



**Riparian Vegetation Classification of the
Columbia Basin, Washington**

Prepared for Bureau of Land
Management , Spokane District
and The Nature Conservancy

Prepared by
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A RIPARIAN VEGETATION CLASSIFICATION OF THE COLUMBIA BASIN, WASHINGTON

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In coordination with:

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SUMMARY

This report summarizes the results of a four-year project to inventory the riparian vegetation of Washington's Columbia Basin and to develop a riparian vegetation classification for the area. The Bureau of Land Management, Spokane District, and The Nature Conservancy funded this phase of the project. Previous inventory was funded by the BLM, Environmental Protection Agency and the Washington Department of Natural Resources.

Sample sites included valley segments on public land and on land owned by cooperating private land owners. Riparian samples are located along one hundred nineteen stream reach locations. A stream/riparian reach or reaches that typified each valley segment was characterized by eighteen stream variables or ratings. Each stream reach was mapped in vertical profile and as a horizontal map. Eleven physical variables and a plant species list with cover estimates were collected in plots on representative fluvial surfaces at each reach.

Table 1 lists the most frequently sampled vascular plant species recorded during inventory by their life form, native or introduced status, and U.S. F.W.S. Region 9 hydrologic status, erosion control potential, short-term and long-term revegetation ability, forage for cattle, and potential to provide cover for mule deer, upland game birds, and waterfowl.

Analysis of vegetation and environmental data collected at three hundred forty-seven sites derived ninety-eight vegetation types. Each type is briefly described including its affinity to the existing national vegetation classification and sources of management recommendation for the type. Types are of existing vegetation and are related to potential vegetation whenever information is available.

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INTRODUCTION

Riparian and wetland vegetation classifications provide integrated information systems that help in communication and interpretation of current land use, in definition of desired futures, and in comparison and monitoring for improving management. This report documents a four-year project to develop a riparian vegetation classification for the Columbia Basin in Washington. This Columbia Plateau riparian vegetation classification provides:

- 1) A guide to the riparian and wetland vegetation of Washington's Columbia Basin with information on fluvial, geomorphological, and land use processes,
- 2) An information source on the relationship between riparian vegetation and water quality, runoff and habitat for wildlife and livestock, and
- 3) A riparian restoration and management guide and a baseline for monitoring change.

Riparian or streamside environments are critical linkages and transition zones between the upland and the aquatic environments. Riparian zones provide a variety of ecosystem functions, such as wildlife habitat, contribution to fish habitat, unique plant species habitat, improving flood control, and sediment trapping. Lowrance et al. (1985) documented how riparian vegetation controlled agricultural non-point-source pollution stressors to the environment. The riparian and wetland zone is vitally important to the livestock industry because it provides more and higher quality forage than the adjacent uplands. Improper grazing in riparian zones changes riparian vegetation and contributes to altered water quality, sediment flow and other environmental stressors.

Variability within the riparian zone has been recognized and cataloged by classifying its vegetation (Kovalchik 1987, 2001, Manning et al. 1996, Hansen et al. 1995). Each vegetation unit has its own characteristics and contributes in its own way to maintaining a healthy riparian and stream ecosystem (Crowe and Clausnitzer 1997). Classification of riparian vegetation in relation to fluvial surfaces in a particular watershed will give targets for restoration or mitigation projects. Previous riparian vegetation classification in the Columbia Basin was limited and at a coarse scale (Cowardin et al. 1979, Evans 1989, Daubenmire 1970).

METHODS

Sampling of riparian vegetation and its associated environment follows procedures for riparian characterization developed by a coalition of governmental and private organizations in Montana (Hansen et al. 1995), the forests of eastern Washington (Kovalchik 1992, 2001) and the rangeland and forests of northern Nevada (Manning and Padgett 1996). The inventory scheme is designed to sample across the variation in stream and riparian ecosystems (Reid and Bourgeron 1993).

Major drivers identified as determinants of riparian vegetation are valley gradient, geology, and landuse. Accurate or complete GIS covers of the latter factors were not available at the beginning of this project. The distribution of public land was assumed to capture the variation in geology and landuse across the county and was used as a surrogate for those factors. Public land combined with three valley gradient classes derived from a Department of Natural Resources hydrology layer were used to initially stratify sample locations.

Stream reaches selected for sampling were first assessed as to their representativeness of the valley's disturbance history and hydrology. After a walking reconnaissance of the valley, a representative reach was selected for sampling and located on an orthophoto map. A preliminary horizontal map was sketched illustrating observed fluvial surfaces with associated vegetation and land use.

Using a modified Rosgen (1996) method of stream characterization, stream, valley, and environmental features were recorded and a stream profile was drawn to display the relationship of surfaces to field determined bankfull (Figure 1). The following information were collected at each stream reach: bankfull, bankfull width, average stream depth and maximum depth, floodprone width (measured at twice maximum depth from channel bottom), stream gradient, Rosgen stream type, influence of spring, seep, and sub-irrigation. Each stream was characterized as ephemeral, intermittent, or perennial as illustrated on recent USGS maps.

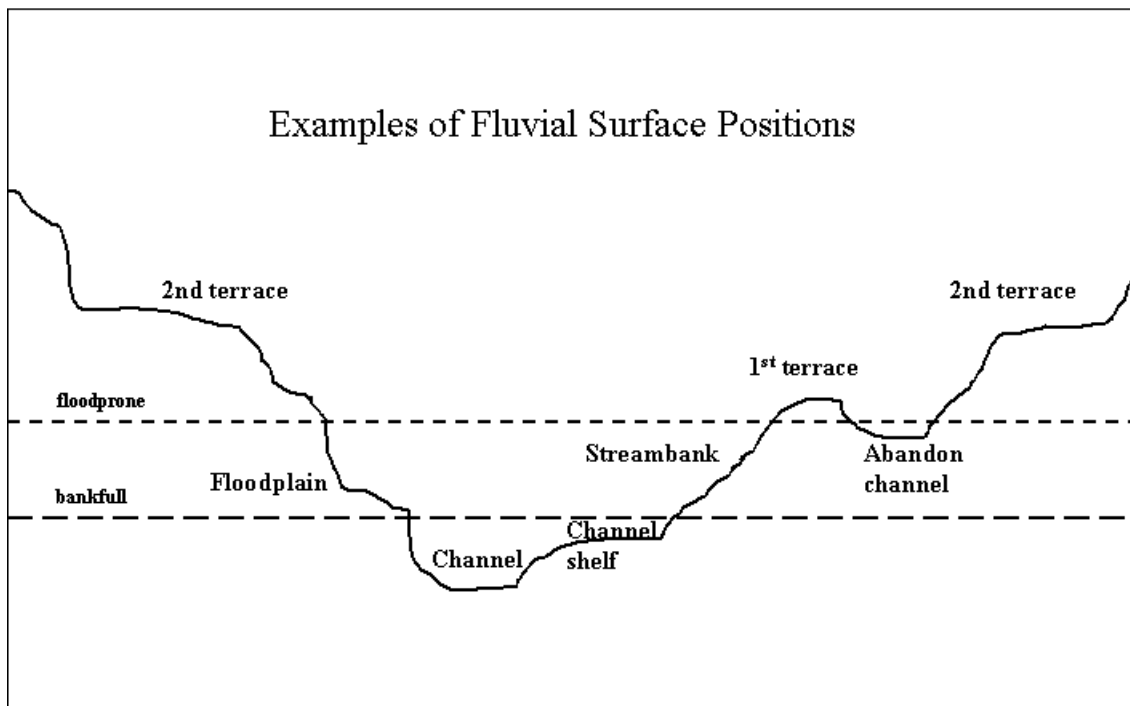


Figure 1. Illustration of relative positions of fluvial surfaces recorded for location of each vegetation plot.

The following information was recorded to characterize each representative fluvial surface and its vegetation: 1) the distance from the channel at bankfull, 2) elevation above bankfull at plot center, 3) current land use, 4) thickness, texture and Munsel color of surface soil layers and where possible, characters of subsurface soil as to depth to redox layer, restrictive layer, or water table, and 5) a complete plant list by lifeform and species cover. Horizontal and vertical distances for stream profiles were determined by a tape measure and clinometer. Woody plants that can typically grow into a tree with single trunk over 5 inches diameter at 4.5 feet from the

ground (DBH) were recorded as overstory trees and as understory trees when less than 5 inches DBH. Plot size for vegetation varied with size of dominant plants and size and shape of fluvial surface. Plot size in tree-dominated communities varied between .02 and .1 acre, .01 and .1 acre for shrublands and .001 and 0.1 acre for herbaceous vegetation.

Vegetation and site data were analyzed using TWINSPLAN and cluster analysis using the PC-ORD analytical package (McCune and Mefford 1997). Description and comparison of vegetation units with stream and site variables included deriving a Flooding Potential Index or FPI (Chappell 1999). FPI is calculated for each fluvial surface sampled by dividing its elevation above bankfull by maximum stream depth above bankfull (Figure 2). FPI places each site in a relative vertical position above the stream channel or relative to the floodprone area.

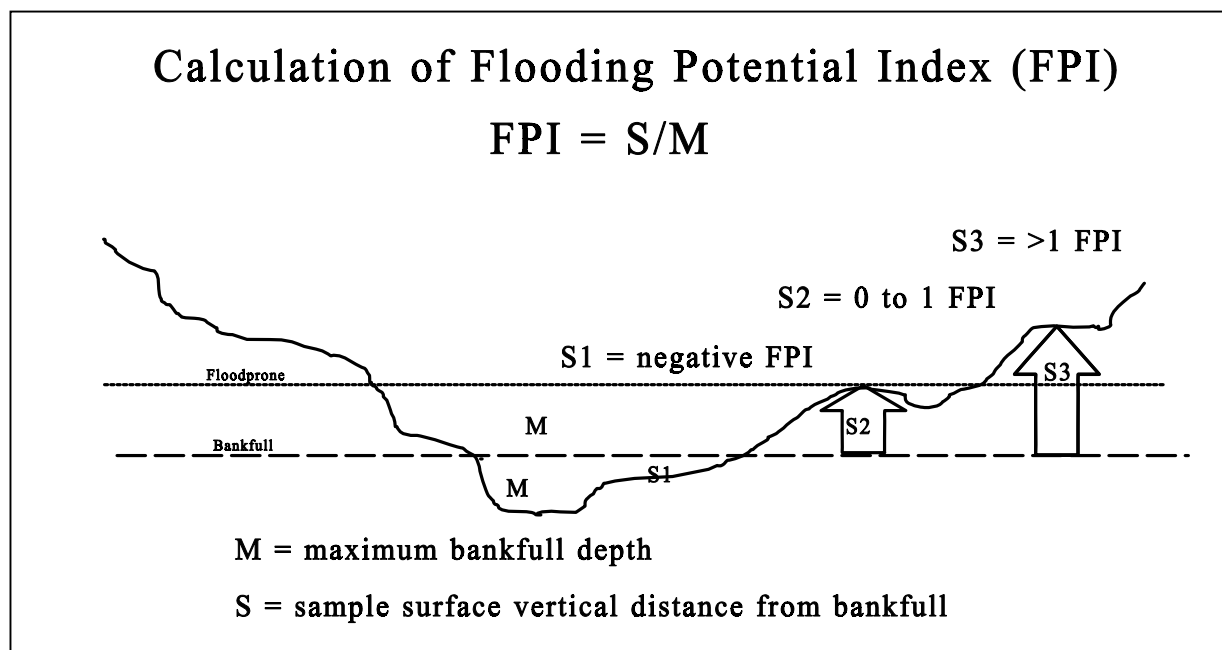


Figure 2. Stream measurements following Rosgen (1996) for field determined bankfull, which is the level of incipient flooding, and the floodprone zone defined as twice the maximum depth.

RESULTS AND DISCUSSION

Geologic setting. The Columbia Basin is underlain by 7 to 17 million year old basalt layers that fill a basin between the Cascade and Rocky Mountains. During the Pleistocene, 1 million to 10,000 years ago, glaciers intermittently covered the land north of most of the Columbia Basin. A lobe of that ice would sometimes dam a river in the northern Rockies (the Clark Fork River in Montana) and create a large lake that is now referred to as Lake Missoula. The ice dam formed and was breached or was broken-up as many as one hundred times, each time sending a torrent of water, ice and debris across the Columbia Basin Washington that eventually reached the Pacific Ocean through the Columbia River gorge. These catastrophic floods cut deep canyons and coulees in the basalt layers and deposited vast amounts of sand, gravel and boulders. The material sometimes partially filled canyons previously cut in the basalt. Finer material left after

the floods were deposited in the Quincy and Pasco Basins. After the water receded and the sediments dried, they were blown northeastward to partially or completely cap exposed basalt and flood deposits with sand and silt. These wind blown deposits are now the deep, productive soils of the Palouse and adjacent areas (Alt and Hyndman 1984, Stoffel et al.1991).

Northern Douglas County is the only portion of the Columbia Plateau that was overridden by glaciers. This area at the edge of the Columbia River basalts additionally was also inundated by glacial meltwater lakes dammed up behind the Okanogan lobe of the continental glacier. The upper valley reaches are similar to other loess covered portions of the Columbia Basin except it is mixed with till. Additionally, underlying granodiorite is exposed near the Columbia River Canyon where it merges with the Okanogan river valley (Stoffel et al.1991).

Upland vegetation setting. The Columbia Basin supports a complex landscape composed of: native shrubsteppe vegetation composed of scattered shrubs, typically sagebrush species or bitterbrush with a bunchgrass cover, usually bluebunch wheatgrass, Idaho fescue or needlegrasses, scablands (shallow rocky soils) that support specialized vegetation dominated by stiff sagebrush, one of several bushy buckwheats, and short bunchgrasses, and land largely converted to agricultural use or rangeland dominated by exotic plants or native vegetation tolerant of persistent land use.

Daubenmire (1970) describes the pre-agricultural vegetation landscape and Vander Haegen et al. (2000) describe the current landscape condition of the Columbia Basin of Washington.

Hydrologic setting. The Columbia Basin proper (the area bounded by the Columbia and Snake River canyons and the Rocky Mountain foothills) has four major watersheds: Crab Creek, Douglas Creek including McCartney Creek, and Foster Creek that all flow to the Columbia River and the Palouse River that flows to the Snake River. The Palouse River drains the foothills of the northern Rockies and the adjacent Columbia Basin plateau. Snowmelt and winter rain dominate the watershed. Cow Creek, a Palouse tributary, is the only part of that watershed sampled and the only part with significant dams, ditches and dikes.

Upper Crab Creek originates along the breaks above the Columbia River canyon in northeastern Spokane County and flows southwestward to Wilson Creek in Grant County. Upper Crab Creek is dominated by a multitude of springs, snowmelt and winter rain. From Wilson Creek, Crab Creek flows south into Moses Lake. Lower Crab Creek dominates the natural watershed of Grant County although the Columbia River Irrigation Project (CRIP) is the dominant hydrologic driver of much the county. Much of northern Grant County is the Grand Coulee, a major ice age flood channel that prior to CRIP supported a series of internally drained lakes. Today, Banks Lake reservoir is now at the head of Grand Coulee and provides water via a canal system to the irrigated agriculture landscape of central Grant County. Seepage from Banks Lake feeds the lakes south in Grand Coulee. Crab Creek and CRIP parallel each other and interact below Billy Clapp Reservoir. Wasteways (surface irrigation water re-entering the natural watershed) generally flow into narrow, steep valleys although they may be held as “pothole lakes” in broad flat valleys. These wasteway creeks have seasonal and daily flood patterns not found in native watersheds. Lower Crab Creek from Corfu to the Columbia River flows through a broad, flat valley with wasteway creeks entering along its north side.

Douglas and McCartney Creeks drain most of Douglas County southward through Moses Coulee into the Columbia River. Snowmelt, winter rain and springs dominate this watershed. Upper Douglas Creek is not dammed although it is confined within its narrow valley by railroad and road grades and is ditched in the lower reaches. The western portion of the watershed drains Badger Mountain, a local up-lift of Grande Ronde basalt. Generally, upper reaches of the Badger Mountain watershed are in steep gradient, narrow valleys while the lower reaches are in narrow, mid to low gradient valleys before joining the mainstem of Douglas Creek. Although McCartney Creek drains Jameson Lake, the only portions that have surface water are spring-fed. Douglas Creek recently has experienced a series of rain-on-snow flash flood events that scoured the much of the creek's flood plain.

Foster Creek drains northern Douglas County, the only glaciated portion of the Columbia Plateau, and flows north into the Columbia River. Snowmelt, winter rain and springs dominate this watershed. It is not dammed and comparatively only a few reaches are ditched or diked. The upper valley reaches are similar to other loess covered portions of the Columbia Basin except it is mixed with till. The mid reaches flow through generally broad low gradient valleys with Pleistocene lake deposits. The lower reaches are in narrower, steeper valleys cutting through a mix of exposed deep gravelly flood deposits and exposed granodiorite near the Columbia River Canyon where the Okanogan river valley merges.

Watersheds that originate in the Blue Mountains and the east Cascades and flow through the arid Columbia Basin into the Snake and Columbia Rivers are dominated by snowmelt although spring reaches are not uncommon.

Land Use Setting. Dryland farming and irrigation agriculture and hay production are primarily found on deep fine textured soils occupying over 50% the basin. The rest of the basin, primarily shallow or rocky soils, supports or was used to support livestock. Population centers are generally small and typically associated with water features, for example, Moses Lake and the tri-cities on the Columbia River.

Riparian Species List and Species Characteristics. Table 1 lists vascular plant species commonly encountered during vegetation sampling (>5% of plots or indicator value) by their lifeform, native or introduced status, and U.S. F.W.S. Region 9 hydrologic status. A total of 445 species were included in all samples. Common and scientific names are those listed in the U.S.D.A. Plants Database (<http://plants.usda.gov/plants>). Synonyms used in Hitchcock and Cronquist (1973) appear in Table 1. Table 2 lists the erosion control potential, short-term and long-term revegetation ability, forage for cattle, and potential to provide cover for mule deer, upland game birds, and waterfowl for selected species. Sources for this information are Hansen et al. (1995) and Crowe and Clausnitzer (1997).

Riparian Vegetation Classification. Analysis of vegetation and environmental data from 347 plots in 119 riparian settings derived 98 vegetation types (Figure 3). These are existing-vegetation types and they are related to potential vegetation types when information is available.

Each type is briefly described including its geographic distribution, fluvial setting, vegetation, and previous classification including its affinity to the existing national vegetation classification or NVC (Anderson et al. 1998), and sources of management recommendations. A vertical

stream profile illustrates the relationship between fluvial surface and plant community type. Fluvial surfaces are depicted in relation to field-determined bankfull and the floodprone zone as defined by Rosgen (1996). Each profile indicates the measured distance of each surface above and below bankfull and its horizontal width. Each description lists: 1) common plants in the community type with average cover and constancy or percent of plot they occurred in, and 2) environmental features of the type.

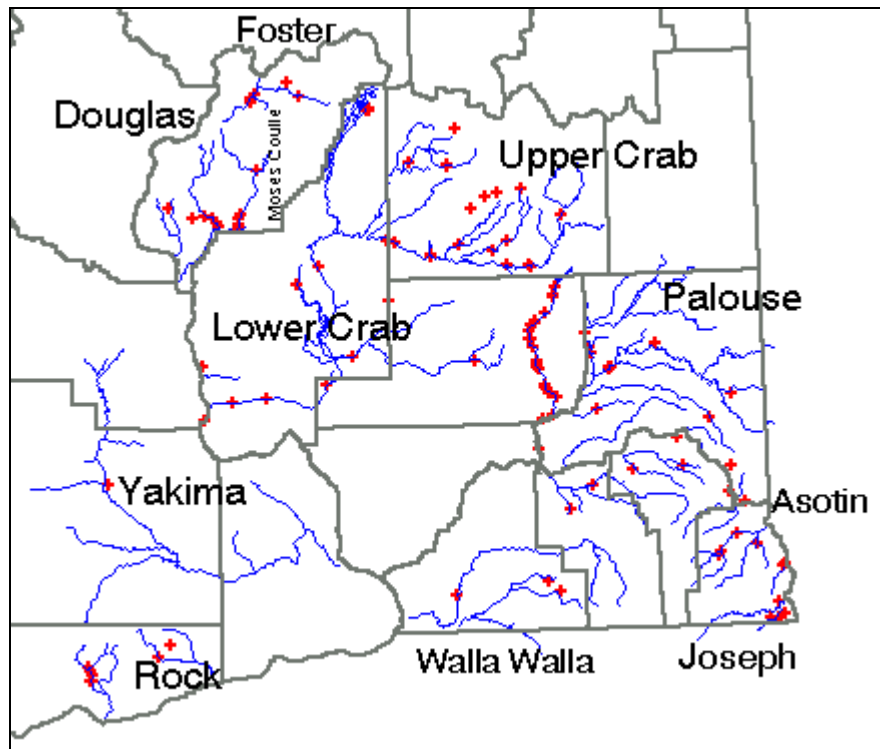


Figure 3. Distribution of sample reaches (+) and major drainages of the Columbia Basin, Washington.

Types are grouped first by dominant lifeform: tree-, shrub-, grass and grass-like- and forb-dominated. Within the physiognomic groups types are clustered by a unifying characteristic, for example, salt meadow types or types with redosier dogwood. Common plant and environmental features tables list the groupings of types.

Plot numbers are listed with the plant association (types in the NVC) and community type (proposed or unrecognized plant associations) description. Plots number is a combination of a sample reach number, plus the number of each sample at that location. For example, sample reach location 99RC10 had three samples: 99RC100 the unvegetated channel, 99RC101 reed canarygrass at bankfull, and 99RC102 an aspen stand on a second terrace.

Table 1. Species names and riparian/wetland characteristics.

Wetland Status from U.S. F.W.S. OW = obligate wetland species that always occur in wetlands; FW =Facultative Wetland species that 67-99% of the time occur in wetlands; F = Facultative species that 34-67% occur in wetlands or uplands; FU = Facultative Upland species that 1-33% occur in wetlands; U = Obligate Uplands species that always in uplands.

Wetland Status	Native Status	Common names	USDA Plants Database Name	Hitchcock & Cronquist 1973
TREES				
F	native	bigleaf maple	<i>Acer macrophyllum</i>	
F	native	black cottonwood	<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	<i>Populus trichocarpa</i>
F	native	black hawthorn	<i>Crataegus douglasii</i>	
-	introduced	black walnut	<i>Juglans nigra</i>	
FW	introduced	boxelder	<i>Acer negundo</i>	
FU	native	common chokecherry	<i>Prunus virginiana</i>	
-	native	greenleaf willow	<i>Salix lucida</i> ssp. <i>caudata</i>	<i>Salix lasiandra</i> ssp. <i>caudata</i>
F	introduced	honey locust	<i>Gleditsia triacanthos</i>	
F	native	netleaf hackberry	<i>Celtis laevigata</i> var. <i>reticulata</i>	<i>Celtis reticulata</i>
FU	native	Oregon white oak	<i>Quercus garryana</i>	
FW	native	peachleaf willow	<i>Salix amygdaloides</i>	
FU	native	ponderosa pine	<i>Pinus ponderosa</i>	
FW	native	quaking aspen	<i>Populus tremuloides</i>	
FU	native	Rocky Mountain juniper	<i>Juniperus scopulorum</i>	
F	introduced	Russian olive	<i>Elaeagnus angustifolia</i>	
FW	native	thinleaf alder	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	<i>Alnus incana</i>
FW	native	water birch	<i>Betula occidentalis</i>	
FU	native	western juniper	<i>Juniperus occidentalis</i>	
FW	native	white alder	<i>Alnus rhombifolia</i>	
FW	introduced	white willow	<i>Salix alba</i>	
SHRUBS				
FW	native	arroyo willow	<i>Salix lasiolepis</i>	
FU	native	basin big sagebrush	<i>Artemisia tridentata</i> ssp. <i>tridentata</i>	<i>Artemisia tridentata</i>
FW	native	Bebb willow	<i>Salix bebbiana</i>	
F	native	blue elderberry	<i>Sambucus nigra</i> ssp. <i>cerulea</i>	
-	native	California blackberry	<i>Rubus ursinus</i>	
FU	native	common snowberry	<i>Symphoricarpos albus</i>	
-	introduced	dog rose	<i>Rosa canina</i>	
F	native	golden currant	<i>Ribes aureum</i>	
FU	native	greasewood	<i>Sarcobatus vermiculatus</i>	
FU	native	heath goldenrod	<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>nauseosa</i>	<i>Chrysothamnus nauseosus</i>
-	introduced	indigobush	<i>Amorpha fruticosa</i>	
F	native	Lewis' mockorange	<i>Philadelphus lewisii</i>	
FW	native	white sagebrush	<i>Artemisia ludoviciana</i>	
FU	native	Nootka rose	<i>Rosa nutkana</i>	
-	native	mallowleaf ninebark	<i>Physocarpus malvaceus</i>	
-	native	oceanspray	<i>Holodiscus discolor</i>	
FU	native	parsnipflower buckwheat	<i>Eriogonum heracleoides</i>	
-	native	Pursh's buckthorn	<i>Frangula purshiana</i>	<i>Rhamnus purshiana</i>
FW	native	redosier dogwood	<i>Cornus sericea</i>	<i>Cornus stolonifera</i>
OW	native	sandbar willow	<i>Salix exigua</i>	

Wetland Status	Native Status	Common names	USDA Plants Database Name	Hitchcock & Cronquist 1973
FU	native	Saskatoon serviceberry	Amelanchier alnifolia	
F	native	Scouler's willow	Salix scouleriana	
FU	native	smooth sumac	Rhus glabra	
FU	native	snow buckwheat	Eriogonum niveum	
FU	native	thimbleberry	Rubus parviflorus	
-	native	wax current	Ribes cereum var. cereum	
F	native	wedgeleaf saltbrush	Atriplex truncata	
FW	native	western poison ivy	Toxicodendron rydbergii	Rhus radicans
FU	native	western white clematis	Clematis ligusticifolia	
-	native	white spirea	Spiraea betulifolia	
F	native	whitestem gooseberry	Ribes inerme	
FU	native	Woods' rose	Rosa woodsii	
FU	native	Wyoming big sagebrush	Artemisia tridentata ssp. wyomingensis	Artemisia tridentata
OW	native	yellow willow	Salix lutea	Salix rigida var. watsonii
GRASS-LIKES				
OW	native	analogue sedge	Carex simulata	
OW	native	Baltic rush	Juncus balticus	
OW	native	chairmaker's bulrush	Schoenoplectus americanus	Scirpus americanus
FW	native	clustered field sedge	Carex praeegracilis	
OW	native	common spikerush	Eleocharis palustris	
OW	native	fewflower sedge	Carex pauciflora	
OW	native	hardstem bulrush	Schoenoplectus acutus	Scirpus acutus
OW	native	Nebraska sedge	Carex nebrascensis	
OW	native	Northwest Territory sedge	Carex utriculata	
OW	native	owlfruit sedge	Carex stipita	
OW	native	panicled bulrush	Scirpus microcarpus	
F	native	poverty rush	Juncus tenuis	
OW	native	river bulrush	Schoenoplectus fluviatilis	
FW	native	slenderbeak sedge	Carex athrostachya	
FW	native	swordleaf rush	Juncus ensifolius	
OW	native	tapertip rush	Juncus acuminatus	
FW	native	toad rush	Juncus bufonius	
OW	native	water sedge	Carex aquatilis	
OW	native	woolly sedge	Carex pellita	Carex pellita
GRASSES				
FU	native	alkali bluegrass	Poa secunda	Poa juncifolia
FW	native	alkali cordgrass	Spartina gracilis	
FW	native	annual hairgrass	Deschampsia danthonioides	
FW	introduced	annual rabbitsfoot grass	Polypogon monspeliensis	
FU	native	basin wildrye	Leymus cinereus	Elymus cinereus
-	both	bentgrass	Agrostis spp	
FU	native	blue wildrye	Elymus glaucus	
U	native	bluebunch wheatgrass	Pseudoroegneria spicata	Agropyron spicatum
-	native	bluegrass	Poa species	
FW	native	bluejoint	Calamagrostis canadensis	
FU	introduced	bulbous bluegrass	Poa bulbosa	
F	introduced	Canada bluegrass	Poa compressa	
FU	introduced	cheatgrass	Bromus tectorum	

Wetland Status	Native Status	Common names	USDA Plants Database Name	Hitchcock & Cronquist 1973
GRASSES				
F	introduced	colonial bentgrass	<i>Agrostis capillaris</i>	<i>Agrostis tenuis</i>
FW	native	creeping bentgrass	<i>Agrostis stolonifera</i>	<i>Agrostis alba</i>
F+	introduced	Darbyshire meadow ryegrass	<i>Lolium pratense</i>	<i>Festuca pratensis</i>
F	introduced	dense silkybent	<i>Agrostis interrupta</i>	
OW	native	fowl mannagrass	<i>Glyceria striata</i>	<i>Glyceria elata</i>
F	native	foxtail barley	<i>Hordeum jubatum</i>	
U	native	Idaho fescue	<i>Festuca idahoensis</i>	
FW	introduced	intermediate wheatgrass	<i>Elytrigia intermedia</i>	<i>Agropyron intermedium</i>
U	introduced	Japanese brome	<i>Bromus japonicus</i>	
FU	introduced?	Kentucky bluegrass	<i>Poa pratensis</i>	
F	native	Lemmon's alkaligrass	<i>Puccinellia lemmonii</i>	
FW	introduced	leporinum barley	<i>Hordeum murinum</i> ssp. <i>leporinum</i>	<i>Hordeum lepidum</i>
FW	native	mat muhly	<i>Muhlenbergia richardsonis</i>	
FW	native	meadow barley	<i>Hordeum brachyantherum</i>	
FU	introduced	medusahead	<i>Taeniatherum caput-medusae</i>	
FU	native	Nevada bluegrass	<i>Poa secunda</i>	<i>Poa nevadensis</i>
FU	introduced	orchardgrass	<i>Dactylis glomerata</i>	
FU	introduced	quackgrass	<i>Elytrigia repens</i> var. <i>repens</i>	<i>Agropyron repens</i>
FW	introduced?	reed canarygrass	<i>Phalaris arundinacea</i>	
U	introduced	rye brome	<i>Bromus secalinus</i>	
FU	introduced	ryegrass	<i>Lolium arundinaceum</i>	<i>Festuca arundinaceum</i>
FW	native	saltgrass	<i>Distichlis spicata</i>	<i>Distichlis stricta</i>
U	native	Sandberg bluegrass	<i>Poa secunda</i>	
-	both	six-week fescues	<i>Vulpia</i> spp.	
FU	native	streambank wheatgrass	<i>Elymus lanceolatus</i>	<i>Agropyron dasystachyum</i>
FU	introduced	timothy	<i>Phleum pratense</i>	
U	introduced	ventenatagrass	<i>Ventenata dubia</i>	
OW	native	weeping alkaligrass	<i>Puccinellia distans</i>	
FORBS				
-	introduced	absinthium	<i>Artemisia absinthium</i>	
-	introduced	alfalfa	<i>Medicago sativa</i>	
OW	native	alkali buttercup	<i>Ranunculus cymbalaria</i>	
OW	native	American speedwell	<i>Veronica americana</i>	
-	native	arrowleaf balsamroot	<i>Balsamorhiza sagittata</i>	
OW	native	arumleaf arrowhead	<i>Sagittaria cuneata</i>	
-	native	aster	<i>Aster</i> sp.	
FU	native	bigbract verbena	<i>Verbena bracteosa</i>	
F	introduced	black medick	<i>Medicago lupulina</i>	
-	native	blue-eyed Mary	<i>Collinsia grandiflora</i>	
F	native	blue lettuce	<i>Lactuca tatarica</i> var. <i>pulchella</i>	<i>Lactuca pulchella</i>
OW	native	broadfruit burreed	<i>Sparganium eurycarpum</i>	
OW	native	broadleaf cattail	<i>Typha latifolia</i>	
F	introduced	Perennial pepperweed	<i>Lepidium latifolium</i>	
FW	native	brook cinquefoil	<i>Potentilla rivalis</i>	
FU	introduced	bull thistle	<i>Cirsium vulgare</i>	
-	introduced	burr chervil	<i>Anthriscus scandicina</i>	
-	unknown	buttercup	<i>Ranunculus</i> sp.	
FU	native	Canada goldenrod	<i>Solidago canadensis</i>	

Wetland Status	Native Status	Common names	USDA Plants Database Name	Hitchcock & Cronquist 1973
		FORBS		
FU	introduced	Canadian thistle	Cirsium arvense	
FU	introduced	clasping pepperweed	Lepidium perfoliatum	
F	introduced	climbing nightshade	Solanum dulcamara	
-	native	coastal manroot	Marah oreganus	
F	native	common cowparsnip	Heracleum maximum	Heracleum lanatum
FU	native	common dandelion	Taraxacum officinale	
OW	native	common duckweed	Lemna minor	
-	native	common gaillardia	Gaillardia aristata	
-	introduced	common motherwort	Leonurus cardiaca	
-	introduced	common mullein	Verbascum thapsus	
F	native	common plantain	Plantago major	
-	introduced	common St. Johnswort	Hypericum perforatum	
FU	native	common sunflower	Helianthus annuus	
-	introduced	common tansy	Tanacetum vulgare	
FU	native	common yarrow	Achillea millefolium	
FW	introduced	creeping buttercup	Ranunculus repens	
FU	native	curlycup gumweed	Grindelia squarrosa	
OW	introduced	cutleaf waterparsnip	Berula erecta	
-	native	dock	Rumex sp.	
OW	native	dotted smartweed	Polygonum punctatum	
F	native	feathery false lily of the valley	Maianthemum racemosum	Smilacina racemosa
F	native	Fendler's waterleaf	Hydrophyllum fendleri var. albifrons	
-	native	fernleaf biscuitroot	Lomatium dissectum	
FU	native	fiddleleaf hawksbeard	Crepis runcinata	
FW	introduced	fivehorn smotherweed	Bassia hyssopifolia	
-	introduced	Fuller's teasel	Dipsacus fullonum ssp.sylvestris	Dipsacus sylvestris
FW	native	giant horsetail	Equisetum telmateia	
F	native	giant sumpweed	Iva xanthifolia	
-	native	Gray's biscuitroot	Lomatium grayi	
-	unknown	groundsmoke	Gayophytum sp.	
-	introduced	gypsyflower	Cynoglossum officinale	
OW	native	hairy pepperwort	Marsilea vestita	
-	native	harlequin blue eyed Mary	Collinsia heterophylla	
-	native	heartleaf arnica	Arnica cordifolia	
-	native	Henderson inflated olsynium	Olsynium douglasii var. inflatum	Sisyrichium douglasii
-	introduced	hogbite	Chondrilla juncea	
F	native	intermediate dogbane	Apocynum X floribundum	Apocynum medium
FW	native	jewelweed	Impatiens capensis	
F	native	lambsquarters	Chenopodium album	
F	native	lambtongue ragwort	Senecio integerrimus	
FW	native	largeleaf avens	Geum macrophyllum	
-	introduced	lesser burdock	Arctium minus	
-	native	littleflower gilia	Ipomopsis minutiflora	Gilia minutiflora
OW	native	Macoun's buttercup	Ranunculus macounii	
-	introduced	madwort	Asperugo procumbens	
F	native	manyflowered aster	Aster ericoides var. pansus	Aster pansus
OW	native	marsh skullcap	Scutellaria galericulata	
F	native	miner's lettuce	Claytonia perfoliata ssp.perfoliata	Montia perfoliata

Wetland Status	Native Status	Common names	USDA Plants Database Name	Hitchcock & Cronquist 1973
		FORBS		
-	native	mint	Mentha sp.	
-	native	Munro's globemallow	Sphaeralcea munroana	
OW	native	narrowleaf cattail	Typha angustifolia	
-	native	needleleaf navarretia	Navarretia intertexta	
F	native	nettleleaf giant hyssop	Agastache urticifolia	
-	native	northern bog violet	Viola nephrophylla var. nephrophylla	
OW	native	northern marsh yellowcress	Rorippa islandica	
-	native	northern willowherb	Epilobium ciliatum ssp. watsonii	Epilobium watsonii
F	native	northwest cinquefoil	Potentilla gracilis	
FW	native	Oregon checkermallow	Sidalcea oregana	
OW	introduced	paleyellow iris	Iris pseudacorus	
FU	native	Pennsylvania pellitory	Parietaria pennsylvanica	
F	introduced	perennial pepperweed	Lepidium latifolium	
FW	introduced	poison hemlock	Conium maculatum	
-	native	popcornflower	Plagiobothrys sp.	
F	native	povertyweed	Iva axillaris	
F	introduced	prickly lettuce	Lactuca serriola	
OW	introduced	purple loosestrife	Lythrum salicaria	
F+	native	purple sweetroot	Osmorhiza purpurea	
-	introduced	redstem stork's bill	Erodium cicutarium	
FW	native	Rocky Mountain iris	Iris missouriensis	
F	native	rough cocklebur	Xanthium strumarium	
OW	native	seaside arrowgrass	Triglochin maritimum	
OW	native	seep monkeyflower	Mimulus guttatus	
F	native	showy milkweed	Asclepias speciosa	
F	introduced	silver cinquefoil	Potentilla argentea	
OW	native	silverweed cinquefoil	Argentina anserina	Potentilla anserina
-	unknown	smartweed	Polygonum sp.	
FW	native	smooth horsetail	Equisetum laevigatum	
-	native	sowthistle	Sonchus sp.	
F	native	starry false Solomon's seal	Maianthemum stellatum	Smilacina stellata
FU	native	stickywilly	Galium aparine	
FW	native	stinging nettle	Urtica dioica	
OW	native	swamp smartweed	Polygonum hydropiperoides	
F	native	swamp verbena	Verbena hastata	
-	native	sweetcicely	Osmorhiza berteroi	Osmorhiza chilensis
-	introduced	sweetclover	Melilotus sp.	
FW	native	tall groundwel	Senecio hydrophiloides	Senecio foetidus
F	native	tall ragwort	Senecio serra	
-	native	tall tumbledustard	Sisymbrium altissimum	
-	native	tansyleaf eveningprimrose	Oenothera tanacetifolia	
-	native	tarweed fiddleneck	Amsinckia lycopsoides	
-	unknown	thistle	Cirsium spp.	
-	native	turpentine wavewing	Pteryxia terebinthina var. terebinthina	Cymopterus terebinthinus
-	native	violet	Viola sp.	
OW	native	water knotweed	Polygonum amphibium	
OW	native	water speedwell	Veronica anagallis-aquatica	
OW	introduced	watercress	Rorippa nasturtium-aquaticum	
FW	native	wedgescale saltbush	Atriplex truncata	
FW	native	western goldentop	Euthamia occidentalis	Solidago occidentalis

Wetland Status	Native Status	Common names	USDA Plants Database Name	Hitchcock & Cronquist 1973
		FORBS		
-	native	western gromwell	Lithospermum ruderales	
-	native	western tansymustard	Descurainia pinnata	
OW	native	western water hemlock	Cicuta douglasii	
FU	introduced	white clover	Trifolium repens	
F	native	whitetip clover	Trifolium variegatum	
-	introduced	whitetop	Cardaria draba	
OW	native	whitewater crowfoot	Ranunculus aquatilis	
F	native	wild mint	Mentha arvensis	
-	native	wild onion	Allium spp.	
FW	native	willow dock	Rumex salicifolius	
-	native	willowherb	Epilobium spp	
-	native	woolly eriophyllum	Eriophyllum lanatum	
-	native	woolly plantain	Plantago patagonica	
FU	introduced	wormseed wallflower	Erysimum cheiranthoides	
-	introduced	yellow salsify	Tragopogon dubius	
-	introduced	yellow sweetclover	Melilotus officinalis	

Table 2. Selected revegetation and habitat characteristics of riparian species.

