow-herb) | <1 | 0-3 | 14 |
| Forb (unknown forb) | <1 | 0-1 | 14 |
| *Galium trifidum* (small bedstraw) | <1 | 0-1 | 14 |
| *Lemna minor* (water lentil) | 3 | 0-20 | 14 |
| *Mentha arvensis* (field mint) | <1 | 0-1 | 14 |
| *Myosotis scorpioides* (common forget-me-not) | 7 | 0-50 | 14 |
| *Polygonum amphibium* (water smartweed) | <1 | 0-1 | 14 |
| *Polygonum punctatum* (water smartweed) | <1 | 0-1 | 14 |
| *Sagittaria cuneata* (arumleaf arrowhead) | 1 | 0-10 | 14 |
| *Sium suave* (hemlock water-parsnip) | <1 | 0-1 | 14 |
| *Taraxacum officinale* (common dandelion) | <1 | 0-1 | 14 |
| *Typha* spp. (cattail) | 89 | 70-98 | 100 |

## SUCCESSIONAL INFORMATION

*Typha latifolia* (common cattail) and *Typha angustifolia* (narrow-leaved cattail) are early colonizers of saturated and inundated sites. They are well adapted to prolonged submergence of their roots and lower stems, but require some period of bare soil exposure for germination and establishment. Because seed production is extremely high, they are capable of rapid colonization of wet mineral soils. Due to the saturated soils with water levels either above or near the soil surface throughout the growing season, sites are minimally impacted. However, heavy livestock use can convert stands of this type to the *Carex nebrascensis* (Nebraska sedge) community type (Hansen and others 1995). *Scirpus acutus* (hardstem bulrush) and *Carex rostrata* (beaked sedge) compete for similar locations on some sites. These habitat types could actually replace *Typha* spp. (cattail) communities where changing environmental conditions favor their particular growth strategies. Appropriately, when conditions favor *Typha* spp. (cattail), it may become the dominate community.

## SOILS

Hansen and others (1995) note that soils are commonly Entisols (Typic Fluvaquents) or Mollisols (Aquolls), often characterized by accumulations of organic matter overlying deposits of fine silt and clay. These types are commonly inundated with 30-100 cm (12-39 in) of water throughout the year. Redoximorphic features (mottled or gleyed soils) in mineral horizons are common resulting from permanently saturated, anaerobic soil conditions.

## ADJACENT COMMUNITIES

*Scirpus acutus* (hardstem bulrush) may codominant some sites with similar water regimes, although *Scirpus acutus* (hardstem bulrush) appears to tolerate more brackish conditions than *Typha latifolia* (common cattail) (Hansen and others 1995). The *Carex rostrata* (beaked sedge) habitat type frequently occupies adjacent, although moderately drier sites. *Phalaris arundinacea* (reed canarygrass), *Eleocharis palustris* (common spikesedge), *Polygonum* spp. (smartweed) may persist along the periphery of *Typha latifolia* (common cattail) stands. Upper floodplains may be dominated by *Populus trichocarpa* (black cottonwood) and *Salix* spp. (willow). Hay meadows and pastureland may be present on upland plateaus while *Artemisia tridentata* (big sagebrush) grasslands often populate drier hillsides.

## MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

### Livestock

*Typha latifolia* (common cattail) is normally little used by livestock. However, if water levels drop or upland forage limiting, livestock may heavily utilize this type. *Typha latifolia* (common cattail) is a highly preferred food of muskrats (Allen and Hoffman 1984).

### Wildlife

*Typha latifolia* (common cattail) is an important source of shade, hiding cover, and food for wildlife. It is used by muskrats for construction of huts. Waterfowl use this type for nesting and hiding cover, provided the stands are not too dense. Dense stands of *Typha latifolia* (common cattail) will hinder waterfowl uses. Deer also use this type for forage and hiding cover. This type is a critical source of nesting and roosting cover for yellow-headed and redwinged blackbirds and wrens (Hansen and others 1995).

### Fire

Dense stands of *Typha latifolia* (common cattail) can be burned in late fall or early spring in order to improve habitat for waterfowl (Hansen and others 1995).

### Soil Management and Rehabilitation Opportunities

Standing water and continually wet conditions restrict most development on these sites.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

### USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = permanently flooded to semipermanently flooded.

## OTHER STUDIES

Pierce and Johnson (1986) and Chadde and others (1988) described similar *Typha latifolia* (common cattail) communities. A similar community was described by Padgett and others (1989) for Utah and southeastern Idaho, and Hansen and others (1995) for Montana.

## *Wyethia amplexicaulis* Community Type
## (Northern Mule's-ears Community Type)

**WYEAMP (WYAM)**
**Number Of Stands Sampled = 1**

### LOCATION AND ASSOCIATED LANDFORMS

The *Wyethia amplexicaulis* (northern mule's-ears) community type is an incidental type at mid to high elevations in the foothills and mountains of northeastern Idaho. Sampled sites occur in the vicinity of 1,950 m (6,534 ft). This community type occupies poorly drained wet meadows and flats, or slight depressions near streams where subsurface flows provide moisture to the soil solum.

### VEGETATION

The *Wyethia amplexicaulis* (northern mule's-ears) community type may represent a grazing disclimax in Idaho. Mueggler (1989) notes that stands typically occur on sites that can support palatable grasses and forbs. This community type forms broad meadows, dominated by *Wyethia amplexicaulis* (northern mule's-ears) and *Wyethia helianthoides* (white-head mule's-ears), between groves of *Populus tremuloides* (quaking aspen). A variety of graminoids and forbs may be present on site, including: *Antennaria luzuloides* (woodrush pussy-toes), *Festuca idahoensis* (Idaho Fescue), and other perennial grasses.

### SUCCESSIONAL INFORMATION

Mueggler (1989) suggests that the *Wyethia amplexicaulis* (northern mule's-ears) community type occupies sites that are capable of supporting palatable grasses and forbs. Careful observation of physical site parameters and surrounding vegetation may indicate the potential climax community on a site where sites have not been permanently altered by severe, long term grazing. This community may belong to the *Populus tremuloides /Wyethia amplexicaulis* (quaking aspen/ northern mule's-ears) community type that Mueggler (1989) describes in his classification for the Intermountain Region.

### SOILS

Poorly drained clay loam soils dominate surface horizons. Gravel-sized rocks are present on the ground surface and throughout the lower soil layers. Pugging 5 to 10 cm (2 to 4 in) deep indicate saturated conditions or even ponding on some

sites. As sites dry, soils crack, suggesting shrink/swell clays. Possible subsurface flows may maintain soil moisture at the surface for part of the growing season.

## ADJACENT COMMUNITIES

*Populus tremuloides* (quaking aspen) groves or coniferous dominated forests may occupy the perimeter of *Wyethia amplexicaulis* (northern mule's-ears) meadows. This community type creates broad, homogeneous stands up to a few hectares (acres) in size.

## MANAGEMENT INFORMATION

### Livestock

*Wyethia amplexicaulis* (northern mule's-ears) is considered to be unpalatable for livestock (Mueggler 1989).

### Wildlife

The *Wyethia amplexicaulis* (northern mule's-ears) community type is relatively unpalatable for wild ungulates, and the low structural diversity and poor species diversity offers little value for other forms of wildlife as well (Mueggler 1989).

### Soil Management and Rehabilitation Opportunities

Fine textured soils may be susceptible to compaction in the spring when sites are saturated from snowmelt. Livestock and vehicular traffic should be restricted from these sites where practical.

## RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

### USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

## OTHER STUDIES

Mueggler (1989) describes a *Populus tremuloides /Wyethia amplexicaulis* (quaking aspen/ northern mule's-ears) community type with a similar understory component in Nevada, Utah, southwestern Wyoming, and southern and eastern Idaho .

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# APPENDIX A. MANAGEMENT INFORMATION FOR SELECTIVE PLANT SPECIES IN THE PROJECT AREA (Hansen and others 1995)

Appendix A contain the following management information on a species-by-species basis: 1) forage palatability for cattle, sheep, and horses, 2) wetland status, 3) energy value, 4) protein value, 5) thermal or feeding cover values for elk, mule deer, whitetail deer, upland game birds, waterfowl, small non-game birds, and small mammal), 6) food value or degree of use for elk, mule deer, whitetail deer, antelope, upland game birds, waterfowl, small non-game birds, and small mammals, 7) potential biomass production, 8) erosion control potential, 9) short-term revegetation potential, and 10) long-term revegetation potential.

The management information is from the document *The Plant Information Network (PIN) Data Base: Colorado, Montana, North Dakota, Utah, and Wyoming* by Dittberner and Olson (1983), with some modifications. In some instances, no management information was available for certain plant species. The authors then used professional experience along with information that was available for species with similar morphological or physiological characteristics.

## APPENDIX A-1. Forage palatability for cattle, sheep, and horses (Hansen and others 1995)

**Palatability** refers to the relish and degree of use shown by livestock for a plant or plant part. **G** (Good) = highly relished and consumed to a high degree; **F** (Fair) = moderately relished and consumed to a moderate degree; **P** (Poor) = not relished and normally consumed to only a small degree or not at all.

| Species | Cattle Forage Palatability | Sheep Forage Palatability | Horse Forage Palatability |
|---|---|---|---|
| **Trees** | | | |
| *Abies lasiocarpa* (subalpine fir) | P | P | P |
| *Acer negundo* (box-elder) | P | P | P |
| *Elaeagnus angustifolia* (Russian olive) | P | P | P |
| *Fraxinus pennsylvanica* (green ash) | F | F | F |
| *Juniperus scopulorum* (Rocky Mountain juniper) | P | P | P |
| *Picea engelmannii* (Engelmann spruce) | P | P | P |
| *Picea glauca* (white spruce) | P | P | P |
| *Pinus contorta* (lodgepole pine) | P | P | P |
| *Pinus ponderosa* (ponderosa pine) | P | P | P |
| *Populus angustifolia* (narrowleaf cottonwood) | P | F | P |
| *Populus deltoides* (Great Plains cottonwood) | P | F | P |
| *Populus tremuloides* (quaking aspen) | F | G | F |
| *Populus trichocarpa* (black cottonwood) | P | F | P |
| *Pseudotsuga menziesii* (Douglas fir) | P | P | P |
| *Salix amygdaloides* (peach-leaf willow) | F | G | F |
| **Shrubs** | | | |
| *Acer glabrum* (Rocky Mountain maple) | P | F | P |
| *Alnus incana* (mountain alder) | P | F | P |
| *Amelanchier alnifolia* (western serviceberry) | F | G | F |
| *Arctostaphylos uva-ursi* (kinnikinnick) | P | P | P |

**APPENDIX A-1 (cont.)**

| Species | Cattle Forage Palatability | Sheep Forage Palatability | Horse Forage Palatability |
|---|---|---|---|
| *Artemisia cana* (silver sagebrush) | F | G | F |
| *Betula glandulosa* (bog birch) | P | F | P |
| *Betula occidentalis* (water birch) | P | P | P |
| *Clematis ligusticifolia* (western virgins-bower) | P | F | P |
| *Cornus stolonifera* (red-osier dogwood) | F | F | P |
| *Crataegus douglasii* (black hawthorn) | F | F | P |
| *Crataegus succulenta* (succulent hawthorn) | F | F | P |
| *Elaeagnus commutata* (silverberry) | P | F | P |
| *Kalmia microphylla* (small-leaved laurel) | P | P | P |
| *Lonicera utahensis* (Utah honeysuckle) | F | F | P |
| *Potentilla fruticosa* (shrubby cinquefoil) | P | F | P |
| *Prunus americana* (wild plum) | F | F | P |
| *Prunus virginiana* (common chokecherry) | F | G | P |
| *Rhus aromatica* (fragrant sumac) | P | F | P |
| *Ribes odoratum* (buffalo currant) | F | F | P |
| *Ribes setosum* (Missouri gooseberry) | P | P | P |
| *Rosa acicularis* (prickly rose) | F | F | P |
| *Rosa woodsii* (woods rose) | F | F | P |
| *Rubus parviflorus* (thimbleberry) | P | F | P |
| *Salix bebbiana* (Bebb willow) | G | G | G |
| *Salix boothii* (Booth willow) | F | F | F |
| *Salix drummondiana* (Drummond willow) | P | F | P |
| *Salix exigua* (sandbar willow) | F | F | F |
| *Salix geyeriana* (Geyer willow) | F | G | G |
| *Salix lasiandra* (Pacific willow) | F | F | F |
| *Salix lutea* (yellow willow) | F | G | G |
| *Sarcobatus vermiculatus* (black greasewood) | F | F | F |
| *Shepherdia argentea* (thorny buffaloberry) | P | F | P |
| *Shepherdia canadensis* (Canada buffaloberry) | P | F | P |
| *Spiraea betulifolia* (shiny-leaf spiraea) | P | F | P |
| *Symphoricarpos albus* (common snowberry) | F | F | P |
| *Symphoricarpos occidentalis* (western snowberry) | F | F | P |
| *Vaccinium cespitosum* (dwarf huckleberry) | P | F | P |
| *Vaccinium scoparium* (whortleberry) | P | F | P |
| **Graminoids** | | | |
| *Agropyron caninum* (bearded wheatgrass) | G | G | G |
| *Agropyron repens* (quackgrass) | G | F | G |
| *Agropyron smithii* (western wheatgrass) | G | G | G |
| *Agrostis stolonifera* (redtop) | F | F | F |
| *Beckmannia syzigachne* (American sloughgrass) | G | F | G |
| *Bromus anomalus* (nodding brome) | G | F | G |
| *Bromus ciliatus* (fringed brome) | G | G | G |
| *Bromus inermis* (smooth brome) | G | G | G |
| *Calamagrostis canadensis* (bluejoint reedgrass) | G | F | G |
| *Calamagrostis rubescens* (pinegrass) | F | P | F |