Erosion control refers to species with a growth habitat that has the potential to reduce soil erosion. H = high potential species that are aggressive, persistent, high biomass and soil binding root/rhizome system, M = moderate potential species, L = low potential species that have poor growth form, persistence, biomass or root/rhizome system.

Short-term revegetation potential refers to species that quickly establish and grow within 1-3 years. H = high potential species that grow rapidly, provides good cover and reproduce quickly, M = moderate potential; L = low potential.

Long-term revegetation potential refers to species that establish in and persist for more than 3 years. H = high potential, M = moderate potential, L = low potential.

Cattle forage refers to palatability rated G = good, F = fair, P = poor.

Cover refers to thermal or feeding cover for the wildlife group rated G = good, F = fair, P = poor. All ratings were taken from Hansen et al. (1995).

Common names	Erosion control	Short-term revegetation	Long-term revegetation	Cattle forage	Mule deer cover	Upland game birds cover	Waterfowl cover
TREES							
black cottonwood	H	L	M	P	F	F	F
black hawthorn	M	L	M	F	G	F	F
boxelder	M	L	L	P	G	G	P
common chokecherry	M	L	H	F	G	G	G
quaking aspen	H	L	H	F	G	G	F
peachleaf willow	H	L	M	F	G	G	F
water birch	H	L	M	P	G	G	G
white willow	H	L	M				
SHRUBS							
basin big sagebrush	L	L	L	L	L		
Bebb willow	H	L	M	G	G	G	F
common snowberry	M	L	M	F	F	G	G
black greasewood	M	L	M	F	F	F	G
redosier dogwood	H	L	M	F	G	F	F
sandbar willow	H	L	M	F	G	G	G
Saskatoon serviceberry	M	L	M	F	F	F	G
western white clematis	M	L	L	P			
Woods' rose	H	L	M	F	G	F	G
yellow willow	H	L	M	F	G	G	F
GRAMINOIDS							
Baltic rush	M	L	M	F		F	G
common spikerush	H	H	M	P		F	G
Northwest Territory sedge	H	M	H			P	P
hardstem bulrush	M	M	M	F	G	G	G
water sedge	H	M	M	G		P	F
woolly sedge	H	M	M	G		P	F

Common names	Erosion control	Short-term revegetation	Long-term revegetation	Cattle forage	Mule deer cover	Upland game birds cover	Waterfow l cover
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GRASSES

alkali cordgrass	H	M	H	F	F	G	G
basin wildrye	H	M	H	G		F	G
blue wildrye	M	M	H	G			
bluejoint	H	L	H	G		P	G
creeping bentgrass	H	H	H	F		G	G
fowl mannagrass	M	L	M	G		F	G
foxtail barley	L	M	L	P		P	G
Idaho fescue	M	L	M	G			
Kentucky bluegrass	L	M	H	G		G	G
quackgrass	H	M	H	G		G	G
reed canarygrass	H	M	H	G		F	G
saltgrass	M	L	M	F		P	P
timothy	M	M	H	G	G	F	G

FORBS

broadleaf cattail	H	L	H	P	F	G	G
Canada goldenrod	M	M	M	P			
Canadian thistle	M	L	M	P			
common cowparsnip	M	L	L	G			
common dandelion	L	L	L	F			
common horsetail	M	H	M	P	P	P	P
common yarrow	L	H	M	P			
largeleaf avens	L	L	L				
northwest cinquefoil	L	M	M	F			
seaside arrowgrass	L	L	L	P			
silverweed cinquefoil	M	M	M	F			
smooth horsetail	M	H	M	P			
starry false Solomon's seal	L	L	L	P			
stinging nettle	M	L	L	P			
water knotweed	M	M	M	F			
white clover	L	M	M	G			
yellow sweetclover	M	H	M	G		G	G

KEY TO RIPARIAN AND WETLAND VEGETATION TYPES ON THE COLUMBIA PLATEAU, WASHINGTON

This is a key to vegetation types associated with permanent, intermittent and ephemeral streams, ponds and lakes in the Columbia Basin in Washington. Types were either sampled during this project and/or have been documented in literature (see page 96). The key differs from more traditional dichotomous keys in that, it presents only the first couplet and does not always list the alternative choice. The listed choices are arranged hierarchically so that if a statement is not met then one proceeds to the next statement. As with all keys, this is an aid for identification, not the classification. Upland vegetation types occurring in streamside environments are not included.

Tree and Shrub dominated communities:

Ponderosa pine (*Pinus ponderosa*) dominant tree and >25% cover

Common snowberry (*Symphoricarpos albus*) >10% cover.....Ponderosa pine/common snowberry floodplain Forest, page 32.

Western juniper (*Juniperus occidentalis*) dominant tree and >25% cover

Lewis' mockorange (*Philadelphus lewisii*) >10% cover.....Western juniper/Lewis mockorange woodland, page 32.

Bluebunch wheatgrass (*Pseudoroegneria spicata*)>10% cover..... Western juniper/bluebunch wheatgrass woodland, page 32.

Quaking aspen (*Populus tremuloides*) dominant tree and >25% cover

Woolly sedge (*Carex pellita*) >10% cover *Populus tremuloides* / *Carex pellita* Forest, page 96.

Redosier dogwood (*Cornus sericea*) >10% cover Quaking aspen / redosier dogwood association, page 24.

Common snowberry (*Symphoricarpos albus*) >10% cover..... Quaking aspen/common snowberry association, page 25.

Black hawthorn (*Crataegus douglasii*) >10% cover and common snowberry (*Symphoricarpos albus*) >10% cover..... (Quaking aspen)/black hawthorn /common snowberry association, page 96.

Black hawthorn (*Crataegus douglasii*) >10% cover and cowparsnip (*Heracleum maximum*) >10% cover..... (Quaking aspen)/black hawthorn / cowparsnip association, page 46.

Black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) dominant tree and >25% cover

White alder (*Alnus rhombifolia*) >10% cover..... *Populus balsamifera* ssp. *trichocarpa* - *Alnus rhombifolia* Forest, page 96.

Thinleaf alder (*Alnus incana*) >10% cover..... *Populus balsamifera* ssp. *trichocarpa* / *Alnus incana* Forest, page 96.

Redosier dogwood (*Cornus sericea*) >10% cover..... Black cottonwood/redosier dogwood Forest, page 27.

Common snowberry (*Symphoricarpos albus*) >10% cover..... Black cottonwood/common snowberry association, page 26.

Sandbar willow (*Salix exigua*) >10% cover..... Black cottonwood/sandbar willow community, page 27.

Rocky Mountain juniper (*Juniperus scopulorum*) >10% cover..... Black cottonwood-Rocky Mountain juniper community, page 27.

Lewis' mockorange (*Philadelphus lewisii*) >10% cover..... Black cottonwood / Lewis mockorange community, page 27.

Water hemlock (*Cicuta douglasii*) cover >10%..... *Populus balsamifera* ssp. *trichocarpa* / *Cicuta douglasii* Forest, page 96

Common horsetail (*Equisetum arvense*) >10% cover..... Black cottonwood / common Forest page 91.

- *Populus balsamifera* ssp. *trichocarpa* / *Equisetum hymenale* Forest, page 81

White alder (*Alnus rhombifolia*) dominant tree and >25% cover

Water birch (*Betula occidentalis*) >10% cover..... White alder/water birch association association, page 31.

Lewis' mockorange (*Philadelphus lewisii*) >10% cover..... White alder/Lewis mockorange association, page 30.

Netleaf hackberry (*Celtis occidentalis* var. *reticulata*) >10% cover.... White alder/netleaf hackberry association, page 31.

Common horsetail (*Equisetum arvense*) >10% cover..... White alder / common horsetail Forest page 29.

Oregon white oak (*Quercus garryana*) dominant tree and >25% cover

Common snowberry (*Symphoricarpos albus*) >10% cover and Lewis' mockorange (*Philadelphus lewisii*) >10% cover Oregon white oak / Lewis' mockorange-common snowberry association, page 28.

Common snowberry <10% cover, wild blueyeye (*Elymus glaucus*) >5%.... *Quercus garryana*/ *Elymus glaucus* Temporarily Flooded Woodland, page 28 and 96.

Thinleaf alder (*Alnus incana*) >25% cover

Redosier dogwood (*Cornus sericea*) >10% cover..... Thinleaf alder/redosier dogwood association, page 38.

Yellow willow (*Salix lutea*)>10% cover..... Thinleaf alder/yellow willow community, page 43.

Water birch (*Betula occidentalis*) >10% cover..... *Alnus incana* / *Betula occidentalis* Shrubland, page 96.

Woods rose (*Rosa woodsii*) >10% cover..... *Alnus incana* / *Rosa woodsii* Shrubland page 96.

Water birch (*Betula occidentalis*) >25% cover

Redosier dogwood (*Cornus sericea*) >10% cover Water birch / redosier dogwood association, page 39.

Common snowberry (*Symphoricarpos albus*) >10% cover..... Water birch / Common snowberry community type, page 40.

Woods' rose (*Rosa woodsii*) >10% cover..... Water birch / Woods' association, page 41.

Lewis' mockorange (*Philadelphus lewisii*) >10% cover..... Water birch / Lewis mockorange association, page 42.

Common horsetail (*Equisetum arvense*) >10% cover..... Water birch / common horsetail community type, page 43.

Black hawthorn (*Crataegus douglasii*) >25% cover

Common snowberry (*Symphoricarpos albus*) >10% cover..... Black hawthorn / common snowberry association , page 44.

Woods' rose (*Rosa woodsii*) >10% cover..... Black hawthorn / Woods' rose association, page 45.

Cowparsnip (*Heracleum maximum*) >10% cover..... Black hawthorn / cowparsnip association, page 46.

Common chokecherry (*Prunus virginiana*) >10% cover

Common chokecherry (*Prunus virginiana*) community, page 58.

Peachleaf or shining willow (*Salix amygdaloides* or *Salix lucida* ssp. *caudata*) >25% cover

Salix amygdaloides Woodland, page 54.

Salix lucida ssp. *caudata* Shrubland [Provisional], page 96.

Arroyo willow (*Salix lasiolepis*) >25% cover

Arroyo willow (*Salix lasiolepis*) community type, page 53.

Yellow willow (*Salix lutea*) >10% cover

Redosier dogwood (*Cornus sericea*) >10% cover ... Yellow willow/ redosier dogwood community, page 50

Sandbar willow (*Salix exigua*) >10% cover..... Yellow willow - Sandbar community, page 51.

Sandbar willow (*Salix exigua*) >10% cover

Sandbar or coyote willow association, page 52.

Salix exigua / *Equisetum arvense* Shrubland, page 96.

Bebb willow (*Salix bebbiana*) >25% cover

Bebb willow community, page 54.

Redosier dogwood (*Cornus sericea*) >25% cover

Redosier dogwood (*Cornus sericea*) association, page 47.

Rose species (*Rosa woodsii* or *nutkana*) >10% cover

Woods' or Nootka rose community community, page 48.

Netleaf hackberry (*Celtis occidentalis* var. *reticulata*) >10% cover

Netleaf hackberry / Lewis' community type, page 55.

Lewis' mockorange (*Philadelphus lewisii*) and/or Saskatoon serviceberry (*Amelanchier alnifolia*) >10% cover

Common snowberry (*Symphoricarpos albus*) >10% cover.....Lewis' mockorange / common snowberry association, page 56.

White clematis (*Clematis ligustifolia*) >10% cover.....Lewis' mockorange / white clematis community type, page 57.

Poison-ivy (*Toxicodendron rydbergii*) >25% cover..... Saskatoon serviceberry / poison-ivy community type, page 61.

Bluebunch wheatgrass (*Pseudoroegneria spicata*)>10% cover..... Saskatoon serviceberry – Lewis' mockorange / bluebunch wheatgrass community type, page 59.

White sagebrush (*Artemisia ludoviciana*) >5% cover

White sagebrush community type, page 60.

Smooth sumac (*Rhus glabra*) >10% cover

Smooth sumac association, page 61.

Black greasewood (*Sarcobatus vermiculatus*) >10% cover

Black greasewood / Saltgrass association, page 81.

Herbaceous plant communities

Water sedge (*Carex aquatilis*) >25% cover

Water sedge association, page 71

Northwest Territory sedge (*Carex urticulata*) >25% cover

Northwest Territory sedge association, page 66.

Tufted hairgrass (*Deschampsia cespitosa*) >10% cover

Tufted hairgrass community, page 79.

Fowl mannagrass (*Glyceria striata*) >10% cover

Fowl mannagrass association, page 74.

Woolly sedge (*Carex pellita*) >25% cover

Silverweed cinquefoil (*Argentina anserina*) >5% cover.....Woolly sedge - silverweed cinquefoil community, page 64.

Analogue sedge (*Carex simulata*) >5% coverWoolly sedge – analogue sedge community, page 71.

Silverweed cinquefoil (*Argentina anserina*) <5% coverWoolly sedge - common spikerush, page 65.

Nebraska sedge (*Carex nebrascensis*) >25% cover

Silverweed cinquefoil (*Argentina anserina*) >1% cover.....Nebraska sedge - silverweed cinquefoil community, page 67.

Silverweed cinquefoil (*Argentina anserina*) <1% cover.....Nebraska sedge community, page 96.

Hard-stem bulrush (*Schoenoplectus acutus*) >25% cover

Hard-stem bulrush, page 70.

Cattail (*Typha latifolia* or *T. angustifolia*) >25% cover

Broadleaf cattail page 94.

Narrowleaf cattail page 94.

Common spikerush (*Eleocharis palustris*) >25% cover

Common spikerush association, page 68.

Basin wildrye (*Leymus cinereus*) >5% cover

Clustered field sedge (*Carex praegracilis*) more abundant than saltgrass (*Distichlis spicata*) Basin wildrye - clustered field sedge community, page 86.

Saltgrass (*Distichlis spicata*) more abundant than clustered field sedge (*Carex praegracilis*)Basin wildrye - saltgrass association, page 85.

Cheatgrass (*Bromus tectorum*) and/or other annual plants dominant Basin wildrye - cheatgrass community, page 87.

Chairmaker's bulrush (*Schoenoplectus americanus*) >25% cover

Saltgrass - Chairmaker's bulrush community, page 83.

River bulrush (*Schoenoplectus fluviatilis*) >25% cover

River bulrush community, page 71.

Alkali cordgrass (*Spartina gracile*) >25% cover

Alkali cordgrass association (*Spartina gracile*), page 84.

Saltgrass (*Distichlis spicata*) >25% cover

Saltgrass - Clustered field sedge community, page 82.

Prairie cordgrass (*Spartina pectinata*) >25% cover

Prairie cordgrass community, page 79.

Water foxtail (*Alopecurus geniculatus*) >25% cover

Water foxtail community, page 76.

Baltic rush (*Juncus balticus*) >25% cover

Silverweed cinquefoil (*Argentina anserina*) >1% cover.....Baltic rush - silverweed cinquefoil community, page 69.

Silverweed cinquefoil (*Argentina anserina*) <1% cover.....Baltic rush community, page 71.

Watercress (*Rorripa nasturtium-aquaticum*) >10% cover or only species

Watercress community, page 93

Broadfruit burreed (*Sparganium eurycarpum*) >25% cover

Broadfruit burreed stand, page 95

Common horsetail (*Equisetum arvense*) >25% cover

Common horsetail community type, page 91

Aquatic herbaceous dominated communities:

Canadian waterweed (*Eleodea canadensis*) community page 95.

Whitewater crowfoot (*Ranunculus aquatilis*) community, page 95.

Exotic woody communities:

White willow (*Salix alba*) >25% cover

White willow community, page 49

Boxelder (*Acer negundo*) >25% cover

Boxelder community, page 49.

Indigobush (*Amorpha fruticosa*) >25% cover

Indigobush community page 49.

Exotic herbaceous dominated communities:

Reed canarygrass (*Phalaris arundinacea*) >25% cover

Reed canarygrass association, page 75.

Bentgrass (*Agrostis stolonifera*) >10% cover

Bentgrass community, page 77.

Quackgrass (*Elytrigia repens* var. *repens*) >10% cover

Quackgrass community, page 78.

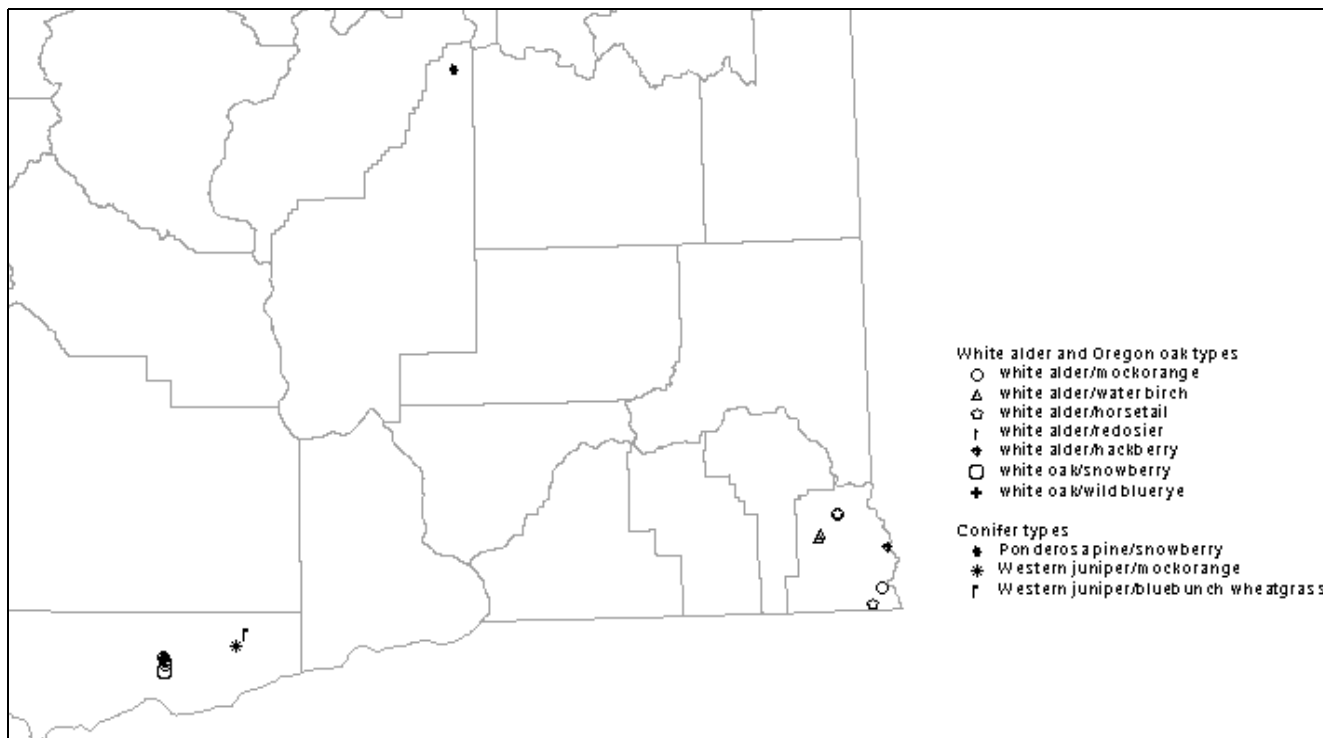
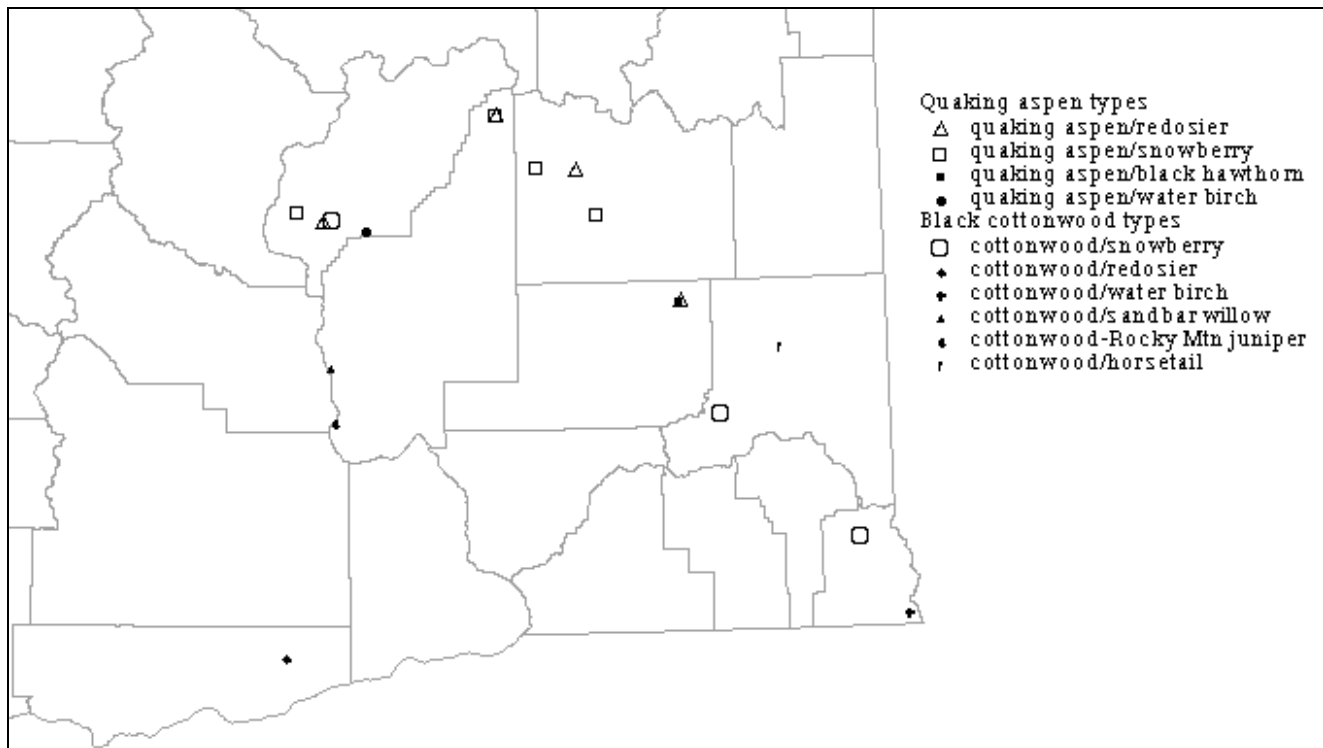
Other exotic herbaceous communities observed:

Intermediate wheatgrass (*Elytrigia intermedia*) pasture, page 79.

Broadleaved pepperweed (*Lepidium latifolium*) community, page 95.

Tall Tree Riparian Vegetation Types

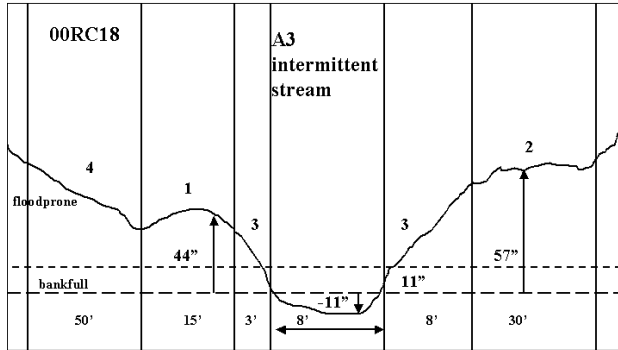
Plot locations



Tall Tree Riparian Vegetation Types

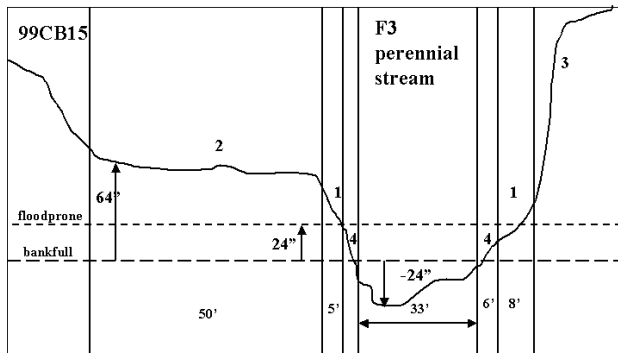
Selected stream profiles

T1



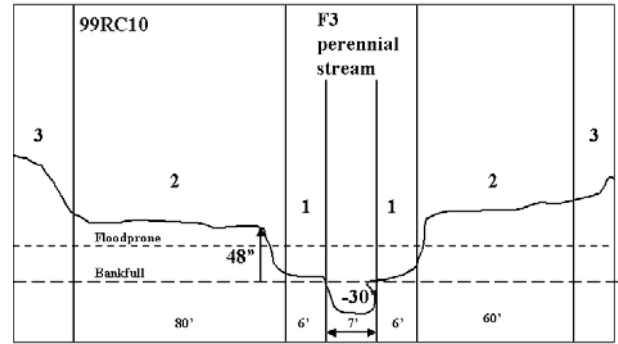
Stream and riparian vegetation profile at Duffy Creek, Douglas County. 1= thinleaf alder / redosier dogwood, 2= quaking aspen / redosier dogwood, 3= streambank, 4= mockorange / common snowberry, and 5= talus.

T3



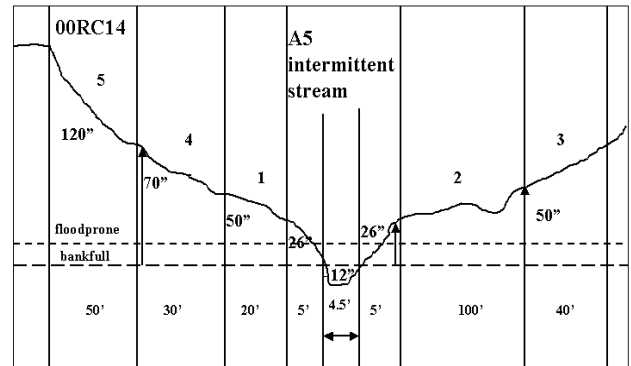
Stream and riparian vegetation profile at Asotin Creek, Asotin County. 1= white alder/ mockorange, 2= black cottonwood / common snowberry, 3= cliff, 4= red canarygrass, and 5= basin wildrye - cheatgrass.

T2



Stream and riparian vegetation profile at Lake Creek, Lincoln County. 1=reed canarygrass, 2 =quaking aspen / common snowberry, and 3 = stiff sagebrush upland.

T4



Stream and riparian vegetation profile Rock Island Creek, Douglas County. 1= Thinleaf alder - yellow willow, 2= yellow willow- redosier dogwood, 3= quaking aspen/common snowberry, 4= black hawthorn/ Wood's rose, and 5= Wyoming big sagebrush/bluebunch wheatgrass.

Quaking aspen and Black cottonwood riparian types

Quaking aspen / redosier dogwood association *Populus tremuloides* / *Cornus sericea* Forest (POPTRE/CORSER)

NVC code: CEGL000582

Plots 98RC0244, 99RC213, 00RC182, 00RC242

Location. This is a widespread forest community type previously described in Montana, Idaho, Oregon, and Washington. It is found at low to mid elevations in forested mountains and adjacent lowlands east of the Cascades. In the Columbia Basin, this is a spring, pond edge, and streamside type with samples located in the northern half of Cow, upper Crab, Duffy, and Northrup Creek. It has been observed in most counties of eastern Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	32.4	15	82.5
width of floodplain (ft)	120.8	10	350
entrenchment ratio	2.1	1.06	3.75
stream gradient (%)	1.6	0.5	4
Rosgen types	A3, C3, E5, F1		

Fluvial setting. It occurs on alluvial terraces next to streams, rivers or near springs or seeps in broader valleys with very low to low gradients. In the Columbia Basin, this community has been sampled above the floodprone zone along permanent streams and near springs. Sites appear to rarely flood but are saturated early in the growing season and dry by late summer. The upper soil horizons are densely intermingled with roots and are silty loams with few if any coarse fragments. A rocky restrictive layer was encountered at 20 inches on one site. See representative stream profile T1 page 23.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	3.1	0.5	7
percent slope	5.5	1	10
Position	2 first terraces, toe slope, lake edge, spring edge		

PERCENT OF GROUND COVER

Litter	88	80	95
Moss	0	0	0
Bareground	9	0	20
Gravel	0	0	0
Cobble-boulder	3	0	15
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON

percent of coarse fragments (n=5)	16	0	60
texture	3 silt loam, sandy loam		

Vegetation. In the Columbia Basin, this is a closed to open canopy forest type with a 25 to 50-foot tall aspen layer over a 10 to 15-foot tall redosier dogwood dominated shrub layer. Golden current and Wood's rose

are found in most stands with starry false solomonseal, miner's lettuce, and sticky willy. Common snowberry, a low shrub, appears in many stands. This community generally occurs between wetter redosier dogwood communities and upland Wyoming big sagebrush or bunchgrass communities.

Management information is summarized in Hansen et al. (1995 page 235).

LAYER PERCENT COVER	average	min	max
Overstory trees	23	13	30
Understory trees	26	3	40
Shrubs	77	30	98
Grasses	7	0	13
Grasslikes	0	0	0
Forbs	26	13	40
Non-vascular	0	0	0

COMMON SPECIES	n=4 cover			
	constancy	average	min	max
Overstory trees				
<i>Populus tremuloides</i>	100%	19	13	30
<i>Alnus incana</i>	25%	30	30	30
<i>Prunus virginiana</i>	25%	8	8	8
Understory trees				
<i>Populus tremuloides</i>	100%	19	1	40
<i>Prunus virginiana</i>	75%	9	1	13
<i>Alnus incana</i>	25%	8	8	8
Shrubs				
<i>Cornus sericea</i>	100%	73	30	90
<i>Rosa woodsii</i>	75%	10	3	13
<i>Toxicodendron rydbergii</i>	50%	1	1	1
<i>Ribes aureum</i>	50%	5	1	8
<i>Symphoricarpos albus</i>	50%	3	3	3
Forbs				
<i>Maianthemum stellatum</i>	100%	14	8	20
<i>Urtica dioica</i>	75%	6	1	13
<i>Arctium minus</i>	25%	1	1	1
<i>Smilicina racemosa</i>	25%	3	3	3
Grasses				
<i>Elymus glaucus</i>	50%	2	1	3
<i>Agrostis stolonifera</i>	25%	1	1	1
<i>Phalaris arundinacea</i>	25%	8	8	8
Annuals				
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	50%	12	3	20
<i>Galium aparine</i>	25%	3	3	3

Classification. This type is similar to a type described along streams in northeastern and southeastern Washington (Crowe and Clausnitzer 1997; Kovalchik 2001; Titus et al. 1998) but differs by not having conifers, thinleaf alder and other more montane species. These authors considered it a potential vegetation type. More sampling below the montane forest zone may distinguish this community as different from the more montane type. Plot 02RC301 sampled a canyon wall **Quaking aspen/ water birch/ poison-ivy** subirrigated stand in Moses Coulee. Although similar stands are observed elsewhere, scattered ponderosa pine stumps and an environmental affinity with the serviceberry/ poison-ivy type (page 48) confound classification of this stand.

Quaking aspen / common snowberry association
Populus tremuloides* / *Symphoricarpos albus
Temporarily Flooded Forest (POPTRE/SYMALB)
 NVC code: C EGL000609

Plots 99RC082, 99RC102, 00RC143, 00RC251

Location. This is a widespread forest community type previously described across western North America. It is found at low to mid elevations in mountains and adjacent lowlands east of the Cascades. In Washington's Columbia Basin, this is a spring transition and streamside type with samples located in the northern half of Cow Creek, upper Crab, Rock Island, and Northrup Creeks. It has been observed in most counties of eastern Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	7.3	5.3	10
width of floodplain (ft)	10	3	20
entrenchment ratio	1.7	1	2.5
stream gradient (%)	5.3	1	15
Rosgen types	F5, F6, G5, Spring		

Fluvial setting. It occurs on alluvial terraces next to streams, rivers or near springs or seeps and usually occurs in broader valleys with low to very low gradients. In the Columbia Basin, this community has been sampled above the floodprone zone. Mottling and/or gleying layers were not encountered in the top 24 inches of soil at two sample sites. See representative stream profiles T2 and T4 page 23.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	3.1	1.3	4
percent slope	11.8	1	23
Position	first terrace, 2 second terraces, spring edge		

PERCENT OF GROUND COVER	average	min	max
Litter	95	89	100
Moss	0	0	0
Bareground	4	0	20
Gravel	1	0	1
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=3)	4.6	0	10
texture	3 silt loam		

Vegetation. Similar floristically to the Quaking aspen / redosier dogwood association, this association is generally a more open stand of larger trees (25-60 feet tall) with a shorter shrub layer (3-6 feet tall) dominated by snowberry and only scattered redosier dogwood, if any. In stands more heavily used by livestock, Wood's rose will dominate the undergrowth usually with one or more gooseberry species. Herbaceous species are patchy to scattered in the undergrowth.

LAYER PERCENT COVER	average	min	max
Overstory trees	48	3	80
Understory trees	20	8	30
Shrubs	65	30	98
Grasses	6	3	8
Grasslikes	0	0	0
Forbs	34	13	60
Non-vascular	0	0	0

COMMON SPECIES	n=4 constancy	cover average	min	max
Overstory trees				
<i>Populus tremuloides</i>	100%	48	3	80
<i>Betula occidentalis</i>	25%	1	1	1
<i>Prunus virginiana</i>	25%	8	8	8
Understory trees				
<i>Populus tremuloides</i>	100%	18	3	30
<i>Prunus virginiana</i>	100%	3	1	8
<i>Crataegus douglasii</i>	25%	1	1	1
Shrubs				
<i>Symphoricarpos albus</i>	100%	47	20	98
<i>Rosa woodsii</i>	100%	28	13	50
<i>Ribes aureum</i>	75%	19	8	30
<i>Cornus sericea</i>	50%	5	1	8
<i>Clematis ligusticifolia</i>	50%	1	1	1
<i>Ribes inerme</i>	25%	20	20	20
Forbs				
<i>Urtica dioica</i>	50%	16	1	30
<i>Maianthemum stellatum</i>	50%	8	3	13
<i>Solidago canadensis</i>	50%	8	3	13
<i>Heracleum maximum</i>	25%	8	8	8
<i>Osmorhiza berteroi</i>	25%	13	13	13
Grasses				
<i>Bromus tectorum</i>	50%	6	3	8
<i>Poa pratensis</i>	50%	5	1	8
<i>Elymus glaucus</i>	25%	1	1	1
<i>Agrostis interrupta</i>	25%	1	1	1
Annuals				
<i>Galium aparine</i>	50%	17	13	20
<i>Amsinckia lycopsoides</i>	50%	3	3	3
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	50%	3	3	3

Classification. Stand 98RC0251 has large trees and a 15-foot tall black hawthorn shrub layer with scattered redosier dogwood and a conspicuous reed canarygrass layer. Woolly sedge is also present in this stand. This stand may be allied with the quaking aspen phase of the black hawthorn/ snowberry association (CEGL001065) described by Daubenmire (1972). As described here community type is a low elevation variant of the quaking aspen/ common snowberry association described by Kovalchik (2001) and Crowe and Clausnitzer (1997).

Black cottonwood/snowberry association
Populus balsamifera subspecies *trichocarpa* /
Symphoricarpos albus Temporarily Flooded Forest
(POPBAT/SYMALB)

NVC code: CEG000677

Plots 99CB602, 99CB1502, 00RC192

Location. This is a widespread forest community type previously recognized in northern Idaho, Oregon, and Washington. It is found at low to mid elevations in mountains and adjacent lowlands east of the Cascades. In the Columbia Basin, this is a streamside type sampled in Asotin, Douglas, and Walla Walla counties and observed in Yakima, Whitman and Lincoln counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	16.3	10.9	27.1
width of floodplain (ft)	19.2	6	42
entrenchment ratio	1.3	1.1	1.6
stream gradient (%)	3.3	2	5
Rosgen types	A3, F4, G4		

Fluvial setting. This association occurs on alluvial terraces next to streams and rivers. These Columbia Basin samples occur in valleys 30 to 1000 feet wide with 4-5% gradients. The community was sampled well above the floodprone zone along permanent streams 6 and 36 feet wide. Sites rarely flood. The upper soil horizons are densely intermingled with roots and are silty clay loams with few if any coarse fragments. A coarse-textured and a cobble layer were encountered at 45 and 12 inches. Mottling and/or gleying layers were not encountered in the top 24 inches of soil at two sites. See representative stream profile T3 page 23.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	6.3	2.7	11.2
percent slope	2	2	2
Position	2 first terraces, second terrace		

PERCENT OF GROUND COVER	average	min	max
Litter	85	70	95
Moss	0	0	0
Bareground	15	5	30
Gravel	0	0	0
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n= 3)	0	0	0
texture	silty clay loam, sandy clay loam, sandy loam		

Vegetation. In the Columbia Basin, this is a closed canopy forest type with a 60 to 80-foot tall cottonwood layer over a 4-foot tall shrub layer dominated by snowberry. Short chokecherry trees, mockorange and

white clematis were recorded in all stands. Cottonwood stands initiate on floodbars that capture sediments (Scott et al 1996). As it slowly builds and the channel downcuts or moves laterally away from the surface, the stand ages and the surface becomes located above the floodprone zone. Cottonwood forests are either replaced through succession or the surface is eroded away. In the Columbia Basin, water birch, thinleaf alder, chokecherry or black hawthorn are likely late seral communities although ponderosa pine or Douglas-fir can occur. See Braatne and Jamieson (2001) for information on dynamics and impact of regulated flow on cottonwood stands on the Yakima River. Management information is summarized in Hansen et al. (1995 page 250).

LAYER PERCENT COVER	average	min	max
Overstory trees	83	50	100
Understory trees	38	13	80
Shrubs	90	70	100
Grasses	16	1	40
Grasslikes	0	0	0
Forbs	23	10	40
Non-vascular	0	0	0

COMMON SPECIES	n=3 constancy	cover average	min	max
Overstory trees				
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	100%	80	50	100
<i>Prunus virginiana</i>	67%	7	3	10
Understory trees				
<i>Prunus virginiana</i>	100%	36	8	80
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	100%	8	5	10
<i>Crataegus douglasii</i>	33%	20	20	20
Shrubs				
<i>Symphoricarpos albus</i>	100%	77	50	100
<i>Philadelphus lewisii</i>	100%	9	1	20
<i>Clematis ligusticifolia</i>	100%	3	1	8
<i>Rosa canina</i>	67%	1	1	1
<i>Amelanchier alnifolia</i>	33%	20	20	20
<i>Cornus sericea</i>	33%	13	13	13
<i>Rosa nutkana</i>	33%	13	13	13
<i>Physocarpus malvaceus</i>	33%	10	10	10
Forbs				
<i>Urtica dioica</i>	100%	1	1	1
<i>Maianthemum stellatum</i>	67%	7	1	13
<i>Cynoglossum officinale</i>	67%	1	1	1
<i>Heracleum maximum</i>	33%	40	40	40
<i>Maianthemum racemosum</i>	33%	20	20	20
Grasses				
<i>Phalaris arundinacea</i>	67%	1	1	1
<i>Poa pratensis</i>	33%	20	20	20
<i>Elymus glaucus</i>	33%	8	8	8
Annuals				
<i>Galium aparine</i>	33%	1	1	1

Classification. This is similar to a type described along streams in southeastern and northeastern Washington (Crowe and Clausnitzer 1997; Kovalchik 2001) but differs in an absence of conifers, thinleaf alder and other more montane species.

Other Black Cottonwood riparian types

Black cottonwood-Rocky mountain juniper community type *Populus balsamifera* subspecies *trichocarpa* - *Juniperus scopulorum* Temporarily Flooded Forest (POPBAT/JUNSCO)

NVC code: none

Plots 00RC033, 00RC034

These samples occurred on alluvial deposits periodically saturated by changing levels of a reservoir on the Columbia River in Grant County. Braatne and Jamieson (2001) describe dynamics and impact of regulated flow on similar cottonwood stands on the Yakima River. Black cottonwood dominated the forest patch with thinleaf alder and Rocky Mountain juniper in the lower canopy in the plot near bankfull. The invasive exotic climbing multiflora rose (*Rosa multiflora*) is a common feature of this community. The other plot, near the upland transition, displayed black cottonwood with Rocky Mountain juniper in the lower canopy and few species in the understory. These appear to be new community type(s) developing under hydrologic regimes associated with damming the Columbia River. Jankovsky-Jones et al. (2001) in southeast Idaho describe natural Rocky Mountain juniper riparian associations with a few similar floristic characteristics.

Black cottonwood/redosier dogwood association *Populus balsamifera* subspecies *trichocarpa* / *Cornus sericea* Temporarily Flooded Forest (POPBAT/CORSER)

NVC code: CEGL000672

Plot 02RC031

This association has been documented from Washington south to northern California and eastward to Idaho and Montana. It occupies alluvial terraces of major rivers and streams, lake or pond margins, and footslopes and lower subirrigated slopes in mountainous terrain. Many of these sites are flooded in the spring and dry deeply by summer's end although the upper portions of soil profile remain moist late in the summer. This sample is from Klickitat County although it was observed along the Yakima River in central Washington. Kovalchik (2001) describes it as a major type in the mountains of eastern Washington. Black cottonwood dominates the overstory with 80% cover. The shrub layer comprises at least 25% cover of redosier dogwood. Common snowberry was abundant in the sample. Grasses are uncommon although disturbance-associated exotics, such as cheatgrass in the sample can display high cover.

Black cottonwood-water birch/mockorange community type *Populus balsamifera* ssp. *trichocarpa*-*Betula occidentalis*/*Philadelphus lewisii* Temporarily Flooded Forest (POPBAT/BETOCC/PHILEW)

NVC code: none

Plot 99CB1701

This forest community type is preliminarily described from 4 plots in eastern Oregon and one Washington. It is found at low elevations in mountains and adjacent lowlands east of the Cascades. It occurs on alluvial terraces next to streams and rivers. In the Columbia Basin, it was sampled in Asotin County although likely elsewhere in Washington. The sample was above the floodprone zone (FPI 2) along a 2-foot wide intermittent, with Rosgen A4a spring stream. The upper soil horizon was a sandy clay loam with few coarse fragments. A clay layer was encountered at 18 inches. This is an open canopy forest type of 60-foot tall cottonwood trees occurs over a 10-foot tall mockorange and/or water birch shrub layer. Black hawthorn, Wood's rose, poison ivy, and western white clematis are common woody plants. As described type from streams in eastern Oregon (Titus et al. 1998, 4 plots), it is considered a midseral type associated with cooler, fair to poor stability streams. It is very similar to the water birch/Lewis' mockorange community on page 42.

Black cottonwood/sandbar willow association *Populus balsamifera* subspecies *trichocarpa* / *Salix exigua* Temporarily Flooded Forest (POPBAT/SALEXI)

NVC code: CEGL000676

Plot 00RC073

This community occurs at low elevations in mountains and adjacent lowlands east of the Cascades in Washington, Oregon, Idaho, and Nevada. It appears on alluvial deposits along rivers and perennial streams in habitats that are seasonally flooded and saturated. Generally seen along wider river valleys or terraces, black cottonwood dominates tree patches with a sandbar willow shrub layer. In the Columbia Basin, it was sampled in Grant County in Washington above the floodprone zone (FPI 3.3) on the first terrace along an irrigation wasteway stream with characters of a Rosgen C3 stream type. An open cottonwood canopy, 45 feet tall, appears over a 10-foot tall shrub layer. This type is similar to a described type from less regulated streams in eastern Oregon (Titus et al. 1998) and Nevada (Manning and Paggett 1996).

Oregon white oak types:

Oregon white oak / Lewis' mockorange-common snowberry community type

Quercus garryana / *Philadelphus lewisii* -
Symphoricarpos albus Temporarily Flooded Forest
(QUEGAR/PHILEW-SYMALB)

NVC code: none

Plots 00RC153, 00RC161, 00RC162

Location. In the East Cascades foothills, Oregon white oak is located along streams in western Klickitat, Yakima, rarely in Kittitas counties, and in adjacent Oregon. All samples are from Rock Creek.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	12.7	12	14
width of floodplain (ft)	17.7	17	18
entrenchment ratio	1.4	1.2	1.5
stream gradient (%)	3	3	3
Rosgen types	2 B2		

Fluvial setting. This type occurs in moderate to narrow valleys with very low to moderate gradients. The community was sampled well above the floodprone zone along a permanent and an unregulated intermittent stream. Soils are wet near the surface for only a short period early in the growing season. There was no reoxidation layer in the top 12 inches of soil at a sample site.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	3.0	2.4	3.5
percent slope	5	5	5
Position	first and second terraces		

PERCENT OF GROUND COVER

	75	65	90
Litter	75	65	90
Moss	7	0	20
Bareground	2	0	5
Gravel	8	0	25
cobble-boulder	8	5	10
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON

percent of coarse fragments (n=1)	40
texture	sandy clay loam

Vegetation. This is a short woodland or forest (55-60 feet tall) dominated by Oregon white oak that may be dominant or co-dominant with ponderosa pine or black cottonwood. Snowberry is always present with over 20% cover along with other shrub species, such as oceanspray and chokecherry. Mockorange was common in the Klickitat County plots, whereas, California hazel is common in Yakima plots (Lillybridge et al. 1995; Kovalchik 2001). Blue wildrye and Kentucky bluegrass are common grass species.

Management information is partially available in Lillybridge et al. (1995). Pertinent management information on key species appears in Table 3.

LAYER PERCENT COVER	average	min	max
Overstory trees	63	50	80
Understory trees	43	30	60
Shrubs	43	30	50
Grasses	8	3	13
Grasslikes	0	0	0
Forbs	2	1	3
Non-vascular	0	0	0

COMMON SPECIES	n=3 constancy	cover average	min	max
Overstory trees				
<i>Quercus garryana</i>	100%	28	13	40
<i>Populus balsamifolia</i> ssp. <i>trichocarpa</i>	67%	13	13	13
<i>Acer macrophyllum</i>	33%	60	60	60
<i>Alnus rhombifolia</i>	33%	60	60	60
Understory trees				
<i>Quercus garryana</i>	100%	4	1	8
<i>Prunus virginiana</i>	67%	50	40	60
<i>Acer macrophyllum</i>	33%	30	30	30
<i>Alnus rhombifolia</i>	33%	8	8	8
<i>Pinus ponderosa</i>	33%	1	1	1
Shrubs				
<i>Symphoricarpos albus</i>	100%	23	20	30
<i>Philadelphus lewisii</i>	100%	23	8	30
<i>Holodiscus discolor</i>	100%	7	1	13
<i>Rosa woodsii</i>	67%	6	3	8
Graminoids				
<i>Elymus glaucus</i>	100%	6	1	8
<i>Bromus sterilis</i>	67%	6	3	8
<i>Poa pratensis</i>	67%	5	1	8
Forbs				
<i>Lomatium dissectum</i>	67%	1	1	1
<i>Maianthemum stellatum</i>	67%	1	1	1
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	33%	3	3	3
Moss and Lichen	0%			

Classification. This type is similar to or the same as the **Oregon white oak/California hazel-common snowberry association** on the Wenatchee National Forest (Lillybridge et al. 1995; Kovalchik 2001). It differs primarily in the lack of certain mesic shrubs (hazel, bittercherry, and Rocky mt. maple). Plot 02RC063 sampled along a Rosgen B3 perennial stream on a second terrace (FPI 4.2) is the **Oregon white oak/blue wildrye association** (CEGL000550) on the Yakama Nation (John et al. 1988). This sample is very similar environmentally to the type described here but differs in it being a grass-dominated understory (blue wildrye, elk sedge and bluegrass) with few shrubs. More sampling is needed to better understand relationships among these riparian types.

White Alder riparian types:

White alder/common horsetail community type *Alnus rhombifolia* / *Equisetum arvense* Seasonally Flooded Forest (ALNRHO/EQUARV)

NVC code: none

Plots 99CB101, 99CB1503, 02RC055

Location. White alder occurs in tributary valleys of the Snake River in southeastern Washington and adjacent Oregon and Idaho along streams in Klickitat County and adjacent Yakima County. This association is possible throughout the range of white alder although it was only sampled in Klickitat and in southeast Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	29.7	25	37
width of floodplain (ft)	47.7	33	68
entrenchment ratio	1.3	1.2	1.6
stream gradient (%)	2	2	2
Rosgen types	2 B3, F4		

Fluvial setting. This type occurs in moderate to narrow valleys with very low to moderate gradients. The community was sampled well below the floodprone zone along permanent streams. Soils are dominated by coarse fragments and likely are wet near the surface for much of the growing season. This community appears to occur on eroding fluvial surfaces indicated by white alder trees and stumps in the adjacent active channel.

FLUVIAL SURFACE	average	min	max
Flooding potential index (FPI)	0.3	0.1	0.4
percent slope	10	0.5	20
Position	2 floodplains, bar		

PERCENT OF GROUND COVER

Litter	18	5	43
Moss	7	1	20
Bareground	7	5	10
Gravel	43	10	73
Cobble-boulder	25	0	60
Bedrock	1	0	2
Water	3	0	10

SOIL SURFACE HORIZON

percent of coarse fragments (n=0)	
texture	Skeletal sandy clay loam

Vegetation. White alder, 25-50 feet tall, dominates this closed to open forest. Shrub species are sparsely represented often observed only as sprouts. Blue wildrye, Kentucky bluegrass and reed canarygrass are common grass species but rarely with cover over 25%. Common horsetail is by far the predominate species in this community. It typically forms a 1 –2 foot tall layer with few associates although a moss or algae ground cover is common.

Pertinent management information on key species appears in Table 3.

LAYER PERCENT COVER	average	min	max
Overstory trees	63	10	100
Understory trees	18	5	30
Shrubs	2	1	3
Grasses	24	1	40
Grasslikes	1	1	1
Forbs	37	20	60
Non-vascular	11	1	20

COMMON SPECIES	n=3	cover		
	constancy	average	min	max
Overstory trees				
<i>Alnus rhombifolia</i>	100%	63	10	100
Understory trees				
<i>Alnus rhombifolia</i>	67%	17	5	30
<i>Betula occidentalis</i>	33%	1	1	1
Shrubs				
<i>Philadelphus lewisii</i>	67%	2	1	3
<i>Cornus sericea</i>	67%	1	1	2
<i>Holodiscus discolor</i>	33%	1	1	1
<i>Rosa woodsii</i>	33%	1	1	1
Graminoids				
<i>Poa pratensis</i>	67%	20	10	30
<i>Elymus glaucus</i>	67%	1	1	1
<i>Phalaris arundinacea</i>	33%	30	30	30
Forbs				
<i>Equisetum arvense</i>	100%	37	20	60
<i>Hypericum perforatum</i>	67%	1	1	1
<i>Urtica dioeca</i>	33%	1	1	1
<i>Solanum dulcamara</i>	33%	3	3	3
Moss and Lichen				
	67%	11	1	20

Classification. This type is similar to type recognized by Titus et al. (1998) who referred to it as white alder/common horsetail-stinging nettle. Various community types are described with common horsetail as the diagnostic species and all appear in similar fluvial environments (see page 91).

White alder/Lewis' mockorange association
***Alnus rhombifolia* / *Philadelphus lewisii* Temporarily**
Flooded Forest (ALNRHO/PHILEW)
 NVC code: CEG000634

Plots 99CB1501, 99CB2101, 02RC041, 02RC042, 02RC052, 02RC053, 02RC062

Location. White alder occurs in tributary valleys of the Snake River in southeastern Washington and adjacent Oregon and Idaho and along streams in Klickitat County and adjacent Yakima County. Samples are from the Aostin Creek in Asotin County and Rock Creek in Klickitat County.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	19.8	7	32
width of floodplain (ft)	29.8	11	42
entrenchment ratio	1.7	1	2
stream gradient (%)	3.4	2	13
Rosgen types	A3, 3 B3, 2 C3, F4		

Fluvial setting. This type occurs in moderately to narrow valleys usually with low gradients. The community was sampled within the floodprone zone along perennial streams. One stand was located in a seep valley. Soils maybe wet near the surface for only a short period early in the growing season. There was no reoxidation layer in the top 12 inches of soil at a sample site. All sites had sandy soils with abundant gravels and or cobbles. See representative stream profiles T3 page 23 and S8 page 37.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.1	0	2
percent slope	22.1	2	50
Position	Floodplain, streambank, abandon channel, and 4 first terraces		

PERCENT OF GROUND COVER			
Litter	56	10	95
Moss	1	0	5
Bareground	11	0	40
Gravel	14	0	40
Cobble-boulder	18	5	40
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=6)	48	0	70
texture	sandy clay loam, 4 sand, loamy coarse sand		

Vegetation. White alder trees, 30-40 feet tall, dominate these typically closed forests. The shrub layer (4-8 feet tall) is dominated by Lewis' mockorange often with white clematis vines. Colonies of the introduced shrub Himalayan blackberry are occasionally present. The herbaceous component of this association is composed of species indicative of disturbance, cheatgrass, although

the native blue wildrye grass occurs in many stands. Miner's lettuce is a common feature of the understory seen early in the growing season. Pertinent management information is discussed in Jankovsky-Jones et al. (2001).

LAYER PERCENT COVER	average	min	max
Overstory trees	73	10	100
Understory trees	15	1	40
Shrubs	36	5	80
Grasses	14	1	50
Grasslikes	1	1	1
Forbs	21	1	60
Non-vascular	9	8	10

COMMON SPECIES	n=7 constancy	Cover		
		average	min	max
Overstory trees				
<i>Alnus rhombifolia</i>	100%	73	10	100
Understory trees				
<i>Alnus rhombifolia</i>	71%	19	1	40
<i>Prunus virginiana</i>	43%	2	1	5
<i>Quercus garryana</i>	29%	2	1	2
Shrubs				
<i>Philadelphus lewisii</i>	100%	36	5	80
<i>Clematis ligusticifolia</i>	71%	2	1	3
<i>Holodiscus discolor</i>	43%	4	1	10
<i>Cornus sericea</i>	43%	2	1	3
<i>Rosa woodsii</i>	29%	1	1	1
Graminoids				
<i>Bromus tectorum</i>	86%	3	1	8
<i>Elymus glaucus</i>	71%	10	1	30
<i>Trisetum canescens</i>	43%	5	1	10
Perennial Forbs				
<i>Galium triflorum</i>	29%	7	1	12
<i>Lomatium dissectum</i>	29%	2	1	3
<i>Urtica dioica</i>	29%	1	1	1
Annual Forbs				
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	100%	16	1	60
<i>Galium aparine</i>	43%	3	1	8
Moss and Lichen				
	29%	9	8	10

Classification. This community is described in Oregon and Idaho (Miller 1976; Jankovsky-Jones et al. 2001). Plot 02RC054, sampled in Klickitat County, is a **white alder stand with mockorange** with a high cover of **redosier dogwood**. It appears to be transitional environmentally and floristically between the drier white alder/mockorange and the more moist redosier dogwood association and not included in the summary data for the former type.

Other White Alder riparian types:

White alder/water birch association

***Alnus rhombifolia* / *Betula occidentalis* Temporarily Flooded Forest (ALNRHO/BETOCC)**

NVC code: CEG000632

Plots 99CB1401, 99CB2501

White alder occurs in tributary valleys of the Snake River in southeastern Washington and adjacent Oregon and Idaho and along streams in Klickitat County near the eastern Columbia River Gorge and adjacent Yakima County in Washington. This community was sampled within the floodprone zone on permanent streams in Asotin County. Stream gradient was 2-3% on Rosgen types C3 and F3. The association occurs on stable and unstable stream channel substrates. This plant association is dominated by broad-leaved, deciduous tree species. White alder is taller but co-dominant with water birch, both occurring with high cover. Black cottonwood and conifers, such as, Douglas-fir may be associated. A dense, multi-layered, and species-rich deciduous shrub layer characterizes the undergrowth. Species commonly present include Lewis' mockorange, chokecherry, black hawthorn, redosier dogwood, currents, oceanspray and snowberry. Cowparsnip is common and can be abundant. This community is described in adjacent Oregon and Idaho (Miller 1976).

White alder/netleaf hackberry association

***Alnus rhombifolia* / *Celtis occidentalis* var. *reticulata* Temporarily Flooded Forest (ALNRHO/CELOCC)**

NVC code: CEG000633

Plot 99CB2301

This association is described as restricted to southeast Washington and adjacent states. The community was sampled well above the floodprone zone on a permanent streams in Asotin county. Stream gradient was 2% on Rosgen stream type F3. White alder dominates these deciduous forests with netleaf hackberry in the lower canopy. Common chokecherry, black hawthorn, current species, and redosier dogwood are associated shrubs. Cheatgrass is common in most stands. This community is described in Oregon and Idaho (Miller 1976). A highly degraded stand of white alder with hackberry was observed in Klickitat County, indicating this association may extend into the eastern Columbia River Gorge.

Conifer tree-dominated riparian types:

Ponderosa pine / common snowberry floodplain association

Pinus ponderosa / *Symphoricarpos alba* floodplain
Intermittently Flooded woodland
(PINPON/SYMALB FLOODPLAIN)

NVC code: CEG000866

Plot 00RC231

This community is found at low elevations in lowlands across Washington east of the Cascades. As described in Oregon, it occurs on alluvial deposits along intermittent or perennial streams in habitats with the water table 27 inches below the surface in mid summer (Crowe and Clausnitzer 1997). It generally occurs in narrow valleys on terraces, with ponderosa pine dominating woodland patches with a mixed shrub canopy. In the Columbia Basin, it was sampled in Grant County elsewhere in Washington. The community was sampled above the floodprone zone (FPI 1.3) on floodplain along a Rosgen stream type B3. This is an open canopy forest type with a 70-foot tall pine layer over a 8-foot tall shrub layer. Serviceberry, mockorange, and common snowberry are abundant in this stand. This stand is most similar to the ponderosa pine/common snowberry floodplain type from streams in eastern Oregon (Crowe and Clausnitzer 1997) although their type lacks serviceberry and mockorange.

Western juniper / mockorange community

Juniperus occidentalis / *Philadelphus lewisii*
Intermittently Flooded woodland
(JUNOCC/PHILEW)

NVC code: none

Plot 02RC023

This community is represented by a single sample in Klickitat County and was observed only in that part of Washington. It occurred on alluvial deposits on intermittent streams. The community was sampled above the floodprone zone (FPI 2) on the floodplain along a Rosgen stream type B3. This is an open canopy woodland type with a 35-foot tall juniper layer over a 6-foot tall arroyo willow and mockorange shrub layer. Bulbous bluegrass was the near sole member of the herbaceous layer. This may represent recent change in stream position with increasing arroyo willow and residual juniper trees. This type is not described elsewhere and more samples are needed to verify the extent of the community type. This community differs from the western juniper ephemeral drainage type described by Jankovsky-Jones et al. (2001) in southeast Idaho. They reference other undescribed western juniper/mountain shrub types for comparison.

Western juniper / big sagebrush/ bluebunch wheatgrass association

Juniperus occidentalis / *Artemisia tridentata* /
Pseudoroegneria spicata Intermittently Flooded
woodland (JUNOCC/PSESPI)

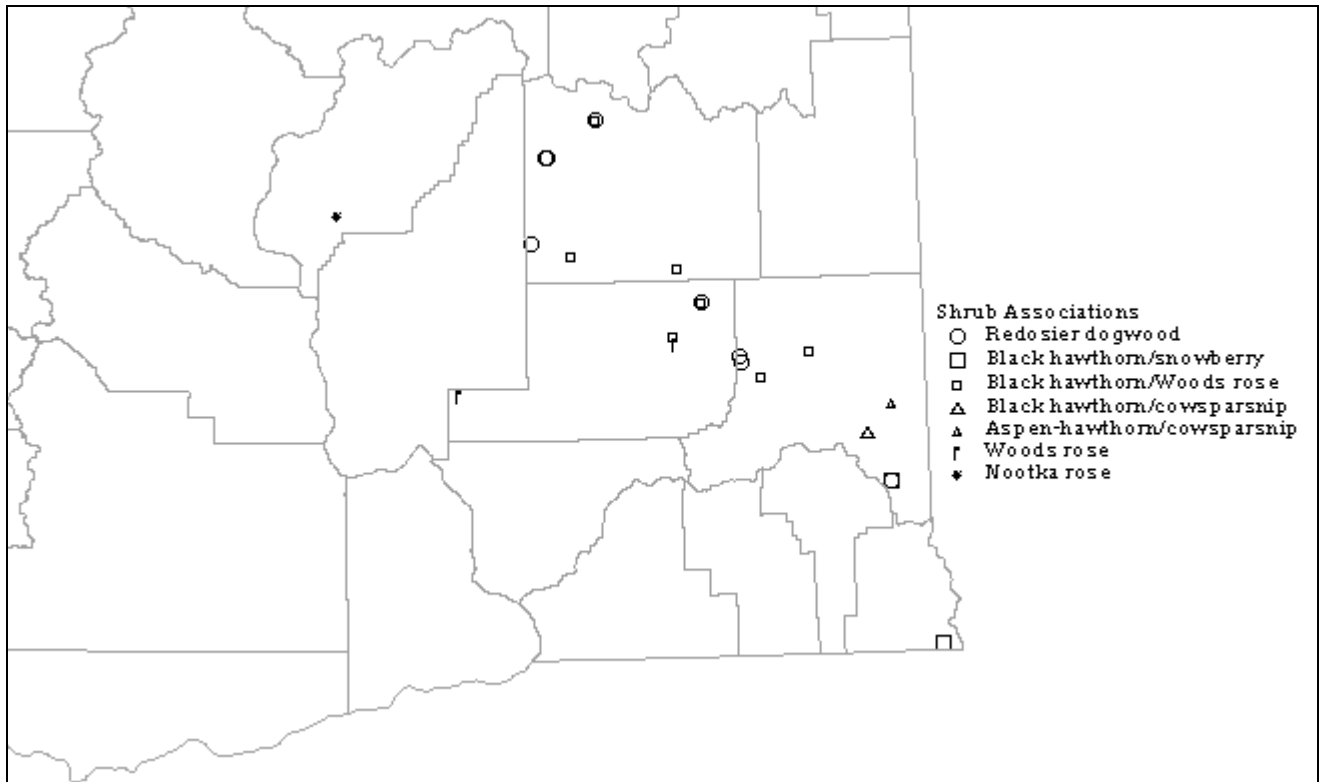
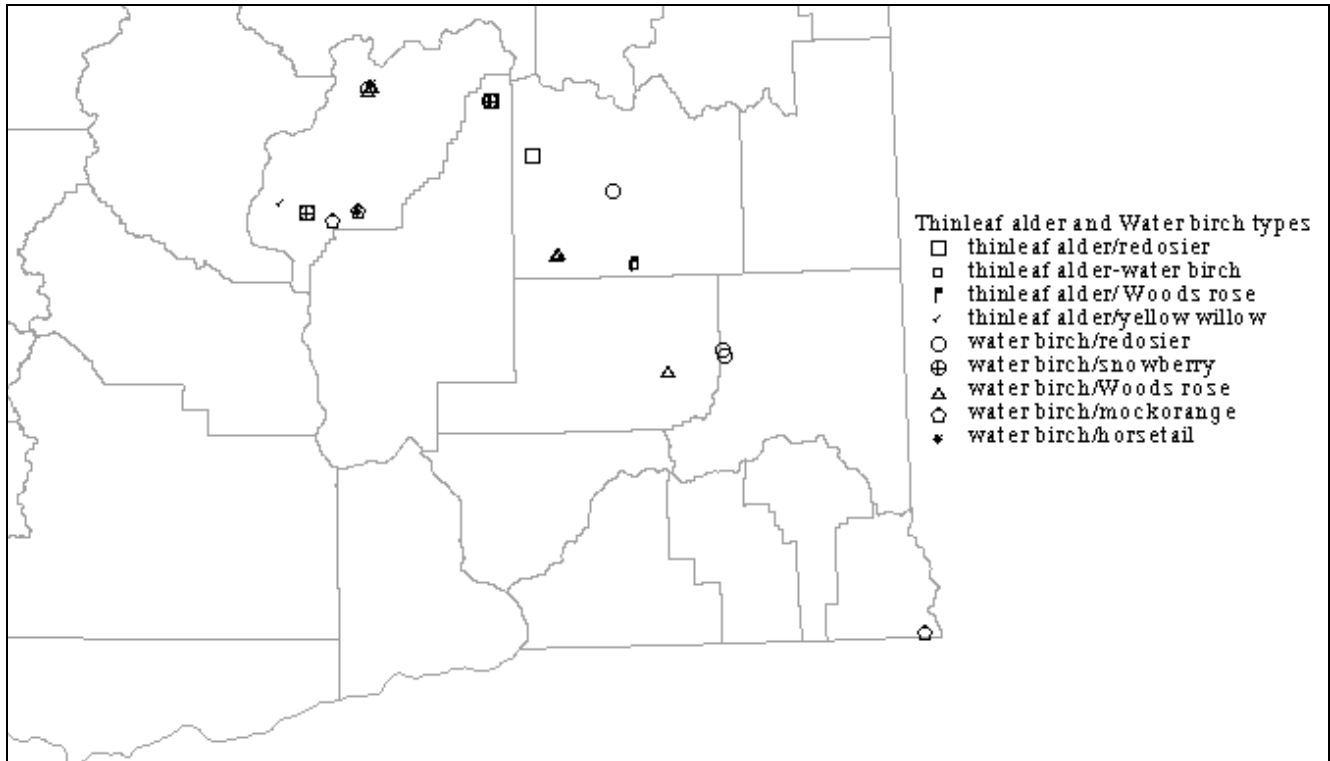
NVC code: CEG001721

Plots 00RC013

This community is represented by a single sample in Klickitat County and is found only in Washington adjacent to the type's wider distribution in eastern Oregon. It occurred on alluvial deposits on an intermittent stream. The community was sampled well above the floodprone zone (FPI 4.7) on the second terrace along a Rosgen stream type B3. This is an open canopy woodland type with a 35-foot tall juniper layer over patchy herbaceous layer. Bluebunch wheatgrass, cheatgrass, and bulbous bluegrass dominate the ground cover. Scattered tall basin big sagebrush and shorter shrubby buckwheats occurred as well. This community is more commonly seen in upland settings and occurs on high terraces as a riparian type. This community differs from the western juniper ephemeral drainage type described by Jankovsky-Jones et al. (2001) in southeast Idaho. They reference other undescribed western juniper/mountain shrub types for comparison.