## APPENDIX A-1 (cont.)

| Species | Cattle Forage Palatability | Sheep Forage Palatability | Horse Forage Palatability |
|---|---|---|---|
| *Calamagrostis stricta* (narrow-spiked reedgrass) | G | F | G |
| *Carex aquatilis* (water sedge) | G | G | G |
| *Carex atherodes* (awned sedge) | G | F | G |
| *Carex lanuginosa* (woolly sedge) | G | G | F |
| *Carex lasiocarpa* (slender sedge) | P | P | P |
| *Carex microptera* (small-winged sedge) | F | P | F |
| *Carex nebrascensis* (Nebraska sedge) | G | F | G |
| *Carex nigricans* (black alpine sedge) | F | F | F |
| *Carex rostrata* (beaked sedge) | F | F | G |
| *Carex scopulorum* (Holm's Rocky Mountain sedge) | F | F | F |
| *Carex simulata* (short-beaked sedge) | P | P | P |
| *Carex vesicaria* (inflated sedge) | F | F | F |
| *Deschampsia cespitosa* (tufted hairgrass) | G | F | G |
| *Distichlis spicata* (inland saltgrass) | F | F | G |
| *Eleocharis acicularis* (needle spike-rush) | F | F | F |
| *Eleocharis palustris* (common spikesedge) | P | P | P |
| *Eleocharis pauciflora* (few-flowered spike-rush) | P | P | P |
| *Elymus canadensis* (Canada wildrye) | F | F | G |
| *Elymus cinereus* (basin wildrye) | G | F | G |
| *Elymus glaucus* (blue wildrye) | G | F | G |
| *Festuca idahoensis* (Idaho fescue) | G | G | G |
| *Glyceria borealis* (northern mannagrass) | G | G | G |
| *Glyceria grandis* (American mannagrass) | G | G | G |
| *Glyceria striata* (fowl mannagrass) | G | G | G |
| *Hordeum jubatum* (foxtail barley) | P | F | F |
| *Juncus balticus* (Baltic rush) | F | P | F |
| *Phalaris arundinacea* (reed canarygrass) | G | G | G |
| *Phleum alpinum* (alpine timothy) | G | G | G |
| *Phleum pratense* (common timothy) | G | G | G |
| *Phragmites australis* (common reed) | F | P | F |
| *Poa palustris* (fowl bluegrass) | F | F | F |
| *Poa pratensis* (Kentucky bluegrass) | G | G | G |
| *Puccinellia nuttalliana* (Nuttall alkaligrass) | F | F | F |
| *Scirpus acutus* (hardstem bulrush) | F | P | F |
| *Scirpus maritimus* (alkali bulrush) | F | F | F |
| *Scirpus pungens* (sharp bulrush) | F | F | F |
| *Scirpus validus* (softstem bulrush) | F | P | P |
| *Spartina gracilis* (alkali cordgrass) | F | F | F |
| *Spartina pectinata* (prairie cordgrass) | G | F | F |
| *Stipa occidentalis* (western needlegrass) | G | F | G |
| *Trisetum spicatum* (spike trisetum) | F | F | G |
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | P | F | P |
| *Actaea rubra* (baneberry) | P | F | P |
| *Arnica cordifolia* (heart-leaf arnica) | P | F | P |

## APPENDIX A-1 (cont.)

| Species | Cattle Forage Palatability | Sheep Forage Palatability | Horse Forage Palatability |
|---|---|---|---|
| *Aster foliaceus* (leafy aster) | F | G | G |
| *Cirsium arvense* (Canada thistle) | P | P | P |
| *Epilobium angustifolium* (fireweed) | F | G | F |
| *Equisetum arvense* (field horsetail)P | P | P | |
| *Equisetum fluviatile* (water horsetail) | P | P | P |
| *Equisetum laevigatum* (smooth scouring-rush) | P | P | P |
| *Fragaria virginiana* (Virginia strawberry) | P | G | P |
| *Galium boreale* (northern bedstraw) | P | F | P |
| *Geranium richardsonii* (white geranium) | F | G | F |
| *Geranium viscosissimum* (sticky geranium) | F | G | F |
| *Geum triflorum* (old man's whiskers) | P | F | P |
| *Glycyrrhiza lepidota* (American licorice) | P | F | P |
| *Heracleum lanatum* (cow-parsnip) | G | G | G |
| *Melilotus alba* (white sweetclover) | G | G | G |
| *Melilotus officinalis* (yellow sweet-clover) | G | G | G |
| *Mertensia ciliata* (mountain bluebell) | F | G | F |
| *Osmorhiza chilensis* (mountain sweet-cicely) | F | F | F |
| *Pedicularis groenlandica* (elephant's head) | P | F | P |
| *Polygonum amphibium* (water smartweed) | F | F | F |
| *Polygonum bistortoides* (American bistort) | P | F | P |
| *Polygonum lapathifolium* (willow weed) | P | P | P |
| *Potentilla anserina* (common silverweed) | F | F | P |
| *Potentilla gracilis* (slender cinquefoil) | P | F | P |
| *Senecio triangularis* (arrowleaf groundsel) | F | G | F |
| *Smilacina stellata* (starry Solomon-plume) | P | F | P |
| *Solidago canadensis* (Canada goldenrod) | P | P | P |
| *Taraxacum officinale* (common dandelion) | F | G | G |
| *Thalictrum occidentale* (western meadowrue) | P | F | P |
| *Trifolium repens* (white clover) | G | G | G |
| *Triglochin maritimum* (seaside arrow-grass) | P | P | P |
| *Typha angustifolia* (hybrid cattail) | P | P | P |
| *Typha latifolia* (common cattail) | P | P | P |
| *Urtica dioica* (stinging nettle) | P | F | P |
| *Viola adunca* (hook violet) | F | G | P |

## APPENDIX A-2. Wetland status, energy value, and protein value (Hansen and others 1995)

**Wetland status** refers to to plant species that have exhibited and ability to develop to maturity and reproduce in an environment where all or portions of the soil within the root zone become, periodically or continuously, saturated or inundated during the growing season. The ability to grow and reproduce in wetlands is due to morphological and/or physiological adaptations and/or reproductive strategies of the plant (Reed 1988a; 1988b). Categories are as follows: **OBL**

(Obligate Wetland) refers to species that almost always occur (estimated probability greater than 99%) under natural conditions in wetlands; **FACW** (Facultative Wetland) refers to species that usually occur in wetlands (estimated probability 67-99%), but is occasionally found in non-wetlands; **FAC** (Facultative) refers to species that are equally likely to occur in wetlands or non-wetlands (estimated probability 34-66%); **FACU** (Facultative Upland) refers to species that usually occur in non-wetlands (estimated probability 67-99%), but is occasionally found in wetlands (estimated probability 1-33%). The category for the species listed above where obtained from Reed (1988a, 1988b); however, for some species no information was available. In those instances, the authors used professional experience using information available for species with similar morphological or physiological characteristics.

**Energy value** refers to the usable energy a plant provides to livestock or wildlife during the period from flowering or early seed formation to the following spring, within a ***comparable life form*** (e.g., a grass is compared to other grasses). **H** (High) = retains usable energy value well during fall and winter (e.g., cures well and/or retains leaves); **M** (Medium) = retains usable energy value moderately well during fall and winter; **L** (Low) = poor retention of usable energy value during fall and winter (e.g., cures poorly and/or drops leaves).

**Protein value** refers to the digestible protein a plant provides to livestock or wildlife during the period from flowering or early seed formation to the following spring, within a comparable life form (e.g., a grass is compared to other grasses). **H** (High) = retains digestible protein value well during fall and winter (e.g., cures well and/or retains leaves); **M** (Medium) = retains digestible protein value moderately well during fall and winter; **L** (Low) = poor retention of digestible protein value during fall and winter (e.g., cures poorly and/or drops leaves).

| Species | Wetland Status | Energy Value | Protein Value |
|---|---|---|---|
| **Trees** | | | |
| *Abies lasiocarpa* (subalpine fir) | FACU | M | L |
| *Acer negundo* (box-elder) | FACW | M | L |
| *Elaeagnus angustifolia* (Russian olive) | FACW | M | M |
| *Fraxinus pennsylvanica* (green ash) | FACW | M | L |
| *Juniperus scopulorum* (Rocky Mountain juniper) | FACU | H | M |
| *Picea engelmannii* (Engelmann spruce) | FAC | M | L |
| *Picea glauca* (white spruce) | FAC | M | L |
| *Pinus contorta* (lodgepole pine) | FAC | M | L |
| *Pinus ponderosa* (ponderosa pine) | FACU | M | L |
| *Populus angustifolia* (narrowleaf cottonwood) | FACW | M | M |
| *Populus deltoides* (Great Plains cottonwood) | FACW | M | M |
| *Populus tremuloides* (quaking aspen) | FAC | M | M |
| *Populus trichocarpa* (black cottonwood) | FACW | M | M |
| *Pseudotsuga menziesii* (Douglas fir) | FACU | M | M |
| *Salix amygdaloides* (peach-leaf willow) | FACW | M | L |
| **Shrubs** | | | |
| *Acer glabrum* (Rocky Mountain maple) | FAC | M | L |
| *Alnus incana* (mountain alder) | FACW | M | L |
| *Amelanchier alnifolia* (western serviceberry) | FACU | M | M |
| *Artemisia cana* (silver sagebrush) | FAC | M | M |
| *Berberis repens* (creeping Oregongrape) | FAC | M | M |
| *Betula glandulosa* (bog birch) | OBL | L | L |

## APPENDIX A-2 (cont.)

| Species | Wetland Status | Energy Value | Protein Value |
|---|---|---|---|
| *Betula occidentalis* (water birch) | FACW | M | M |
| *Clĕmatis ligusticifolia* (western virgins-bower) | FACU | L | L |
| *Cornus stolonifera* (red-osier dogwood) | FACW | M | L |
| *Crataegus douglasii* (black hawthorn) | FAC | M | M |
| *Crataegus succulenta* (succulent hawthorn) | FAC | M | M |
| *Elaeagnus commutata* (silverberry) | FAC | M | M |
| *Kalmia microphylla* (small-leaved laurel) | FACW | — | — |
| *Ledum glandulosum* (Labrador tea) | FACW | M | M |
| *Lonicera utahensis* (Utah honeysuckle) | FACU | L | L |
| *Potentilla fruticosa* (shrubby cinquefoil) | FAC | M | L |
| *Prunus americana* (wild plum) | FACU | M | M |
| *Prunus virginiana* (common chokecherry) | FACU | H | M |
| *Rhus aromatica* (fragrant sumac) | FACU | M | L |
| *Ribes lacustre* (swamp currant) | FAC | M | L |
| *Ribes odoratum* (buffalo currant) | FACU | L | L |
| *Ribes setosum* (Missouri gooseberry) | — | L | L |
| *Rosa acicularis* (prickly rose) | FACU | L | L |
| *Rosa woodsii* (woods rose) | FACU | L | L |
| *Rubus parviflorus* (thimbleberry) | FACU | L | L |
| *Salix bebbiana* (Bebb willow) | FACW | M | L |
| *Salix boothii* (Booth willow) | OBL | M | L |
| *Salix brachycarpa* (short-fruited willow) | FACW | M | L |
| *Salix candida* (hoary willow) | OBL | M | L |
| *Salix commutata* (undergreen willow) | OBL | M | L |
| *Salix drummondiana* (Drummond willow) | FACW | M | L |
| *Salix exigua* (sandbar willow) | OBL | M | L |
| *Salix geyeriana* (Geyer willow) | FACW | M | L |
| *Salix lasiandra* (Pacific willow) | FACW | M | L |
| *Salix lutea* (yellow willow) | OBL | M | L |
| *Salix planifolia* (planeleaf willow) | OBL | M | L |
| *Salix wolfii* (Wolf's willow) | FACW | M | L |
| *Sarcobatus vermiculatus* (black greasewood) | FACU | M | M |
| *Shepherdia argentea* (thorny buffaloberry) | FACU | M | L |
| *Shepherdia canadensis* (Canada buffaloberry) | — | M | L |
| *Symphoricarpos albus* (common snowberry) | FACU | M | M |
| *Symphoricarpos occidentalis* (western snowberry) | FACU | M | M |
| *Vaccinium cespitosum* (dwarf huckleberry) | FACU | L | M |
| *Vaccinium scoparium* (whortleberry) | FACU | L | M |
| **Graminoids** | | | |
| *Agropyron caninum* (bearded wheatgrass) | FAC | H | M |
| *Agropyron repens* (quackgrass) | FACU | M | L |
| *Agropyron smithii* (western wheatgrass) | FACU | H | M |
| *Agrostis stolonifera* (redtop) | FACW | M | L |
| *Beckmannia syzigachne* (American sloughgrass) | OBL | L | L |
| *Bromus anomalus* (nodding brome) | — | M | L |
| *Bromus ciliatus* (fringed brome) | FAC | M | L |

## APPENDIX A-2 (cont.)

| Species | Wetland Status | Energy Value | Protein Value |
|---|---|---|---|
| *Bromus inermis* (smooth brome) | FAC | M | L |
| *Calamagrostis canadensis* (bluejoint reedgrass) | FACW | M | L |
| *Calamagrostis rubescens* (pinegrass) | — | M | L |
| *Calamagrostis stricta* (narrow-spiked reedgrass) | FACW | M | L |
| *Carex aquatilis* (water sedge) | OBL | M | M |
| *Carex atherodes* (awned sedge) | OBL | M | L |
| *Carex buxbaumii* (Buxbaum's sedge) | OBL | M | M |
| *Carex lanuginosa* (woolly sedge) | OBL | M | L |
| *Carex lasiocarpa* (slender sedge) | OBL | M | M |
| *Carex lenticularis* (lentil-fruit sedge) | FACW | M | M |
| *Carex limosa* (mud sedge) | OBL | M | M |
| *Carex microptera* (small-winged sedge) | FAC | M | M |
| *Carex nebrascensis* (Nebraska sedge) | OBL | H | M |
| *Carex nigricans* (black alpine sedge) | FACW | M | M |
| *Carex rostrata* (beaked sedge) | OBL | M | L |
| *Carex scopulorum* (Holm's Rocky Mountain sedge) | FACW | M | M |
| *Carex simulata* (short-beaked sedge) | OBL | M | M |
| *Carex vesicaria* (inflated sedge) | OBL | M | L |
| *Deschampsia cespitosa* (tufted hairgrass) | FACW | M | L |
| *Distichlis spicata* (inland saltgrass) | FACW | M | L |
| *Eleocharis acicularis* (needle spike-rush) | OBL | M | L |
| *Eleocharis palustris* (common spikesedge) | OBL | M | L |
| *Eleocharis pauciflora* (few-flowered spike-rush) | OBL | M | L |
| *Elymus canadensis* (Canada wildrye) | FAC | H | L |
| *Elymus cinereus* (basin wildrye) | FACU | H | L |
| *Elymus glaucus* (blue wildrye) | FACU | H | L |
| *Festuca idahoensis* (Idaho fescue) | — | H | M |
| *Glyceria borealis* (northern mannagrass) | OBL | M | L |
| *Glyceria grandis* (American mannagrass) | FACW | M | L |
| *Glyceria striata* (fowl mannagrass) | OBL | M | L |
| *Hordeum jubatum* (foxtail barley) | FAC | M | L |
| *Juncus balticus* (Baltic rush) | OBL | M | L |
| *Phalaris arundinacea* (reed canarygrass) | FACW | M | L |
| *Phleum alpinum* (alpine timothy) | FAC | H | L |
| *Phleum pratense* (common timothy) | FACU | M | L |
| *Phragmites australis* (common reed) | FACW | M | L |
| *Poa palustris* (fowl bluegrass) | FAC | M | L |
| *Poa pratensis* (Kentucky bluegrass) | FACU | M | L |
| *Puccinellia nuttalliana* (Nuttall alkaligrass) | OBL | M | L |
| *Scirpus acutus* (hardstem bulrush) | OBL | M | L |
| *Scirpus maritimus* (alkali bulrush) | OBL | M | L |
| *Scirpus pungens* (sharp bulrush) | OBL | M | L |
| *Scirpus validus* (softstem bulrush) | OBL | L | L |
| *Spartina gracilis* (alkali cordgrass) | FACW | M | L |
| *Spartina pectinata* (prairie cordgrass) | OBL | M | L |
| *Trisetum spicatum* (spike trisetum) | FACU | M | L |