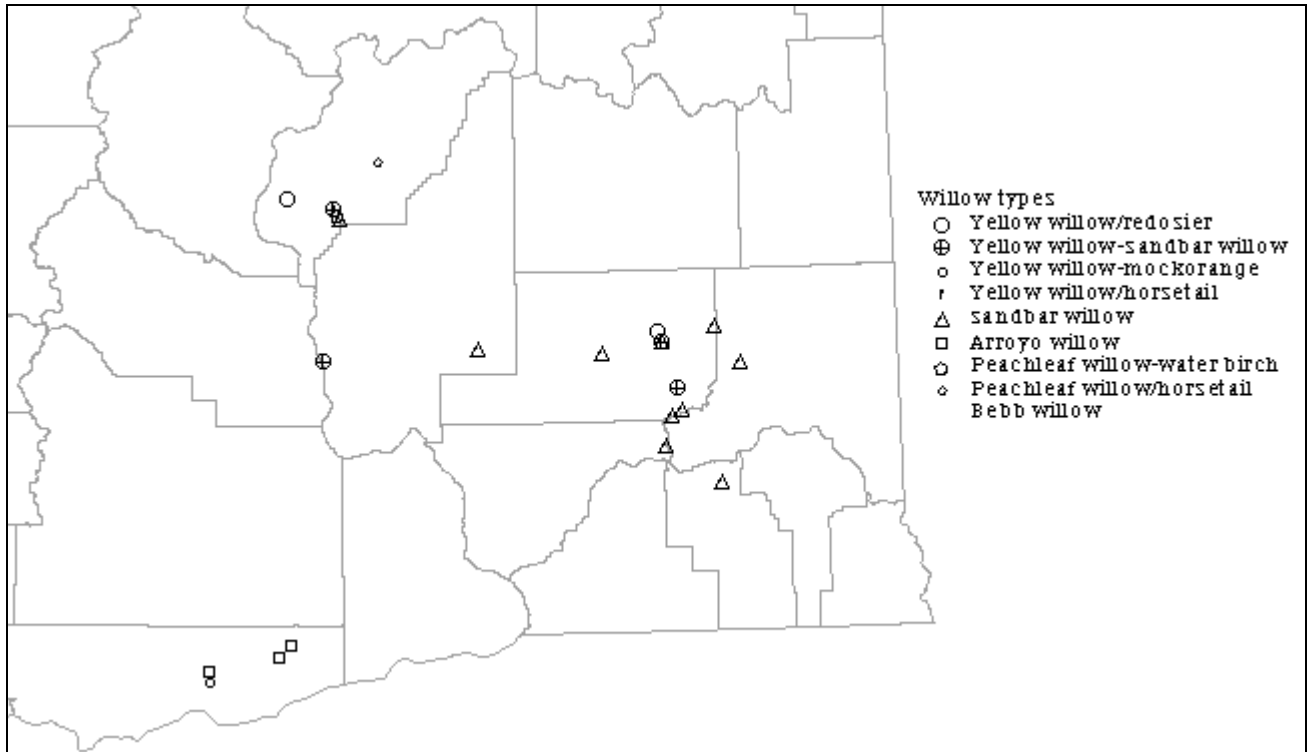
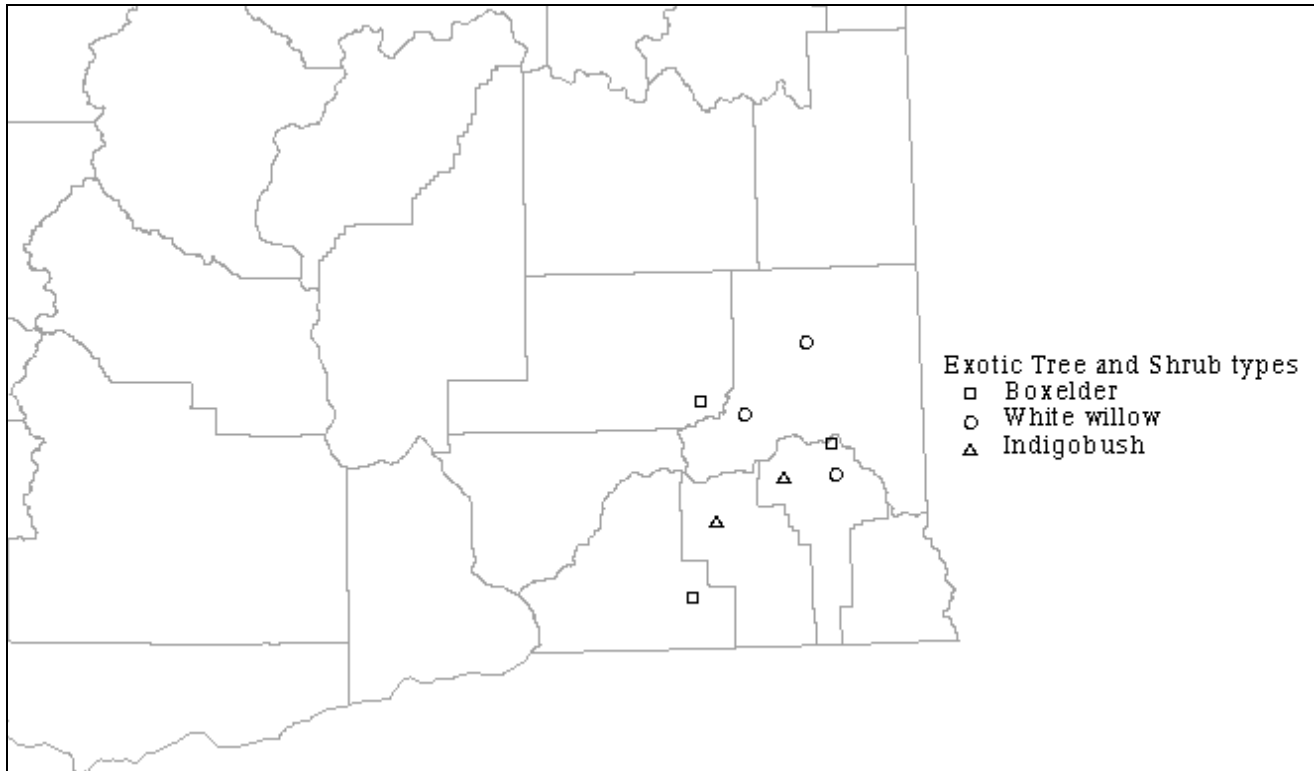
Short Tree and Tall Shrub Riparian Vegetation Types

Plot locations



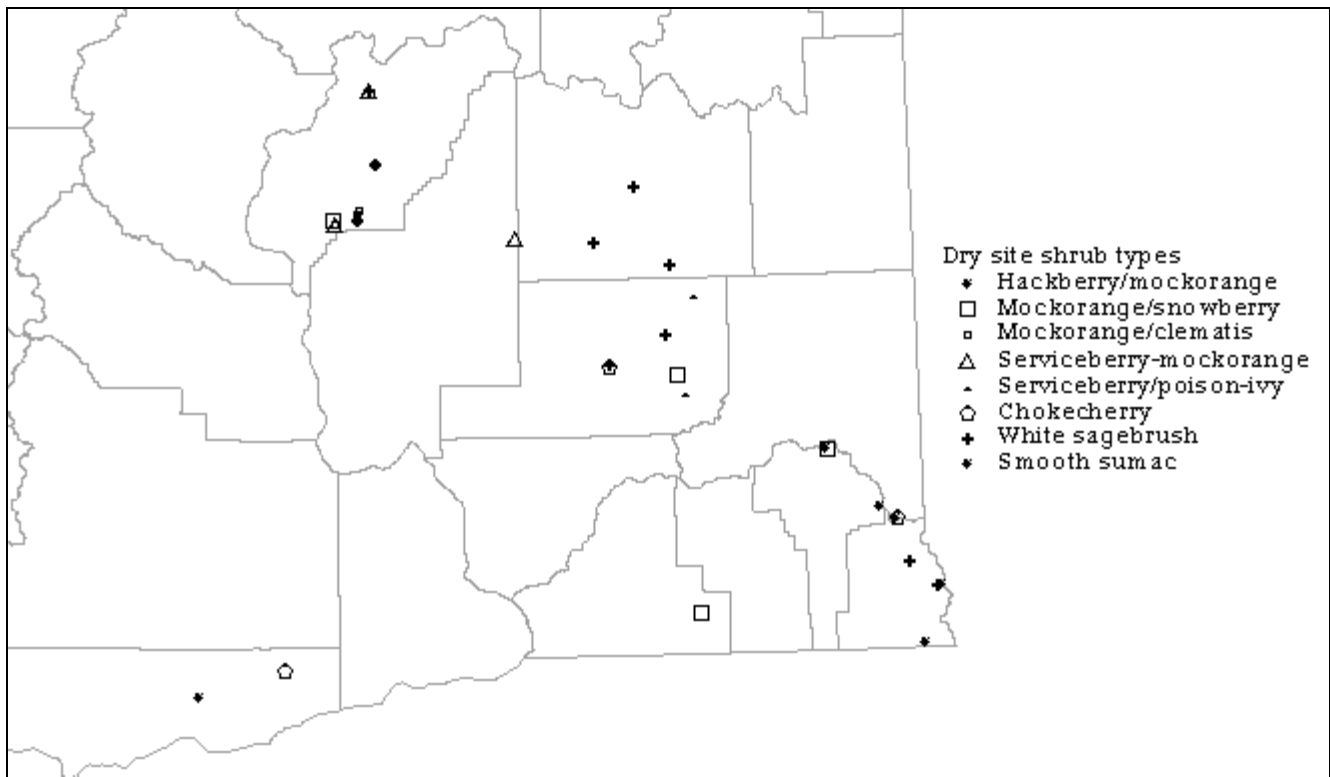
Exotic Tree/shrub and Willow Riparian Vegetation Types

Plot locations



Dry-site Short Tree and Shrub Riparian Vegetation Types

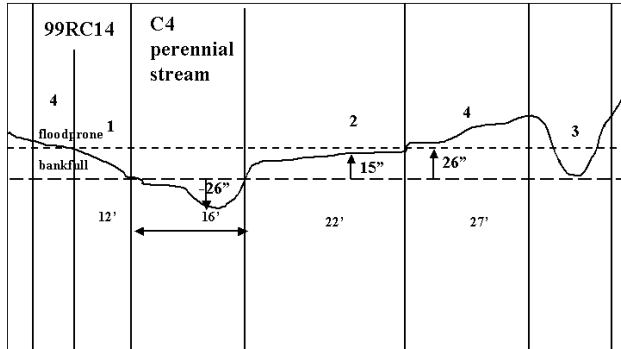
Plot locations



Short Tree and Shrub Riparian Vegetation Types

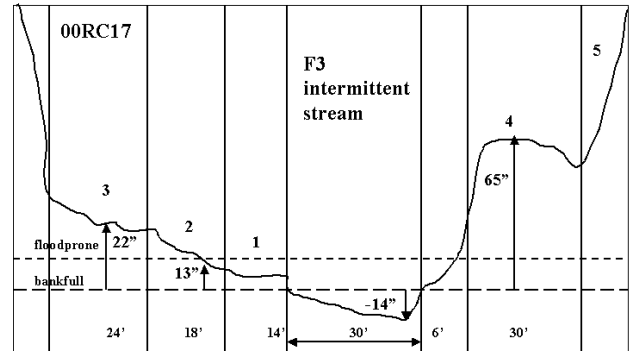
Selected stream profiles

S1



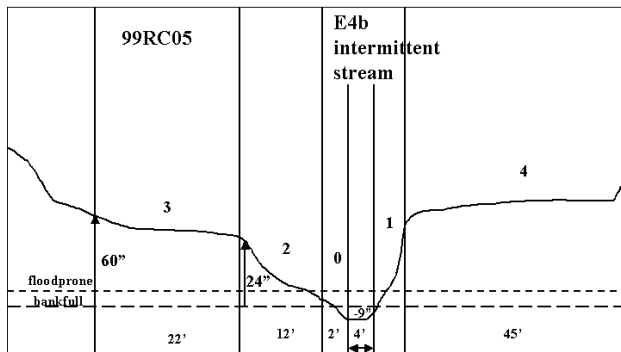
Stream and riparian vegetation profile at Lake Creek, Lincoln County. 1=redosier dogwood, 2= water birch / redosier dogwood, 3 = abandon channel, and 4 = basin wildrye – clustered field sedge.

S2



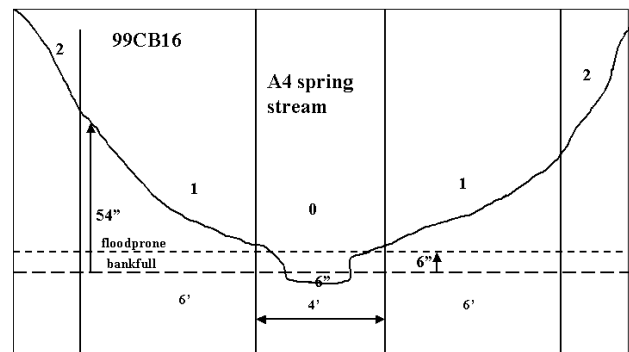
Stream and riparian vegetation profile near Douglas Creek, Douglas County. 1= reed canarygrass, 2= peachleaf willow, 3= water birch / common snowberry, 4=Lewis mockorange/ common snowberry, and 5= railroad fill slope.

S3



Stream and riparian vegetation profile at upper Crab Creek tributary, Lincoln County. 0= water foxtail, 1= white sagebrush, 2=water birch / Wood's rose, 3=black hawthorn / Wood's rose, and 4= Wood's rose.

S4

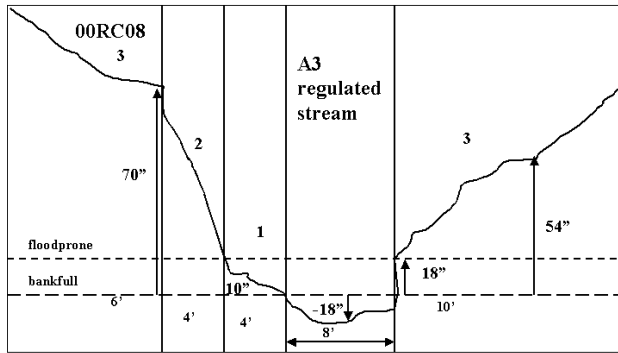


Stream and riparian vegetation profile at Green Creek, Asotin County. 0 =watercress, 1=black hawthorn / common snowberry, and 2 = bunchgrass uplands.

Short Tree and Shrub Riparian Vegetation Types

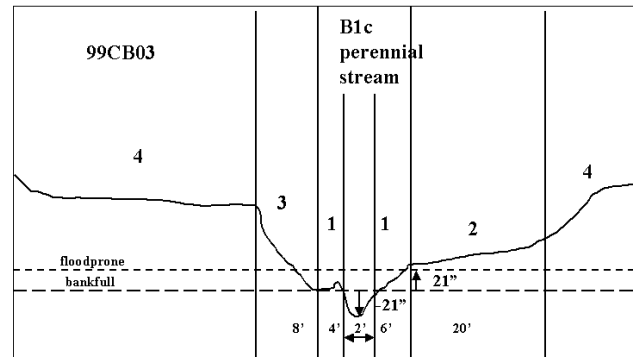
Selected stream profiles

S5



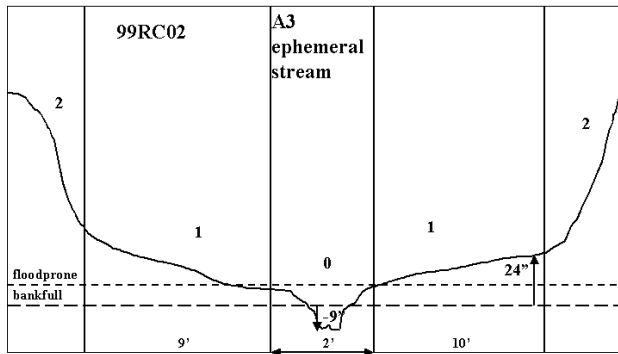
Stream and riparian vegetation profile near George, Grant County. 1= yellow willow – sandbar willow, 2= common horsetail, and 3= Wyoming big sagebrush/bluebunch wheatgrass.

S6



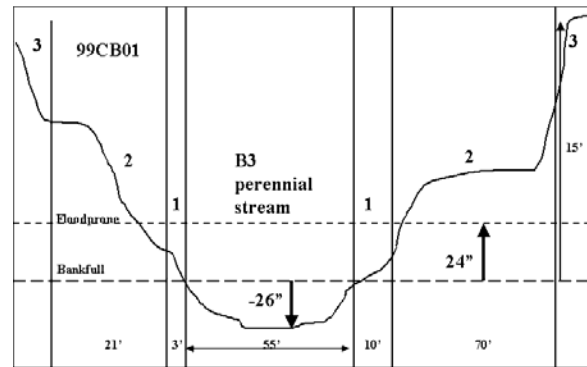
Stream and riparian vegetation profile at Patah Creek, Whitman County. 1=reed canarygrass, 2=sandbar willow, 3 = annual dominated uplands.

S7



Stream and riparian vegetation profile near Marlin, Lincoln County. 0= bluebunch wheatgrass, 1= Saskatoon serviceberry – Lewis' mockorange / bluebunch wheatgrass, 2 = Wyoming sagebrush / bluebunch wheatgrass uplands.

S8



Stream and riparian vegetation profile at Joseph Creek, Asotin County. 1=White alder /Lewis' mockorange, 2= netleaf hackberry / Lewis' mockorange, and 3 = smooth sumac / bunchgrass uplands.

Thinleaf Alder and Water birch types:

Thinleaf alder / redosier dogwood association

Alnus incana / *Cornus sericea* association

(ALNINC/CORSER)

NVC code: CEGL001145

Plots 99RC91, 00RC181, 00RC241

Location. This tall shrubland community is similar to a previously described type documented in the mountains of eastern Oregon and Washington. It was sampled in Lincoln and Douglas counties in the Columbia Basin.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	16.5	15	18.6
width of floodplain (ft)	49.3	10	75
entrenchment ratio	2.1	1.25	2.6
stream gradient (%)	2.2	1	4
Rosgen types	A3, C4, E5		

Fluvial setting. In the mountains of eastern Washington, this type occurs on active fluvial surfaces along Rosgen B streams and within a forest landscape. In the Columbia Basin, it was sampled in 100 to over 300-foot wide valleys with 1-4% gradient. In the Wyoming big sagebrush landscape, this community usually appears along permanent streams near the floodprone zone. Sites appear to flood frequently and the soil surface is wet early in the growing season, drying to the water table by late summer. Mottling and/or gleying layers were encountered at 12 inches at one site and not encountered in the top 24 inches at another site. See representative stream profiles T1 page 23 and G1 page 73.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.1	0	3
percent slope	6.6	1	13
Position	floodplain, first terrace, abandon channel		

PERCENT OF GROUND COVER	average	min	max
Litter	80	70	90
Moss	0	0	0
Bareground	13	10	20
Gravel	7	0	20
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	31	2	60
texture	gravel/cobble, sandy clay loam		

Vegetation. This community is a closed canopy with an 8 to 10-foot tall shrub thicket of thinleaf alder and redosier dogwood. Either shrub can be dominant but both always contribute significantly to total cover. Thinleaf alder can appear as a tree (25 feet tall) above the redosier dogwood in some areas. There is usually a shorter, sparse shrub layer of Wood's rose and golden

current with white clematis draped among the branches. A patchy herbaceous layer is composed of stinging nettle, sticky willy, thistles, and white-top. Useful management information is discussed in Hansen et al. (1995 page 356).

LAYER PERCENT COVER	average	min	max
Overstory trees	77	60	90
Understory trees	9	1	20
Shrubs	53	40	60
Grasses	13	3	30
Grasslikes	0	0	0
Forbs	27	8	60
Non-vascular	0	0	0

COMMON SPECIES	n=3	cover		
	constancy	average	min	max
Overstory trees				
<i>Alnus incana</i>	100%	73	50	90
<i>Salix lucida</i> ssp. <i>caudata</i>	33%	13	13	13
<i>Betula occidentalis</i>	33%	5	5	5
Understory trees				
<i>Betula occidentalis</i>	67%	11	3	20
<i>Prunus virginiana</i>	33%	3	3	3
<i>Alnus incana</i>	33%	1	1	1
Shrubs				
<i>Cornus sericea</i>	100%	47	30	60
<i>Ribes aureum</i>	67%	11	3	20
<i>Rosa woodsii</i>	67%	4	1	8
<i>Clematis ligusticifolia</i>	67%	3	3	3
<i>Symphoricarpos albus</i>	33%	20	20	20
Forbs				
<i>Urtica dioica</i>	100%	4	1	8
<i>Arctium minus</i>	100%	2	1	3
<i>Solanum dulcamara</i>	67%	4	1	8
<i>Tanacetum vulgare</i>	67%	3	3	3
<i>Cirsium</i> spp	67%	3	3	3
<i>Equisetum arvense</i>	33%	13	13	13
<i>Smilicina racemosa</i>	33%	3	3	3
<i>Maianthemum stellatum</i>	33%	3	3	3
Annuals				
<i>Sonchus arvensis</i>	67%	5	1	10
<i>Amsinckia lycopsoides</i>	33%	20	20	20

Classification. Overall this type is similar to the thinleaf alder - redosier dogwood/ mesic forb association described by Crowe and Clausnitzer (1997) and the thinleaf alder-redosier dogwood / common snowberry by Kovalchik (2001) but without montane floristic elements and with Columbia Plateau species. It appears distinct from the thinleaf alder -creek dogwood/blue wildrye association in eastern Oregon (Titus et al. 1998). Further inventory may distinguish this as a distinct community type.

Water birch / redosier dogwood association
***Betula occidentalis* / *Cornus sericea* association**
(BETOCC/CORSER)
NVC code: CEGL001161

Plots 99RC141, 99RC142, 00RC111, 02RC163, 02RC182

Location. This tall shrubland community is similar to a type previously recognized across the inland Pacific Northwest. It was sampled on Crab, Rock, Foster Creeks in the Columbia Basin of Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	15.8	9.4	26
width of floodplain (ft)	64.9	6.5	150
entrenchment ratio	2.5	1.1	3.6
stream gradient (%)	7.7	1.5	32
Rosgen types	A3, 2 C3, C4		

Fluvial setting. This community was sampled in 100 to 300-foot wide valleys with 1-3% gradient. These samples appeared within the floodprone zone, along a spring-feed reach of an intermittent stream and well above the floodprone zone along a spring fringe. These sites appear to flood annually. Surface soil layers were a silt loams. At one site, 24 inches of mineral soil appears above a buried, saturated organic layer. See representative stream profiles S1 page 36.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.3	0	9.1
percent slope	7.6	2	20
Position	spring edge, 2 floodplain, 2 first terraces		

PERCENT OF GROUND COVER			
Litter	65	40	90
Moss	2	0	10
Bareground	32	10	60
Gravel	0	0	0
Cobble-boulder	1	0	5
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=2)	2	0	5
texture (n=3)	sand, 2 silt loam		

Vegetation. This community is an open short tree layer of water birch (40 feet tall) over a shrub thicket dominated by a 10-foot tall redosier dogwood layer. Snowberry was the most abundant associated shrub although both Wood's rose and golden current were present. Starry false solomonseal is always present usually associated with a patchy herbaceous layer with reed canarygrass, Kentucky bluegrass, stinging nettle, sticky willy and pellitory. This type appeared between a redosier dogwood and a clustered field sedge community. Management information applicable to this type is summarized in Hansen et al. (1995 page 340).

LAYER PERCENT COVER	average	min	max
Overstory trees	35	8	70
Understory trees	23	20	30
Shrubs	62	40	90
Grasses	26	3	50
Grasslikes	0	0	0
Forbs	35	3	60
Non-vascular	0	0	0

COMMON SPECIES	n=5 constancy	cover average	min	max
Overstory trees				
<i>Betula occidentalis</i>	100%	34	8	70
<i>Crataegus douglasii</i>	20%	13	13	13
Understory trees				
<i>Betula occidentalis</i>	100%	18	13	20
<i>Crataegus douglasii</i>	20%	20	20	20
Shrubs				
<i>Rosa woodsii</i>	100%	6	3	13
<i>Ribes aureum</i>	80%	5	1	13
<i>Philadelphus lewisii</i>	40%	16	3	30
<i>Symphoricarpos albus</i>	40%	7	1	13
<i>Toxicodendron rydbergii</i>	20%	8	8	8
<i>Rosa nutkana</i>	20%	8	8	8
<i>Salix scouleriana</i>	20%	8	8	8
Forbs				
<i>Rumex salicifolius</i>	100%	2	1	3
<i>Urtica dioica</i>	80%	10	1	20
<i>Maianthemum stellatum</i>	80%	7	3	13
<i>Geum macrophyllum</i>	40%	8	3	13
<i>Epilobium ciliatum</i> ssp. <i>glandulosum</i>	40%	5	3	8
<i>Cardaria draba</i>	40%	4	1	8
Grasses				
<i>Phalaris arundinacea</i>	100%	24	3	40
<i>Bromus tectorum</i>	100%	6	1	13
<i>Poa pratensis</i>	40%	10	1	20
<i>Elymus glaucus</i>	20%	13	13	13
Annuals				
<i>Anthriscus scandicina</i>	40%	50	40	60
<i>Parietaria pensylvanica</i>	40%	13	13	13

Classification. This type was tentatively described by Evans (1989) and is similar to the water birch /redosier community type in Jankovsky-Jones et al. (2001) in southeast Idaho, Hansen et al. (1995) in Montana, Padgett et al. (1989) in Utah, and Manning and Padgett (1989) in Nevada.

Water birch / Common snowberry community type
Betula occidentalis* / *Symphoricarpos albus
community type (BETOCC/SYMALB)
 NVC code: none

Plots 00RC183, 00RC243, 00RC252

Location. This plant association is found in the northern Columbia Basin and was sampled along Duffy, Douglas, and Northrup creeks in Douglas, Grant, and Lincoln counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	13.7	10	16
width of floodplain (ft)	25.3	3	63
entrenchment ratio	1.5	1	2.3
stream gradient (%)	2.3	1	4
Rosgen types	A3, E5, F6		

Fluvial setting. It occurs primarily on fluvial surfaces along intermittent and perennial streams. These samples are from 30 to 300-foot wide valleys with 1-4% gradients. This association appears above or usually high in the floodprone zone on stream terraces. See representative stream profiles S2 page 36.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	4.7	0.6	10.0
percent slope	4	2	8
Position	first and 2 second terraces		

PERCENT OF GROUND COVER	average	min	max
Litter	91	88	95
Moss	2	1	4
Bareground	6	0	10
Gravel	0	0	0
Cobble-boulder	1	1	1
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	7.5	0	20
texture	2 silt loam		

Vegetation. A nearly complete cover of woody species characterizes stands. This community has a short tree layer, 25 feet tall, dominated by water birch and typically with a few common chokecherry trees. Common snowberry forms dense thickets with Lewis' mockorange, serviceberry, Wood's or Nootka rose in the undergrowth. White clematis is common growing through and on the shrub layer. A patchy herbaceous layer of starry false Solomon's seal and stinging nettle characterize this community. Grasses and sedges are rare or more often absent. On similar drier sites or sites more heavily used by livestock, water birch is less dense, and grazing increasers such as Kentucky bluegrass and smooth brome are common.

LAYER PERCENT COVER	average	min	max
Overstory trees	20	20	20
Understory trees	37	13	50
Shrubs	76	70	90
Grasses	3	3	3
Grasslikes	0	0	0
Forbs	36	20	50
Non-vascular	0	0	0

COMMON SPECIES	n=3	cover		
	constancy	average	min	max
Overstory trees				
<i>Betula occidentalis</i>	33%	13	13	13
<i>Prunus virginiana</i>	33%	8	8	8
Understory trees				
<i>Prunus virginiana</i>	100%	24	1	50
<i>Betula occidentalis</i>	100%	12	3	20
<i>Populus tremuloides</i>	33%	3	3	3
Shrubs				
<i>Symphoricarpos albus</i>	100%	53	30	70
<i>Amelanchier alnifolia</i>	100%	18	3	30
<i>Clematis ligusticifolia</i>	100%	11	8	13
<i>Philadelphus lewisii</i>	67%	16	13	20
<i>Cornus sericea</i>	67%	11	10	13
<i>Rosa woodsii</i>	67%	5	3	8
<i>Spiraea betulifolia</i>	33%	30	30	30
<i>Acer glabrum</i>	33%	30	30	30
Forbs				
<i>Maianthemum stellatum</i>	100%	34	13	50
<i>Urtica dioica</i>	67%	8	8	8
<i>Arctium minus</i>	67%	2	1	3
<i>Smilicina racemosa</i>	33%	8	8	8
<i>Aquilegia formosa</i>	33%	3	3	3
Grasses				
<i>Elymus glaucus</i>	33%	3	3	3
Annuals				
<i>Galium aparine</i>	33%	30	30	30

Classification. This is an undescribed community type that it has affinities with the water birch / mesic forb association (Crowe and Clausnitzer 1997). These communities differ in gooseberry species and rose species. The water birch / common snowberry community differs in a greater abundance of chokecherry, mockorange, and starry false Solomon's seal and less feathery false lily of the valley. Further inventory is needed to verify this as a distinct community type.

Water birch / Wood's rose association
***Betula occidentalis* / *Rosa woodsii* community type**
(BETOCC/ROSWOO)
 NVC code: CEG001162

Plots 98RC0075, 99RC42, 99RC052, 00RC112, 00RC132

Location. This short woodland or tall shrubland community type was sampled along upper Crab, Cow, and Foster creeks. It has been observed elsewhere in the Columbia Basin.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	19.8	8	29
width of floodplain (ft)	27.9	6.5	50
entrenchment ratio	1.6	1.1	3.3
stream gradient (%)	8.2	1	32
Rosgen types	A3, E4b, F2, F3b, F4		

Fluvial setting. In the Columbia Basin, this community occurs in 30 to over 1000-foot wide valleys typically with less than 3% gradient. It usually occurs well above the floodprone zone along permanent and intermittent streams, although it was within the flood plain (FPI 0.5) at one site. Sites rarely flood and are saturated for only a short period early in the growing season and dry to the water table by late summer. The upper soil horizons are shallow silt loam often mixed with colluvial and alluvial gravels and densely intermingled with roots. There was no redoxidation in the top 24 inches or top 73 inches of soil at two sample sites. See representative stream profile S3 page 36.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	4.7	0.5	10
percent slope	7.6	1	20
position	spring transition, floodplain, 2 first terraces, second terrace		

PERCENT OF GROUND COVER	average	min	max
litter	77	30	95
moss	0	0	0
bareground	20	0	65
gravel	1	0	5
Cobble-boulder	2	0	5
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	5	0	20
texture	sandy loam, 2 silt loam, silty clay loam		

Vegetation. This closed to open canopy short forest type has a 15 to 30-foot tall water birch layer over a 3 to 8-foot tall Wood's rose and golden current open shrub layer. Western white clematis grows over the shrub and short trees in most stands. There is a dense but patchy herbaceous layer of starry false Solomon's seal, stinging nettle, Canadian thistle and blue wildrye. The herbaceous layer in one stand was dominated by. On similar drier sites or sites more heavily used by livestock,

water birch is less common, and grazing increasers such as Kentucky bluegrass and smooth brome are common. This type appeared between a wetter woolly sedge and upland Idaho fescue - bluebunch wheatgrass. Management information applicable to this type is summarized in Hansen et al. (1995 page 355). Water birch has very high nutritional requirements especially magnesium and calcium (FEIS).

LAYER PERCENT COVER	average	min	max
Overstory trees	64	40	100
Understory trees	17	1	30
Shrubs	17	8	30
Grasses	39	13	90
Grasslikes	2	1	3
Forbs	37	3	60
Non-vascular	0	0	0

COMMON SPECIES	n=5			
	constancy	average	min	max
Overstory trees				
<i>Betula occidentalis</i>	100%	64	40	100
Understory trees				
<i>Betula occidentalis</i>	60%	20	1	30
<i>Prunus virginiana</i>	40%	4	1	8
Shrubs				
<i>Rosa woodsii</i>	100%	11	3	20
<i>Clematis ligusticifolia</i>	80%	9	1	20
<i>Artemisia ludoviciana</i>	40%	3	3	3
<i>Ribes aureum</i>	40%	3	3	3
<i>Symphoricarpos albus</i>	20%	3	3	3
Forbs				
<i>Maianthemum stellatum</i>	60%	40	30	60
<i>Cirsium arvense</i>	60%	2	1	3
<i>Urtica dioica</i>	60%	1	1	1
<i>Iris missouriensis</i>	40%	2	1	3
<i>Taraxacum officinale</i>	40%	1	1	1
Grasses				
<i>Poa pratensis</i>	80%	28	13	50
<i>Bromus inermis</i>	40%	45	20	70
<i>Elymus glaucus</i>	40%	7	1	13
<i>Leymus cinereus</i>	40%	5	3	8
<i>Bromus tectorum</i>	40%	3	3	3
<i>Juncus balticus</i>	40%	2	1	3
<i>Poa bulbosa</i>	40%	2	1	3
Annual forbs				
<i>Galium aparine</i>	80%	3	1	8
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	40%	4	1	8

Classification. It is similar to the water birch-mockorange/western clematis association described by The Oregon Natural Heritage Program but without any mockorange. It may be a disclimax of the water birch/common snowberry association. This type is similar to the water birch / mesic forb association in Oregon (Crowe and Clausnitzer 1997) that has thinleaf alder and snowberry as common features. This Oregon type may be represented in Washington by sample 99RC174 (**water birch - thinleaf alder** with a Wood's rose understory) and by 99RC173 (**thinleaf alder-Wood's rose** stand). Both samples occur in Douglas County.

Water birch / mockorange association
***Betula occidentalis* / *Philadelphus lewisii* community**
type (BETOCC/PHILEW)
 NVC code: C EGL002668

Plots 99CB1201, 00RC173, 02RC073, 02RC075

Location. This short woodland/tall shrubland community is a type recognized in Oregon and Idaho. It was sampled in Asotin and Douglas Counties and likely in other Washington counties with coulees and associated flood topography.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	25.2	5	60
width of floodplain (ft)	21.8	4.5	47
entrenchment ratio	1.5	1.2	2.1
stream gradient (%)	2.6	2	3
Rosgen types	A6a, B4, F3		

Fluvial setting. This association was located in 30 to 100-foot wide valleys with 1-3% gradient. It usually appears above the floodprone zone (FPI 2.6) along seasonally flooded spring-influenced streams. Surface soils were a sandy clay loam and sandy loam often with coarse fragments.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.6	1.5	3.8
percent slope	7.7	5	15
Position	first and 2 second terraces		

PERCENT OF GROUND COVER	average	min	max
Litter	82	70	96
Moss	2	0	10
Bareground	13	1	20
Gravel	1	0	1
Cobble-boulder	2	0	5
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	20	0	70
texture	2 sandy loam, 2 sandy clay loam		

Vegetation. Water birch usually forms a closed short tree layer, 35 feet tall, over a short shrub thicket dominated by a 6-10 foot tall mockorange and shorter water birch. Climbing white clematis is almost always present. Poison ivy is common with a sparse, patchy herbaceous layer composed of forb species common in disturbed understories. This type appeared between the channel and an upland bunchgrass community. Management information applicable to this type is summarized in Hansen et al. (1995) Montana Riparian Guide page 356.

LAYER PERCENT COVER	average	min	max
Overstory trees	86	70	100
Understory trees	32	10	70
Shrubs	45	20	60
Grasses	19	10	40
Grasslikes	2	1	3
Forbs	28	13	40
Non-vascular	10	10	10

COMMON SPECIES	n=4	cover		
	constancy	average	min	max
Overstory trees				
<i>Betula occidentalis</i>	75%	87	70	100
Understory trees				
<i>Betula occidentalis</i>	100%	30	10	60
<i>Prunus virginiana</i>	50%	1	1	1
<i>Crataegus douglasii</i>	25%	50	50	50
Shrubs				
<i>Philadelphus lewisii</i>	100%	38	20	50
<i>Toxicodendron rydbergii</i>	75%	10	1	20
<i>Clematis ligusticifolia</i>	75%	9	1	13
<i>Ribes aureum</i>	50%	2	1	3
<i>Amelanchier alnifolia</i>	50%	1	1	1
<i>Rosa nutkana</i>	25%	20	20	20
<i>Artemisia ludoviciana</i>	25%	1	1	1
<i>Symphoricarpos albus</i>	25%	1	1	1
Forbs				
<i>Silene menziesii</i>	50%	5	1	8
<i>Urtica dioica</i>	50%	2	1	3
<i>Aquilegia formosa</i>	50%	2	1	2
<i>Maianthemum stellatum</i>	25%	5	5	5
<i>Equisetum arvense</i>	25%	30	30	30
Grasses				
<i>Poa pratensis</i>	75%	9	5	13
<i>Elymus glaucus</i>	75%	6	1	13
Annuals				
<i>Galium aparine</i>	75%	2	1	3

Classification. This community is similar to the water birch/mockorange association in Idaho (Jankovsky-Jones et al. 2001) and the water birch-mockorange/western clematis association described by the Titus et al. 1998. It may be a later seral stage of either the black cottonwood/mockorange type or white alder/mockorange type.

Other thinleaf alder and waterbirch Types

Thinleaf alder/yellow willow community type

Alnus incana / *Salix lutea* community type

(ALNINC/SALLUT)

NVC code: none

Plot 00RC141

This association was sampled on Badger Mountain in Douglas County and is possible elsewhere in the Columbia Basin. The community was sampled above the floodprone zone (FPI 3) on the first terrace along a 3% gradient perennial stream. It was associated with Rosgen stream type G3. This is an open canopy forest type with a 30-foot tall thinleaf alder layer (40% cover) over an 8-foot tall shrub layer. Yellow willow, Wood's rose, whitestem gooseberry and common snowberry form a closed shrub layer with few herbaceous species. Sweetcicely, cowparsnip, and enchanter's nightshade are common forbs on site. This is similar to the thinleaf alder/common snowberry shrubland type (CEGL001153) from streams in the mountains of eastern Oregon (Kovalchik 1987; Crowe and Clausnitzer 1997) and Washington (Kovalchik 1992, 2001) but lacks redosier dogwood and several species more associated with montane zones. More samples of this community are needed assess its relationship to other types or to fully describe its ecological characteristics in Washington.

Water birch / common horsetail community type

Betula occidentalis / *Equisetum arvense* community type **(BETOCC/EQUARV)**

NVC code: none

Plots 00RC133, 02RC072

This type occurs in moderate to narrow valleys with very low to moderate gradients. The community was sampled well below the floodprone zone (FPI 0.6-0.9) along an intermittent and a permanent stream. Stream gradients were 2 and 3%. Soils are dominated by coarse fragments and likely are wet near the surface for much of the growing season. This community appears to occur on eroding fluvial surfaces. Water birch, 2-30 feet tall, dominate this usually open short forest. Shrub species are sparsely represented often observed only as sprouts. Grasses and grasslike species are infrequent, although bentgrass was abundant in one stand. Common horsetail is by far the predominate species in this community. It typically forms a 1 to 2 foot tall layer with few associates. See Common Horsetail community, page 91, for a comparative discussion.

Black hawthorn types:

Black hawthorn / common snowberry plant association

Crataegus douglasii / *Symphoricarpos albus* plant association (CRADOU/SYMALB)

NVC code: CEGL0001096

Plots 99CB1003, 99CB1603

Location. This plant association is found in the Columbia Basin primarily within the Palouse region of southeastern Washington, northeastern Oregon and adjacent Idaho.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	7.3	6.7	8.0
width of floodplain (ft)	6.1	5.7	6.5
entrenchment ratio	1.5	1.4	1.6
stream gradient (%)	8.5	7	10
Rosgen types	A1, A4		

Fluvial setting. This association occurs on fluvial surfaces along intermittent and perennial streams and near springs. It was originally described from valleys with less than 3% gradients in the Palouse Prairie likely associated with Rosgen stream types C and F. These two samples are from narrow V-shaped valleys with over 8% gradient and with stream gradients over 40%. Samples were well above the floodprone zone along a permanent and intermittent stream. Soils are sandy textured and well drained. See representative stream profile S4 page 36.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	5.9	10	5.9
percent slope	52	40	64
Position	stream bank, lake edge		

PERCENT OF GROUND COVER			
Litter	95	90	100
Moss	2.5	0	5
Bareground	0	0	0
Gravel	0	0	0
Cobble-boulder	2.5	0	5
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=2)	20	0	40
texture	silty clay loam, sandy clay loam		

Vegetation. This is a closed canopy short tree or shrub thicket, 6 to 10 feet tall. Black hawthorn forms dense thickets over a shrub understory with over 20% cover of snowberry with spiraea, serviceberry, Wood's or Nootka rose or mockorange. Stands have few sedges or rushes and low cover of grasses, most commonly, cheatgrass and Kentucky bluegrass. Forbs average 25% cover and include a variety of species. Sweet cicely, sticky willy, dandelion and gypsyflower were present in both stands.

This type appears between the channel or a mockorange/white sagebrush community and bunchgrass steppe on the adjacent upland. Management information is summarized in (Crowe and Clausnitzer 1997 page 154).

LAYER PERCENT COVER	average	min	max
Overstory trees	10	10	10
Understory trees	100	100	100
Shrubs	95	90	100
Grasses	22	3	40
Grasslikes	1	1	1
Forbs	25	10	40
Non-vascular	10	10	10

COMMON SPECIES	n=2	cover		
	constancy	average	min	max
Overstory trees				
Populus balsamorhiza ssp. trichocarpa	50%	10	10	10
Understory trees				
Crataegus douglasii	100%	100	100	100
Populus balsamorhiza ssp. trichocarpa	50%	1	1	1
Shrubs				
Symphoricarpos albus	100%	55	20	90
Philadelphus lewisii	100%	51	1	100
Spiraea betulifolia	100%	15	10	20
Amelanchier alnifolia	100%	10	10	10
Holodiscus discolor	50%	20	20	20
Physocarpus malvaceus	50%	20	20	20
Forbs				
Cynoglossum officinale	100%	5	1	10
Osmorhiza pupurea	100%	1	1	1
Arnica cordifolia	50%	30	30	30
Grasses				
Bromus tectorum	100%	6	3	10
Poa pratensis	50%	20	20	20
Annuals				
Galium aparine	100%	2	1	3
Moss and Lichen				
	50%	10	10	10

Classification. This is the typical phase of the black hawthorn / snowberry type described by Daubenmire (1970); see that reference for more detailed descriptions. This type is equivalent to the (quaking aspen)-black hawthorn/ snowberry association the NVC. An abundance of snowberry, presence of blue wildrye and little or no Wood's rose distinguish this association from the black hawthorn/ Wood's rose association.

Black hawthorn / Woods' rose association
***Crataegus douglasii* / *Rosa woodsii* community type**
(CRADOU/ROSWOO)
 NVC code: CEG0001095

Plots 98RC114, 98RC243, 99RC053, 99RC152, 99RC193, 02RC123, 02RC133

Location. This deciduous shrubland or short tree community is a described type in eastern Washington, Idaho, and Oregon. It has been observed in Whitman, Lincoln, Douglas, Grant, Adams, and Benton counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	32.5	7.8	100
width of floodplain (ft)	86.3	13	235
entrenchment ratio	2.4	1.2	3.7
stream gradient (%)	1.5	0.5	3
Rosgen types	2C3, D3, E4b, E5, F3, F6		

Fluvial setting. This association occurs along low elevation, low gradient streams with broad floodplains that flood seasonally. Due to the low gradients, the floodplains are rarely scoured surfaces. It occurs primarily on fluvial surfaces along intermittent streams but also occurs with perennial streams and springs. It was sampled in 100 to 1000 feet wide valleys with less than 3% gradients. This community lines creeks in the upper floodprone zone. It is well above the floodprone zone along permanent streams and on a spring creek. Sites currently appear to rarely flood and associated with entrenched streams, average entrenchment ratio of 2.8. Soils are coarse-textured and well drained. There was no mottling and/or gleying layer in the top 24 inches of soil at the three sites sampled. See representative stream profiles T4 page 23, S3 page 36, and G2 page 73.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.5	0.6	6.7
Percent slope	7.5	1	25
Position	floodplain, 5 first terraces, second terrace		

PERCENT OF GROUND COVER	average	min	max
Litter	61	30	90
Moss	0	0	0
Bareground	32	10	70
Gravel	1	0	3
Cobble-boulder	1	0	10
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
Percent of coarse fragments (n=5) texture	2.8	0	7
	4 silt loam, sandy loam		

Vegetation. This is a closed canopy, 10 to 20-foot tall shrub thicket dominated by black hawthorn. Woods' rose is common and maybe abundant in the black hawthorn layer. Golden current and common snowberry are frequent, low cover associates in a shorter shrub

layer. Stands have few sedges or rushes and have a low cover of grasses, even though blue wildrye and cheatgrass were in 60% of the samples. Forbs averaged 23% cover and are composed of a variety of species. Starry false Solomon seal, Canadian thistle, stinging nettle, and sticky willy are common in all stands. This type appears between a wetter reed canarygrass or redosier dogwood and saltgrass - clustered field sedge, Quaking aspen or basin wildrye communities on drier fluvial surfaces. Management information is summarized in Hansen et al. (1995 page 359).

LAYER PERCENT COVER	average	min	max
Overstory trees	50	1	80
Understory trees	40	1	90
Shrubs	46	8	98
Grasses	25	1	60
Grasslikes	3	3	3
Forbs	28	13	50
Non-vascular	0	0	0

COMMON SPECIES	n=7	cover		
	constancy	average	min	max
Overstory trees				
<i>Crataegus douglasii</i>	57%	63	40	80
Understory trees				
<i>Crataegus douglasii</i>	100%	36	1	90
<i>Prunus virginiana</i>	29%	16	1	30
Shrubs				
<i>Rosa woodsii</i>	100%	22	1	60
<i>Ribes aureum</i>	100%	7	3	8
<i>Symphoricarpos albus</i>	57%	6	1	13
<i>Artemisia ludoviciana</i>	43%	2	1	3
<i>Clematis ligusticifolia</i>	29%	25	20	30
<i>Philadelphus lewisii</i>	14%	8	8	8
Forbs				
<i>Maianthemum stellatum</i>	86%	13	3	30
<i>Urtica dioica</i>	86%	7	1	13
<i>Cirsium arvense</i>	86%	5	1	13
<i>Agastache urticifolia</i>	43%	6	1	8
<i>Heracleum maximum</i>	14%	3	3	3
Grasses				
<i>Bromus tectorum</i>	71%	18	1	60
<i>Elymus glaucus</i>	57%	9	8	13
<i>Poa pratensis</i>	43%	8	1	13
<i>Bromus inermis</i>	43%	7	1	13
Annuals				
<i>Galium aparine</i>	100%	3	1	13
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	71%	5	1	13

Classification. This type is the black hawthorn / Woods rose association recognized by the by Crawford (1998,1999,2001) and by Jankovsky-Jones et al. (2001) in Idaho. It may be a grazing disclimax of the black hawthorn / snowberry type described by Daubenmire (1970). Titus et al. (1998) describe a similar community as the black hawthorn/common snowberry-blue wildrye association.

Other black hawthorn types:

**(Quaking aspen) - Black hawthorn / cowsparsnip
plant association**

(Populus tremuloides) -Crataegus douglasii /

***Heracelum maximum* plant association**

((POPTRE)-CRADOU/HERMAX)

NVC code: CEGL001094

Plots 99CB1103, 02RC172

This represents the black hawthorn / cowsparsnip plant association, quaking aspen phase (Daubenmire 1970) of the Columbia Basin. It appears on relatively moist sites on deep soils within flat valleys. The canopy is dominated by black hawthorn between 15-20 feet tall. The overstory is locally dominated by quaking aspen as illustrated by plot 02RC172. The understory is dominated by forbs, including cowsparsnip, Fender's waterleaf and stinging needle. The remainder of the herbaceous layer is relatively depauperate. Locations with a tall tree layer of quaking aspen do not differ in environmental characteristics from those dominated by black hawthorn without quaking aspen (Daubenmire, 1970). Plot 99CB1103 is the **black hawthorn / cowsparsnip plant association, black hawthorn phase** described by Daubenmire (1970) but with a scattered ponderosa pine tree layer.

Other Shrub types:

Redosier dogwood association *Cornus sericea* association (CORSER)

NVC code: CEG001166

Plots 98RC242, 99CB1001, 99RC73, 99RC81, 99RC92, 99RC93, 99RC162, 99RC192, 02RC162, 02RC183

Location. This tall shrubland community is similar to a widespread type described throughout the western United States. It is found in the Columbia Basin, Okanogan Highlands, Blue Mountains, and in the Cascades of eastern Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	13.8	6.6	26
width of floodplain (ft)	100.8	6.5	351
entrenchment ratio	3.8	1.6	13.5
stream gradient (%)	3.5	0.50	15
Rosgen types	A1, 3 C3, 2 C4, E5, E6		

Fluvial setting. In mountains of eastern Washington, this community occurs on active fluvial surfaces along Rosgen A and B streams and near lakes and ponds. In the Columbia Basin, it was usually sampled in wide valleys (over 100 feet across) with less than 4% gradient. It was found in steeper and narrower valleys when associated with springs or intermittent streams. It has been observed along ponds and potholes elsewhere in the Columbia Basin. This community lines creeks well within the floodprone zone (FPI 0 to 0.8) along permanent streams and well above the floodprone zone (FPI 2.5) near an intermittent stream and a spring. It is usually associated with Rosgen stream types C3 and C4 with permanent streams 16-35 feet wide. Stream sites appear to flood annually but the surface is wet early in the growing season and probably dries to less than 2 feet by late summer. Soils are usually fine-textured and well-drained. A mottling and/or gleying layer was detected at 8 inches at one site. See representative stream profile S1 page 36.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.1	0.4	2.5
percent slope	8.6	0.5	55
Position	5 floodplains, 2 stream banks, 2 second terraces, spring		

PERCENT OF GROUND COVER			
Litter	68	15	100
Moss	0.1	0	1
Bareground	30	0	85
Gravel	0.5	0	5
Cobble-boulder	0.2	0	1
Bedrock	0	0	0
Water	1	0	5

SOIL SURFACE HORIZON			
percent of coarse fragments (n=4)	0	0	0
texture	3 silt loam, sandy loam		

Vegetation. This community is a closed canopy shrub thicket dominated by a 10 to 20-foot tall redosier dogwood layer. There is usually a shorter, sparse shrub layer of Wood's rose and golden current or snowberry. Sandbar willow may add to the thicket. Occasional short chokecherry trees are present. A patchy herbaceous layer is typically composed of stinging nettle, starry false solomonseal, sticky willy, cheatgrass, miner's lettuce, and seep monkeyflower. On drier surfaces and sites more heavily used by livestock, redosier dogwood is less dense and grazing increasers, such as reed canarygrass, Kentucky bluegrass, or Canadian thistle are common. This type often appears between wetter reed canarygrass and Woods' rose, black hawthorn, or aspen communities on drier fluvial surfaces. Management information applicable to this type is summarized in Hansen et al. (1995 page 357) and in Crowe and Clausnitzer (1997 page 152).

LAYER PERCENT COVER	average	min	max
Overstory trees	5	3	8
Understory trees	4	1	8
Shrubs	82	30	100
Grasses	8	1	13
Grasslikes	1	1	1
Forbs	30	1	80
Non-vascular	0	0	0

COMMON SHRUBS	n=6 cover			
	constancy	average	min	max
Trees				
Prunus virginiana	50%	3	1	8
Shrubs				
Cornus sericea	100%	75	30	100
Rosa woodsii	80%	12	3	40
Ribes aureum	80%	12	1	40
Symphoricarpos albus	40%	6	1	20
Clematis ligusticifolia	40%	4	1	8
Graminoids				
Phalaris arundinacea	60%	7	1	13
Bromus tectorum	50%	5	1	13
Forbs				
Urtica dioica	70%	12	3	30
Maianthemum stellatum	70%	5	1	13
Heracleum maximum	40%	12	1	40
Claytonia perfoliata ssp. perfoliata	40%	4	1	8
Galium aparine	40%	2	1	3

Classification. Two community types may be represented: the typical redosier dogwood low in the floodprone zone and a more forb rich community with higher cover of starry false solomonseal, miner's lettuce, snowberry on higher fluvial surfaces. Overall this type is similar to the redosier dogwood association described by Jankovsky-Jones et al. (2001) and Youngblood et al. (1985).

Woods' or Nootka rose community type
***Rosa woodsii* or *R. nutkana* community**
(ROSWOO,NUT)
 NVC code: none

Plots 98RC143, 00RC063, 00RC202

Location. This deciduous shrubland community is similar to a type described in Montana. It has been observed across Washington's Columbia Basin and sampled in Adams and Douglas counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	11.2	4	15
width of floodplain (ft)	190	30	500
entrenchment	11.5	1.5	31.3
stream gradient (%)	1.5	0.5	3
Rosgen types	B1, B6, E6		

Fluvial setting. This community was sampled in wide canyons within the floodprone zone and on a toeslope. These sites are flat to slightly convex and appeared to rarely, if ever, flood. Soils are fine textured and moderately well drained. See representative stream profile S3 page 36.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.0	0.4	1.7
percent slope	7.8	0.5	15
Position	2 floodplains, toe slope		

PERCENT OF GROUND COVER			
Litter	79	60	98
Moss	0	0	0
Bareground	0	0	0
Gravel	0	0	0
Cobble-boulder	1	0	2
Bedrock	0	0	0
Water	20	0	40

SOIL SURFACE CHARACTERISTICS			
percent of coarse fragments (n=2)	0.5	0	1
texture	silt loam		

Vegetation. This is a closed canopy tall shrub thicket dominated by Wood's or Nootka rose. This 6 to 10-foot tall shrub patch contained golden current and sandbar willow. Reed canarygrass and common horsetail are the most frequent herbaceous plants typically accompanied by one of several weedy species. The same fluvial surfaces that are not isolated from early season grazing support an intermediate wheatgrass pasture with clustered field sedge and a narrow reed canarygrass community along the incised channel. Management information applicable to this type is summarized in Hansen et al. (1995 page 369).

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	51	13	80
Grasses	39	8	70
Grasslikes	15	1	30
Forbs	50	30	60
Non-vascular	0	0	0

COMMON SPECIES	n=3	cover		
	constancy	average	min	max
Shrubs				
<i>Rosa woodsii</i>	67%	50	30	70
<i>Rosa nutkana</i>	33%	13	13	13
<i>Artemisia ludoviciana</i>	67%	1	1	1
<i>Toxicodendron rydbergii</i>	33%	40	40	40
<i>Ribes aureum</i>	33%	13	13	13
Grasses				
<i>Phalaris arundinacea</i>	67%	36	1	70
<i>Juncus balticus</i>	33%	30	30	30
<i>Bromus inermis</i>	33%	8	8	8
<i>Poa pratensis</i>	33%	8	8	8
<i>Agrostis stolonifera</i>	33%	3	3	3
Forbs				
<i>Equisetum arvense</i>	67%	40	20	60
<i>Solidago canadensis</i>	33%	40	40	40
<i>Cirsium arvense</i>	33%	20	20	20
<i>Galium aparine</i>	33%	8	8	8

Classification. This type is similar to the "grazing disclimax" Woods' rose community type (CEGL0001126) described by Hansen et al. in Montana (1995) from central and eastern Montana and the *Rosa woodsii/Poa pratensis* community type in Nevada (Manning and Padgett 1989).

Exotic tree and shrub types:

White willow community type *Salix alba* community type (SALALB)

NVC code: none

Plots 99CB1902, 99CB703, 02RC134

White willow communities have been observed across the Columbia Basin in Washington primarily in cultivated landscapes and in natural streams and “waterways” carrying irrigation water. It is most common along streams in the Palouse Prairie, in adjacent tributaries into the Snake River and in the Yakima Valley. This type occurs in broader valleys with very low to moderate gradients. Although samples were well above the floodprone zone (FPI 4-8) along a spring and a permanent stream, observations indicator of large white willow trees near bankfull on regulated and unregulated permanent streams are very common. It is associated with Rosgen stream type B6 in southeast Washington. The upper soil horizon is a silty clay loam and densely intermingled with roots.

This is a closed to open canopy forest or woodland type that is over 30 feet tall and dominated by the introduced, often planted, exotic broadleaf tree, white willow. Exotic grasses, such as cheatgrass, Kentucky bluegrass, reed canarygrass, and bentgrass are a dominant feature of the understory with over 50% cover. Canadian thistle or various weedy annuals may be present. This community generally appears between wetter reed canarygrass or the channel and upland basin wildrye or agricultural fields. White willow is an introduced species in Washington that has been widely planted and locally naturalized (escaped) along streams in the arid west. It is often confused with the native whiplash willow (*Salix lucida* var. *caudata*). This type is an undescribed, non-native vegetation type.

Boxelder community type *Acer negundo* community type (ACENEG)

NVC code: none

Plots 98RC0023, 99CB202, 99CB802

Boxelder is native to North America but introduced to Washington. Boxelder is located in southeastern Washington along streams in the Palouse region and in tributary valleys of the Snake and the in eastern Columbia River Gorge. It has been observed on lower Rock Creek in Adams and Whitman counties and along Rock Creek in Klickitat County. This type occurs in broader valleys with very low to moderate gradients. The community was sampled within the floodprone zone (FPI 0.5) on a regulated stream and well above the floodprone zone (FPI 3 to 7) along a spring stream and an unregulated intermittent stream. It is associated with

Rosgen stream types E5, F3B and G6. Soils are wet near the surface for only a short period early in the growing season. The upper soil horizon is silt loam to silty clay loam and densely intermingled with roots.

This is a closed to open short woodland or tall shrubland type that is 50-100 feet tall and dominated by introduced, often planted, exotic broadleaf trees. Boxelder is found in all stands and often a dominant or a co-dominant with other taller exotic trees, such as black walnut, honey locust, silver maple, and white poplar. Black cottonwood is an occasional native tree. Sandbar willow and chokecherry are common native tall shrubs in this community. Grasses and forbs contribute equally to the undergrowth providing around 40% cover each. Poison hemlock may be a most obvious herbaceous species in the community although cheatgrass and stinging nettle are more consistently abundant. Black hawthorn might be expected on similar sites. This community generally appears between wetter reed canarygrass or quackgrass communities and upland basin wildrye or smooth sumac communities or wheat fields. This type is an undescribed, non-native vegetation type. This is similar to a native boxelder/ chokecherry community described in Montana (Hansen et al. 1995). Management information is unavailable.

Indigobush community type *Amorpha fruticosa* community type (AMOFRO)

NVC code: none

Plots 99CB401, 99CB2001, 90CB72002

Indigobush, native to North America, is an introduced species in Washington and appears on the Class B weed list (Wa. Department of Agriculture, 2003). Sample locations are located along tributaries into the Snake River. This type occurs in broader valleys with very low to moderate gradients. The community was sampled below and well above the floodprone zone (FPI 0.6-2.9) along spring influenced permanent streams, although observed along reservoir slack water shorelines. It is associated with Rosgen stream types B4 and F3 developing in gullies in older valley bottoms. The upper soil horizon is a sandy clay loam at all sites and a reoxidation layer was detected at 6 inches at one location. Coarse fragments were rare in upper horizons.

This is a closed shrubland type 5-6 feet tall dominated by an introduced, often planted, exotic leguminous shrub. Exotic grasses, reed canarygrass, cheatgrass, Kentucky bluegrass, and foxtail are dominant the understory with over 50% cover. While forb species are diverse, exotic and native disturbance increaser species are usually the most abundant members of the understory. This type is an undescribed, non-native vegetation type.

Willow types:

Yellow willow/ redosier dogwood community type *Salix lutea* / *Cornus sericea* community type (SALLUT/CORSER)

NVC code: none

Plots 98RC142, 00RC142

Location. This tall shrubland is found in the Columbia Basin of eastern Washington. Locations are along Cow, Lake, and Rock Island Creeks in Adams and Douglas counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	5.2	4.0	6.4
width of floodplain (ft)	254	7	500
entrenchment ratio	16.4	1.6	31.3
stream gradient (%)	1.8	0.5	3.0
Rosgen types	E6, G5		

Fluvial setting. This association was sampled in narrow and wide valleys with less than 3% gradient. It was sampled within and above the floodprone zone along permanent streams. Sites appear to flood annually but the surface is wet early in the growing season and probably dries to the water table (less than 2 feet) by late summer. There was no reoxidation layer in the top 18 inches of a sample site. Soils are usually fine textured. See representative stream profile T4 page 23.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.5	0	3
percent slope	17.5	5	30
Position	first terrace, channel shelf		

PERCENT OF GROUND COVER			
Litter	55	10	100
Moss	0	0	0
Bareground	0	0	0
Gravel	0	0	0
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	45	0	90

SOIL SURFACE HORIZON			
percent of coarse fragments (n=2)	0	0	0
texture	sandy clay loam, silty clay loam		

Vegetation. This community is a closed canopy shrub thicket dominated by a 10 to 20-foot tall redosier dogwood layer with yellow willow as a dominant or co-dominant. Usually a shorter, sparse shrub layer composed of Wood's rose, whitestem current and/or Sandbar willow add to the thicket. A patchy herbaceous layer is typically composed of stinging nettle, sticky willy, bentgrass, and cowparsnip. On similar drier sites and sites more heavily used by livestock, redosier dogwood is less dense and grazing increasers, such as reed canarygrass, Kentucky bluegrass, or Canadian

thistle are common. Management information applicable to this type is summarized in Hansen et al. (1995 page 318).

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	89	80	98
Grasses	8	3	13
Grasslikes	0	0	0
Forbs	22	13	30
Non-vascular	0	0	0

COMMON SHRUBS	cover			
	constancy	average	min	max

Trees				
Shrubs				
Salix lutea	100%	60	40	80
Cornus sericea	100%	40	40	40
Rosa woodsii	50%	30	30	30
Salix exigua	50%	20	20	20
Ribes inerme	50%	20	20	20
Salix bebbiana	50%	8	8	8
Symphoricarpos albus	50%	1	1	1
Ribes aureum	0%			
Clematis ligusticifolia	0%			
Philadelphus lewisii	0%			
Graminoids				
Agrostis stolonifera	100%	2	1	3
Phalaris arundinacea	50%	13	13	13
Poa pratensis	50%	3	3	3
Forbs				
Galium aparine	100%	5.5	3	8
Urtica dioica	100%	3	3	3
Heracleum maximum	50%	13	13	13
Claytonia perfoliata ssp. perfoliata	50%	3	3	3
Maianthemum stellatum	0%			

Classification. Overall, this type is similar to the redosier dogwood association described by Crowe and Clausnitzer (1997) and Kovalchik (1992, 2001) and maybe within the variation of that type (CEGL001165). Hansen et al. (1995) describe a yellow willow/ bluejoint reedgrass type that is similar. Jankovsky-Jones et al. (2001) describe an apparently drier yellow willow/ Woods rose association. More samples are needed verify and fully described this type.

Yellow willow- Sandbar willow community type
***Salix lutea* – *S. exigua* community type**
(SALLUT-SALEXI)

NVC code: none

Plots 98RC102, 98RC211, 00RC071, 00RC072, 00RC081, 00RC203

Location. This tall shrub community has been observed in several counties in eastern Washington. Samples are from Adams, Douglas, and Grant counties. It has not been sampled elsewhere.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	10.9	6.0	14.7
width of floodplain (ft)	241.6	13	1100
entrenchment ratio	11.0	1	45.8
stream gradient (%)	3.1	0.5	8
Rosgen types	A3, B3, B6c, C3, E6		

Fluvial setting. This community type was sampled in narrow to broad valleys with less than 3% valley gradient. This community was usually sampled low in the the floodprone zone and often associated with regulated hydrologic systems. Stream bank sites flood annually. Two samples are along an irrigation wasteway “stream” that captured a natural ephemeral streambed. This stream floods several times daily during irrigation season. Another channel is a ditched section of Cow Creek. All sites were on deep fine textured soils. See representative stream profile S5 page 37.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.2	-0.4	0.7
percent slope	14.1	0.5	70.0
Position	channel shelf, 2 floodplains, gravelbar, first terrace, stream bank		

PERCENT OF GROUND COVER			
Litter	51	0	100
Moss	4	0	20
Bareground	45	0	100
Gravel	0	0	0
Cobble-boulder	0	0	1
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=2)	0	0	1
texture	silt loam, sandy loam		

Vegetation. This is an open canopy tall shrub community with a 6 to 20-foot tall yellow and sandbar willow layer. There is a patchy herbaceous layer with bentgrasses, ryegrass, reed canarygrass and horsetail. Kentucky bluegrass, and Canadian thistle without willows cover the steep stream banks above the incised channel. Management information applicable to this type is summarized in Hansen et al. (1995 page 327) and in Crowe and Clausnitzer (1997) page 114.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	7	1	13
Shrubs	81	50	100
Grasses	36	1	70
Grasslikes	0	0	0
Forbs	9	3	20
Non-vascular	11	1	20

COMMON SPECIES	n=6 cover			
	constancy	average	min	max
Trees				
<i>Populus balsamorhiza</i> ssp. <i>trichocarpa</i>	17%	13	13	13
<i>Salix alba</i>	17%	8	8	8
Shrubs				
<i>Salix lutea</i>	100%	36	8	100
<i>Salix exigua</i>	100%	51	8	90
<i>Rosa woodsii</i>	17%	1	1	1
<i>Artemisia ludoviciana</i>	17%	1	1	1
<i>Symphoricarpos albus</i>	0%			
Graminoids				
<i>Lolium arundinaceum</i>	50%	15	3	30
<i>Agrostis stolonifera</i>	50%	40	30	50
<i>Elytrigia repens</i> var. <i>repens</i>	33%	7	1	13
<i>Phalaris arundinacea</i>	33%	25	20	30
<i>Bromus inermis</i>	33%	16	3	30
Forbs				
<i>Lycopus americanus</i>	50%	3	3	3
<i>Equisetum hyemale</i>	50%	4	1	8
<i>Equisetum arvense</i>	33%	3	3	3
<i>Equisetum laevigatum</i>	33%	8	8	8
Moss and Lichen	33%	10	1	20

Classification. This is a proposed community type that is distinguished from the sandbar willow association by co-dominance of yellow willow, more bentgrass and horsetail, less reed canarygrass and angular coarse fragments, if any, in the soil profile. Plot 00RC151 clustered with this type in analysis, it is dominated by **yellow willow with Lewis’ mockorange**, white clematis and other indicators of a more stable fluvial environment. The Oregon Natural Heritage Programdistinguishes three sandbar willow associations and with more sampling in Washington these or other types could be recognized. This type is similar to the yellow willow type described by Hansen et al. (1995).

Sandbar or coyote willow association

***Salix exigua* association (SALEXI)**

NVC code: CEG0001197

Plots 98RC103, 98RC013, 99CB302, 99CB4204, 00RC042, 00RC051, 02RC101, 02RC112, 02RC124, 02RC142

Location. This tall shrub community is similar to a type found across much of the western United States. It has been observed in all counties in eastern Washington. Samples are from Adams, Columbia, Douglas, Franklin, Grant and Whitman counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	25	6	100
width of floodplain (ft)	249.1	10	1100
entrenchment ratio	9.2	1.2	45.8
stream gradient (%)	1.5	0.5	3
Rosgen types	B1c, B3,C3,C5,E5, 2 E6,F2,F3		

Fluvial setting. In the Blue Mountains, this association occurs on gravelly or cobbly alluvial bars and banks along Rosgen B, C and D stream types. These sites flood during spring runoff and water recedes by late spring. In the lowlands of eastern Washington, this type was sampled in broad valleys with less than 3% valley gradient. This community was low in the floodprone zone. One plot was subirrigated and occurred above the floodprone zone on a B1c stream type. Stream bank sites flood annually but the surface dries to the water table by late summer. All sites were on deep fine textured soils overlaying cobble gravels. Mottling and/or gleying layers were encountered at 6 inches and 28 inches at the only two sites sampled. See representative stream profile S6 page 37.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.3	-0.4	1.3
percent slope	12.5	2	30
Position	2 channel shelves, bar, 3 floodplains, 2 first terraces, 2 streambanks		

PERCENT OF GROUND COVER	average	min	max
Litter	55	5	100
Moss	0	0	0
Bareground	21	0	70
Gravel	18	0	65
Cobble-boulder	1	0	5
Bedrock	0	0	0
Water	4	0	40

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=6)	25	0	70
texture	silty clay loam, fine sandy loam,silt loam, sandy loam, sand		

Vegetation. This is an open to closed canopy tall shrub community with a 6 to 20-foot tall sandbar willow layer that may have scattered yellow willow shrubs. There is a patchy herbaceous layer with reed canarygrass,

quackgrass, bentgrasses and stinging nettle or thistles. This type appeared between a strea,side grass or rush community or the active channel and various more stable or drier shrub riparian type. Management information applicable to this type is summarized in Hansen et al. (1995 page 289) and in Crowe and Clausnitzer (1997 page 114).

LAYER PERCENT COVER	average	min	max
Overstory trees	3	3	3
Understory trees	4	3	5
Shrubs	63	15	100
Grasses	50	3	100
Grasslikes	8	8	8
Forbs	22	8	55
Non-vascular	5	5	5

COMMON SPECIES	n=10		cover	
	constancy	average	min	max
Trees				
Crataegus douglasii	20%	3	1	5
Elaeagnus angustifolia	10%	3	3	3
Betula occidentalis	0%			
Shrubs				
Salix exigua	100%	61	10	100
Salix lutea	30%	1	1	1
Clematis ligusticifolia	30%	2	1	3
Rosa woodsii	30%	3	1	8
Ribes aureum	20%	1	1	1
Graminoids				
Phalaris arundinacea	70%	47	3	100
Elytrigia repens var. repens	60%	14	1	40
Bromus tectorum	40%	20	1	60
Poa pratensis	20%	2	1	3
Forbs				
Cirsium arvense	60%	4.5	1	20
Solidago canadensis	40%	1.5	1	3
Rumex salicifolius	40%	9.25	1	30
Galium aparine	30%	2.33	1	5
Moss and Lichen				
	0%			

Classification. This community currently describes sandbar willow communities on annually flooded gravel bars and those on less frequently flooded streambanks with fine textured soils. It might be better classed as sandbar willow/reed canarygrass as described on the Hanford Reach of the Columbia by Salstrom and Easterly (1995) or Sandbar willow/ barren of Padgett et al. (1989) and Jankovsky-Jones et al. (2001). The Oregon Natural Heritage Program distinguishes three sandbar willow associations and with more sampling in Washington these or other types are likely to be recognized. This type is similar to the Sandbar willow association described by Crowe and Clausnitzer (1997) and Hansen et al. (1995).

Arroyo willow community type
***Salix lasiolepis* community type (SALLAS)**
 NVC code: none

Plots 02RC011, 02RC021, 02RC061

Location. This shrub community is similar to types found in the Great Basin and southern Columbia Plateau. It only has been observed in southern Klickitat County.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	22	10	32
width of floodplain (ft)	53.3	40	60
entrenchment ratio	5.5	1.2	12
stream gradient (%)	3	2	4
Rosgen types	3 B3		

Fluvial setting. In the lowlands of eastern Washington, this type was sampled in 30-300 foot wide valleys bottoms with moderate valley gradient. This community is high in the floodprone zone and usually within it. Periodic scouring floods transporting gravel and cobble were evident at all sites. All sites were on cobble gravelly soils.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.8	0.4	1.3
percent slope	2.3	2	3
Position	first terrace, gravel bar, floodplain		

PERCENT OF GROUND COVER	average	min	max
Litter	64	40	93
Moss	3	0	10
Bareground	5	0	15
Gravel	10	5	15
Cobble-boulder	17	1	30
Bedrock	0	0	0
Water	0	0	1

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=3)	70	70	70
texture	Cobble, gravel and sandy clay		

Vegetation. This is a closed canopy tall shrub thicket with a 4 to 10-foot tall arroyo willow layer and a few scattered Lewis' mockorange shrubs. White clematis, golden current, oceanspray or rose are usually present. A patchy, sparse herbaceous layer of annuals is characteristic. Cheatgrass, bulbous bluegrass, stinging nettle and burr chervil are common. Management information applicable to this type is summarized in Jankovsky-Jones et al. (2001).