## APPENDIX A-2 (cont.)

| Species | Wetland Status | Energy Value | Protein Value |
|---|---|---|---|
| **Forbs** | | | |
| *Achillea millefolium* (common yarrow) | FACU | L | L |
| *Actaea rubra* (baneberry) | — | L | L |
| *Aralia nudicaulis* (wild sarsaparilla) | FACU | L | L |
| *Arnica cordifolia* (heart-leaf arnica) | — | L | L |
| *Aster conspicuus* (showy aster) | — | L | L |
| *Aster foliaceus* (leafy aster) | FACW | L | L |
| *Caltha leptosepala* (elkslip marshmarigold) | OBL | L | L |
| *Cirsium arvense* (Canada thistle) | FACU | L | L |
| *Cirsium scariosum* (elk thistle) | — | L | L |
| *Clintonia uniflora* (queen's cup) | FAC | L | L |
| *Epilobium angustifolium* (fireweed) | FACU | L | L |
| *Epilobium ciliatum* (common willow-herb) | FACW | L | L |
| *Equisetum arvense* (field horsetail) | FAC | L | L |
| *Equisetum fluviatile* (water horsetail) | OBL | L | L |
| *Equisetum laevigatum* (smooth scouring-rush) | FACW | L | L |
| *Fragaria virginiana* (Virginia strawberry) | — | L | L |
| *Galium boreale* (northern bedstraw) | FACU | L | L |
| *Galium trifidum* (small bedstraw) | FACW | L | L |
| *Galium triflorum* (sweetscented bedstraw) | FACU | L | L |
| *Geranium richardsonii* (white geranium) | FACU | L | L |
| *Geranium viscosissimum* (sticky geranium) | FAC | L | L |
| *Geum macrophyllum* (large-leaved avens) | FACW | L | L |
| *Geum triflorum* (old man's whiskers) | FACU | L | L |
| *Glycyrrhiza lepidota* (American licorice) | FAC | M | L |
| *Heracleum lanatum* (cow-parsnip) | FAC | L | L |
| *Melilotus alba* (white sweetclover) | FACU | M | L |
| *Melilotus officinalis* (yellow sweet-clover) | FACU | M | L |
| *Mertensia ciliata* (mountain bluebell) | FACW | L | L |
| *Osmorhiza occidentalis* (western sweet-cicely) | FAC | L | L |
| *Pedicularis groenlandica* (elephant's head) | OBL | L | L |
| *Polygonum amphibium* (water smartweed) | OBL | L | L |
| *Polygonum bistortoides* (American bistort) | FACW | L | L |
| *Polygonum lapathifolium* (willow weed) | FACW | L | L |
| *Potentilla anserina* (common silverweed) | OBL | L | L |
| *Potentilla diversifolia* (diverse-leaved cinquefoil) | FACU | L | L |
| *Potentilla gracilis* (slender cinquefoil) | FAC | L | L |
| *Potentilla norvegica* (Norwegian cinquefoil) | FAC | L | L |
| *Potentilla palustris* (purple cinquefoil) | OBL | L | L |
| *Sagittaria cuneata* (arumleaf arrowhead) | OBL | L | L |
| *Salicornia rubra* (red glasswort) | OBL | L | L |
| *Senecio hydrophilus* (alkali-marsh butterweed) | OBL | L | L |
| *Senecio triangularis* (arrowleaf groundsel) | FACW | L | L |
| *Smilacina stellata* (starry Solomon-plume) | FAC | L | L |
| *Solidago canadensis* (Canada goldenrod) | FACU | L | L |
| *Streptopus amplexifolius* (clasping-leaved twisted stalk) | FAC | L | L |
| *Taraxacum officinale* (common dandelion) | FACU | L | L |

## APPENDIX A-2 (cont.)

| Species | Wetland Status | Energy Value | Protein Value |
|---|---|---|---|
| *Thalictrum occidentale* (western meadowrue) | FACU | L | L |
| *Trifolium repens* (white clover) | FACU | L | L |
| *Triglochin maritimum* (seaside arrow-grass) | OBL | L | L |
| *Typha angustifolia* (hybrid cattail) | OBL | M | L |
| *Typha latifolia* (common cattail) | OBL | L | L |
| *Urtica dioica* (stinging nettle) | FAC | L | L |
| *Viola adunca* (hook violet) | FAC | L | L |
| *Viola canadensis* (Canada violet) | FAC | L | L |
| *Viola orbiculata* (round-leaved violet) | — | L | L |

## APPENDIX A-3. Thermal or feeding cover values for elk, mule deer, and whitetail deer(Hansen and others 1995)

**Thermal or feeding cover value** refers to the degree to which a plant provides environmental protection (e.g., thermal or feeding cover), during one or more seasons. G (Good) = readily utilized for cover when available; F (Fair) = moderately utilized for cover when available; P (Poor) = rarely or never utilized for cover when available.

| Species | Elk Cover Value | Mule Deer Cover Value | Whitetail Deer Cover Value |
|---|---|---|---|
| **Trees** | | | |
| *Abies lasiocarpa* (subalpine fir) | F | F | F |
| *Acer negundo* (box-elder) | P | G | G |
| *Elaeagnus angustifolia* (Russian olive) | F | F | G |
| *Fraxinus pennsylvanica* (green ash) | F | F | G |
| *Juniperus scopulorum* (Rocky Mountain juniper) | G | G | G |
| *Picea engelmannii* (Engelmann spruce) | G | G | G |
| *Picea glauca* (white spruce) | G | G | G |
| *Pinus contorta* (lodgepole pine) | G | G | G |
| *Pinus ponderosa* (ponderosa pine) | G | G | G |
| *Populus angustifolia* (narrowleaf cottonwood) | F | F | F |
| *Populus deltoides* (Great Plains cottonwood) | F | F | G |
| *Populus tremuloides* (quaking aspen) | G | G | G |
| *Populus trichocarpa* (black cottonwood) | F | F | G |
| *Pseudotsuga menziesii* (Douglas fir) | G | G | G |
| *Salix amygdaloides* (peach-leaf willow) | F | G | G |
| **Shrubs** | | | |
| *Acer glabrum* (Rocky Mountain maple) | F | F | F |
| *Alnus incana* (mountain alder) | F | F | F |
| *Amelanchier alnifolia* (western serviceberry) | P | F | F |

## APPENDIX A-3 (cont.)

| Species | Elk Cover Value | Mule Deer Cover Value | Whitetail Deer Cover Value |
|---|---|---|---|
| *Artemisia cana* (silver sagebrush) | P | F | P |
| *Betula glandulosa* (bog birch) | P | P | P |
| *Betula occidentalis* (water birch) | F | G | G |
| *Cornus stolonifera* (red-osier dogwood) | F | F | F |
| *Crataegus douglasii* (black hawthorn) | F | G | G |
| *Crataegus succulenta* (succulent hawthorn) | F | G | G |
| *Elaeagnus commutata* (silverberry) | F | F | F |
| *Kalmia microphylla* (small-leaved laurel) | F | F | F |
| *Lonicera utahensis* (Utah honeysuckle) | F | F | F |
| *Potentilla fruticosa* (shrubby cinquefoil) | P | P | P |
| *Prunus americana* (wild plum) | P | F | G |
| *Prunus virginiana* (common chokecherry) | F | G | G |
| *Rhus aromatica* (fragrant sumac) | F | F | F |
| *Ribes lacustre* (swamp currant) | P | F | F |
| *Ribes odoratum* (buffalo currant) | F | G | G |
| *Ribes setosum* (Missouri gooseberry) | P | F | F |
| *Rosa acicularis* (prickly rose) | F | G | G |
| *Rosa woodsii* (woods rose) | F | G | G |
| *Salix bebbiana* (Bebb willow) | G | G | G |
| *Salix boothii* (Booth willow) | G | G | G |
| *Salix drummondiana* (Drummond willow) | G | G | G |
| *Salix exigua* (sandbar willow) | G | G | G |
| *Salix geyeriana* (Geyer willow) | G | G | G |
| *Salix lasiandra* (Pacific willow) | G | G | G |
| *Salix lutea* (yellow willow) | G | G | G |
| *Salix planifolia* (planeleaf willow) | F | F | F |
| *Salix wolfii* (Wolf's willow) | F | F | F |
| *Sarcobatus vermiculatus* (black greasewood) | P | F | F |
| *Shepherdia argentea* (thorny buffaloberry) | G | G | G |
| *Shepherdia canadensis* (Canada buffaloberry) | P | F | F |
| *Spiraea betulifolia* (shiny-leaf spiraea) | P | P | P |
| *Symphoricarpos albus* (common snowberry) | P | F | F |
| *Symphoricarpos occidentalis* (western snowberry) | P | F | F |
| *Vaccinium cespitosum* (dwarf huckleberry) | P | P | P |
| *Vaccinium scoparium* (whortleberry) | P | P | P |
| **Graminoids**—in general, provide poor cover except for the following species: | | | |
| *Phalaris arundinacea* (reed canarygrass) | P | G | G |
| *Phragmites australis* (common reed) | F | G | G |
| *Scirpus acutus* (hardstem bulrush) | P | F | P |
| *Scirpus pungens* (sharp bulrush) | P | F | F |
| *Scirpus validus* (softstem bulrush) | P | G | G |
| *Spartina gracilis* (alkali cordgrass) | P | F | G |
| *Spartina pectinata* (prairie cordgrass) | P | F | G |

## APPENDIX A-3 (cont.)

| Species | Elk Cover Value | Mule Deer Cover Value | Whitetail Deer Cover Value |
|---|---|---|---|
| **Forbs**—in general, provide poor cover except for the following species: | | | |
| *Melilotus alba* (white sweetclover) | P | F | F |
| *Melilotus officinalis* (yellow sweet-clover) | P | F | F |
| *Typha angustifolia* (hybrid cattail) | P | F | G |
| *Typha latifolia* (common cattail) | P | F | G |

## APPENDIX A-4. Thermal or feeding cover values for upland game birds, waterfowl, small non-game birds, and small mammals (Hansen and others 1995)

**Thermal or feeding cover value** refers to the degree to which a plant provides environmental protection (e.g., thermal, nesting, brooding, or feeding cover), during one or more seasons. **G** (Good) = readily utilized for cover when available; **F** (Fair) = moderately utilized for cover when available; **P** (Poor) = rarely or never utilized for cover when available.

| Species | Upland Game Bird Cover Value | Waterfowl Cover Value | Small Non-game Bird Cover Value | Small Mammal Cover Value |
|---|---|---|---|---|
| **Trees** | | | | |
| *Abies lasiocarpa* (subalpine fir) | G | P | F | G |
| *Acer negundo* (box-elder) | G | P | G | F |
| *Elaeagnus angustifolia* (Russian olive) | G | F | G | F |
| *Fraxinus pennsylvanica* (green ash) | F | F | G | G |
| *Juniperus scopulorum* (Rocky Mountain juniper) | F | F | F | F |
| *Picea engelmannii* (Engelmann spruce) | G | P | G | G |
| *Picea glauca* (white spruce) | G | P | G | G |
| *Pinus contorta* (lodgepole pine) | G | P | G | G |
| *Pinus ponderosa* (ponderosa pine) | G | P | G | G |
| *Populus angustifolia* (narrowleaf cottonwood) | F | F | G | G |
| *Populus deltoides* (Great Plains cottonwood) | F | F | F | P |
| *Populus tremuloides* (quaking aspen) | G | F | G | G |
| *Populus trichocarpa* (black cottonwood) | F | F | G | G |
| *Pseudotsuga menziesii* (Douglas fir) | G | P | G | G |
| *Salix amygdaloides* (peach-leaf willow) | G | F | G | G |
| **Shrubs** | | | | |
| *Acer glabrum* (Rocky Mountain maple) | F | F | F | F |
| *Alnus incana* (mountain alder) | F | G | F | F |
| *Amelanchier alnifolia* (western serviceberry) | F | G | F | F |
| *Artemisia cana* (silver sagebrush) | F | G | G | G |

**APPENDIX A-4 (cont.)**

| Species | Upland Game Bird Cover Value | Waterfowl Cover Value | Small Non-game Bird Cover Value | Small Mammal Cover Value |
|---|---|---|---|---|
| *Betula glandulosa* (bog birch) | F | G | F | F |
| *Betula occidentalis* (water birch) | G | G | G | G |
| *Cornus stolonifera* (red-osier dogwood) | F | F | F | F |
| *Crataegus douglasii* (black hawthorn) | F | F | F | F |
| *Crataegus succulenta* (succulent hawthorn) | F | F | F | F |
| *Elaeagnus commutata* (silverberry) | F | G | F | F |
| *Kalmia microphylla* (small-leaved laurel) | F | P | F | F |
| *Lonicera utahensis* (Utah honeysuckle) | F | P | F | F |
| *Potentilla fruticosa* (shrubby cinquefoil) | F | P | P | P |
| *Prunus americana* (wild plum) | G | G | G | G |
| *Prunus virginiana* (common chokecherry) | G | G | G | G |
| *Rhus aromatica* (fragrant sumac) | F | G | F | F |
| *Ribes lacustre* (swamp currant) | G | G | G | G |
| *Ribes odoratum* (buffalo currant) | G | G | G | G |
| *Ribes setosum* (Missouri gooseberry) | G | G | G | G |
| *Rosa acicularis* (prickly rose) | F | G | F | F |
| *Rosa woodsii* (woods rose) | F | G | F | F |
| *Salix bebbiana* (Bebb willow) | G | F | G | G |
| *Salix boothii* (Booth willow) | G | F | G | G |
| *Salix drummondiana* (Drummond willow) | G | F | G | G |
| *Salix exigua* (sandbar willow) | G | G | G | G |
| *Salix geyeriana* (Geyer willow) | G | F | G | G |
| *Salix lasiandra* (Pacific willow) | G | F | G | G |
| *Salix lutea* (yellow willow) | G | F | G | G |
| *Salix planifolia* (planeleaf willow) | F | F | F | F |
| *Salix wolfii* (Wolf's willow) | F | F | F | F |
| *Sarcobatus vermiculatus* (black greasewood) | F | G | G | G |
| *Shepherdia argentea* (thorny buffaloberry) | G | G | G | F |
| *Shepherdia canadensis* (Canada buffaloberry) | G | G | G | F |
| *Spiraea betulifolia* (shiny-leaf spiraea) | P | G | P | P |
| *Symphoricarpos albus* (common snowberry) | G | G | G | G |
| *Symphoricarpos occidentalis* (western snowberry) | G | G | G | G |
| *Vaccinium cespitosum* (dwarf huckleberry) | P | G | P | P |
| *Vaccinium scoparium* (whortleberry) | P | G | P | P |
| **Graminoids** | | | | |
| *Agropyron caninum* (bearded wheatgrass) | G | G | F | F |
| *Agropyron repens* (quackgrass) | G | G | F | G |
| *Agropyron smithii* (western wheatgrass) | G | G | G | G |
| *Agrostis stolonifera* (redtop) | G | G | F | F |
| *Bromus inermis* (smooth brome) | G | G | G | F |
| *Calamagrostis canadensis* (bluejoint reedgrass) | P | G | P | P |
| *Calamagrostis rubescens* (pinegrass) | F | G | P | P |
| *Carex aquatilis* (water sedge) | P | F | F | F |
| *Carex lanuginosa* (woolly sedge) | P | F | F | F |