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	1	1	1
Shrubs	99	98	100
Grasses	3	1	5
Grasslikes	0	0	0
Forbs	9	2	20
Non-vascular	5	5	5

COMMON SPECIES	n=3 cover			
	constancy	average	min	max
Understory Trees				
<i>Alnus rhombifolia</i>	33%	1	1	1
Shrubs				
<i>Salix lasiolepis</i>	100%	99	98	100
<i>Philadelphus lewisii</i>	100%	3	2	5
<i>Ribes aureum</i>	67%	4	3	5
<i>Clematis ligusticifolia</i>	67%	2	2	3
<i>Holodiscus discolor</i>	67%	2	1	2
Graminoids				
<i>Bromus tectorum</i>	100%	2	1	2
<i>Agrostis scabra</i>	67%	1	1	1
<i>Poa bulbosa</i>	67%	1	1	1
<i>Elymus glaucus</i>	33%	1	1	1
Forbs				
<i>Potentilla argentea</i>	67%	1	1	1
<i>Urtica dioica</i>	67%	1	1	1
<i>Galium aparine</i>	67%	1	1	1
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	33%	20	20	20
Moss and Lichen	33%	5	5	5

Classification. This type is most similar to the arroyo willow association described by Jankovsky-Jones et al. (2001) and Titus et al (1998) who suggest defining an **arroyo willow / mockorange** type. It also has affinities with other arroyo willow types described in Utah, Nevada and Oregon (Padgett et al. 1989, Manning and Padgett 1995 and Jankovsky-Jones et al. 2001).

Other willow types:

Peachleaf willow community type

***Salix amygdaloides* community type (SALAMY)**

NVC code: none

Plots 00RC172, 02RC081

This riparian type, likely in northern Columbia Basin counties, was sampled only in Douglas County. It was sampled on the first terrace of intermittent Rosgen stream types A1 and F3. Both occur on 2-3% gradient streams near the floodprone zone. Peachleaf willow trees, 30 feet tall, dominate sample 00RC172 with a lower layer of water birch and peachleaf willow sprouts. Reed canarygrass and smooth horsetail dominate the herbaceous layer. Sample 02RC081 was more recently and severely affected by scouring floods. Peachleaf willow sprouts (10 feet tall) with white clematis and patches of smooth brome and common horsetail characterize its vegetation. These plots are tentatively included within the **general peachleaf willow type** recognized by Evans (1989). Neither plot clearly resembles the peachleaf willow – coyote willow (CEGL000948) described in the central Rockies that may occur on the Hanford National Monument (Wilderman 1994). Plots better resemble the general, apparently more montane, peachleaf willow type (CEGL000947) described in northern Rocky Mountains (Hansen et al. 1995) although that community contains Great Plains species.

Bebb willow community

***Salix bebbiana* community (SALBEB)**

NVC code: none

Plots 02RC193

This riparian/wetland type was sampled only in Yakima County at a spring supporting a fen. The surface soil is a hemic horizon. Bebb willow dominates the stand with patches of smooth horsetail. This is an unclassified stand without clear affinities to described types. It is most similar to the association described by Hansen et al. (1995). The generalized **Bebb willow type** (CEGL001173) occurs in the montane regions and western plains of the United States, ranging from South Dakota and Montana south to New Mexico. That type is typically located along streams. The **Bebb willow / mesic graminoid type** (CEGL001174) is recognized in Idaho and Utah and is more a riparian type rather than wetland type as represented at this site.

Dry-site short tree and shrub types:

Netleaf hackberry / mockorange community type *Celtis occidentalis* var. *reticulata* / *Philadelphus lewisii* community type (CELRET/PHILEW)

NVC code: none

Plots 99CB0102, 99CB901, 99CB1801, 99CB2302

Location. Netleaf hackberry is known only in the vicinity of the common border of Oregon, Washington, and Idaho along the Snake River and tributaries and the in the eastern Columbia River Gorge. This deciduous shrubland community was sampled in Asotin, Garfield, and Whitman counties. A highly degraded stand of hackberry and mockorange was observed in Klickitat County, indicating this association may extend into the eastern Columbia River Gorge.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	31.4	11.7	46
width of floodplain (ft)	32.8	7	68
entrenchment ratio	1.5	1.0	2.1
stream gradient (%)	6.7	2	13
Rosgen types	A3a, B3, F3b		

Fluvial setting. It occurs on fluvial surfaces along intermittent and permanent streams. It was sampled in narrow canyons with moderate to steep stream gradients. Sites appear above the floodprone zone. See representative stream profile S8 page 37.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	3.9	1.0	8.9
percent slope	11.7	5	15
Position	floodplain, 2 first terraces		

PERCENT OF GROUND COVER			
Litter	57	30	95
Moss	7	0	20
Bareground	23	5	60
Gravel	0	0	0
Cobble-boulder	3	0	10
Bedrock	10	0	30
water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=2)	0	0	0
texture	silty clay loam, sandy clay loam		

Vegetation. This is a closed to open tree community dominated by netleaf hackberry that rarely exceeds 20 feet in height. Common chokecherry can be part of the short tree canopy. Lewis' mockorange is always present and clearly dominates the shrub layer. It, along with blue elderberry, can merge with the short tree layer. Poison-ivy and smooth sumac are common associates in

the shrub layer. Annual grasses are usually present on sites and can be abundant in patches.

LAYER PERCENT COVER	average	min	max
Overstory trees	80	60	100
Understory trees	40	10	70
Shrubs	55	20	70
Grasses	48	10	100
Grasslikes	0	0	0
Forbs	13	10	20
Non-vascular	10	10	10

COMMON SPECIES	n=3 constancy	cover average	min	max
Overstory trees				
<i>Celtis laevigata</i> var. <i>reticulata</i>	100%	73	60	80
Understory trees				
<i>Celtis laevigata</i> var. <i>reticulata</i>	100%	17	10	30
<i>Prunus virginiana</i>	33%	70	70	70
Shrubs				
<i>Philadelphus lewisii</i>	100%	30	10	70
<i>Sambucus nigra</i> ssp. <i>cerulea</i>	100%	5	1	10
<i>Toxicodendron rydbergii</i>	100%	4	1	10
<i>Rhus glabra</i>	67%	6	1	10
Graminoids				
<i>Bromus tectorum</i>	100%	43	10	100
<i>Poa pratensis</i>	33%	40	40	40
Forbs				
<i>Cynoglossum officinale</i>	100%	3	3	3
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	100%	2	1	3
<i>Galium aparine</i>	67%	2	1	3
<i>Urtica dioica</i>	67%	2	1	3
Moss and Lichen	33%	10	10	10

Classification. This community type is described by Crawford (2001) although Miller (1976) discusses a "non-riparian community" adjacent to white alder riparian forest "comprised of *Celtis reticulata* stands overtopping *Philadelphus lewisii*, *Rosa woodsii* and *Bromus tectorum*." Miller's community is likely the same high terrace community type as described here.

**Mockorange / Common snowberry plant association
Philadelphus lewisii / *Symphoricarpos albus* plant
 association (PHILEW/SYMALB)**

NVC code: none

Plots 98RC063, 99CB601, 99CB801, 00RC174

Location. This plant association is found across Washington's Columbia Basin. It was sampled in Adams, Garfield, Douglas and Walla Walla counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	29.4	10.9	60
width of floodplain (ft)	26.2	6.7	47
entrenchment ratio	1.4	1.1	1.6
stream gradient (%)	2.1	0.5	3
Rosgen types	B2, G4, F3b, F3		

Fluvial setting. This association occurs primarily on fluvial surfaces along intermittent and perennial streams. These samples are from 30 to 100-foot wide valleys with 1-5% gradients and streams 6 to 20 feet wide. This association usually appears above or high in the floodprone zone. Surface soils are typically coarse textured, often with a high frequency of coarse fragments. No reoxidation layer was detected in the top 18 inches of two sample sites. See representative stream profiles T1 page 23 and S2 page 32.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.0	0.5	4.8
percent slope	27	1	60
position	2 floodplains, streambank, second terrace		

PERCENT OF GROUND COVER			
Litter	56	10	90
Moss	1	0	5
Bareground	35	10	70
Gravel	5	0	10
Cobble-boulder	3	0	10
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=4)	25	0	60
texture	2 silty clay loam, sandy loam, silty loam		

Vegetation. This is a 6 to 20-foot tall shrub community dominated by mockorange. Common chokecherry can be present in the tall shrub layer. A short shrub layer of snowberry appears with blue wildrye, Kentucky bluegrass, cheatgrass and in one stand with an abundance of quackgrass. Forbs average 24% cover and are composed of a variety of species. Annuals are present on sites and can be abundant in patches. Bareground, exposed gravel and rock may be as abundant as litter on the ground surface. It is surrounded by upland vegetation of annual grasses or Idaho fescue - bluebunch wheatgrass or sparsely vegetated talus or bedrock. This

type appears between the channel or reed canarygrass and black cottonwood or boxelder forest on fluvial surfaces or upland. Management information is not available, pertinent information on key species appears in Table 3.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	4	3	5
Shrubs	42	10	80
Grasses	44	8	100
Grasslikes	1	1	1
Forbs	25	10	40
Non-vascular	10	10	10

COMMON SPECIES	n=4 constancy	cover average	min	max
Trees				
<i>Prunus virginiana</i>	50%	7	3	10
<i>Populus balsamifolia</i> ssp. <i>trichocarpa</i>	25%	3	3	3
Shrubs				
<i>Philadelphus lewisii</i>	100%	23	10	60
<i>Symphoricarpos albus</i>	100%	6	1	10
<i>Clematis ligusticifolia</i>	50%	17	13	20
<i>Rosa nutkana</i>	25%	50	50	50
<i>Toxicodendron rydbergii</i>	25%	30	30	30
<i>Artemisia ludoviciana</i>	25%	8	8	8
<i>Ribes aureum</i>	25%	3	3	3
<i>Rosa woodsii</i>	25%	1	1	1
Graminoids				
<i>Bromus tectorum</i>	75%	16	8	30
<i>Elymus glaucus</i>	75%	10	3	15
<i>Phalaris arundinacea</i>	50%	9	8	10
<i>Poa palustris</i>	50%	7	3	10
<i>Poa pratensis</i>	50%	6	1	10
Forbs				
<i>Lactuca serriola</i>	50%	7	1	13
<i>Cirsium arvense</i>	50%	1	1	1
<i>Equisetum laevigatum</i>	25%	30	30	30
Moss and Lichen	50%	10	10	10

Classification. This association occurs on Columbia Plateau of Washington, central Oregon and southern Idaho and was previously recognized in Crawford (2001).

Mockorange / Western white clematis community type
***Philadelphus lewisii* / *Clematis ligustifolia* community type (PHILEW/CLELIG)**
 NVC code: none

Plots 00RC043, 02RC074, 02RC083, 02RC091, 02RC204, 02RC211

Location. This plant association was sampled in Douglas County and has been observed across Washington's western Columbia Basin.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	20	7.8	33.3
width of floodplain (ft)	39.6	12	68
entrenchment ratio	2	1.2	3.4
stream gradient (%)	10.3	1	50
Rosgen types	A1,A2,B4,C3,E1,F2		

Fluvial setting. This association occurs on fluvial surfaces along intermittent and perennial streams. These samples are from 10 to 300-foot wide valleys typically with 1-5% gradients and streams 6 to 20 feet wide. This association usually appears above or high in the floodprone zone although it does occur in floodprone in flash flood valleys. Surface soils are typically coarse textured, often with a high abundance of coarse fragments.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.8	0.4	8.7
percent slope	18	2	50
Position	2 floodplains, first and 2 second terraces, seep		

PERCENT OF GROUND COVER			
Litter	63	35	95
Moss	0	0	1
Bareground	13	1	30
Gravel	7	0	30
Cobble-boulder	23	0	60
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=3)	47	20	70
texture	2 sand, 2 sandy loam		

Vegetation. This is a 6 to 10-foot tall shrub thicket community dominated by mockorange. Wood's rose, golden current, and/or serviceberry are usually present but with low cover. White clematis is seen climbing through the shrub layer and a prominent feature of the community. Herbaceous species are diverse, patchy and usually not abundant. Starry false-solomonseal was abundant at one site and may represent the least disturbed condition. Livestock use was an apparent, persistent, low level disturbance in these stands. Annuals are present on sites and can be abundant in patches. Bareground, exposed gravel and rock may be as abundant as litter on the ground surface. It is surrounded by upland vegetation of big sagebrush / bluebunch

wheatgrass or sparsely vegetated talus. Management information is not available, pertinent information on key species appears in Table 3.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	3	3	3
Shrubs	63	40	90
Grasses	10	1	30
Grasslikes	0	0	0
Forbs	15	1	60
Non-vascular	0	0	0

COMMON SPECIES	n=6 cover			
	constancy	average	min	max
Trees				
<i>Prunus virginiana</i>	33%	2	1	3
Shrubs				
<i>Philadelphus lewisii</i>	100%	58	30	90
<i>Clematis ligusticifolia</i>	100%	19	1	50
<i>Rosa woodsii</i>	83%	4	1	10
<i>Ribes aureum</i>	67%	8	1	13
<i>Amelanchier alnifolia</i>	67%	4	1	13
<i>Artemisia ludoviciana</i>	50%	1	1	1
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	33%	1	1	1
<i>Artemisia tridentata</i> ssp. <i>tridentata</i>	17%	8	8	8
Graminoids				
<i>Bromus tectorum</i>	83%	8	1	30
<i>Leymus cinereus</i>	33%	2	1	3
Forbs				
<i>Solidago canadensis</i>	50%	2	1	3
<i>Achillea millefolium</i>	33%	1	1	1
<i>Artemisia biennis</i>	33%	2	1	3
<i>Maianthemum stellatum</i>	17%	60	60	60
Moss and Lichen	0			

Classification. This is included in a general mockorange type (CEGL001170) described by Jankovsky-Jones et al. (2001) although their type contains more wet-site species (redosier dogwood, Columbia hawthorn) than this type. Further sampling across its full range of variation is needed to verify if this type is valid or its status as part of the generalized mockorange type.

Common chokecherry community type
***Prunus virginiana* community type (PRUVIR)**

NVC code: none.

Plots 99CB900, 02RC012, 02RC102

Location. This deciduous shrubland community has been observed throughout the Columbia Basin. This riparian type was sampled in Adams, Klickitat and Whitman counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	13	10	18
width of floodplain (ft)	24	3.2	60
entrenchment ratio	4.9	1.1	12
stream gradient (%)	7	2	15
Rosgen types	A6, B3, E6		

Fluvial setting. This was sampled in narrow canyons to broad valleys with 1 to 6% gradients. Streams are moderate to steep gradient and intermittent. Surfaces were below and above the floodprone zone. Soils are usually fine-textured.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.7	0	4.2
percent slope	30	1	75
Position	Channel, streambank, second terrace		

PERCENT OF GROUND COVER	average	min	max
Litter	70	50	90
Moss	0	0	0
Bareground	27	1	50
Gravel	0	0	0
Cobble-boulder	0.3	0	1
Bedrock	0.3	0	1
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0	0	0
texture	2 silt loam		

Vegetation. This is an 8-18-foot short tree/tall shrub thicket dominated by chokecherry (10-50% cover) with few or any other tree species. Woods' rose is the most abundance shrub although sandbar willow and golden current are usually present in moderate abundance and oceanspray is usually present in trace amounts. Cheatgrass is always present and often abundant. Blue wildrye is present one stand and Idaho fescue in another. Average forb cover is 10% and is composed of a variety of species. It was surrounded by upland vegetation of annual grasses or Idaho fescue - bluebunch wheatgrass or sparsely vegetated talus or bedrock.

LAYER PERCENT COVER	average	min	max
Overstory trees	12	8	15
Understory trees	22	10	30
Shrubs	59	40	98
Grasses	50	20	70
Grasslikes	3	3	3
Forbs	11	10	13
Non-vascular	0	0	0

COMMON SPECIES	n=3 constancy	cover average	min	max
Overstory trees				
<i>Prunus virginiana</i>	67%	12	8	15
Understory trees				
<i>Prunus virginiana</i>	100%	25	10	40
<i>Crataegus douglasii</i>	33%	1	1	1
Shrubs				
<i>Rosa woodsii</i>	67%	28	5	50
<i>Ribes aureum</i>	67%	6	5	8
<i>Salix exigua</i>	67%	6	3	10
<i>Holodiscus discolor</i>	67%	1	1	1
<i>Philadelphus lewisii</i>	33%	20	20	20
<i>Rubus ursinus</i>	33%	20	20	20
<i>Salix lasiolepis</i>	33%	20	20	20
Grasses				
<i>Bromus tectorum</i>	100%	28	10	60
<i>Poa bulbosa</i>	33%	60	60	60
<i>Elymus glaucus</i>	33%	10	10	10
<i>Festuca idahoensis</i>	33%	3	3	3
Forbs				
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	67%	9	5	13
<i>Anthriscus scandicina</i>	33%	5	5	5

Classification. It is tentatively included within the common chokecherry type recognized by Evans (1989), Crawford (2001) and Jankovsky-Jones et al. (2001). This type may have affinity to the Oregon Natural Heritage Program common chokecherry – willow/Wood's rose type of southern Oregon. All plots sampled were or are heavily used by livestock so this community represents a wide range of seral conditions.

Saskatoon serviceberry – Lewis’ mockorange / bluebunch wheatgrass community type
Amelanchier alnifolia – Philadelphus lewisii / Pseudoroegneria spicata community type
(AMEANL-PHILEW)
 NVC code: none

Plots 99RC021, 00RC044, 00RC092

Location. This deciduous shrubland community has been observed throughout the Columbia Basin. This type is currently represented by plots in Douglas and Lincoln counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	16.9	6	30.8
width of floodplain (ft)	19.5	2	52
entrenchment ratio	1.3	1,3	1.4
stream gradient (%)	5.3	3	7
Rosgen types	2 A3, F2		

Fluvial setting. It occurs on toeslopes, cliff garlands, and fluvial surfaces along streams. This was sampled in narrow canyons with 4 to 6% gradients. Streams are moderate to steep gradient. Surfaces were generally well above the floodprone zone although one plot was in the upper floodprone zone. Soils are coarse-textured and well drained. See representative stream profile S7 page 37.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.5	2.0	3.0
percent slope	8.3	5	10
Position	floodplain, first terrace, toeslope		

PERCENT OF GROUND COVER	average	min	max
Litter	33	20	50
Moss	17	0	30
Bareground	11	5	24
Gravel	14	13	15
Cobble-boulder	24	13	40
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	17	0	50
texture	sand, sandy loam, silt loam		

Vegetation. This is a 6 to 12-foot tall shrub dominated community with Lewis’ mockorange and/or Saskatoon serviceberry cover of 13% and 30%, respectively. Wyoming big sagebrush frequently occurs in these dry riparian types from the adjacent upland. Bluebunch wheatgrass, Sandberg’s bluegrass (including alkali bluegrass) and western yarrow usually occur with cheatgrass.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	48	13	70
Grasses	43	30	60
Grasslikes	0	0	0
Forbs	11	1	20
Non-vascular	0	0	0

COMMON SPECIES	n=3	cover	constancy	average	min	max
Trees						
Shrubs						
Amelanchier alnifolia	67%	41	13	70		
Artemisia tridentata ssp. wyomingensis	67%	16	3	30		
Eriogonum niveum	67%	7	1	13		
Artemisia ludoviciana	33%	30	30	30		
Philadelphus lewisii	33%	30	30	30		
Eriogonum sphaerocephalum	33%	3	3	3		
Artemisia tridentata ssp. tridentata	33%	3	3	3		
Ribes cereum var. cereum	33%	3	3	3		
Graminoids						
Bromus tectorum	100%	33	20	50		
Poa secunda	100%	8	8	8		
Pseudoroegneria spicata	100%	3	3	3		
Poa bulbosa	67%	11	3	20		
Elymus lanceolatus	33%	8	8	8		
Forbs						
Achillea millefolium	67%	1	1	1		

Classification. This type is related to the Saskatoon serviceberry community described by Crowe and Clausnitzer (1997). Johnson and Clausnitzer (1987) included similar communities in the talus garland communities.

White sagebrush community type
***Artemisia ludoviciana* community type**
(ARTLUD)

NVC code: none

Plots 98RC131, 99CB1301, 99CB2201, 99RC11, 99RC30, 99RC154, 00RC091, 02RC082, 02RC100, 02RC203

Location. This is a widespread community type in the Columbia Basin of Idaho, Oregon and Washington. It was sampled in Adams, Asotin, Douglas, and Lincoln counties and has been observed in all dryland counties in Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	28.9	10.0	60
width of floodplain (ft)	33.5	4.5	107
entrenchment ratio	1.8	1	4
stream gradient (%)	2.7	1	7
Rosgen types	A1, A3, 2 C3, D3, E6, F3, 2 F3b, G3		

Fluvial setting. This community is found at low elevations in arid lands on alluvial terraces along intermittent and permanent streams. It can occur in cobbly overflow channels of perennial streams and in ephemeral streambeds. It was sampled at or near bankfull and above the floodprone zone. Sites may not flood annually, but associated surfaces appear to be frequently scoured by floods. Rock and gravel occupied 2-70% of soil surfaces. Litter and plant basal area exhibit as much cover as bareground. Surface soils are sandy with high abundance of coarse fragments. See representative stream profiles S3 page 36 and G2 page 73.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.5	-1	3.1
percent slope	8	1	60
position	3 floodplains, 2 abandon channels, streambank, 2 intermittent channels, first terrace		

PERCENT OF GROUND COVER	average	min	max
Litter	34	14	85
Moss	1	0	10
Bareground	25	3	45
Gravel	20.	0	40
Cobble-boulder	17	0	50
Bedrock	0	0	5
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=8)	58	2	90
texture	3 gravel/cobble, 2 sand, 2 sandy loam, sandy clay loam		

Vegetation. White sagebrush is always present displaying 8-40% cover. It appears with a variety of herbaceous plants. Cheatgrass, quackgrass and western yarrow occurred in more than half of the samples and were abundant in an overflow channel of a perennial

stream. Vegetation is sparse to closed with its total cover and composition varying throughout the growing season, as well as, year to year. When this community is outside the floodprone zone, it appears to be early seral to mockorange or other woody plant dominated communities. Management information is not available. These sites produce little forage.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	1	1	1
Shrubs	17	8	40
Grasses	34	3	80
Grasslikes	0	0	0
Forbs	34	8	70
Non-vascular	1	1	1

COMMON SPECIES	n=10 Cover			
	constancy	average	min	max
Trees	20%	1	1	1
Shrubs				
<i>Artemisia ludoviciana</i>	100%	16	8	40
<i>Philadelphus lewisii</i>	40%	1	1	3
<i>Artemisia tridentata</i> ssp. <i>tridentata</i>	20%	5	3	8
<i>Clematis ligusticifolia</i>	20%	5	1	10
<i>Eriogonum niveum</i>	20%	1	1	1
Graminoids				
<i>Bromus tectorum</i>	80%	15	1	60
<i>Elytrigia repens</i> var. <i>repens</i>	60%	10	1	50
<i>Bromus japonicus</i>	30%	30	20	40
<i>Agrostis interrupta</i>	30%	8	3	13
<i>Poa bulbosa</i>	30%	8	1	20
<i>Poa secunda</i>	30%	8	3	13
<i>Poa compressa</i>	30%	2	1	3
<i>Muhlenbergia richardsonis</i>	20%	3	3	3
<i>Leymus cinereus</i>	20%	2	1	3
<i>Bromus inermis</i>	20%	1	1	2
<i>Poa pratensis</i>	20%	1	1	1
<i>Polygogon monspeliensis</i>	20%	1	1	1
Forbs				
<i>Achillea millefolium</i>	80%	1	1	3
<i>Verbascum thapsus</i>	30%	6	3	10
<i>Epilobium minutum</i>	30%	5	1	13
<i>Artemisia biennis</i>	30%	4	1	8
<i>Galium aparine</i>	30%	3	1	8
<i>Cirsium arvense</i>	30%	2	1	3
<i>Dipsacus fullonum</i> ssp. <i>sylvestris</i>	30%	2	1	3
Moss and Lichen	10%	1	1	1

Classification. White sagebrush is listed as a subshrub having a woody base and an above ground stem that can persist. Consequently, it is listed as a forb community by some authors. This type is described by Moseley (1998) and Jankovsky-Jones et al. (2001) in Idaho, Crawford (1998, 1999, 2001) and Titus et al. (1998). This is a highly variable species (3 of 8 subspecies occur in Washington) that forms communities across a wide range of habitats (streams to vernal pools). A rangewide sampling and analysis is needed to fully describe the status of this or these associations.

Other Dry-site shrub types:

Saskatoon serviceberry/western poison ivy community type

Amelanchier alnifolia / *Toxicodendron rydbergii*
community type (AMEALN/TOXRYB)

NVC code: none

Plots 98RC201, 98RC234

This deciduous shrubland community is similar to a poorly described type observed in eastern Washington and Oregon. It occurs on toeslopes, cliff garlands, and fluvial surfaces along intermittent streams. In Adams County, it was sampled in narrow canyons with moderate to steep stream gradients and on a permanent and spring stream. Sites are on steep slopes (10-60%). Sites appear above the floodprone zone (FPI 3.5 and 7.5) but are likely to be subirrigated since both sites are associated with intermittent springs. Soils are coarse-textured and well drained.

This is a 6 to 20-foot tall shrub thicket dominated by serviceberry. Woods' rose and western white clematis are common associates in the shrub layer. Stands had a short dense layer of western poison ivy. Annual grasses are present on sites and can be abundant in patches. Blue wildrye is present in both stands. Average forb cover is 10% and is composed of a variety of species. This type also appeared above a narrow intermittent channel with watercress and on a toeslope above reed canarygrass and basin wildrye communities. It was surrounded by upland vegetation of annual grasses or Idaho fescue - bluebunch

wheatgrass or sparsely vegetated talus or bedrock. This type is similar to the Saskatoon serviceberry community described by Crowe and Clausnitzer (1997). The Oregon Natural Heritage Program describes a similar association, called Saskatoon serviceberry/elk sedge, found at higher elevations. Plot 02RC301 sampled a **Quaking aspen/ water birch/ poison-ivy** seep stand in Moses Coulee. Although similar stand are observed elsewhere, scattered ponderosa pine stumps and environmental affinity with the serviceberry/ poison-ivy type confound the classification of this stand.

Smooth sumac association

Rhus glabra association (RHUGLA)

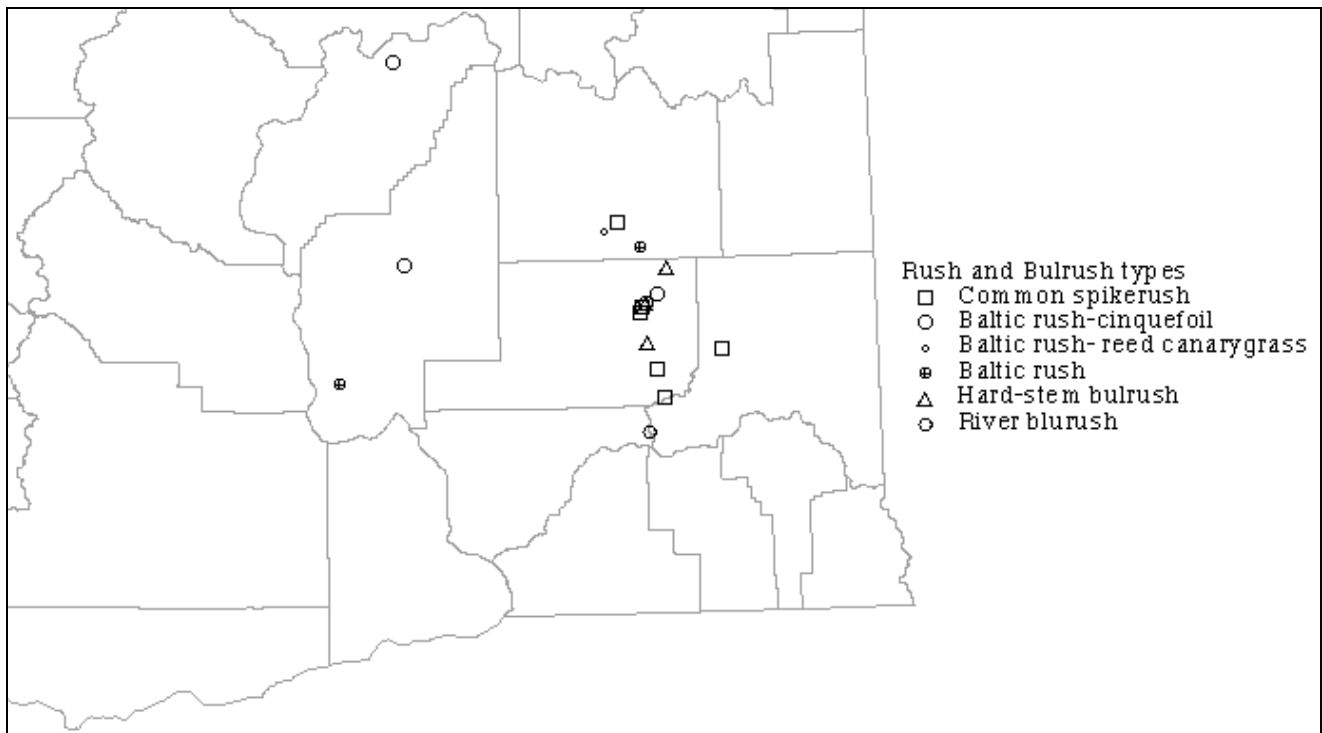
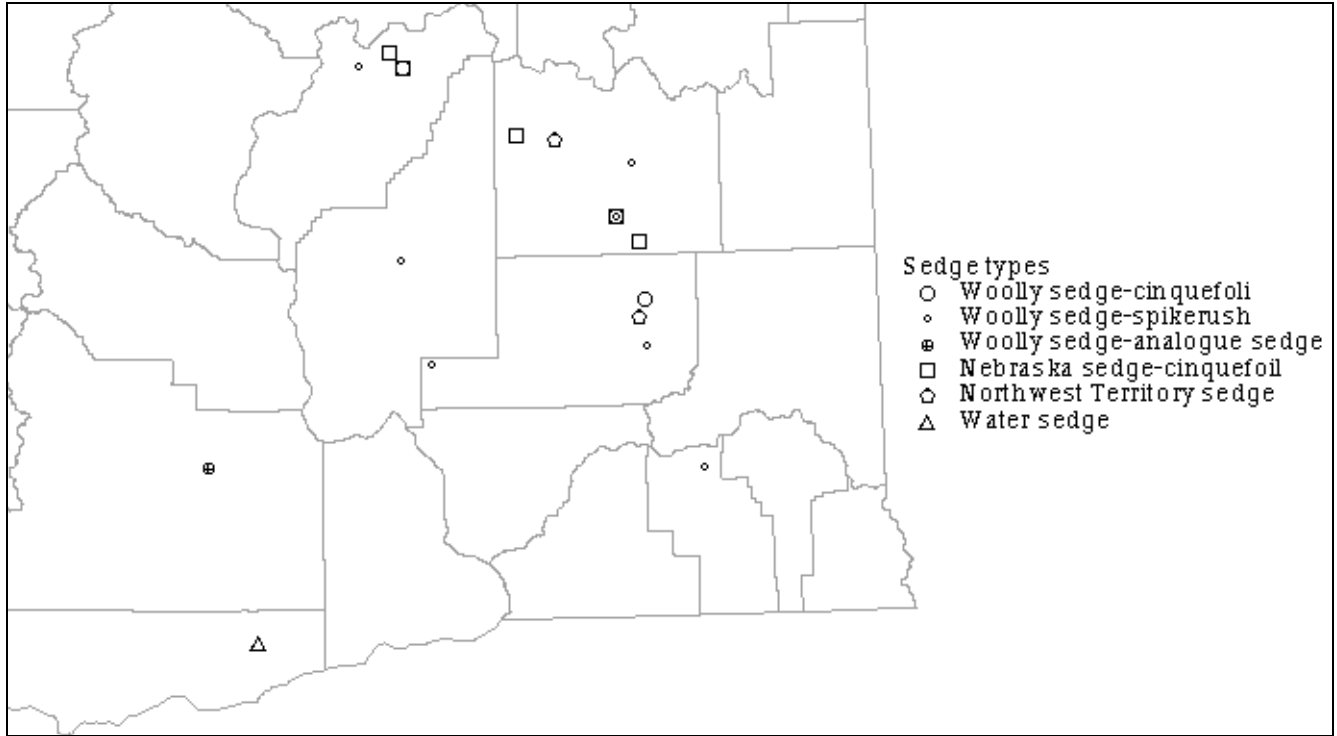
NVC code: CEG001122

Plots 99CB103, 99CB803, 02RC064

This upland/riparian type occurs on foot and toeslopes in eastern Washington, Oregon and Idaho. It was sampled only in Aostin and Klickitat counties although it observed in most dryalnd counties with deep canyons. As a riparian community, it was sampled on the second terraces of two perennial Rosgen stream type B3 and an intermittent F3b stream. All occurred well above the floodprone zone (FPI 6 to 12). Smooth sumac, 2 -3 feet tall, cover 25% of a grass-dominated understory. Bluebunch wheatgrass is abundant on better condition sites, whereas, cheatgrass is abundant on lower condition areas the typical situation. This community is described as an upland toeslope and alluvial fan community by Daubenmire (1970), Tisdale (1986), and Johnson and Simon (1986).

Grass-like Wet Meadow and Riparian Vegetation Types

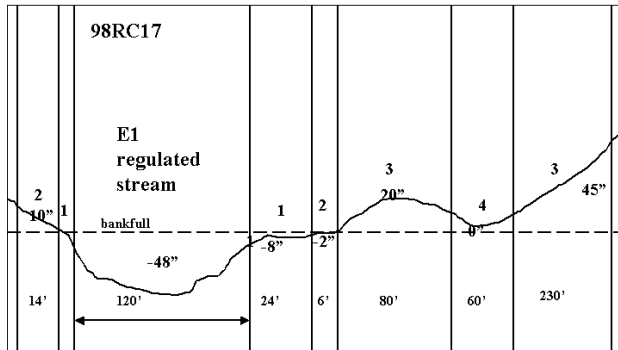
Plot locations



Grass-like Wet Meadow and Riparian Vegetation Types

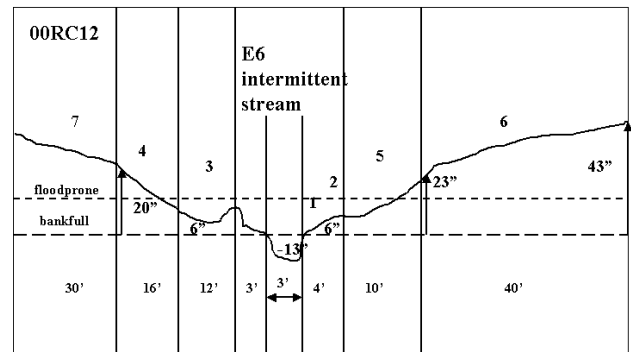
Selected stream profiles

L1



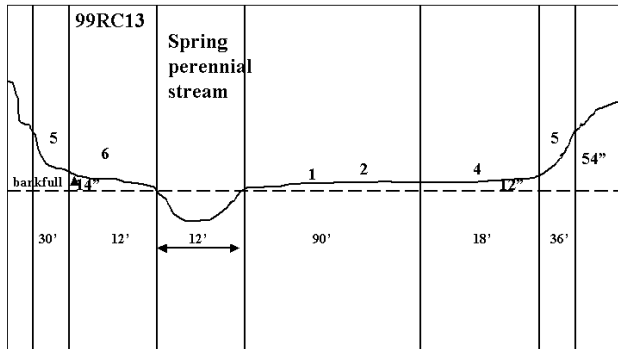
Stream and riparian vegetation profile at Finnel Lake, Adams County. 1= common spikerush, 2= Baltic rush – silverleaf cinquefoil, 3= saltgrass – clustered field sedge, and 4= annual hairgrass vernal pond.

L2



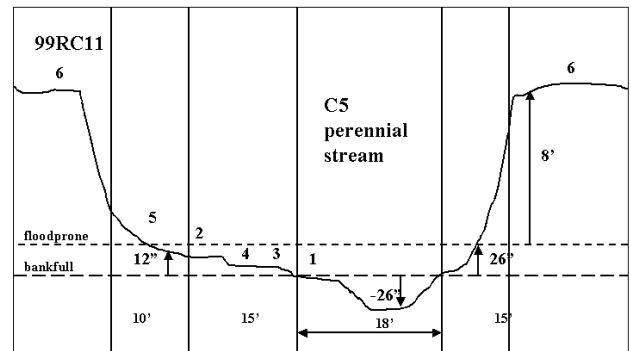
Stream and riparian vegetation profile on east Foster Creek, Douglas County. 1= common spikerush, 2= woolly sedge-silverweed cinquefoil, 3= Nebraska sedge-silverweed cinquefoil, 4= basin wildrye – clustered field sedge, and 5= Baltic rush, 6= saltgrass – clustered field sedge, and 7= black greasewood/ saltgrass.

L3



Stream and riparian vegetation profile near Rocklyn, Lincoln County. 1= woolly sedge – common spikerush, 2= tufted hairgrass, 4= Nebraska sedge - silverweed cinquefoil, 5= Kentucky bluegrass, and 6= Baltic rush.

L4



Stream and riparian vegetation profile at Coal Creek, Lincoln County. 1= reed canarygrass, 2= common horsetail, 3= woolly sedge – common spikerush and 4= Nebraska sedge - silverweed cinquefoil, 5= Baltic rush, and 6= basin wildrye - cheatgrass.

Grass-like Wet Meadow and Riparian Vegetation Types

Woolly sedge – silverweed cinquefoil community type *Carex pellita* - *Argentina anserina* community type (CARPEL-ARGANS)

NVC code: none

Plots 98RC043, 98RC053, 99RC122, 00RC122

Location. This sedge-dominated community is similar to a widespread type found throughout the interior Pacific Northwest. It is sampled in Adams and Lincoln counties and is likely in the other dryland counties in Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	33.6	2.5	93.7
width of floodplain (ft)	250	27.5	605
entrenchment ratio	4.9	1.6	11
stream gradient (%)	1	1	1
Rosgen types	C1, E5, E6, F1		

Fluvial setting. In Washington's Columbia Basin, this community was sampled in valleys with less than 3% gradient and near perennial streams or intermittent streams with spring-fed reaches. Sites are well within the floodprone zone and appear to flood annually. Mottling and/or gleying layers appeared at 9, 10 and 11 inches below the surface at all three sites sampled. See representative stream profile L2 page 63.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.2	-0.3	0.5
percent slope	3	0	10
position	channel shelf, 3 floodplains		

PERCENT OF GROUND COVER	average	min	max
Litter	67	30	100
Moss	0	0	1
Bareground	32	0	70
Gravel	0	0	0
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	0	0	0
texture	hemic, sandy loam, silt, clay loam		

Vegetation. This is a dense herbaceous community dominated by a rhizomatous sedge species. Woolly sedge usually is the dominant sedge. Nebraska sedge rarely appears in this community but with much less cover than woolly sedge. Baltic rush and Canada thistle are common to abundant on more disturbed sites. Reed canarygrass appears in this type but is more abundant in the Nebraska sedge - silverweed cinquefoil community. Forb diversity is low and provides 40% average cover. Water knotweed and/or swamp smartweed are frequent members of this community. Management information

applicable to this type is summarized in Hansen et al. (1995 page 398) and in Crowe and Clausnitzer (1997 page 192).

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	0	0	0
Grasses	31	8	90
Grasslikes	81	40	98
Forbs	32	13	60
Non-vascular	0	0	0

COMMON SPECIES	n=4	cover		
	constancy	average	min	max
Trees	0%			
Shrubs	0%			
Grass and Grasslikes				
<i>Carex pellita</i>	100%	72	60	80
<i>Juncus balticus</i>	100%	42	30	60
<i>Schoenoplectus americanus</i>	50%	2	1	3
<i>Hordeum jubatum</i>	50%	2	1	3
<i>Eleocharis palustris</i>	50%	2	1	3
<i>Phalaris arundinacea</i>	25%	3	3	3
<i>Carex nebrascensis</i>	25%	3	3	3
<i>Calamagrostis canadensis</i>	25%	3	3	3
<i>Agrostis stolonifera</i>	25%	3	3	3
<i>Schoenoplectus acutus</i>	25%	1	1	1
<i>Juncus longistylis</i>	25%	1	1	1
<i>Polypogon monspeliensis</i>	0%			
<i>Glyceria striata</i>	0%			
Forbs				
<i>Argentina anserina</i>	100%	4	3	8
<i>Cirsium arvense</i>	75%	18	1	40
<i>Polygonum hydropiperoides</i>	50%	19	8	30
<i>Polygonum amphibium</i>	50%	5	3	8
<i>Achillea millefolium</i>	50%	1	1	1
<i>Epilobium ciliatum</i> ssp. <i>glandulosum</i>	25%	13	13	13
<i>Veronica anagallis-aquatica</i>	25%	3	3	3
<i>Ranunculus repens</i>	25%	3	3	3
<i>Epilobium ciliatum</i> ssp. <i>watsonii</i>	0%			
<i>Mimulus guttatus</i>	0%			
<i>Equisetum arvense</i>	0%			
<i>Rorippa nasturtium-aquaticum</i>	0%			

Classification. The USDA Plants Database lists woolly sedge as *Carex pellita*, a synonym of the more generally applied name *C. lanuginosa*. Although described here as a separate entity, this community type is similar to an association described by Kovalchik (1987), Crowe and Clausnitzer (1997) and Hansen et al. (1995). It is included in the general **woolly sedge association** (CEGL001809). For this report, this community type is distinguished from the woolly sedge – common spikerush community by the presence of silverweed cinquefoil and poor occurrence of species usually associated with flowing water and less stable fluvial surfaces, such as, watercress, water speedwell, and monkeyflower. Reed canarygrass is less abundant here than in the Nebraska sedge – common spikerush community.

Woolly sedge – common spikerush community type
***Carex pellita* – *Eleocharis palustris* community type**
(CARPEL-ELEPAL)

NVC code: none

Plots 98RC0073, 99RC113, 99RC131, 99CB303, 00RC61, 00RC131, 00RC213

Location. This sedge-dominated community is similar to a widespread type that is recognized throughout the interior Pacific Northwest. In Washington’s Columbia Basin, it has been sampled in Adams, Douglas, Grant, Garfield, and Lincoln counties and is likely in other dryland counties in Washington with streams and ponds.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	16.2	6.3	29
width of floodplain (ft)	33.4	21	50
entrenchment ratio	1.7	1.2	2.3
stream gradient (%)	1.5	0.5	3
Rosgen types	2 B1, C5, E6, F3b, F4		

Fluvial setting. In Oregon, similar communities appear in wet basins, springs and floodplains along Rosgen C and E stream types. These sites flood during spring runoff and dry to 8 to 24 inches by midsummer. Soils are organic matter-rich, fine-textured and have a high water holding capacity. In Washington’s Columbia Basin, this type was sampled in valleys with less than 3% gradient. This community occurred at a spring, on perennial streams, and on intermittent streams apparently with spring-fed reaches. Sites are near bankfull and appear to flood annually. All sites had dark, fine textured, often mucky surface soil layer. Mottling and/or gleying layers were detected at 3, 4 and 10 inches at three sites and undetected in the top 10 inches of soil at two other sites. See representative stream profiles L3 and L4 page 63.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.1	-0.1	0.4
percent slope	1.5	0	7
Position	3 channel shelves, 2 abandon channels, gravelbar, floodplain		

PERCENT OF GROUND COVER	average	min	max
Litter	59	0	97
Moss	2	0	10
Bareground	35	0	80
Gravel	1	0	5
Cobble-boulder	0	0	1
Bedrock	0	0	0
Water	4	0	14

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=7) texture	17	0	60
	hemic, 2 organic loam, fine sandy loam, 2 silt loam, silty clay loam		

Vegetation. This dense sedge and grass community is 2-3 feet tall. It can have scattered flood tolerant shrubs or tree species. Woolly sedge dominates with more than

25% cover on the least disturbed stands coverage and can exceed 80% cover. Reed canarygrass, Kentucky bluegrass and Baltic rush are common to abundant on more disturbed sites. Reed canarygrass can be more abundant than woolly sedge particularly if it overtops woolly sedge late in the growing season. Common spikerush is found in most plots. Forb diversity provides 40% average cover. Willowherb, seep monkeyflower, common horsetail and Canada goldenrod are frequent occurring forb species. Management information applicable to this type is summarized in Hansen et al. (1995 page 392) as the slender sedge community and in Kovalchik (1987 page 98).

LAYER PERCENT COVER	average	min	max
Overstory trees	13	13	13
Understory trees	0	0	0
Shrubs	2	1	3
Grasses	9	1	20
Grasslikes	77	50	100
Forbs	33	1	70
Non-vascular	0	0	0

COMMON SPECIES	n=7 constancy	cover average	min	max
Trees	13%			
Shrubs				
Salix exigua	29%	2	1	3
Graminoids				
Carex pellita	100%	58	20	90
Juncus balticus	86%	21	3	80
Eleocharis palustris	86%	15	1	60
Phalaris arundinacea	43%	17	10	20
Agrostis stolonifera	43%	2	1	3
Schoenoplectus americanus	29%	7	1	13
Hordeum jubatum	0%			
Carex nebrascensis	0%			
Schoenoplectus acutus	0%			
Forbs				
Epilobium ciliatum ssp. watsonii	71%	1	1	1
Equisetum arvense	57%	25	1	60
Solidago canadensis	57%	4	1	13
Lycopus asper	43%	6	1	13
Lemna minor	29%	30	30	30
Berula erecta	29%	15	1	30
Argentina anserina	0%			

Classification. This type is similar to an association described by Kovalchik (1987) and Hansen et al. (1995). The USDA Plants Database lists woolly sedge as *Carex pellita* that is a synonym of the more generally used name *C. lanuginosa*. Currently this community is included in the general **woolly sedge association** (CEGL001809). For this report, this community type is distinguished from the woolly sedge – silverweed cinquefoil community by the absence of silverweed cinquefoil, less stable fluvial surfaces and occurrence of species usually associated with flowing water, such as, watercress, water speedwell, and monkeyflower.

Northwest Territory sedge association
Carex utriculata association (CARURT)
 NVC code: CEGL0001562

Plots 98RC150, 98RC151, 99RC212

Location. This sedge-dominated community is similar to a type found throughout the interior western United States. It has been described across Washington and is likely appear in all the dryland counties in eastern Washington where ever appropriate environments occur. Samples are from Adams and Lincoln counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	194.2	82.5	250
width of floodplain (ft)	133.3	25	350
entrenchment ratio	1	1	1.1
stream gradient (%)	0	0	0
Rosgen types	Spring , F1		

Fluvial setting. In the montane forest landscape of eastern Washington and Oregon, this community appears in wet basins, springs and floodplains along Rosgen C, E and F stream types. These sites are very wet sites and remain saturated well into the growing season. In the Columbia Basin of Washington, it was sampled in a spring-fed fen and along a spring feed reach of an intermittent stream. The soil surface is submerged much of the year and covered by litter. Soils are organic. One sample displayed a gleyed horizon at 5 inches below the surface organic horizon.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.6	-0.2	5.0
percent slope	0.3	0.0	1.0
Position	spring/seep, lake edge		

PERCENT OF GROUND COVER	average	min	max
Litter	73	50	100
Moss	0	0	0
Bareground	0	0	0
Gravel	0	0	0
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	27	0	50

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=3)	0	0	0
texture	2 hemic, silty clay loam		

Vegetation. This dense sedge community can be 2 to 3 feet tall. Northwest territory sedge dominates the community with more than 25% cover. In the inland Pacific Northwest, it forms several plant communities with a variety of willows. The willows may decrease or locally disappear with severe grazing or flooding. Reed canarygrass is common to abundant on more disturbed sites. Forb diversity is generally low and provides little cover. All sample sites in the Columbia Basin contained reed canarygrass, cattail, and swamp smartweed. Adjacent communities are bulrush, cattail and watercress

on wetter surfaces and Nebraska sedge or redosier dogwood on drier. Management information applicable to this type is summarized in Hansen et al. (1995 page 401) as the beaked sedge community and in Crowe and Clausnitzer (1997 page 178).

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	0	0	0
Grasses	24	1	40
Grasslikes	73	60	90
Forbs	47	40	60
Non-vascular	0	0	0

COMMON SPECIES	n=3 cover			
	constancy	average	min	max
Trees	0%			
Shrubs	0%			
Graminoids				
Carex utriculata	100%	57	30	90
Phalaris arundinacea	100%	15	1	30
Schoenoplectus acutus	67%	16	3	30
Glyceria striata	67%	13	1	30
Carex stipata	33%	13	13	13
Juncus balticus	33%	3	3	3
Eleocharis palustris	33%	3	3	3
Forbs				
Typha latifolia	100%	13	1	30
Rorippa nasturtium-aquaticum	67%	24	8	40
Mimulus guttatus	67%	22	13	30
Anthriscus scandicina	67%	11	8	13
Polygonum hydropiperoides	67%	8	3	13
Sparganium eurycarpum	67%	2	1	3
Epilobium ciliatum ssp. watsonii	67%	2	1	3

Classification. Crowe and Clausnitzer (1997) and Kovalchik (2001) described this association with the common name bladder sedge. Prior to the early 1990's, the name beaked sedge (*Carex rostrata*) was misapplied to Northwest Territory sedge (*Carex utriculata*). The former name was used to describe a common wetland community type in the western United States. For example, Kovalchik (1987) and Hansen et al. (1995) described this association as a beaked sedge association.

Nebraska sedge - silverweed cinquefoil community type
***Carex nebrascensis* - *Argentina anserina* community type (CARNEB-ARGANS)**
 NVC code: none

Plots 99RC071, 99RC114, 99RC123, 99RC181, 00RC101, 00RC123

Location. This sedge-dominated community is similar to a widespread type found throughout the interior Pacific Northwest. It is sampled in Lincoln and Douglas counties and likely in the other dryland counties in Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	6.9	2.5	12
width of floodplain (ft)	32	27.5	41
entrenchment ratio	4.9	2.3	11
stream gradient (%)	1	0.5	1.5
Rosgen types	2 springs, C5, E4, E5, E6		

Fluvial setting. This community was sampled in valleys with less than 3% gradient. It occurred near springs and on perennial and intermittent streams with spring-fed reaches. Sites are usually well within the floodprone zone. Streamside sites flood annually and appear to dry during the growing season to a shallow water table by late summer. The spring locations have dark, organic soils. The streamside sites had fine sandy loams or clay surface soil. Mottling and/or gleying layers appeared at 6, 6, 17, and 21 inches below the surface at four of five sites sampled. Water was encountered at 9 inches at the fifth sample site. See representative stream profile L3 page 63.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.4	0.2	0.7
percent slope	4	0.5	15
position	spring, channel shelf, 3 floodplains, first terrace		

PERCENT OF GROUND COVER			
Litter	75	40	98
Moss	0	0	0
Bareground	23	0	60
Gravel	0	0	1
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	1	0	10

SOIL SURFACE HORIZON			
percent of coarse fragments (n=5)	1	0	3
texture	fibric, hemic, 2 sandy loam, 2 clay loam		

Vegetation. This is a dense to open herbaceous community dominated by an aggressive rhizomatous species. The typical dominant, Nebraska sedge, is tolerant of trampling and increases relative to other sedges where grazed. Nebraska sedge will eventually be eliminated with severe grazing pressure. Baltic rush is always present and can be abundant. Woolly sedge can

appear in this community but with less cover than Nebraska sedge. Reed canarygrass, Baltic rush, and Kentucky bluegrass are common to abundant on more disturbed sites. Reed canarygrass can be more abundant than Nebraska sedge after it is overtopped late in the growing season. Forb diversity is low and they provide 50% average cover. Water speedwell, willowherb, seep monkeyflower, watercress, common horsetail and western goldenrod are common forb species. Management information applicable to this type is summarized in Hansen et al. (1995 page 398 and in Crowe and Clausnitzer (1997 page 192).

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	0	0	0
Grasses	31	8	90
Grasslikes	81	40	98
Forbs	32	13	60
Non-vascular	0	0	0

COMMON SPECIES	n=6 constancy	cover average	min	max
Trees	0%			
Shrubs	0%			
Graminoids				
<i>Carex nebrascensis</i>	100%	65	40	98
<i>Juncus balticus</i>	83%	24	8	50
<i>Carex pellita</i>	50%	17	1	30
<i>Phalaris arundinacea</i>	50%	34	8	80
<i>Eleocharis palustris</i>	50%	5	1	13
<i>Schoenoplectus americanus</i>	17%	13	13	13
<i>Polypogon monspeliensis</i>	17%	8	8	8
<i>Poa pratensis</i>	17%	1	1	1
<i>Poa palustris</i>	17%	3	3	3
<i>Juncus bufonius</i>	17%	3	3	3
Forbs				
<i>Cirsium arvense</i>	67%	12	1	20
<i>Argentina anserina</i>	67%	9	1	30
<i>Veronica anagallis-aquatica</i>	67%	5	1	13
<i>Epilobium ciliatum</i> ssp. <i>watsonii</i>	67%	3	1	8
<i>Lycopus asper</i>	50%	4	3	8
<i>Rumex salicifolius</i>	50%	1	1	1
<i>Euthamia occidentalis</i>	33%	5	3	8
<i>Mentha arvensis</i>	33%	3	3	3
<i>Rorippa nasturtium-aquaticum</i>	33%	2	1	3
<i>Mimulus guttatus</i>	33%	3	3	3

Classification. This type is similar to an association described by Kovalchik (1987), Crowe and Clausnitzer (1997) and Hansen et al. (1995). Plot 99RC071, co-dominated by Nebraska sedge and reed canarygrass, is similar to the community described here but lacks silverweed cinquefoil, and woolly sedge. It is included in the general **Nebraska sedge association** (CEGL0001813).

Common spikerush association
***Eleocharis palustris* association (ELEPAL)**
 NVC code: CEG0001833

Plots 98RC012, 98RC122, 98RC171, 98RC181, 99RC121, 02RC121

Location. This herbaceous community is found throughout the arid western U.S. It has been described across Washington and has been observed in all the dryland counties in eastern Washington. Samples are from Adams, Lincoln and Whitman County.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	40	6.8	100
width of floodplain (ft)	212	28	500
entrenchment ratio	4.3	1.2	10
stream gradient (%)	1.5	0.5	2
Rosgen types	3 C3, E1, E5, F3		

Fluvial setting. This community occurs along river and lake shorelines that are prone to yearly flooding and on soils that often stay wet throughout the growing season. It was sampled in a variety of valleys; all with low stream gradients. It was observed along pond margins and in the bottom some vernal ponds. This community was sampled on muddy point bars and on streambanks near or below bankfull. Streams are regulated and unregulated, and intermittent and perennial. Bareground or litter dominates the soil surface although it is often submerged by water. Soils typically have high organic content in surface layers and are associated with coarse-textured mineral soil although one sample was basalt rubble mixed with volcanic ash on a shoreline. Mottling and/or gleying layers were detected at 1 and 13 inches at two sites and undetected in the top 18 inches of soil at two other sites. See representative stream profiles L1 and L2 page 63.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	-0.2	-0.6	0.2
percent slope	1	0	2
Position	3 channel shelf, 3 gravelbar,		

PERCENT OF GROUND COVER			
Litter	31	0	90
Moss	6	0	30
Bareground	27	3	75
Gravel	12	0	70
Cobble-boulder	1	0	3
Bedrock	0	0	0
Water	27	0	80

SOIL SURFACE HORIZON			
percent of coarse fragments (n=5)	16	0	80
texture	gravel, sand, sandy loam, silt, clay loam		

Vegetation. This is a dense to open herbaceous community that is typically less than a foot tall. Common spikerush, an aggressive rhizomatous species, is always present and abundant with 50-90% cover. Baltic rush

appeared abundantly in one plot. Willow dock, seep monkeyflower, water speedwell, and arumleaf arrowhead occurred in most plots. Watercress can be abundant. This type appeared between the channel and Baltic rush, bentgrass and quackgrass communities. Management information applicable to this type is summarized in Hansen et al. (1995 page 433) and Crowe and Clausnitzer (1997 page 182).

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	3	2	5
Grasses	9	1	20
Grasslikes	80	60	98
Forbs	24	3	80
Non-vascular	1	1	1

COMMON SPECIES	n=6 cover			
	constancy	average	min	max
Shrubs	17%			
Graminoids				
<i>Eleocharis palustris</i>	100%	70	20	98
<i>Juncus balticus</i>	50%	26	8	50
<i>Phalaris arundinacea</i>	50%	9	3	20
<i>Agrostis stolonifera</i>	33%	5	3	8
Forbs				
<i>Rumex salicifolius</i>	67%	12	1	30
<i>Sagittaria cuneata</i>	67%	3	1	5
<i>Veronica anagallis-aquatica</i>	50%	5	3	10
<i>Mimulus guttatus</i>	50%	5	1	13
<i>Rorippa nasturtium-aquaticum</i>	33%	30	10	50
<i>Euthamia occidentalis</i>	33%	10	1	20
Moss and Lichen	17%	1	1	1

Classification. This type is similar to the common spikerush community that occurs in western United States (Crowe & Clausnitzer 1997, Kovalchik 1987, 2001, Hansen et al. 1995, Manning and Padgett 1989, and other citations). Jankovsky-Jones et al. (2001) in southeast Idaho describe a spikerush lotic association that is similar to the community describe here. They also recognize a spikerush vernal pool association similar to the spikerush vernal pool type that occurs in Washington (Bjork 1997).

Baltic rush - silverweed cinquefoil community type
***Juncus balticus* - *Argentina anserina* community type**
(JUNBAL-ARGANS)
 NVC code: none

Plots 98RC032, 98RC054, 98RC172, 00RC102, 00RC212

Location. This herbaceous community may be found throughout the western U.S. Washington samples are from Adams, Douglas and Grant County. Although it has been observed it is not sampled in Lincoln and Whitman counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	68	8.3	120
width of floodplain (ft)	901.7	500	1600
entrenchment ratio	2.1	1.3	3.3
Stream gradient (%)	0.6	0.5	1
Rosgen types	E1, 2 F1, E6, Spring		

Fluvial setting. This community is associated with sites along rivers and lakes that flood annually and with soils that are wet to moist through much of the growing season. It was sampled in broad canyons with low stream gradients. It appears low in the floodprone zone. This community has also been observed in vernal ponds. Soils typically have high organic matter content in surface layers and fine-textured mineral soil. Mottling and/or gleying layers appeared at 7 inches below the surface at one site but were undetected with the top 18 inches at two other sample sites. See representative stream profile L1 page 63.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.1	-0.1	0.2
percent slope	4.4	0	20
position	3 floodplains, 2 streambanks		

PERCENT OF GROUND COVER	average	min	max
Litter	81	15	100
Moss	0	0	0
Bareground	18	0	80
Gravel	0	0	0
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	1	0	5

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	0	0	0
texture	fibric, sandy loam, silt loam, silt, silty clay loam		

Vegetation. This is a dense herbaceous community dominated by an aggressive rhizomatous species. Baltic rush is always present and usually abundant (50-100% cover). Clustered field sedge appears in many samples and represents the drier variant of this type. Silverweed cinquefoil is the most abundant forb in this community although Rocky Mountain iris may be the most obvious particular late in the growing season. Wild barley and rabbitfoot are frequent members of this community. This type appears between the channel, common spikerush, or

woolly sedge communities and saltgrass - clustered field sedge communities including those with intermediate wheatgrass. Management information applicable to this type is summarized in Hansen et al. (1995 page 445) and Crowe and Clausnitzer (1997 page 194). Both authors consider this a grazing disclimax community.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	0	0	0
Grasses	3	1	8
Grasslikes	95	90	100
Forbs	32	3	60
Non-vascular	0	0	0

COMMON SPECIES	n=5 cover			
	constancy	average	min	max
Trees	0			
Shrubs	0			
Graminoids				
<i>Juncus balticus</i>	100%	85	50	100
<i>Carex praegracilis</i>	40%	37	13	60
<i>Hordeum jubatum</i>	40%	3	3	3
<i>Polypogon monspeliensis</i>	40%	2	1	3
<i>Hordeum brachyantherum</i>	40%	1	1	1
<i>Juncus ensifolius</i>	20%	3	3	3
<i>Juncus acuminatus</i>	20%	3	3	3
<i>Schoenoplectus americanus</i>	20%	1	1	1
<i>Agrostis stolonifera</i>	20%	1	1	1
<i>Agrostis interrupta</i>	20%	1	1	1
<i>Carex nebrascensis</i>	0%			
<i>Carex pellita</i>	0%			
Forbs	100%	43	4	73
<i>Argentina anserina</i>	100%	30	3	60
<i>Iris missouriensis</i>	60%	7	1	13
<i>Cirsium arvense</i>	20%	13	13	13
<i>Mentha arvensis</i>	20%	13	13	13
<i>Veronica anagallis-aquatica</i>	20%	8	8	8
<i>Triglochin maritimum</i>	20%	3	3	3
<i>Epilobium ciliatum</i> ssp. <i>watsonii</i>	0%			

Classification. This type is similar to the **Baltic rush community** (CEGL0001838) that occurs across the western US. This community is a “converted” community from continued overgrazing in wet meadow environments (Montana technical guide to rangelands 1997). It is distinguished here as a seral or retrogressed form of the woolly sedge or the Nebraska sedge association. Plot 99RC62 clustered with this Baltic rush – reed canarygrass type although it has trace amount of woolly sedge and displayed moderate cover of grasses, timothy and reed canarygrass.

Hard-stem bulrush association

Schoenoplectus acutus association (SCHACU)

NVC code: CEG0001840

Plots 98RC052, 98RC161, 98RC222

Location. This herbaceous community is found throughout the United States. It has been observed in all counties in the Columbia Basin and is described in the mountains of eastern Washington. Samples are from Adams County.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	39.2	9	93.7
width of floodplain (ft)	735	100	1500
entrenchment ratio	19.5	1.61	53.6
stream gradient (%)	0.7	0.5	1
Rosgen types	C6, E6, F1		

Fluvial setting. This community is associated with river and lake shorelines prone to yearly flooding and with soils that usually stay flooded throughout the growing season. It was sampled in valleys over 300 feet wide with 1% or less gradients. It occurs at or below bankfull. This community was sampled on streambanks and muddy point bars associated with slow-moving perennial streams and reservoirs, ponds or lakes. Soils typically have high organic content in surface layers and are associated with trapped fine-textured mineral particles. All sites were flooded at the time of sampling.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0	-0.1	0.0
percent slope	0.3	0	1
position	floodbar, 2 streambanks		

PERCENT OF GROUND COVER

Litter	23	5	50
Moss	0	0	0
Bareground	20	5	35
Gravel	0	0	0
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	57	30	80

SOIL SURFACE HORIZON

percent of coarse fragments (n=2)	0	0	0
texture	2 hemic		

Vegetation. This is a dense herbaceous community dominated by 10-foot tall hard-stem bulrush, an aggressive rhizomatous species. Hard-stem bulrush can be the only species present. Broadleaf cattail is a common associate and forms a transition to pure cattail-dominated communities. It is adjacent to the channel and wet meadow or salt meadow communities.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	0	0	0
Grasses	1	1	1
Grasslikes	98	98	98
Forbs	6	1	13
Non-vascular	0	0	0

COMMON SPECIES	n=3 constancy	cover average	min	max
Trees	0			
Shrubs	0			
Graminoids				
<i>Schoenoplectus acutus</i>	100%	92	80	98
<i>Phalaris arundinacea</i>	33%	1	1	1
<i>Juncus balticus</i>	33%	1	1	1
<i>Eleocharis palustris</i>	33%	1	1	1
<i>Carex utriculata</i>	0%			
<i>Glyceria striata</i>	0%			
Forbs				
<i>Polygonum hydropiperoides</i>	67%	2	1	3
<i>Typha latifolia</i>	33%	20	20	20
<i>Lemna minor</i>	33%	13	13	13
<i>Veronica anagallis-aquatica</i>	33%	3	3	3
<i>Sparganium eurycarpum</i>	33%	1	1	1

Management information applicable to this type is summarized in Hansen et al. (1995 page 448).

Classification. *Schoenoplectus acutus* is the current synonym for *Scirpus acutus* in Hitchcock and Cronquist (1973). Crawford (1998) incorrectly reported this as soft-stem bulrush (*S. tabernaemontani*). Jankovsky-Jones et al. (2001) in southeast Idaho and Hansen et al. (1995) merge hard stem and soft-stem bulrush communities into a single type due to similarity in habitat and subtlety of species identification. This bulrush community is often merged with broadleaf cattail and/or hard-stem bulrush communities (Crawford 2001).

Miscellaneous Grass-like Riparian Types

Water sedge community

Carex aquatilis community (CARAQU)

NVC code: CEGLO001802 or CEGLO001826

Plot 02RC032

The water sedge association is found across the inland Pacific Northwest primarily in forested landscapes. Rare in the Columbia Basin in Washington, this single sample is from a spring in southeast Klickitat County. The spring feeds a black cottonwood riparian strip along a Rosgen A6 stream in a (western juniper)/ big sagebrush/ bunchgrass canyon landscape. This herbaceous community is almost exclusively water sedge forming a dense rhizomatous sward. Kentucky bluegrass and slender hairgrass appear sparsely. Stinging nettle is the only forb that appeared abundantly along the transition where livestock and native ungulates disturbance was apparent. Kovalchik (1987, 2001) and Crowe and Clausnitzer (1997) describe similar communities. Management information applicable to this type is summarized in Hansen et al. (1995 page 390) and Crowe and Clausnitzer (1997 page 175). Water sedge at this site appears to be intermediate between Sitka sedge (*Carex aquatilis* ssp. *dives*) and water sedge (ssp. *aquatilis*)

Woolly sedge- Analogue sedge community type

Carex pellita- *Carex simulata* community type (CARPEL-CARSIM)

NVC code: none

Plots 02RC192, 02RC194

This grass-dominated community is recognized as part of the variation of the analogue sedge types found throughout the interior Pacific Northwest. Yakima County supports the only known site on the Columbia Basin in Washington. In eastern Oregon, this community is adjacent to Rosgen E6 stream types. These sites described to have organic soils with the water table at or near the surface throughout the year. In Yakima County, it was sampled at two locations at a single spring site: a perennial spring meadow at the edge of a broad, cultivated coulee valley. Both sites had well-developed humic layers. This sedge community is 1-2 feet tall with analogue sedge and woolly sedge dominating the tallest layer with 45% and 34% cover, respectively. Baltic rush, Nebraska sedge, spike rush, and/or bentgrass are common associates. Common and smooth horsetail, water hemlock, and swamp verbena are common forbs. A Bebb willow shrub thicket occurs at this fen. The adjacent uplands are Wyoming big sagebrush and black greasewood. This type is similar to an **analogue sedge association** (CEGL001825) described Crowe and Clausnitzer (1997; 2 plots) and Titus et al. (1998; 25 plots) that is found in montane and

adjacent lowlands in eastern Oregon. Crowe observed that with overuse by grazing animals, graminoids such as Nebraska sedge, small-fruit bulrush, short-beaked sedge (*Carex simulata*), Baltic rush, Kentucky bluegrass, and meadow foxtail, increase.

Baltic rush community

Juncus balticus community (JUNBAL)

NVC code: CEGLO001838

Plots 99RC183, 00RC022

Washington samples are from Crab Creek in Adams and Grant counties. This community is associated with sites along rivers and lakes that tend to flood annually on soils that are wet to moist through much of the growing season. It was sampled near 2% gradient streams. It appears low in the floodprone zone on Rosgen stream type E6 and near a spring. Soils typically have high organic matter content in surface layers and fine-textured mineral soil. See representative stream profiles L3 and L4 page 63. This is a dense herbaceous community dominated by an aggressive rhizomatous species. Baltic rush is always present and usually abundant (50-80% cover). Clustered field sedge, Kentucky bluegrass, and bentgrass appear abundantly in one sample. Canadian thistle is abundant typically accompanied by other weedy species. This type is the **Baltic rush community** that occurs across the western United States. This community is a "converted" community from continued overgrazing in wet meadow environments (Montana technical guide to rangelands 1997). Management information applicable to this type is summarized in Hansen et al. (1995 page 445) and Crowe and Clausnitzer (1997 page 194). Both authors consider this a grazing disclimax community.

River bulrush community

Schoenoplectus fluviatilis community (SCHFLU)

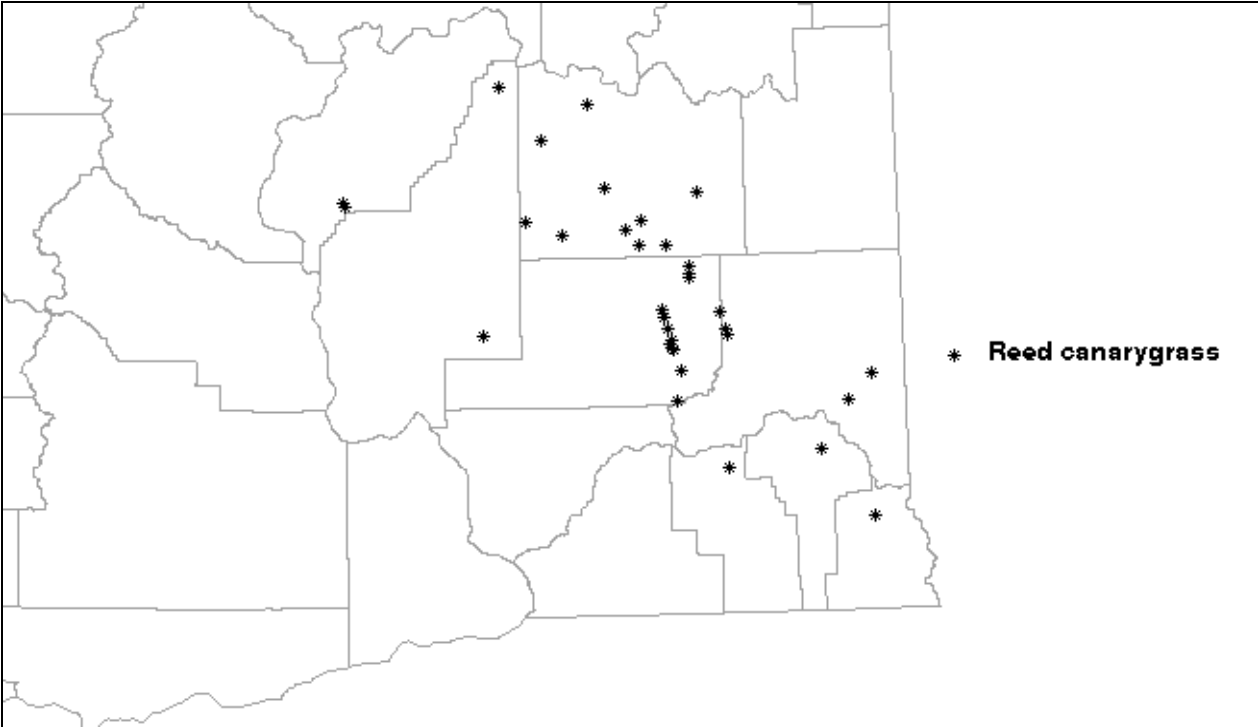
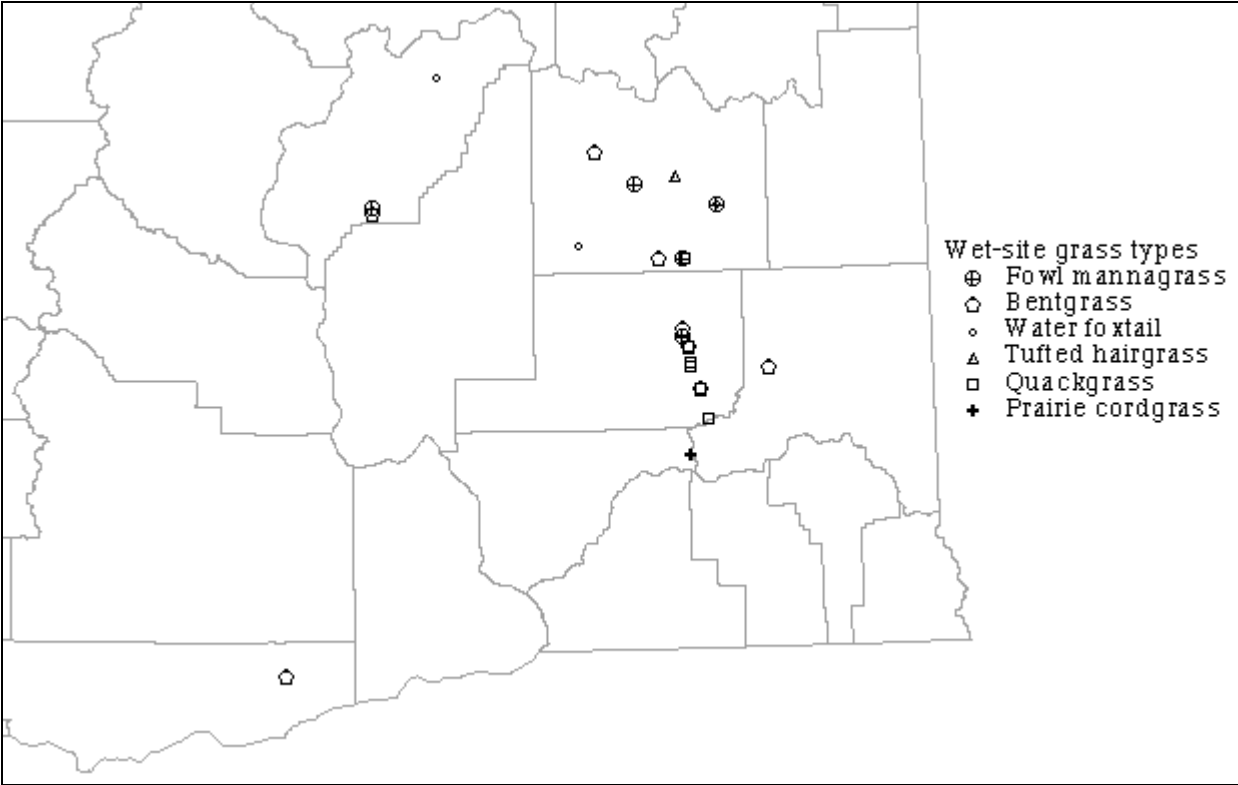
NVC code: none

Plot 99CB4202

This single sample is on the lower Palouse River in Whitman County and may occur along the Snake and Columbia Rivers. This two-foot tall community floods annually and with soils that are wet to moist through much of the growing season. This is a dense herbaceous community dominated by an aggressive rhizomatous species river (80% cover). Reed canarygrass, common spikerush, and chairmaker's bulrush appear abundantly in the sample. This community formed a mosaic with reed canarygrass and prairie cordgrass communities on a channel shelf below bankfull. This may be Pacific Northwest version of the **River Bulrush - Clubrush species** Herbaceous Vegetation (*Schoenoplectus fluviatilis* - *Schoenoplectus* spp.) CEGLO02221 described across the Great Plains of the midwestern United States.