## APPENDIX A-4 (cont.)

| Species | Upland Game Bird Cover Value | Waterfowl Cover Value | Small Non-game Bird Cover Value | Small Mammal Cover Value |
|---|---|---|---|---|
| *Carex lasiocarpa* (slender sedge) | P | F | F | F |
| *Carex lenticularis* (lentil-fruit sedge) | P | F | F | F |
| *Carex nebrascensis* (Nebraska sedge) | P | F | F | G |
| *Carex rostrata* (beaked sedge) | P | P | F | F |
| *Carex vesicaria* (inflated sedge) | P | F | F | F |
| *Deschampsia cespitosa* (tufted hairgrass) | P | G | P | P |
| *Distichlis spicata* (inland saltgrass) | P | P | P | P |
| *Elymus canadensis* (Canada wildrye) | F | G | P | P |
| *Elymus cinereus* (basin wildrye) | F | G | P | P |
| *Glyceria borealis* (northern mannagrass) | F | G | G | G |
| *Glyceria grandis* (American mannagrass) | F | G | G | G |
| *Glyceria striata* (fowl mannagrass) | F | G | G | G |
| *Hordeum jubatum* (foxtail barley) | P | G | P | P |
| *Juncus balticus* (Baltic rush) | F | G | F | F |
| *Phalaris arundinacea* (reed canarygrass) | F | G | F | F |
| *Phleum alpinum* (alpine timothy) | P | F | P | P |
| *Phleum pratense* (common timothy) | F | G | F | F |
| *Phragmites australis* (common reed) | G | G | G | G |
| *Eleocharis acicularis* (needle spike-rush) | F | G | F | F |
| *Eleocharis palustris* (common spikesedge) | F | G | F | F |
| *Eleocharis pauciflora* (few-flowered spike-rush) | F | G | F | F |
| *Poa pratensis* (Kentucky bluegrass) | G | G | G | G |
| *Puccinellia nuttalliana* (Nuttall alkaligrass) | F | G | F | G |
| *Scirpus acutus* (hardstem bulrush) | G | G | G | F |
| *Scirpus maritimus* (alkali bulrush) | G | G | F | F |
| *Scirpus pungens* (sharp bulrush) | G | G | G | G |
| *Scirpus validus* (softstem bulrush) | G | G | G | G |
| *Spartina gracilis* (alkali cordgrass) | G | G | G | G |
| *Spartina pectinata* (prairie cordgrass) | G | G | G | G |
| *Trisetum spicatum* (spike trisetum) | P | P | P | P |
| *Trisetum wolfii* (Wolf's trisetum) | P | P | P | P |
| **Forbs**—most forbs are generally poor to fair except for the following species: | | | | |
| *Melilotus alba* (white sweetclover) | G | G | G | G |
| *Melilotus officinalis* (yellow sweet-clover) | G | G | G | G |
| *Typha angustifolia* (hybrid cattail) | G | G | G | F |
| *Typha latifolia* (common cattail) | G | G | G | F |

# APPENDIX A-5. Food value or degree of use for elk, mule deer, whitetail deer, and antelope (Hansen and others 1995)

**Food value** refers to the relish and degree of use shown by a wildlife species for a plant or plant part, as well as the plant's availability throughout its range. **G** (Good) = readily to moderately available in the plant's range and consumed to a high degree; **F** (Fair) = readily to moderately available in the plant's range but consumed only to a moderate degree; **P** (Poor) = available but the plant is consumed to only a small degree or not at all.

| Species | Elk Food Value | Mule Deer Food Value | Whitetail Deer Food Value | Antelope Food Value |
|---|---|---|---|---|
| **Trees** | | | | |
| *Abies lasiocarpa* (subalpine fir) | P | P | P | P |
| *Acer negundo* (box-elder) | F | P | F | P |
| *Elaeagnus angustifolia* (Russian olive) | F | P | F | F |
| *Fraxinus pennsylvanica* (green ash) | F | F | F | P |
| *Juniperus scopulorum* (Rocky Mountain juniper) | P | P | P | P |
| *Picea engelmannii* (Engelmann spruce) | P | P | P | P |
| *Picea glauca* (white spruce) | P | P | P | P |
| *Pinus contorta* (lodgepole pine) | P | P | P | P |
| *Pinus ponderosa* (ponderosa pine) | P | P | P | P |
| *Populus angustifolia* (narrowleaf cottonwood) | P | P | P | P |
| *Populus deltoides* (Great Plains cottonwood) | P | P | F | P |
| *Populus tremuloides* (quaking aspen) | F | F | F | P |
| *Populus trichocarpa* (black cottonwood) | P | P | P | P |
| *Pseudotsuga menziesii* (Douglas fir) | P | F | P | P |
| *Salix amygdaloides* (peach-leaf willow) | G | G | F | P |
| **Shrubs** | | | | |
| *Acer glabrum* (Rocky Mountain maple) | F | G | F | P |
| *Alnus incana* (mountain alder) | P | P | P | P |
| *Amelanchier alnifolia* (western serviceberry) | F | G | G | G |
| *Arctostaphylos uva-ursi* (kinnikinnick) | F | F | F | P |
| *Artemisia cana* (silver sagebrush) | F | F | F | P |
| *Betula glandulosa* (bog birch) | P | P | P | P |
| *Betula occidentalis* (water birch) | F | P | F | P |
| *Cornus stolonifera* (red-osier dogwood) | P | G | G | F |
| *Crataegus douglasii* (black hawthorn) | F | F | F | F |
| *Crataegus succulenta* (succulent hawthorn) | F | F | F | F |
| *Elaeagnus commutata* (silverberry) | G | P | P | F |
| *Kalmia microphylla* (small-leaved laurel) | P | P | P | P |
| *Potentilla fruticosa* (shrubby cinquefoil) | F | F | F | P |
| *Prunus americana* (wild plum) | F | F | F | F |
| *Prunus virginiana* (common chokecherry) | F | G | G | F |
| *Rhus aromatica* (fragrant sumac) | P | G | P | P |
| *Ribes lacustre* (swamp currant) | G | F | F | P |
| *Ribes odoratum* (buffalo currant) | F | G | F | F |
| *Ribes setosum* (Missouri gooseberry) | P | F | F | P |
| *Rosa acicularis* (prickly rose) | F | F | F | G |

## APPENDIX A-5 (cont.)

| Species | Elk Food Value | Mule Deer Food Value | Whitetail Deer Food Value | Antelope Food Value |
|---|---|---|---|---|
| *Rosa woodsii* (woods rose) | F | F | F | G |
| *Rubus parviflorus* (thimbleberry) | P | P | P | P |
| *Salix bebbiana* (Bebb willow) | G | F | F | F |
| *Salix boothii* (Booth willow) | F | F | F | F |
| *Salix candida* (hoary willow) | F | F | F | P |
| *Salix drummondiana* (Drummond willow) | F | F | F | P |
| *Salix exigua* (sandbar willow) | G | G | G | F |
| *Salix geyeriana* (Geyer willow) | G | F | F | F |
| *Salix lutea* (yellow willow) | G | F | F | P |
| *Sarcobatus vermiculatus* (black greasewood) | P | P | P | F |
| *Shepherdia argentea* (thorny buffaloberry) | F | G | F | P |
| *Shepherdia canadensis* (Canada buffaloberry) | P | P | P | F |
| *Spiraea betulifolia* (shiny-leaf spiraea) | P | F | F | F |
| *Symphoricarpos albus* (common snowberry) | F | F | F | F |
| *Symphoricarpos occidentalis* (western snowberry) | F | G | G | F |
| *Vaccinium cespitosum* (dwarf huckleberry) | G | G | F | F |
| *Vaccinium scoparium* (whortleberry) | P | P | P | P |
| **Graminoids** | | | | |
| *Agropyron caninum* (bearded wheatgrass) | F | P | P | P |
| *Agropyron repens* (quackgrass) | G | G | P | P |
| *Agropyron smithii* (western wheatgrass) | G | P | P | P |
| *Agrostis stolonifera* (redtop) | G | G | F | P |
| *Beckmannia syzigachne* (American sloughgrass) | F | G | P | P |
| *Bromus inermis* (smooth brome) | F | F | F | F |
| *Calamagrostis canadensis* (bluejoint reedgrass) | F | P | P | P |
| *Calamagrostis rubescens* (pinegrass) | P | P | P | P |
| *Calamagrostis stricta* (narrow-spiked reedgrass) | F | P | P | P |
| *Carex aquatilis* (water sedge) | F | F | F | P |
| *Carex atherodes* (awned sedge) | F | F | F | P |
| *Carex lanuginosa* (woolly sedge) | F | F | F | F |
| *Carex lasiocarpa* (slender sedge) | P | P | P | P |
| *Carex nebrascensis* (Nebraska sedge) | F | F | F | P |
| *Carex rostrata* (beaked sedge) | F | F | P | P |
| *Carex vesicaria* (inflated sedge) | F | P | P | P |
| *Deschampsia cespitosa* (tufted hairgrass) | G | F | F | F |
| *Distichlis spicata* (inland saltgrass) | P | P | P | P |
| *Eleocharis acicularis* (needle spike-rush) | G | F | P | P |
| *Eleocharis palustris* (common spikesedge) | F | F | P | P |
| *Eleocharis pauciflora* (few-flowered spike-rush) | F | F | P | P |
| *Elymus canadensis* (Canada wildrye) | F | F | P | P |
| *Elymus cinereus* (basin wildrye) | G | F | F | F |
| *Elymus glaucus* (blue wildrye) | G | G | F | P |
| *Glyceria borealis* (northern mannagrass) | F | F | P | P |
| *Glyceria grandis* (American mannagrass) | F | F | P | P |

**APPENDIX A-5 (cont.)**

| Species | Elk Food Value | Mule Deer Food Value | Whitetail Deer Food Value | Antelope Food Value |
|---|---|---|---|---|
| *Glyceria striata* (fowl mannagrass) | F | F | P | P |
| *Hordeum jubatum* (foxtail barley) | P | P | P | P |
| *Juncus balticus* (Baltic rush) | F | P | P | P |
| *Phalaris arundinacea* (reed canarygrass) | G | F | F | F |
| *Phleum pratense* (common timothy) | F | F | F | P |
| *Phragmites australis* (common reed) | P | P | P | F |
| *Poa palustris* (fowl bluegrass) | G | G | G | F |
| *Poa pratensis* (Kentucky bluegrass) | G | F | G | F |
| *Puccinellia nuttalliana* (Nuttall alkaligrass) | G | F | P | F |
| *Scirpus acutus* (hardstem bulrush) | P | P | P | P |
| *Scirpus maritimus* (alkali bulrush) | P | P | P | P |
| *Scirpus pungens* (sharp bulrush) | F | P | P | P |
| *Scirpus validus* (softstem bulrush) | P | P | P | P |
| *Spartina gracilis* (alkali cordgrass) | P | P | P | P |
| *Spartina pectinata* (prairie cordgrass) | P | P | P | P |
| *Stipa occidentalis* (western needlegrass) | G | F | P | P |
| *Trisetum spicatum* (spike trisetum) | P | P | P | P |
| *Trisetum wolfii* (Wolf's trisetum) | P | P | P | P |
| **Forbs** | | | | |
| *Achillea millefolium* (common yarrow) | P | P | P | P |
| *Actaea rubra* (baneberry) | F | F | F | P |
| *Arnica cordifolia* (heart-leaf arnica) | F | F | F | F |
| *Aster foliaceus* (leafy aster) | G | G | F | F |
| *Cirsium arvense* (Canada thistle) | P | F | P | P |
| *Epilobium angustifolium* (fireweed) | F | F | F | F |
| *Equisetum arvense* (field horsetail) | P | P | P | P |
| *Equisetum laevigatum* (smooth scouring-rush) | F | F | P | P |
| *Fragaria virginiana* (Virginia strawberry) | F | G | G | P |
| *Galium boreale* (northern bedstraw) | P | F | P | P |
| *Geranium richardsonii* (white geranium) | G | G | G | P |
| *Geranium viscosissimum* (sticky geranium) | G | G | G | P |
| *Geum triflorum* (old man's whiskers) | P | P | F | P |
| *Glycyrrhiza lepidota* (American licorice) | F | F | F | P |
| *Heracleum lanatum* (cow-parsnip) | G | G | G | P |
| *Melilotus alba* (white sweetclover) | G | F | F | F |
| *Melilotus officinalis* (yellow sweet-clover) | G | G | G | G |
| *Mertensia ciliata* (mountain bluebell) | P | P | P | P |
| *Pedicularis groenlandica* (elephant's head) | F | F | P | P |
| *Polygonum amphibium* (water smartweed) | P | P | P | P |
| *Polygonum lapathifolium* (willow weed) | P | P | P | P |
| *Potentilla anserina* (common silverweed) | F | G | F | P |
| *Potentilla gracilis* (slender cinquefoil) | P | P | P | P |
| *Sagittaria cuneata* (arumleaf arrowhead) | P | P | P | P |
| *Senecio triangularis* (arrowleaf groundsel) | G | F | F | P |

## APPENDIX A-5 (cont.)

| Species | Elk Food Value | Mule Deer Food Value | Whitetail Deer Food Value | Antelope Food Value |
|---|---|---|---|---|
| *Smilacina stellata* (starry Solomon-plume) | P | F | F | P |
| *Solidago canadensis* (Canada goldenrod) | P | F | F | P |
| *Taraxacum officinale* (common dandelion) | G | F | F | G |
| *Thalictrum occidentale* (western meadowrue) | F | F | F | P |
| *Trifolium repens* (white clover) | G | G | G | G |
| *Typha angustifolia* (hybrid cattail) | P | P | P | P |
| *Typha latifolia* (common cattail) | P | P | P | P |
| *Urtica dioica* (stinging nettle) | P | P | P | P |
| *Viola adunca* (hook violet) | F | F | F | P |

## APPENDIX A-6. Food value or degree of use for upland game birds, waterfowl, small non-game birds, and small mammals (Hansen and others 1995)

**Food value** refers to the relish and degree of use shown by a wildlife species for a plant or plant part, as well as the plant's availability throughout its range. **G** (Good) = readily to moderately available in the plant's range and consumed to a high degree; **F** (Fair) = readily to moderately available in the plant's range but consumed only to a moderate degree; **P** (Poor) = available but the plant is consumed to only a small degree or not at all.

| Species | Upland Game Bird Food Value | Waterfowl Food Value | Small Non-Game Bird Food Value | Small Mammal Food Value |
|---|---|---|---|---|
| **Trees** | | | | |
| *Abies lasiocarpa* (subalpine fir) | F | P | P | F |
| *Acer negundo* (box-elder) | F | F | F | F |
| *Elaeagnus angustifolia* (Russian olive) | G | G | G | G |
| *Fraxinus pennsylvanica* (green ash) | P | P | F | F |
| *Juniperus scopulorum* (Rocky Mountain juniper) | F | P | G | P |
| *Picea engelmannii* (Engelmann spruce) | F | P | G | G |
| *Picea glauca* (white spruce) | F | P | G | G |
| *Pinus contorta* (lodgepole pine) | G | P | P | P |
| *Pinus ponderosa* (ponderosa pine) | G | P | G | G |
| *Populus angustifolia* (narrowleaf cottonwood) | F | P | F | G |
| *Populus deltoides* (Great Plains cottonwood) | F | P | G | G |
| *Populus tremuloides* (quaking aspen) | G | F | G | G |
| *Populus trichocarpa* (black cottonwood) | G | F | G | G |
| *Pseudotsuga menziesii* (Douglas fir) | G | P | P | F |
| *Salix amygdaloides* (peach-leaf willow) | F | F | F | F |

## APPENDIX A-6 (cont.)

| Species | Upland Game Bird Food Value | Waterfowl Food Value | Small Non-Game Bird Food Value | Small Mammal Food Value |
|---|---|---|---|---|
| **Shrubs** | | | | |
| *Acer glabrum* (Rocky Mountain maple) | F | P | F | F |
| *Alnus incana* (mountain alder) | F | P | G | F |
| *Amelanchier alnifolia* (western serviceberry) | F | P | F | F |
| *Artemisia cana* (silver sagebrush) | F | P | F | F |
| *Betula glandulosa* (bog birch) | F | P | F | F |
| *Betula occidentalis* (water birch) | G | F | F | G |
| *Cornus stolonifera* (red-osier dogwood) | F | F | F | F |
| *Crataegus douglasii* (black hawthorn) | F | P | F | F |
| *Crataegus succulenta* (succulent hawthorn) | F | P | F | F |
| *Elaeagnus commutata* (silverberry) | F | F | F | F |
| *Lonicera utahensis* (Utah honeysuckle) | F | F | G | F |
| *Potentilla fruticosa* (shrubby cinquefoil) | P | P | F | F |
| *Prunus americana* (wild plum) | G | P | G | F |
| *Prunus virginiana* (common chokecherry) | G | P | G | G |
| *Rhus aromatica* (fragrant sumac) | G | P | G | G |
| *Ribes lacustre* (swamp currant) | G | F | G | G |
| *Ribes odoratum* (buffalo currant) | F | P | F | F |
| *Ribes setosum* (Missouri gooseberry) | G | P | G | G |
| *Rosa acicularis* (prickly rose) | G | P | G | G |
| *Rosa woodsii* (woods rose) | G | P | G | G |
| *Rubus parviflorus* (thimbleberry) | F | P | F | F |
| *Salix bebbiana* (Bebb willow) | G | F | G | G |
| *Salix boothii* (Booth willow) | G | F | G | G |
| *Salix drummondiana* (Drummond willow) | G | F | F | F |
| *Salix exigua* (sandbar willow) | G | F | G | G |
| *Salix geyeriana* (Geyer willow) | G | F | G | G |
| *Salix lutea* (yellow willow) | G | F | G | G |
| *Sarcobatus vermiculatus* (black greasewood) | F | G | G | G |
| *Shepherdia argentea* (thorny buffaloberry) | F | F | F | F |
| *Shepherdia canadensis* (Canada buffaloberry) | G | F | F | G |
| *Spiraea betulifolia* (shiny-leaf spiraea) | P | P | P | P |
| *Symphoricarpos albus* (common snowberry) | F | F | F | F |
| *Symphoricarpos occidentalis* (western snowberry) | F | F | F | F |
| *Vaccinium cespitosum* (dwarf huckleberry) | F | P | F | G |
| *Vaccinium scoparium* (whortleberry) | F | P | P | P |
| **Graminoids** | | | | |
| *Agropyron caninum* (bearded wheatgrass) | F | G | F | F |
| *Agropyron repens* (quackgrass) | G | G | G | F |
| *Agropyron smithii* (western wheatgrass) | P | G | P | P |
| *Agrostis stolonifera* (redtop) | F | F | F | F |
| *Beckmannia syzigachne* (American sloughgrass) | F | G | F | F |
| *Bromus inermis* (smooth brome) | G | F | G | G |
| *Calamagrostis canadensis* (bluejoint reedgrass) | P | G | P | P |

**APPENDIX A-6 (cont.)**

| Species | Upland Game Bird Food Value | Waterfowl Food Value | Small Non-Game Bird Food Value | Small Mammal Food Value |
|---|---|---|---|---|
| *Carex aquatilis* (water sedge) | P | F | F | F |
| *Carex atherodes* (awned sedge) | P | F | F | F |
| *Carex lanuginosa* (woolly sedge) | F | F | F | F |
| *Carex lasiocarpa* (slender sedge) | F | F | F | F |
| *Carex nebrascensis* (Nebraska sedge) | P | G | G | G |
| *Carex rostrata* (beaked sedge) | F | F | G | G |
| *Carex vesicaria* (inflated sedge) | F | F | G | G |
| *Deschampsia cespitosa* (tufted hairgrass) | F | G | P | P |
| *Distichlis spicata* (inland saltgrass) | F | G | F | P |
| *Eleocharis acicularis* (needle spike-rush) | F | G | G | F |
| *Eleocharis palustris* (common spikesedge) | P | G | F | F |
| *Eleocharis pauciflora* (few-flowered spike-rush) | P | G | F | F |
| *Elymus canadensis* (Canada wildrye) | F | F | P | P |
| *Elymus cinereus* (basin wildrye) | F | F | P | P |
| *Glyceria borealis* (northern mannagrass) | G | G | F | G |
| *Glyceria grandis* (American mannagrass) | G | G | F | G |
| *Glyceria striata* (fowl mannagrass) | F | F | F | G |
| *Juncus balticus* (Baltic rush) | G | G | F | F |
| *Phalaris arundinacea* (reed canarygrass) | F | F | F | F |
| *Phleum pratense* (common timothy) | F | G | F | F |
| *Phragmites australis* (common reed) | G | G | G | G |
| *Poa palustris* (fowl bluegrass) | F | F | F | F |
| *Poa pratensis* (Kentucky bluegrass) | F | G | F | F |
| *Puccinellia nuttalliana* (Nuttall alkaligrass) | F | F | F | F |
| *Scirpus acutus* (hardstem bulrush) | G | G | G | F |
| *Scirpus maritimus* (alkali bulrush) | P | G | G | G |
| *Scirpus pungens* (sharp bulrush) | G | G | G | G |
| *Scirpus validus* (softstem bulrush) | G | G | G | G |
| *Spartina gracilis* (alkali cordgrass) | P | P | P | P |
| *Spartina pectinata* (prairie cordgrass) | P | P | F | F |
| **Forbs** | | | | |
| *Achillea millefolium* (common yarrow) | P | P | P | P |
| *Actaea rubra* (baneberry) | P | P | F | F |
| *Arnica cordifolia* (heart-leaf arnica) | P | P | P | P |
| *Aster foliaceus* (leafy aster) | F | F | G | G |
| *Cirsium arvense* (Canada thistle) | F | P | F | P |
| *Epilobium angustifolium* (fireweed) | F | P | F | P |
| *Equisetum arvense* (field horsetail) | P | P | P | P |
| *Equisetum laevigatum* (smooth scouring-rush) | P | P | P | F |
| *Fragaria virginiana* (Virginia strawberry) | P | P | P | F |
| *Galium boreale* (northern bedstraw) | P | P | P | P |
| *Galium trifidum* (small bedstraw) | P | P | P | P |
| *Galium triflorum* (sweetscented bedstraw) | P | P | P | P |
| *Geranium richardsonii* (white geranium) | F | P | F | F |

## APPENDIX A-6 (cont.)

| Species | Upland Game Bird Food Value | Waterfowl Food Value | Small Non-Game Bird Food Value | Small Mammal Food Value |
|---|---|---|---|---|
| *Geranium viscosissimum* (sticky geranium) | F | P | F | F |
| *Geum triflorum* (old man's whiskers) | P | P | P | P |
| *Glycyrrhiza lepidota* (American licorice) | F | F | F | F |
| *Heracleum lanatum* (cow-parsnip) | F | F | P | P |
| *Melilotus alba* (white sweetclover) | F | G | F | F |
| *Melilotus officinalis* (yellow sweet-clover) | F | G | F | F |
| *Mertensia ciliata* (mountain bluebell) | F | P | F | F |
| *Osmorhiza chilensis* (mountain sweet-cicely) | F | F | G | G |
| *Polygonum amphibium* (water smartweed) | F | G | F | F |
| *Polygonum lapathifolium* (willow weed) | F | G | F | F |
| *Potentilla anserina* (common silverweed) | P | P | F | F |
| *Potentilla gracilis* (slender cinquefoil) | P | P | P | P |
| *Sagittaria cuneata* (arumleaf arrowhead) | P | P | P | P |
| *Senecio triangularis* (arrowleaf groundsel) | F | P | G | G |
| *Smilacina stellata* (starry Solomon-plume) | F | P | F | F |
| *Solidago canadensis* (Canada goldenrod) | F | P | F | F |
| *Taraxacum officinale* (common dandelion) | G | F | F | F |
| *Trifolium repens* (white clover) | G | F | F | F |
| *Typha angustifolia* (hybrid cattail) | G | G | G | F |
| *Typha latifolia* (common cattail) | G | G | G | F |
| *Viola adunca* (hook violet) | P | P | P | P |

## APPENDIX A-7. Potential biomass production, erosion control potential, short-term revegetation potential, and long-term revegetation potential (Hansen and others 1995)

**Potential biomass production** refers to the relative genetic ability of a plant to produce plant material by weight on an annual basis ***compared to other members of the same lifeform*** (e.g., a grass is rated against other grasses). Species are rated as if they were growing on typical sites. Therefore, a plant may have a higher or lower biomass production than the rating given if it occurs on a site more favorable or less favorable than its normal site. **H** (High) = plant possesses ability to produce a greater yield of dry plant material than most other species of the same lifeform; **M** (Medium) = plant produces an average yield of dry plant material as compared to other species of the same lifeform; **L** (Low) = plant produces a low yield of dry plant material as compared to other species of the same lifeform; **V** (Very Low) = plant produces a very low yield of dry plant material as compared to other species of the same lifeform.

**Erosion control potential** refers to a plant that commonly exhibits growth habit, plant structure, biomass and/or root system that has the potential to reduce soil erosion. **H** (High) = plant that has aggressive growth habits, persistent plant structure, high potential biomass, and/or good soil-binding root-rhizome-runner system in established stands; **M** (Medium) = plant that has

moderately aggressive growth, moderately persistent plant structure, moderate potential biomass, and/or moderate soil-binding root-rhizome-runner system in established stands; **L** (Low) = plant that has poor growth, persistence, biomass, and/or soil-binding root system that makes it generally inadequate for erosion control.

**Short-term revegetation potential** refers to the ability of a plant to become quickly established and exhibit rapid growth within 1 to 3 years (includes annuals). **H** (High) = plant demonstrates rapid growth, good cover, and good reproduction; **M** (Medium) = plant demonstrates moderately rapid growth, fair cover, and fair reproduction; **L** (Low) = plant demonstrates slow growth, poor cover, and poor reproduction.

**Long-term revegetation potential** refers to the ability of a plant to become established and persist over a period of more than 3 years. **H** (High) = plant demonstrates good growth, cover, reproduction, and stand maintenance characteristics; **M** (Medium) = plant demonstrates fair growth, cover, reproduction, and stand maintenance characteristics; **L** (Low) = plant demonstrates poor growth, cover, reproduction, and stand maintenance characteristics.

| Species | Potential Biomass Production | Erosion Control Potential | Short-Term Revegetation Potential | Long-Term Reveg. Potential |
|---|---|---|---|---|
| **Trees** | | | | |
| *Abies lasiocarpa* (subalpine fir) | H | M | L | M |
| *Acer negundo* (box-elder) | M | M | L | L |
| *Elaeagnus angustifolia* (Russian olive) | H | M | L | H |
| *Fraxinus pennsylvanica* (green ash) | H | M | L | M |
| *Juniperus scopulorum* (Rocky Mountain juniper) | M | L | L | M |
| *Picea engelmannii* (Engelmann spruce) | H | M | L | M |
| *Picea glauca* (white spruce) | H | M | L | M |
| *Pinus contorta* (lodgepole pine) | H | L | L | M |
| *Pinus ponderosa* (ponderosa pine) | H | M | L | M |
| *Populus angustifolia* (narrowleaf cottonwood) | H | H | L | H |
| *Populus deltoides* (Great Plains cottonwood) | H | H | M | H |
| *Populus tremuloides* (quaking aspen) | M | H | L | H |
| *Populus trichocarpa* (black cottonwood) | H | H | L | M |
| *Pseudotsuga menziesii* (Douglas fir) | H | M | L | H |
| *Salix amygdaloides* (peach-leaf willow) | M | H | L | M |
| *Thuja plicata* (western red cedar) | H | M | L | M |
| **Shrubs** | | | | |
| *Acer glabrum* (Rocky Mountain maple) | M | M | L | M |
| *Alnus incana* (mountain alder) | M | H | L | M |
| *Amelanchier alnifolia* (western serviceberry) | M | M | L | M |
| *Artemisia cana* (silver sagebrush) | M | M | L | M |
| *Betula glandulosa* (bog birch) | M | H | L | H |
| *Betula occidentalis* (water birch) | M | H | L | M |
| *Clematis ligusticifolia* (western virgins-bower) | M | M | L | L |
| *Cornus stolonifera* (red-osier dogwood) | M | H | L | H |
| *Crataegus douglasii* (black hawthorn) | M | M | L | M |
| *Crataegus succulenta* (succulent hawthorn) | M | M | L | M |
| *Elaeagnus commutata* (silverberry) | M | M | L | M |
| *Kalmia microphylla* (small-leaved laurel) | L | M | L | M |

## APPENDIX A-7 (cont.)

| Species | Potential Biomass Production | Erosion Control Potential | Short-Term Revegetation Potential | Long-Term Reveg. Potential |
|---|---|---|---|---|
| *Ledum glandulosum* (Labrador tea) | L | M | L | M |
| *Lonicera utahensis* (Utah honeysuckle) | M | M | L | M |
| *Potentilla fruticosa* (shrubby cinquefoil) | H | M | L | M |
| *Prunus americana* (wild plum) | M | M | L | M |
| *Prunus virginiana* (common chokecherry) | H | M | L | H |
| *Rhus aromatica* (fragrant sumac) | M | M | L | M |
| *Ribes lacustre* (swamp currant) | M | M | L | M |
| *Ribes odoratum* (buffalo currant) | M | M | L | M |
| *Ribes setosum* (Missouri gooseberry) | M | M | L | M |
| *Rosa acicularis* (prickly rose) | M | H | L | M |
| *Rosa woodsii* (woods rose) | M | H | L | M |
| *Rubus parviflorus* (thimbleberry) | M | M | L | M |
| *Salix bebbiana* (Bebb willow) | M | H | L | M |
| *Salix boothii* (Booth willow) | H | H | L | M |
| *Salix candida* (hoary willow) | M | H | L | M |
| *Salix commutata* (undergreen willow) | M | H | L | M |
| *Salix drummondiana* (Drummond willow) | H | H | L | M |
| *Salix exigua* (sandbar willow) | M | H | L | M |
| *Salix geyeriana* (Geyer willow) | H | H | L | M |
| *Salix lasiandra* (Pacific willow) | H | H | L | M |
| *Salix lutea* (yellow willow) | H | H | L | M |
| *Salix planifolia* (planeleaf willow) | M | H | L | M |
| *Salix wolfii* (Wolf's willow) | M | H | L | M |
| *Sarcobatus vermiculatus* (black greasewood) | M | M | L | M |
| *Shepherdia argentea* (thorny buffaloberry) | H | M | L | M |
| *Shepherdia canadensis* (Canada buffaloberry) | H | M | L | M |
| *Spiraea betulifolia* (shiny-leaf spiraea) | M | M | L | M |
| *Symphoricarpos albus* (common snowberry) | M | M | L | M |
| *Symphoricarpos occidentalis* (western snowberry) | M | M | L | M |
| *Vaccinium cespitosum* (dwarf huckleberry) | M | M | L | M |
| *Vaccinium scoparium* (whortleberry) | M | M | L | M |
| **Graminoids** | | | | |
| *Agropyron caninum* (bearded wheatgrass) | M | M | M | H |
| *Agropyron repens* (quackgrass) | M | H | M | H |
| *Agropyron smithii* (western wheatgrass) | M | H | M | H |
| *Agrostis stolonifera* (redtop) | M | H | H | H |
| *Beckmannia syzigachne* (American sloughgrass) | M | M | M | M |
| *Bromus anomalus* (nodding brome) | M | M | M | H |
| *Bromus ciliatus* (fringed brome) | M | M | M | H |
| *Bromus inermis* (smooth brome) | H | H | M | H |
| *Calamagrostis canadensis* (bluejoint reedgrass) | M | H | L | H |
| *Calamagrostis rubescens* (pinegrass) | M | M | L | M |
| *Calamagrostis stricta* (narrow-spiked reedgrass) | M | H | L | H |
| *Carex aquatilis* (water sedge) | H | H | M | M |
| *Carex atherodes* (awned sedge) | H | H | M | M |

## APPENDIX A-7 (cont.)

| Species | Potential Biomass Production | Erosion Control Potential | Short-Term Revegetation Potential | Long-Term Reveg. Potential |
|---|---|---|---|---|
| *Carex buxbaumii* (Buxbaum's sedge) | M | M | L | M |
| *Carex lanuginosa* (woolly sedge) | M | H | M | M |
| *Carex lasiocarpa* (slender sedge) | M | H | M | M |
| *Carex lenticularis* (lentil-fruit sedge) | H | H | M | M |
| *Carex limosa* (mud sedge) | M | M | L | M |
| *Carex livida* (pale sedge) | M | M | L | M |
| *Carex nebrascensis* (Nebraska sedge) | M | H | L | M |
| *Carex rostrata* (beaked sedge) | H | H | M | H |
| *Carex scopulorum* (Holm's Rocky Mountain sedge) | M | H | L | M |
| *Carex vesicaria* (inflated sedge) | H | H | M | H |
| *Deschampsia cespitosa* (tufted hairgrass) | M | L | L | M |
| *Distichlis spicata* (inland saltgrass) | M | M | L | M |
| *Eleocharis acicularis* (needle spike-rush) | L | H | M | L |
| *Eleocharis palustris* (common spikesedge) | M | H | H | M |
| *Eleocharis pauciflora* (few-flowered spike-rush) | M | H | H | M |
| *Elymus canadensis* (Canada wildrye) | H | M | M | M |
| *Elymus cinereus* (basin wildrye) | H | H | M | H |
| *Elymus glaucus* (blue wildrye) | M | M | M | H |
| *Festuca idahoensis* (Idaho fescue) | M | M | L | M |
| *Glyceria borealis* (northern mannagrass) | M | M | M | M |
| *Glyceria grandis* (American mannagrass) | H | M | M | M |
| *Glyceria striata* (fowl mannagrass) | L | M | L | M |
| *Hordeum jubatum* (foxtail barley) | M | L | M | L |
| *Juncus balticus* (Baltic rush) | M | M | L | M |
| *Phalaris arundinacea* (reed canarygrass) | H | H | M | H |
| *Phleum alpinum* (alpine timothy) | M | M | L | M |
| *Phleum pratense* (common timothy) | M | M | M | H |
| *Phragmites australis* (common reed) | H | H | M | H |
| *Poa palustris* (fowl bluegrass) | M | M | M | M |
| *Poa pratensis* (Kentucky bluegrass) | M | L | M | H |
| *Puccinellia nuttalliana* (Nuttall alkaligrass) | M | M | L | M |
| *Scirpus acutus* (hardstem bulrush) | H | M | M | M |
| *Scirpus maritimus* (alkali bulrush) | M | M | L | M |
| *Scirpus pungens* (sharp bulrush) | H | M | M | M |
| *Scirpus validus* (softstem bulrush) | H | M | M | M |
| *Spartina gracilis* (alkali cordgrass) | H | H | M | H |
| *Spartina pectinata* (prairie cordgrass) | H | H | M | H |
| *Stipa occidentalis* (western needlegrass) | M | M | M | H |
| *Trisetum spicatum* (spike trisetum) | M | M | L | M |
| **Forbs** | | | | |
| *Achillea millefolium* (common yarrow) | L | L | H | M |
| *Actaea rubra* (baneberry) | M | L | L | L |
| *Aralia nudicaulis* (wild sarsaparilla) | M | M | L | M |
| *Arnica cordifolia* (heart-leaf arnica) | L | L | L | L |
| *Arnica latifolia* (broadleaf arnica) | L | L | L | L |

## APPENDIX A-7 (cont.)

| Species | Potential Biomass Production | Erosion Control Potential | Short-Term Revegetation Potential | Long-Term Reveg. Potential |
|---|---|---|---|---|
| *Caltha leptosepala* (elkslip marshmarigold) | M | M | L | L |
| *Cirsium arvense* (Canada thistle) | M | M | L | M |
| *Epilobium angustifolium* (fireweed) | H | L | H | M |
| *Epilobium ciliatum* (common willow-herb) | L | L | M | M |
| *Equisetum arvense* (field horsetail) | L | M | H | M |
| *Equisetum fluviatile* (water horsetail) | M | M | H | M |
| *Equisetum laevigatum* (smooth scouring-rush) | L | M | H | M |
| *Fragaria virginiana* (Virginia strawberry) | L | L | L | L |
| *Galium boreale* (northern bedstraw) | L | L | L | L |
| *Galium trifidum* (small bedstraw) | L | L | L | L |
| *Galium triflorum* (sweetscented bedstraw) | L | L | L | L |
| *Geranium richardsonii* (white geranium) | M | M | M | M |
| *Geranium viscosissimum* (sticky geranium) | M | M | L | L |
| *Geum macrophyllum* (large-leaved avens) | M | L | L | L |
| *Geum triflorum* (old man's whiskers) | M | L | L | L |
| *Glycyrrhiza lepidota* (American licorice) | M | M | L | L |
| *Heracleum lanatum* (cow-parsnip) | H | M | L | L |
| *Melilotus alba* (white sweetclover) | H | M | H | M |
| *Melilotus officinalis* (yellow sweet-clover) | H | M | H | M |
| *Mertensia ciliata* (mountain bluebell) | M | M | L | M |
| *Mertensia paniculata* (panicle bluebells) | M | M | L | M |
| *Pedicularis groenlandica* (elephant's head) | L | L | L | L |
| *Polygonum amphibium* (water smartweed) | M | M | M | M |
| *Polygonum bistortoides* (American bistort) | L | L | L | L |
| *Polygonum lapathifolium* (willow weed) | M | L | L | L |
| *Potentilla anserina* (common silverweed) | L | M | M | M |
| *Potentilla diversifolia* (diverse-leaved cinquefoil) | L | M | M | M |
| *Potentilla gracilis* (slender cinquefoil) | M | L | M | M |
| *Sagittaria cuneata* (arumleaf arrowhead) | M | L | L | L |
| *Senecio hydrophilus* (alkali-marsh butterweed) | M | M | L | L |
| *Senecio triangularis* (arrowleaf groundsel) | M | M | L | L |
| *Smilacina stellata* (starry Solomon-plume) | L | L | L | L |
| *Solidago canadensis* (Canada goldenrod) | M | M | M | M |
| *Sparganium emersum* (simplestem bur-reed) | M | M | L | L |
| *Taraxacum officinale* (common dandelion) | L | L | L | L |
| *Thalictrum occidentale* (western meadowrue) | M | L | L | L |
| *Trifolium repens* (white clover) | L | L | M | H |
| *Triglochin maritimum* (seaside arrow-grass) | M | L | L | L |
| *Typha angustifolia* (hybrid cattail) | H | H | L | H |
| *Typha latifolia* (common cattail) | H | H | L | H |
| *Urtica dioica* (stinging nettle) | H | M | L | L |
| *Viola adunca* (hook violet) | L | L | L | L |
| *Viola orbiculata* (round-leaved violet) | L | L | L | L |

# APPENDIX B. RIPARIAN AND WETLAND INDICATOR SPECIES OF IDAHO

| Scientific Name | Common Name | Six-Letter Code |
|---|---|---|
| **Trees** | | |
| *Abies lasiocarpa* | subalpine fir | ABILAS |
| *Acer negundo* | box-elder | ACENEG |
| *Elaeagnus angustifolia* | Russian olive | ELAANG |
| *Juniperus scopulorum* | Rocky Mountain juniper | JUNSCO |
| *Picea* spp. | spruce | PICGLA |
| *Populus angustifolia* | narrowleaf cottonwood | POPANG |
| *Populus tremuloides* | quaking aspen | POPTRE |
| *Populus trichocarpa* | black cottonwood | POPTRI |
| *Pseudotsuga menziesii* | Douglas fir | PSEMEN |
| *Salix amygdaloides* | peach-leaf willow | SALAMY |
| **Shrubs** | | |
| *Acer glabrum* | Rocky Mountain maple | ACEGLA |
| *Acer grandidentatum* | big-tooth maple | ACEGRA |
| *Amelanchier alnifolia* | western serviceberry | AMEALN |
| *Alnus incana* | mountain alder | ALNINC |
| *Artemisia cana* | silver sagebrush | ARTCAN |
| *Betula occidentalis* | water birch | BETOCC |
| *Cornus stolonifera* | red-osier dogwood | CORSTO |
| *Crataegus douglasii* | black hawthorn | CRADOU |
| *Crataegus succulenta* | succulent hawthorn | CRASUC |
| *Potentilla fruticosa* | shrubby cinquefoil | POTFRU |
| *Prunus virginiana* | common chokecherry | PRUVIR |
| *Rosa acicularis* | prickly rose | ROSACI |
| *Rosa woodsii* | woods rose | ROSWOO |
| *Salix bebbiana* | Bebb willow | SALBEB |
| *Salix boothii* | Booth willow | SALBOO |
| *Salix drummondiana* | Drummond willow | SALDRU |
| *Salix exigua* | sandbar willow | SALEXI |
| *Salix geyeriana* | Geyer willow | SALGEY |
| *Salix lasiandra* | Pacific willow | SALLAS |
| *Salix lutea* | yellow willow | SALLUT |
| *Symphoricarpos albus* | common snowberry | SYMALB |
| *Symphoricarpos occidentalis* | western snowberry | SYMOCC |
| **Graminoids** | | |
| *Agrostis stolonifera* | redtop | AGRSTO |
| *Calamagrostis canadensis* | bluejoint reedgrass | CALCAN |
| *Carex aquatilis* | water sedge | CARAQU |
| *Carex atherodes* | awned sedge | CARATH |
| *Carex nebrascensis* | Nebraska sedge | CARNEB |
| *Carex rostrata* | beaked sedge | CARROS |
| *Carex vesicaria* | inflated sedge | CARVES |
| *Deschampsia cespitosa* | tufted hairgrass | DESCES |
| *Eleocharis acicularis* | needle spike-rush | ELEACI |
| *Eleocharis palustris* | common spikesedge | ELEPAL |

**APPENDIX B. (cont.)**

| Scientific Name | Common Name | Six-Letter Code |
|---|---|---|
| *Hordeum jubatum* | foxtail barley | HORJUB |
| *Phalaris arundinacea* | reed canarygrass | PHAARU |
| *Phragmites australis* | common reed | PHRCOM |
| *Poa pratensis* | Kentucky bluegrass | POAPRA |
| *Scirpus acutus* | hardstem bulrush | SCIACU |
| *Scirpus americanus* | American bulrush | SCIAME |
| *Scirpus pungens* | sharp bulrush | SCIPUN |
| *Scirpus validus* | softstem bulrush | SCIVAL |
| **Forbs** | | |
| *Actaea rubra* | baneberry | ACTRUB |
| *Butomus umbellatus* | flowering rush | BUTUMB |
| *Equisetum arvense* | field horsetail | EQUARV |
| *Galium triflorum* | sweetscented bedstraw | GALTRI |
| *Gymnocarpium dryopteris* | oak-fern | GYMDRY |
| *Glycyrrhiza lepidota* | American licorice | GLYLEP |
| *Mitella breweri* | Brewer's mitrewort | MITBRE |
| *Mitella pentandra* | five-stamened mitrewort | MITPEN |
| *Osmorhiza occidentalis* | western sweet-cicely | OSMOCC |
| *Polygonum amphibium* | water smartweed | POLAMP |
| *Senecio triangularis* | arrowleaf groundsel | SENTRI |
| *Sparganium emersum* | simplestem bur-reed | SPAEME |
| *Streptopus amplexifolius* | clasping-leaved twisted stalk | STRAMP |
| *Thalictrum occidentale* | western meadow-rue | THAOCC |
| *Typha angustifolia* | narrow-leaved cattail | TYPANG |
| *Typha latifolia* | common cattail | TYPLAT |
| *Wyethia amplexicaulis* | northern mule's-ears | WYEAMP |

# APPENDIX C. POTENTIAL RIPARIAN HABITAT AND COMMUNITY TYPES OBSERVED DURING THE 1994 PILOT STUDY BUT NOT SAMPLED DURING 1995/1996

## Coniferous Forest Types

*Abies lasiocarpa/Actaea rubra* h.t.
*bies lasiocarpa/Galium triflorum* h.t.
*Juniperus osteosperma* c.t.
*Picea/Equisetum arvense* h.t.

## Deciduous Forest Types

*Populus angustifolia*/Recent Alluvial Bar c.t.
*Populus tremuloides/Calamagrostis canadensis* h.t.
*Populus tremuloides/Poa pratensis* c.t.
*Populus trichocarpa*/Recent Alluvial Bar c.t.
*Populus trichocarpa/Symphoricarpos occidentalis* c.t.

## Willow Shrub Types

*Salix drummondiana/Carex rostrata* h.t.
*alix drummondiana* c.t.
*Salix geyeriana/Calamagrostis canadensis* h.t.
*Salix lutea/Calamagrostis canadensis* h.t.
*Salix lutea/Carex rostrata* h.t.

## Non-Willow Shrub Types

*Artemisia cana/Agropyron smithii* h.t.
*Potentilla fruticosa/Deschampsia cespitosa* h.t.
*Rhus aromatica* c.t.
*Ribes odoratum* c.t.
*Symphoricarpos occidentalis* c.t.

## Sedge Types

*Carex aquatilis* h.t.
*Carex lasiocarpa* h.t.
*Carex microptera* c.t.

## Non-Sedge Types

*Agropyron smithii* h.t.
*Deschampsia cespitosa* h.t.
*Juncus balticus* c.t.

# GLOSSARY

**Abandoned Meander Channel.** A former stream channel that was cut off from the rest of the river and typically lacks year-long standing water.

**Aerobic.** Condition in which molecular oxygen is present in the environment.

**Albic Soil Horizon.** A mineral soil horizon of virtually clean sand and silt particles; clays and free iron oxides have been removed most commonly by leaching, leaving the soil horizon a whitish appearance.

**Alfisols.** A soil order composed of soils having significantly more clay in the B horizon than in the A horizon and high base status.

**Alkaline.** Water or soil with a pH greater than 7.4.

**Alluvial Soil.** Sediments (clay, silt, sand, gravel, cobbles, and boulders) deposited by running water, ordinarily occurring on floodplains and at the base of ridges and slopes.

**Alluvial Terrace.** Deposits of alluvial soil that mark former floodplains. Typically, a floodplain may have several sets of alluvial terraces at different elevations and of different ages (the higher the elevation, the older the age).

**Alluvium.** An accumulation of sediments deposited by streams or rivers.

**Anaerobic.** Condition in which molecular oxygen is absent from the environment. This commonly occurs in wetlands where soils experience prolonged saturation by water.

**Andisols.** Are dark mineral soils developed in volcanic ash, pumice, cinders, other volcanic ejecta, or volcaniclastic materials.

**Aqualfs.** Soils with aquic conditions and having clay accumulating in the B horizon: wet Alfisols.

**Aquatic Bed (Cowardin and others 1979).** A *class* of wetland and deepwater habitat dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years.

**Aquents.** Soils with aquic conditions and lacking distinct soil horizons in the subsoil: wet Entisols.

**Aquepts.** Soils with aquic conditions and showing little soil development in the B horizon: wet Inceptisols.

**Aquic Conditions.** These soils experience continuous or periodic saturation and reduction. The presence of these conditions is indicated by redoximorphic features.

**Aquic Moisture Regime (obsolete).** A moisture condition associated with a seasonal reducing environment that is virtually free of dissolved oxygen because the soil is saturated by ground water or by water of the capillary fringe, as in soils in Aquic suborders and Aquic subgroups.

**Argillic Soil Horizon.** A soil horizon that shows evidence of movement or accumulation of silicate clays, and possesses a higher clay content than an overlying horizon.

**Available Water Capacity.** The ability of a soil to hold water in a form available to plants, expressed in inches of water per inch of soil depth. Classes are: 1) Low = 0 - 0.12, 2) Moderate = 0.13 - 0.17, and 3) High = > 0.17

**Average Canopy Cover.** Refers to the "average" canopy cover of a particular species for the stands that it was recorded. For example, the number of stands sampled for a habitat type or community type may be 20. However, a particular species may only occur in 7 of the 20 stands. The average canopy cover therefore represents the "average" canopy cover of that particular species in the 7 stands.

**Backwater Area.** Seasonal or permanent water bodies found in the lowest parts of floodplains, typically circular or oval in shape.

**Bars (Alluvial).** Sediment accumulations along waterways deposited by moving water. Examples include: 1) ***point bars*** — bars that are formed on the inside of a meander channel, 2) ***side bars*** — bars that are formed along the edges of relatively straight sections of a river, 3) ***mid-channel bars*** — these are found within the channel and generally become more noticeable during low flow periods, and 4) ***delta bars*** — formed immediately downstream of the confluences of a tributary and the main river.

**Beaver Dams.** Dams built by beavers that span the stream channel. In general, water is still flowing through the riparian system.

**Bog (Mitsch and Gosselink 1986).** A sphagnum moss-dominated community whose only water source is rainwater. They are extremely low in nutrients, form acidic peats, and are a northern phenomenon generally associated with low temperatures and short growing seasons.

**Browse.** Shrubby and woody forage consumed by wildlife.

**Calcic Soil Horizon.** A subsurface soil horizon with an accumulation of carbonates.

**Cambic Soil Horizon.** An altered soil horizon that does not have the dark color, organic matter content, or structure of a histic, mollic, or umbric epipedon. Cambic horizons possess the following characteristics: 1) texture is very fine sand, loamy very fine sand, or finer, 2) soil structure or absence of rock structure in at least 1/2 of the horizon (by volume), and 3) the alteration of soil color by the loss of carbonates or aquic conditions.

**Canopy Coverage.** The percentage of ground covered by the gross outline of an individual plant's foliage; or collectively covered by all individuals of a species within a stand or a sample plot.

**Capillary Fringe.** A zone immediately above the water table in which water is drawn upward from the water table by capillary action.

**Carr.** Wetland on organic soil with greater than 25 percent cover of shrubs. Typically, carrs are dominated by willows (*Salix* species).

**Climax Community.** Refers to the final or steady state plant community which is self-perpetuating and in dynamic equilibrium with its environment.

**Colluvium.** A deposit of unconsolidated geologic materials and soil accumulated at the base of slopes as a result of gravity.

**Community (Plant Community).** An assembly of plants living together, reflecting no particular ecological status.

**Community Type.** An aggregation of all plant communities distinguished by floristic and structural similarities in both overstory and undergrowth layers. A unit of vegetation within a classification. ***For the purposes of this document, a community type represents seral vegetation, and is never considered to be climax.***

**Constancy.** The percentage of sampled stands in which a species occurs.

**Disclimax.** Where recurring disturbances, such as grazing (e.g., zootic disclimax) or periodic burning (e.g., fire disclimax), exert the predominant influence in maintaining the structure and composition of the steady-state vegetation. Disclimaxes, such as the zootic climax or fire climax, are not the basis for recognizing habitat types.

**Diversity.** The kind and amount of species in a community per unit area.

**Drained.** A condition in which ground or surface water has been removed by artificial means.

**Dominance Type (Equivalent to Cover Type).** An aggregation of all stands (individual plant communities), grouped and named simply by the species with the greatest canopy coverage in the overstory or upper layer. In this classification, canopy cover of dominant species is greater than 25 percent.

**Emergent Plant.** A rooted herbaceous plant species that has parts extending above a water surface.

**Emergent Wetland (Cowardin and others 1979).** A *class* of wetland habitat characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens

**Entisols.** A soil order including soils of slight or recent development; common along rivers and floodplains.

**Ephemeral Stream.** A stream or stretch of a stream that flows only in direct response to precipitation. It receives no water from springs and no long-continued supply from melting snow or other surface source. Its stream channel is at all times above the water table. These streams do not normally flow for 30 consecutive days.

**Epipedon.** Diagnostic soil horizons formed at the soil surface (e.g., argillic horizon).

**Facultative Species.** Plant species that can occur both in wetlands and uplands. There are three subcategories of facultative species: 1) facultative wetland plants, 2) facultative plants, and 3) facultative upland plants.

**Facultative Plants (FAC).** A plant species that is equally likely to occur in wetlands or nonwetlands (estimated probability 34-66 percent).

**Facultative Upland Plants (FACU).** A plant species that usually occurs in nonwetlands (estimated probability 67-99 percent), but occasionally found in wetlands (estimated probability 1-33 percent).

**Facultative Wetland Plants (FACW).** A plant species that usually occurs in wetlands (estimated probability 67-99 percent), but occasionally found in nonwetlands.

**Fen (Mitsch and Gosselink 1986).** A non-acidic peat-forming wetland that receives nutrients form sources other than precipitation, usually through groundwater movement.

**Fibric Materials.** Plant materials that show very little signs of decomposition. Plant fiber content before rubbing between fingers is at least 3/4 of the soil volume.

**Fibrists.** Organic soils (peats) in which plant remains show very little decomposition and retain original shape; more than 2/3 of the fibers remain after rubbing the materials between the fingers.

**Flooded.** A condition in which the soil surface is temporarily covered with flowing water from any source, such as streams overflowing their banks and runoff from adjacent or surrounding slopes, or any combination of sources.

**Floodplain.** An alluvial plain caused by the overbank deposition of alluvial material. Typically appearing as flat expanses of land bordering a stream or river. Most floodplains are accompanied by a series of alluvial terraces of varying levels.

**Fluvial.** Pertaining to or produced by the action of moving water.

**Forb.** A herbaceous plant, usually broadleaved, that is not a graminoid.

**Forested Wetland (Cowardin and others 1979).** A *class* of wetland habitat characterized by woody vegetation that is 6 m (20 ft) tall or taller.

**Forested Wetlands.** Occur near springs and seeps and in areas with naturally high water tables, such as river floodplains. Two general types of forested wetlands occur in Montana: 1) those dominated by coniferous tree species, and 2) those dominated by deciduous angiosperm tree species.

**Frequently Flooded.** A class of flood frequency in which flooding is common during most years (more than a 50 percent chance of flooding in any year, or more than 50 times in 100 years).

**Gallery Forest.** A strip of forest confined to a stream margin or floodplain in an otherwise unforested landscape.

**Gleization.** A process in saturated or nearly saturated soils which involves the reduction of iron. This process tends to give gray colors (low chroma) to those parts of the soil from which the iron has been reduced or removed and rust colors (high chroma) to those where the iron has oxidized and accumulated.

**Gleyed Soil (obsolete).** A soil condition resulting from prolonged soil saturation, which is manifested by the presence of bluish or greenish colors through the soil mass or in mottles (spots or streaks) among other colors. Gleying occurs under reducing soil conditions resulting from soil saturation, by which iron is reduced predominantly to the ferrous state. See also redox depletions.

**Graminoid.** Grass or grass-like plant, such as species of the Poaceae (grasses), Cyperaceae (sedges), and Juncaceae (rushes).

**Ground Water.** Water occupying the interconnected pore spaces in the soil or geologic material below the water table, this water has a positive pressure.

**Growing Season.** The portion of the year when soil temperatures are above biologic zero (41° F) as defined by *Soil Taxonomy*; the following growing season months are assumed for each of the soil temperature regimes: 1) thermic (February-October), 2) mesic (March-October), 3) frigid (May-September), 4) cryic (June-August), and 5) pergelic (July-August).

**Habitat Type.** The land area that supports, or has the potential of supporting, the same primary climax vegetation. A habitat type classification is a vegetation based ecological site classification. It is based on the potential of the site to produce a specific plant community (plant association). It has been used to classify grasslands, shrublands, woodlands, and forests throughout western United States.

**Herbaceous.** Nonwoody vegetation, such as graminoids and forbs.

**Histic Epipedon.** A 20 to 40 cm (8 to 16 in) soil layer at or near the surface that is saturated for 30 consecutive days or more during the growing season in most years and contains a minimum of 20 percent organic matter when no clay is present or a minimum of 30 percent of organic matter when 60 percent or more clay is present. Generally a thin horizon of peat or muck is present if the soil has not been plowed.

**Histosols.** A soil order composed of organic soils (peats and mucks) with generally greater than 50 percent organic matter in the upper 80 cm (32 in), or that are of any thickness if overlying rock.

**Horizon.** A distinct layer of soil, more or less parallel with soil surface, having similar properties such as color, texture, and permeability; the soil profile is subdivided into the following major horizons: 1) ***A horizon*** — a surface horizon characterized by an accumulation of organic material, 2) ***E horizon*** — most commonly a surface horizon, characterized by leaching of organic material, iron, and clay, 3) ***B horizon*** — a subsurface horizon characterized by relative accumulation of organic matter, iron, clay, or aluminum, 4) ***C horizon*** — undisturbed, unaltered parent material.

**Hydric Soil (USDA SCS 1990).** A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile. Hydric soil indicators are Histosol, histic epipedon, sulfidic odor, aquic moisture regime, reducing conditions, gleyed or low-chroma colors, concretions, high organic content in surface layer in sandy soils, organic streaking in sandy soils, listed on local Hydric Soils List, and listed on National Hydric Soils List (Environmental Laboratory 1987)

**Hydrology.** The science dealing with the properties, distribution, and circulation of water.

**Hydrophyte.** Any macrophytic plant that grows in water or on a substrate that is at least potentially deficient in oxygen as a result of excessive water content; plants typically found in wetland and other aquatic habitats.

**Hydrophytic Vegetation.** Plant life growing in water or on a substrate that is at least potentially deficient in oxygen as a result of excessive water content.

**Inceptisols.** A soil order composed of soils of intermediate development; morphological characteristics are generally too weak to meet requirements of other soil orders.

**Incidental Type.** Refers to a habitat type or community type that rarely occurs or occupies only a small area of a wetland zone.

**Intermittent Stream.** A stream or reach of stream which flows only at certain times of the year when it receives water from springs or from some surface source (e.g., melting snow). They are usually divided with respect to the source of their water into spring-fed or surface-fed intermittent streams. These streams generally flow continuously during periods of at least one month or more during the year.

**Inundation.** A condition in which water temporarily or permanently covers a land surface.

**Irrigation Canal.** Included all types of canals associated with irrigation systems.

**Lacustrine System (Cowardin and others 1979).** Any wetland or deepwater habitat with the following characteristics: 1) situated in a topographic depression or dammed river channel, 2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30 percent areal coverage, and 3) total area exceeds 8 ha (20 acres).

**Lake.** A natural topographic depression collecting a body of water covering at least 8 ha (20 acres) with surface water.

**Lentic Wetland.** See still water wetland.

**Long Duration (Flooding).** A duration class in which inundation for a single event ranges from 7 days to 1 month.

**Lotic Wetland.** See riparian wetland.

**Major Type.** Refers to a habitat type or community type that occupies an extensive area within a wetland zone.

**Marsh.** A frequently or continually inundated wetland on often developing in shallow ponds, depressions, and river margins. Marshes are dominated by herbaceous plants, such as grasses (e.g., *Phragmites*), sedges, cattails (e.g., *Typha*), and bulrushes (e.g., *Scirpus*). Waters are usually neutral to basic.

**Mineral Soil.** Soils composed of predominantly mineral materials (sands, silts, and clays) instead of organic materials. The soil contains less than 20 percent organic matter.

**Minor Type.** Refers to a habitat type or community type that seldom occupies large areas but may be common within a wetland zone.

**Mollic Epipedon.** A surface layer that consists of mineral soil materials and have the following properties: 1) soil structure that is not both massive and hard or very hard when dry, 2) Munsell color value less than 3 moist and 5 dry, and chroma less than 3, 3) base saturation of at least 50 percent, 4) at least 1 percent organic matter throughout the horizon, 5) typically moist for at least 3 months in most years, and 6) at least 18 cm (7 in) thick.

**Mollisols.** A soil order including soils with a thick dark brown to black surface horizon (mollic epipedon), has a high base saturation, and a well-developed structure. Typically associated with grassland soils.

**Monotypic Stands.** Stands composed primarily of a single species.

**Montane.** That region between the subalpine zone and the grassland zone or more broadly, mountain slopes below the alpine zone.

**Mottling (obsolete).** Spots or blotches of different color or shades of color interspersed within the dominant color in a soil layer, usually resulting from the presence of periodic reducing soil conditions. See also redox concentrations.

**Natric Horizon.** A special kind of argillic horizon. Natric horizons have all the properties of argillic horizons but, in addition, are 15 percent or more sodium saturated. Their formation is favored where leaching results in the accumulation of sodium on the cation-exchange complex.

**Nonhydric Soils.** A soil that has developed under predominantly unsaturated soil conditions.

**Nonpersistent Vegetation.** Plants that break down readily after the growing season; no evidence of previous year's growth at the beginning of the next grow season.

**Nonwetland.** Any area that has sufficiently dry conditions that hydrophytic vegetation, hydric soils, and/or wetland hydrology are lacking; it includes upland as well as former wetlands that are effectively drained.

**Obligate Wetland Plant.** Refers to a plant species that occurs almost always (estimated probability greater than 99 percent) under natural conditions in wetlands.

**Organic Soil.** Soils composed of primarily organic rather than mineral material. Equivalent to **Histosols** and includes peats and mucks.

**Overbank Flooding.** Any situation in which inundation occurs as a result of the water level of a river or stream rising above bank level.

**Overflow Channel.** An abandoned channel in a floodplain that may carry water during periods of high stream or river flows.

**Oxbow Lake.** A meander channel of a stream or river that is formed by breaching of a meander loop during flood stage. The ends of the cut-off meander are blocked by bank sediments.

**Palustrine System (Cowardin and others 1979).** Any nontidal wetland of a class dominated by trees, shrubs, persistent emergents, or emergent mosses or lichens.

**Parent Material.** The unconsolidated and undeveloped mineral or organic matter from which the solum (soil) is developed.

**Peraquic Moisture Regime.** A soil condition in which reducing conditions always occur due to the presence of ground water at or near the soil surface.

**Perennial Stream.** A stream or reach of a stream that flows continuously. They are generally fed in part by springs. Surface water elevations are commonly lower than water table elevations in adjacent soils.

**Permanently Flooded.** A water regime condition where standing water covers the land surface throughout the year (but may be absent during extreme droughts).

**Permeability.** The quality of the soil that enables water to move downward through the profile, measured as the number of cm (in) per hour that water moves downward through the saturated soil.

**Phase.** A subdivision of a habitat type or representing a characteristic variation in climax vegetation and environmental conditions.

**Pioneer Species.** Species that colonize bare areas (e.g., gravel bars) where there is little or no competition from other species.

**Plant Association.** Used to group together all those stands of climax vegetation which occur in environments so similar that there is much floristic similarity throughout all layers of the vegetation.

**Playa.** A periodically flooded wetland basin. Playas are common in parts of southwest Montana.

**Pond.** Bodies of water encircled by wetland vegetation. Wave action is minimal, allowing emergent vegetation to establish.

**Ponded.** A condition in which free water covers the soil surface, for example, in a closed depression. The water is removed only by percolation, evaporated, or transpiration.

**Pooled Channel Stream.** An intermittent stream with significant surface pool area and without flowing surface water. The water sources for the pools are springs within the channel.

**Poorly Drained.** Water is removed from the soil so slowly that the soil is saturated periodically during the growing season or remains wet for long periods (greater than 7 days).

**Pothole.** A depressional wetland community caused by glaciation and is common to portions of the Northern Great Plains. The body of water is less than 8 ha (20 acres) in size.

**Primary Succession.** Occurs on a bare surface not previously occupied by plants, such as a recently deposited alluvial bar.

**Range Of Canopy Cover.** Refers to the "range" (e.g., low and high values) of canopy cover of a particular species for all the stands sampled for a habitat type or community type.

**Redox Concentrations.** A redoximorphic feature characterized by zones in the soil of apparent accumulation of iron and manganese oxides. These may form as nodules, concretions, soft bodies, or pore linings and vary in shape, size, and color.

**Redox Depletions.** A redoximorphic feature characterized by zones in the soil of low chroma (less than 3) where iron and manganese oxides alone have been removed, or where both iron/manganese oxides and clay have been removed.

**Redoximorphic Features.** Soil features associated with wetness and are formed as a result of the reduction and oxidation of iron and manganese compounds in the soil following saturation with water (See redox concentrations and redox depletions).

**Reduced Matrix.** A redoximorphic feature characterized by a soil matrix having low chroma (less than 3) in situ, but increases in hue or chroma when exposed (within 30 minutes) to air.

**Reservoir.** An artificial (dammed) water body with at least 8 ha (20 acres) covered by surface water.

**Riparian.** *adj.* Of, on, or relating to the banks of a natural course of water (Latin *riparius*, from *ripa*, bank).

**Riparian Plant Association.** A plant community representing the latest successional stage attainable on a specific, hydrologically influenced surface (equivalent potential natural community type).

**Riparian Wetlands (Lotic Wetlands).** Riparian wetlands are wetlands associated with running water systems found along rivers, streams, and drainageways. Such wetlands contain a defined channel and floodplain. The channel is an open conduit which periodically, or continuously, carries flowing water, dissolved and suspended material. Beaver ponds, seeps, springs, and wet meadows on the floodplain of, or associated with, a river or stream are part of the riparian wetland.

**Riparian or Wetland Ecosystem.** The ecosystem located between aquatic and terrestrial environments. Identified by hydric soil characteristics and riparian or wetland plant species that requires or tolerates free water conditions of varying duration.

**Riparian or Wetland Species.** Plant species occurring within the riparian or wetland zone. Obligate riparian or wetland species require the environmental conditions associated with the riparian or wetland zone. Facultative riparian or wetland species are tolerant of these environmental conditions, but also occur in uplands.

**Riparian Zone.** A geographically delineated portion of the riparian ecosystem based on management concerns.

**River.** Rivers are usually larger than streams. They flow year around, in years of normal precipitation, and when significant amounts of water are not being diverted out of them.

**Riverbank.** That portion of the channel bank cross-section that controls the lateral movement of water.

**Riverine System (Cowardin and others 1979).** Any wetland or deepwater habitat contained within a channel, with exception of wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens.

**Salic Horizon.** A mineral soil horizon 15 cm (6 in) or more thick enriched with secondary soluble salts.

**Saline.** Soil or water containing sufficient soluble salts to interfere with the growth of most plants.

**Saturated.** A soil condition in which all voids (pore spaces) between soil particles are filled with water.

**Secondary Succession.** The process of changing biotic communities that occurs following disturbances to a site that has previously been occupied by living organisms.

**Seep.** Groundwater discharge areas. In general, seeps have less flow than a spring.

**Seral.** Refers to vegetation that has not theoretically attained a steady state with its environment, and current populations of some species are being replaced by other species; a community or species that is replaced by another community or species as succession progresses.

**Series.** Refers to a group of habitat types having the same climax species.

**Scrub-Shrub Wetland (Cowardin and others 1979).** A *class* of wetland habitat which includes areas dominated by woody vegetation less than 6 m (20 ft) tall. It may include true shrubs, young trees, or trees or shrubs that are small or stunted because of environmental conditions.

**Shrub.** A multi-stemmed woody plant generally shorter than 4.8 m (16 ft).

**Small Mountain Lake.** A natural topographic depression collecting a body of water covering less than 8 ha (20 acres) with surface water.

**Soil Series.** A subdivision of a soil family and consists of soils that are similar in all major soil profile characteristics and arrangements.

**Solum.** The upper and most weathered part of the soil profile; the A and B horizons.

**Somewhat Poorly Drained.** Water is removed slowly enough that the soil is wet for significant periods during the growing season.

**Spring.** Groundwater discharge areas. In general, springs are considered to have more flow than seeps.

**Stable Community.** The condition of little or no perceived change in plant communities that are in relative equilibrium with existing environmental conditions. It describes persistent but not necessarily climax stages in plant succession.

**Stand.** A plant community that is relatively uniform in composition, structure, and habitat conditions; a sample unit.

**Stream.** A natural waterway that is defined as first to third order.

**Streambank.** That portion of the channel bank cross-section that controls the lateral movement of water.

**Stream Order.** A classification of streams according to the number of tributaries. Order 1 streams have no tributaries; a stream of order 2 or higher has 2 or more tributaries of the next lower order.

**Still Water Wetlands (Lentic Wetlands).** These wetlands occur in basins and lack a defined channel and floodplain. Included are permanent (e.g., perennial) or intermittent bodies of water such as lakes, reservoirs, potholes, marshes, ponds, and stockponds. Other examples include fens, bogs, wet meadows, and seeps not associated with a defined channel.

**Stockpond.** An artificial (dammed) body of water of less than 8 ha (20 acres) covered by surface water.

**Subterranean Stream.** A stream that flows underground for part of the stream reach.

**Succession.** The change or sequence of plant, animal, and microbial communities that successively occupy an area over a period of time. ***Primary succession*** begins on a bare surface not previously occupied by living organisms, such as a recently deposited gravel bar. ***Secondary succession*** occurs following disturbances on sites that previously supported living organisms.

**Swale.** A depression or topographical low area.

**Sward.** An expanse of grass or grass-like plants.

**Tree.** A single-stemmed woody plant generally taller than 4.8 m (16 ft).

**Unconsolidated Bottom (Cowardin and others 1979).** A *class* of wetland or deepwater habitat with at least 25 percent cover of particles smaller than stones, and a vegetative cover less than 30 percent.

**Unconsolidated Shore (Cowardin and others 1979).** A *class* of wetland habitat having three characteristics: 1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders, or bedrock, 2) less than 30 percent areal cover of vegetation other than pioneering plants, and 3) any of the following water regimes: irregularly exposed, regularly flooded, seasonally flooded, irregularly flooded, temporarily flooded, intermittently flooded, saturated, or artificially flooded.

**Uplands.** Any area that does not qualify as a wetland because the associated hydrologic regime is not sufficiently wet to elicit development of vegetation, soils, and/or hydrologic characteristics associated with wetlands. Such areas occurring in floodplains are more appropriately termed nonwetlands.

**Very Long Duration (Flooding).** A duration class in which inundation for a single event is greater than 1 month.

**Very Poorly Drained.** Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season.

**Water Mark.** A line on vegetation or other upright structures that represents the maximum height reached during a flood, ponding, or inundation event.

**Water Regime (Nontidal) (Cowardin and others 1979).** Includes the following types: 1) ***Permanently flooded*** — water covers the land surface throughout the year in all years. Vegetation is composed of obligate hydrophytes. 2) ***Intermittently exposed*** — surface water is present throughout the year except in years of extreme drought. 3) ***Semipermanently flooded*** — surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface. 4) ***Seasonally flooded*** — surface water is present for extended periods especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the soil surface. 5) ***Saturated*** — the substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present. 6)

*Temporarily flooded* — surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season. Plants that grow both in uplands and wetlands are characteristic of the temporarily flooded regime. 7) *Intermittently flooded* — the substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity. Weeks, months, or even years may intervene between periods of inundation. The dominant plant communities under this regime may change as soil moisture conditions change. Some areas exhibiting this regime may not fall within the wetland definition because they do not have hydric soils or support hydrophytic plants.

**Water Table.** The upper surface of the zone of saturation within the soil or geologic material.

**Wet Meadow.** A herbaceous wetland on mineral soil. Generally, wet meadows occur in seasonally flooded basins and flats. Soils are usually dry for part of the growing season.

**Wetlands.** Areas that under normal circumstances have hydrophytic vegetation, hydric soils, and wetland hydrology. It includes landscape units such as bogs, fens, carrs, marshes, and lowlands covered with shallow, and sometimes ephemeral or intermittent waters. Wetlands are also potholes, sloughs, wet meadows, riparian zones, overflow areas, and shallow lakes and ponds having submerged and emergent vegetation. Permanent waters of streams and water deeper than 3 m (approximately 10 ft) in lakes and reservoirs are not considered wetlands.

**Wetland Hydrology.** Permanent or periodic inundation or prolonged soil saturation sufficient to create anaerobic conditions in the soil. Primary wetland hydrology indicators are: inundated, saturated in upper 4.7 cm (12 in), water marks, drift lines, sediment deposits, drainage patterns in wetlands. Secondary wetland hydrology indicators are: oxidized root channels in upper 4.7 cm (12 in), water-stained leaves, local soil survey data, FAC-neutral test (Environmental Laboratory, 1987).

**Wetland Status.** Refers to to plant species that have exhibited an ability to develop to maturity and reproduce in an environment where all or portions of the soil within the root zone become, periodically or continuously, saturated or inundated during the growing season. The ability to grow and reproduce in wetlands is due to morphological and/or physiological adaptations and/or reproductive strategies of the plant (Reed 1988a; 1988b). Categories are as follows:

**OBL (Obligate Wetland).** Refers to species that almost always occur (estimated probability greater than 99 percent) under natural conditions in wetlands.

**FACW (Facultative Wetland).** Refers to species that usually occur in wetlands (estimated probability 67-99 percent), but is occasionally found in nonwetlands.

**FAC (Facultative).** Refers to species that are equally likely to occur in wetlands or nonwetlands (estimated probability 34-66 percent).

**FACU (Facultative Upland).** Refers to species that usually occur in nonwetlands (estimated probability 67-99 percent), but are occasionally found in wetlands (estimated probability 1-33 percent).