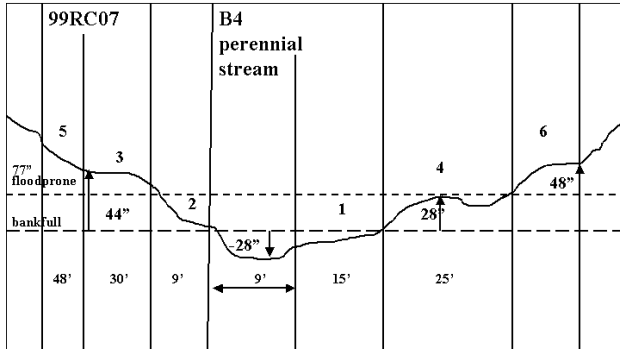
Grass Meadow and Riparian Vegetation Types

Plot locations



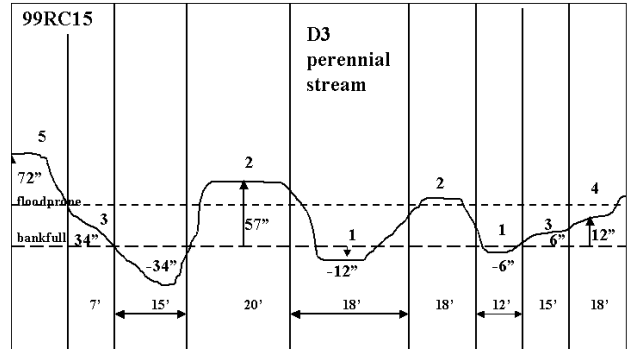
Selected stream profiles

G1



Stream and riparian vegetation profile at Wilson Creek, Lincoln County. 1= Nebraska sedge, 2= reed canarygrass, 3= thinleaf alder / redosier dogwood, and 4= whitetop, and 5= stinging nettle.

G2



Stream and riparian vegetation profile at upper Crab Creek, Lincoln County. 1= reed canarygrass, 2= black hawthorn / Wood's rose, 3= quackgrass, 4= white sagebrush, and 5= basin wildrye - cheatgrass.

Grass Riparian Types

Fowl mannagrass association

Glyceria striata association (GLYSTR)

NVC code: CEGL000219

Plots 99RC143, 99RC182, 99RC223, 99RC224, 98RC152, 02RC090

Location. This grass-dominated community is similar to a widespread type found throughout the interior Pacific Northwest. Samples on the Columbia Basin in Washington are in Adams, Douglas and Lincoln County, although it is likely in the other dryland counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	62.2	7.8	250
width of floodplain (ft)	42	25	58
entrenchment ratio	2.2	1	3.6
stream gradient (%)	1	0.5	1.5
Rosgen types	2 C4, E1		

Fluvial setting. This association is a small-patch wetland and streamside riparian community in the inland Pacific Northwest. It is located at moderately low elevations between 1500-5900 feet in broad to moderately wide valleys with low- to very low-gradient wetlands along streams or ponds. Most sites are associated with organic soils or fine-textured soil-covered gravel that dry to 4-20 inches. In the Blue Mountains, this association appears on floodplains along Rosgen B2, B3, B4, and C4 stream types. These sites flood during spring runoff and dry to 12 to 20 inches by midsummer. In the Columbia Basin, this type was sampled in 100 to 1000-foot wide valleys with 1 to 5% gradient. This community occurred at a spring and on a perennial stream. Sites are near bankfull along streams that floods annually. All sites had a well-developed humic layer that was 20 inches thick at one spring location. The stream reach site had a restrictive layer at 13 inches.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.5	-0.3	7.5
percent slope	1	0	5
position	2 springs, 3 channel shelves		

PERCENT OF GROUND COVER

Litter	60	20	98
Moss	3.3	0	10
Bareground	15.	0	40
Gravel	1	0	5
Cobble-boulder	0	0	0
Bedrock	3	0	20
Water	17	0	50

SOIL SURFACE HORIZON

percent of coarse fragments (n=5)	0	0	1
texture	sapric, hemic, fine sandy loam, sandy clay loam		

Vegetation. This dense grass community with sedges and rushes is 3 to 4 feet tall. Fowl mannagrass dominates the community with 13-60% cover. Creeping bentgrass was codominant or dominant in most plots. On more disturbed sites, fowl mannagrass can be subordinate to Baltic rush or reed canarygrass, the latter can be very abundant late in the growing season. Nebraska sedge appears in this community with less cover than fowl mannagrass. Water speedwell and seep monkeyflower are common forbs in this community. Overall forb diversity is low and typically provides three times less average cover to total vegetation cover than do grasses and grasslike plants. Management information applicable to this type is summarized in Crowe and Clausnitzer (1997 page 209).

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	1	0	1
Grasses	68	30	98
Grasslikes	38	1	90
Forbs	26	8	60
Non-vascular	8	0	8

COMMON SPECIES	n=6		cover	
	constancy	average	min	max
Shrubs	17%			
Graminoids				
<i>Glyceria striata</i>	100%	32	3	60
<i>Agrostis stolonifera</i>	83%	41	3	80
<i>Phalaris arundinacea</i>	67%	24	3	50
<i>Juncus balticus</i>	50%	35	3	90
<i>Carex nebrascensis</i>	50%	34	3	70
<i>Poa pratensis</i>	50%	2	1	3
<i>Poa palustris</i>	33%	10	1	20
<i>Carex pellita</i>	33%	8	3	13
Forbs				
<i>Veronica anagallis-aquatica</i>	67%	8	1	20
<i>Mimulus guttatus</i>	67%	5	1	13
<i>Rorippa nasturtium-aquaticum</i>	50%	11	1	30
Moss	33%	8	8	8

Classification. *Glyceria elata* (Hitchcock and Cronquist 1973) is synonymous with *Glyceria striata* (USDA Plants Database, Kartez 1999). This type is similar to the **tall mannagrass (*Glyceria elata*) association** described by Kovalchik (1992) and Crowe and Clausnitzer (1997) at higher elevations. This community is distinguished by an abundance of mannagrass that is usually associated with water speedwell, and by little and no cover of Nebraska sedge. Although a distinct community, many of these stands are likely transition to associations with a woody layer.

Reed canarygrass association

***Phalaris arundinacea* association (PHAARU)**

NVC code: CEG0001474

Plots 98RC062, 98RC072, 98RC082, 98RC104, 98RC113, 98RC145, 98RC162, 98RC191, 98RC221, 98RC232, 98RC0241, 99RC41, 99RC061, 99RC072, 99RC101, 99RC111, 99RC151, 99RC161, 99RC171, 99RC191, 99RC222, 99CB301, 99CB1100, 99CB1101, 99CB1504, 99CB1901, 00RC041, 00RC052, 00RC171, 00RC230, 02RC111, 02RC141, 02RC161, 02RC171, 02RC181

Location. This herbaceous community occurs throughout the western United States and across Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	20.5	3	60
width of floodplain (ft)	148	5.7	1500
entrenchment ratio	6.2	1.2	53.6
stream gradient (%)	1.4	0.5	3
Rosgen types	B1c, B2, 6-B3, B6c, 6-C3, C4, C5, C6, D3, 2-E4, 2-E5, 2 E6, 2F2, 2 F3, F3, F5, G4		

Fluvial setting. This community is associated with stream terraces sampled in a wide range of valleys typically those less than 3% gradient. This community occurs on channel shelves but also occupies first terraces and point bars. It usually appears near bankfull. Most samples were associated with Rosgen stream type B3, C3 and E4 and E5. Streams are regulated and unregulated perennial and slightly to moderately entrenched. Sites are generally flat or undulating and always with high litter cover. Soils are fine-textured although sandy or gravel soils have been sampled. The upper soil layers are often deposited or captured sediments from the current year's flood although organic layers were frequently sampled. Mottling or gleying was detected at 1, 6, 10, 20 and 30 inches. They were undetected in the top 10 inches of five samples. See representative stream profiles T1, T3 page 23, S2, S6 page 36, L4 page 63, G1, and G2 page 73.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.1	-0.6	0.8
percent slope	6.9	0	58
position	aquatic bed, 20 channel shelves, 9 floodplains, gravelbar, 2 streambank, 2 springs		

PERCENT OF GROUND COVER	average	min	max
Litter	75	5	100
Moss	0.1	0	5
Bareground	12	0	80
Gravel	7	0	79
Cobble-boulder	2	0	20
Bedrock	0	0	0
Water	3	0	50

SOIL SURFACE HORIZON

percent of coarse fragments (n=18)	18	0	70
texture	2 cobble, 2 gravel, sand, 2 sandy loam, 3 silt loam, silt, 3 sandy clay loam, 6 silty clay loam, hemic		

Vegetation. This is a dense grassland community dominated by the 4 to 6-foot tall rhizomatous reed canarygrass with over 50% total cover; it can be the only species with 100% cover. It is also the most frequently encountered species in all sampling and often is a late season dominant in herbaceous community types that occur within the floodprone zone (FPI < 1). Kentucky bluegrass is a commonly encountered grass. Canadian thistle, Canada goldenrod, and stinging nettle are the most common forbs in this community. Other species that may indicate site differences within the reed canarygrass type are: 1) western goldentop on higher, old gravel or point bars, 2) swamp smartweed on more saturated substrates, and 3) quackgrass on deep fine-textured soils. This type appears adjacent to the active channel, bulrush, Northwest Territory sedge or woolly sedge communities and clustered field sedge pastures with intermediate wheatgrass or basin wildrye, black hawthorn, redosier dogwood or uplands in narrow canyons. Management information for this type is summarized in Hansen et al. (1995 page 447).

LAYER PERCENT COVER	average	min	max
Overstory trees	1	1	1
Understory trees	0	0	0
Shrubs	1	1	3
Grasses	90	10	100
Grasslikes	5	1	20
Forbs	9	1	40
Non-vascular	5	1	10

	n=36 constancy	cover average	min	max
Trees	6%	1	1	1
Shrubs				
Salix exigua	11%	2	1	3
Graminoids				
Phalaris arundinacea	100%	85	10	100
Poa pratensis	25%	7	1	30
Forbs				
Cirsium arvense	31%	4	1	8
Euthamia occidentalis	25%	9	1	30
Moss and Lichen	6%	5	1	10

Classification. This type is similar to the reed canarygrass community that occurs across the western US. Currently, native communities of reed canarygrass are not distinguishable from introduced populations. That distinction may not be feasible.

Water foxtail community type
***Alopecurus geniculatus* community type**
(ALOGEN)

NVC code: none

Plots 99RC050, 99RC221, 00RC121

Location. This is an undescribed type. Water foxtail is an introduced grass sampled in Lincoln and Douglas counties. It likely occurs elsewhere in Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	12.3	2.5	22
width of floodplain (ft)	33.8	27.5	40
entrenchment ratio	6.4	1.8	11
stream gradient (%)	1.3	1	2
Rosgen types	C4, E4b, E6		

Fluvial setting. This type is associated with streams near pastures or agricultural lands. It was sampled in 30 to 300-foot wide valleys with 2% gradients. Streams were perennial and intermittent. This community occurred near bankfull on point bars or stream channel sides often submerged early in the growing season. The thin surface soil layers were fine sandy loam and gravel. One site was a gravel bar with 3 inches of gravel over a humic layer. A mottled soil layer appeared 3 inches below the surface on another site. See representative stream profile S3 page 36.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0	-0.2	0.2
percent slope	4	3	5
Position	2 channel shelves, gravelbar		

PERCENT OF GROUND COVER	average	min	max
Litter	67	10	100
Moss	0	0	0
Bareground	0.5	0	1
Gravel	3	0	5
Cobble-boulder	0	0	0
Bedrock	0	0	5
Water	18	0	80

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	25	0	50
texture	sandy clay loam, fine sandy loam		

Vegetation. This is a closed rhizomatous grass community less than one foot tall. Water foxtail dominates stands with bentgrass, common spikerush or reed canarygrass. The community has only a few scattered forbs, such as water speedwell, black medick, and alkali buttercup. Sample stands had 9 and 10 species per plot. Sites were heavily grazed. This type appeared adjacent to the channel and a Nebraska sedge - reed canarygrass community.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	0	0	0
Grasses	53	30	90
Grasslikes	35	20	50
Forbs	15	3	40
Non-vascular	0	0	0

COMMON SPECIES	n=3	cover		
	constancy	average	min	max
Shrubs				
	0%			
Graminoids				
<i>Alopecurus geniculatus</i>	100%	36	8	80
<i>Eleocharis palustris</i>	67%	35	20	50
<i>Agrostis stolonifera</i>	67%	30	30	30
<i>Phalaris arundinacea</i>	67%	8	8	8
<i>Polypogon monspeliensis</i>	33%	20	20	20
<i>Glyceria striata</i>	33%	13	13	13
<i>Carex pellita</i>	33%	1	1	1
Forbs				
<i>Medicago lupulina</i>	67%	2	1	3
<i>Veronica anagallis-aquatica</i>	67%	2	1	3
<i>Ranunculus cymbalaria</i>	67%	1	1	1
<i>Polygonum amphibium</i>	33%	30	30	30
<i>Rorippa nasturtium-aquaticum</i>	33%	20	20	20
<i>Cirsium arvense</i>	33%	13	13	13
<i>Epilobium ciliatum</i> ssp. <i>glandulosum</i>	33%	8	8	8
<i>Mimulus guttatus</i>	33%	8	8	8

Classification. It is closely related to the common spike rush association and probably represents a grazing disclimax of that community.

Bentgrass community type
***Agrostis stolonifera* community type**
(AGRSTO)

NVC code: none

Plots 98RC093, 98RC123, 98RC182, 99RC172, 99RC200, 99RC201, 02RC020, 02RC122, 02RC202

Location. This community was sampled in Adams, Douglas, Klickitat, Lincoln and Whitman counties and been observed across the Columbia Basin. Similar communities are found, but undescribed, throughout the western United States.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	30.9	12	100
width of floodplain (ft)	144.9	18	600
entrenchment ratio	7.4	1.2	42.8
stream gradient (%)	1.5	0.5	3
Rosgen types	3 C3, 3 C6, F3, G4		

Fluvial setting. In eastern Washington, the bentgrass community occurs in narrow to wide valleys. It was sampled on channel shelves and gravel bars that appear to be frequently disturbed by flooding or by livestock. It is found near bankfull on an ephemeral stream, within the floodprone zone on perennial streams, and near a spring stream. Exposed gravel or bareground are common features of the soil surface in this community. This is usually associated with a fine textured surface soil layer often over subsurface layers with a high percentage of coarse fragments. Both soil samples had a black, organic surface soil layer.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.0	-0.5	0.9
percent slope	3.8	0	15
Position	3 channel shelves, floodplain, 2 gravelbar, streambank, intermittent channel		

PERCENT OF GROUND COVER			
Litter	43	5	95
Moss	2	0	10
Bareground	23	0	95
Gravel	23	0	90
Cobble-boulder	3	0	30
Bedrock	0	0	0
Water	4	0	40

SOIL SURFACE HORIZON			
percent of coarse fragments (n=5)	25	0	70
texture	cobble, silt loam, clay loam		

Vegetation. This rhizomatous grass community is up to three feet tall when not grazed and usually a closed grassland. Creeping bentgrass is always present and

usually the dominant grass although quackgrass is often present and can be abundant. Colonial bentgrass also can be dominant. Most species in this community are exotic or native increasers with disturbance. Canadian thistle, Baltic rush, willow dock, common plantain and annual rabbit's-foot grass are found at most sites. White clover, yellow sweet clover, black medic and cheatgrass are common invasive species. This type appeared adjacent to the channel and more moist woolly sedge - spikerush, common spike rush communities and higher surfaces with quackgrass, saltgrass or intermediate wheatgrass communities. Management information applicable to this type is summarized in Hansen et al. (1995 page 420).

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	1	1	1
Shrubs	3	3	3
Grasses	52	5	100
Grasslikes	5	1	20
Forbs	36	1	80
Non-vascular	6	3	10

COMMON SPECIES	n=9	cover		
	constancy	average	min	max
Understory trees				
Salix alba	11%	3	3	3
Populus balsamorrhiza ssp. trichocarpa	11%	3	3	3
Shrubs				
Salix exigua	11%	1	1	1
Salix lutea	11%	3	3	3
Grasses				
Agrostis stolonifera	100%	33	2	100
Elytrigia repens var. repens	89%	13	1	30
Juncus balticus	67%	5	1	13
Phalaris arundinacea	44%	2	1	3
Polypogon monspeliensis	44%	1	1	3
Forbs				
Rumex salicifolius	67%	3	1	13
Plantago major	56%	5	1	20
Cirsium arvense	56%	2	1	3
Moss and Lichen				
	22%	6	3	10

Classification. This community occupies a similar fluvial environment as the native species dominated *Agrostis exarata*-*Agrostis scabra* Herbaceous Vegetation described in south central Idaho (CEGL001557) and as the Redtop community in Montana (Hansen et al. 1995). The presence of bentgrass distinguishes this community from the typically less diverse, more cultivated quackgrass community.

Quackgrass community type
Elytrigia repens var. *repens* community type
(ELYREP)

NVC code: none

Plots 98RC014, 98RC074, 98RC083, 98RC105, 99RC153, 98RC183

Location. This grassland is sampled in Lincoln and Adams counties. This semicultivated/seminatural vegetation is found throughout the western United States.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	26	6	60
width of floodplain (ft)	295	50	1100
entrenchment ratio	11	1.25	45.8
stream gradient (%)	1	0.5	2
Rosgen types	3 C3, D3, F3b, E6		

Fluvial setting. This type is generally associated with streams near pastures or agricultural lands. It was sampled in 30 to over 1000-foot wide valleys with 1% or less gradients. This community occurred within the floodprone zone. The C3 stream types were inside deeply incised channels. Sampled streams were perennial regulated and unregulated. Surfaces were steep to rolling and litter covered always with some exposed bareground. Soils are fine or coarse-textured soils and frequently contain coarse fragments. A mottled soil layer was detected at 60 inches in one sample and undetected in the top 12 inches in another. See representative stream profile G2 page 73.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1	0.2	2.5
percent slope	5	0	15
position	6 floodplains		

PERCENT OF GROUND COVER			
Litter	82	30	100
Moss	0	0	0
Bareground	12	0	40
Gravel	5	0	25
Cobble-boulder	0	0	0
Bedrock	1	0	5
Water	0	0	0

SOIL SURFACE HORIZON	
percent of coarse fragments (n=2)	0
texture	cobble, sandy loam, silty clay loam

Vegetation. This is a closed rhizomatous grass community that grows up to three tall when not grazed. Quackgrass completely dominates some stands with only a few scattered forbs or other grasses. Sample stands had 3 to 9 species per plot. Clustered field sedge was co-dominant in two stands and intermediate rye was co-dominant in two other stands. Canadian thistle, willow

dock and Kentucky bluegrass are common species in this community. This type appeared adjacent to the more moist woolly sedge - spikerush and reed canarygrass communities and water birch or upland basin wildrye / cheatgrass communities on higher surfaces. Management information is not available for this type. Pertinent management information on key species appears in Table 3.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	1	1	1
Grasses	74	40	98
Grasslikes	23	8	40
Forbs	24	8	50
Non-vascular	0	0	0

COMMON SPECIES	n=6 constancy	cover average	min	max
Understory trees	0%			
Shrubs				
Artemisia ludoviciana	17%	1	1	1
Grasses				
Elytrigia repens var. repens	100%	58	20	98
Poa pratensis	50%	10	8	13
Elytrigia intermedia	33%	55	20	90
Carex praegracilis	33%	25	20	30
Phalaris arundinacea	33%	7	3	10
Bromus tectorum	17%	60	60	60
Hordeum murinum ssp. leporinum	17%	20	20	20
Eleocharis palustris	17%	8	8	8
Juncus balticus	17%	1	1	1
Agrostis stolonifera	0%			
Forbs				
Cirsium arvense	83%	7	1	13
Rumex salicifolius	50%	3	1	5
Polypogon monspeliensis	17%	3	3	3
Moss and Lichen	0%			

Classification. *Elytrigia repens* var. *repens* is synonymus with *Agropyron repens* (Hitchcock and Cronquist 1973). This type represents a grazing disclimax or semi-cultivated community. It differs from the bentgrass community by the high cover of quackgrass, the absence of bentgrass, and overall low species diversity.

Miscellaneous Grass Riparian Types

Tufted hairgrass community type

Deschampsia cespitosa community type (DESCES)

NVC code: none

Plots 99RC132, 99RC133

This grass-dominated community is similar to several tufted hairgrass types found throughout the interior Pacific Northwest. Lincoln County supports the only known site on the Columbia Basin in Washington. In the Blue Mountains, this community appears on floodplains along Rosgen C4, C6, and E6 stream types, in wet basins, and near springs. These sites flood during spring runoff and dry to 12 to 32 inches by midsummer but remain moist throughout the growing season. Soils are deep and fine-textured content. In Lincoln County, it was sampled at a single spring location in a 200-foot wide valley on two different surfaces. This community occurred in a perennial spring meadow with a ditched stock pond and stream. Surfaces measured 1 and 3 inches above current water level in June. Both sites had well-developed, 7 and 9 inches thick, humic layers, over a restrictive, gleyed silty clay loam layer. See representative stream profile L3 page 63.

This open bunchgrass community with sedges and rushes is 3 feet tall. Tufted hairgrass dominates the tallest layer with 40-50% cover. Dense 1 to 2-foot tall Baltic rush, woolly sedge, clustered field sedge, and creeping bentgrass layer grows below and around the tufted hairgrass. Nebraska sedge co-dominated the higher surface while Baltic rush co-dominated the lower surface that had 20% moss cover on the ground surface. Both of the above co-dominant species increase with livestock use. Northern willowherb, silver cinquefoil and narrowleaf miner's lettuce are common forbs in this community. Overall forb diversity is low and provides only 13% average cover. This community lies between a woolly sedge community and Nebraska sedge or a Kentucky bluegrass community. The adjacent uplands are Wyoming big sagebrush and stiff sagebrush. This type is similar to an association described by Kovalchik (1987), Kovalchik (2001) and Crowe and Clausnitzer (1997). The Oregon Natural Heritage Program (1998) describes a similar but montane tufted hairgrass - Nebraska sedge association. Management information applicable to this type is summarized in Kovalchik (1987 page 95).

Intermediate wheatgrass pasture

Elytrigia intermedia pasture (ELYINT)

NVC code: none

Plots 98RC094, 98RC132

This semicultivated community was described along Cow Creek in Adams County and unsampled but present along Crab and Foster creeks. This community is associated with broad stream terraces and depressions with deep fine textured soils that stay wet into the growing season. This community was sampled within and well above the floodprone zone (FPI 0.6-3) and associated with Rosgen stream types C6c and G3. Sites are generally flat with soils that are fine-textured, well drained, and alkaline. This community is composed of a planted, exotic tall bunchgrass with a shorter, typically closed grassland that is dominated by native rhizomatous species: clustered field sedge, quackgrass or saltgrass. Prairie cordgrass and Baltic rush are common and may be abundant. This type is similar to the saltgrass - clustered field sedge and the basin wildrye / clustered field sedge communities. This type is undescribed and may be considered a planted saltgrass - clustered field sedge or basin wildrye / clustered field sedge community. A partial enclosure indicates these pastures apparently will support Wood's rose shrublands with less livestock use. NRCS has a wealth of applicable information on pasture management. Pertinent management information appears in Table 3.

Prairie Cordgrass community type

Spartina pectinata community type (SPAPEC)

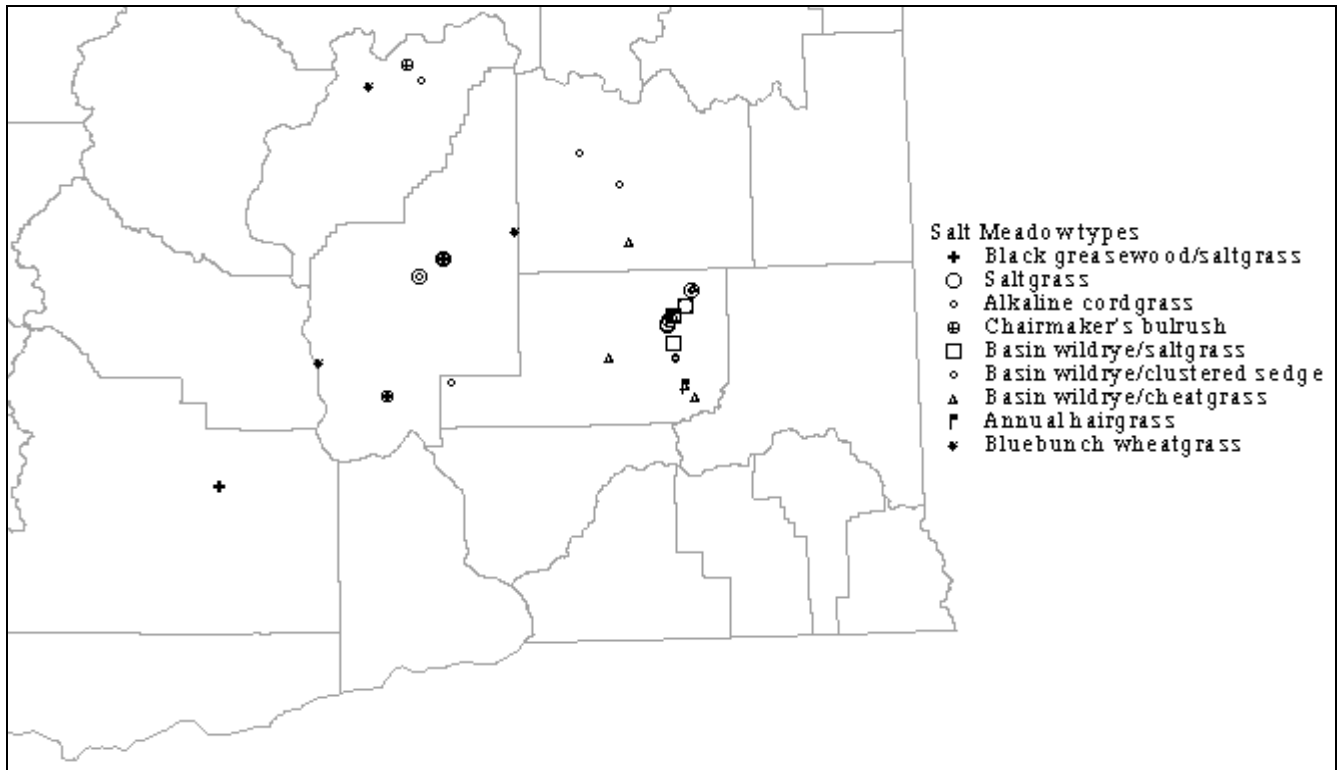
NVC code: none

Plot 99CB2403

This streamside grass community commonly occurs in the northern Great Plains. In Washington, it occurs above and below Palouse Falls and along a short stretch of the Spokane River. It appears in 100 to 1000-foot wide canyons with 1-3% gradient with rivers 100-200 feet wide. It lines the river on channel shelves near bankfull with cobbly soils. Rosgen stream type B2 is expected. This is a dense herbaceous community dominated by perennial 2 to 3-foot tall prairie cordgrass. Few species appear in this community, such as, reed canarygrass and sandbar willow. This site appeared next to the channel and a sandbar willow community. It occurs in Wyoming big sagebrush/bluebunch wheatgrass and ponderosa pine/bunchgrass landscapes. Hansen et al. (1995) describe a similar community (CEGL001476) in Montana across a wider environmental range than in Washington. Jankovsky-Jones et al. (2001) note a similar community on the Snake River in Idaho.

Salt Meadow Riparian Vegetation Types

Plot locations



Salt Meadow Riparian Vegetation Types

Black greasewood / Saltgrass association

Sarcobatus vermiculatus / *Distichlis spicata* associaton (SARVER/DISSPI)

NVC code: CEG001363

Plots 00RC012, 00RC013, 00RC223, 02RC191

Location. This shrub community is located on the Columbia Plateau in Idaho, Oregon and Washington. This description is drawn from four samples in Grant and Yakima county and information from Daubenmire (1970) in Douglas, Walla Walla, Whitman, and Yakima counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	12.7	5	28
width of floodplain (ft)	708	125	1000
entrenchment ratio	27.3	1.8	40
stream gradient (%)	0.7	0.6	1
Rosgen types		2 E6	

Fluvial setting. This community is associated with stream terraces, vernal pools and depressions with deep fine textured soils that stay moist into the growing season. It was sampled in broad canyons with low stream gradient. It is within and above the floodprone zone. Soils are fine-textured, moderately drained, and alkaline. Gleying was detected at 6 and 10 inches in both soils sampled. See representative stream profile L2 page 63.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.6	0.1	1.4
percent slope	6	5	8
Position	first and second terrace, spring transition		

PERCENT OF GROUND COVER	average	min	max
Litter	37	20	80
Moss	5	0	20
Bareground	57	20	80
Gravel	0	0	1
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0	0	0
texture	silty clay loam, silty clay		

Vegetation. This is a shrubland community over 2 to 4 feet tall with a dense, shorter rhizomatous grass cover that typically occurs in patches. Black greasewood and saltgrass are always present with an average cover of 43% and 46% respectively. Basin wildrye is present in these plots but unusual in Daubenmire plots. Alkali

bluegrass is in half of Daubenmire's plots. No other species appears in more than 30% of plots.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	43	13	60
Grasses	53	20	80
Grasslikes	1	1	1
Forbs	7	1	13
Non-vascular	0	0	0

COMMON SPECIES	n=4		cover	
	constancy	average	min	max
Trees				
0%				
Shrubs				
<i>Sarcobatus vermiculatus</i>	100%	43	13	60
Graminoids				
<i>Distichlis spicata</i>	100%	46	13	80
<i>Bromus tectorum</i>	50%	10	1	20
<i>Agrostis interrupta</i>	50%	8	3	13
<i>Leymus cinereus</i>	50%	7	1	13
<i>Elytrigia intermedia</i>	50%	2	1	3
<i>Carex praegracilis</i>	50%	1	1	1
<i>Juncus balticus</i>	25%	1	1	1
<i>Hordeum jubatum</i>	25%	1	1	1
Forbs				
<i>Lactuca serriola</i>	75%	1	1	1
<i>Chenopodium album</i>	50%	5	1	8
<i>Lepidium perfoliatum</i>	25%	3	3	3
<i>Epilobium minutum</i>	25%	1	1	1

Classification. Although two plots have basin wildrye, this is not the black greasewood / basin wildrye association (CEGL001366) in Idaho and eastward that has typically contains *Gutierrezia sarothrae*, *Pascopyrum smithii*, *Pseudoroegneria spicata*, *Koeleria macrantha*, *Carex filifolia* and *Opuntia polyacantha*. This type is Daubenmire's (1970) black greasewood / saltgrass association.

Saltgrass - Clustered field sedge community type
***Distichlis spicata* - *Carex praegracilis* community type**
(DISSPI-CARPAR)

NVC code: none

Plots 98RC033, 98RC055, 98RC115, 98RC124, 98RC173, 98RC253, 00RC214, 00RC222

Location. This grassland was sampled along Cow Creek in Adams County and Crab Creek in Grant County and has been observed in adjacent counties. As described here, this community may occur on appropriate sites across the Columbia Plateau.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	57.6	13.0	120
width of floodplain (ft)	491	56	1600
entrenchment ratio	1.9	1.3	3.3
stream gradient (%)	0.8	0.5	2
Rosgen types	2 C3, E1, 2 E6, 2 F1, F6		

Fluvial setting. This community is associated with stream terraces, vernal pools, and depressions with deep fine textured soils that stay moist into the growing season. It was sampled in broad canyons with low stream gradients although it appears in other settings. This community was sampled on stream terraces usually within the floodprone zone and in a vernal basin. All but one sample was associated with a regulated perennial stream. Sites are generally convex and appear to flood in high water years. Soils are fine-textured, well drained, and alkaline. Mottling was detected at 13 and 36 inches and undetected in the top 30 inches of soil at one site. See representative stream profile L1 page 63.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.6	-0.1	1.3
percent slope	1.2	0.0	5.0
position	channel shelf, floodplain, 4 first terraces, second terrace, basin		

PERCENT OF GROUND COVER	average	min	max
Litter	43	5	95
Moss	7	0	40
Bareground	51	5	95
Gravel	0	0	0
Cobble-boulder	0	0	1
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=5)	0	0	0
texture	4 silt loam, silty clay loam		

Vegetation. This is a dense grassland community less than a foot tall dominated by three rhizomatous grasses

and one rhizomatous sedge species. Saltgrass is always present with 30-90% cover. It always occurs with clustered field sedge having 1-40% cover. Alkali bluegrass is usually present and often is as abundant as saltgrass. Prairie cordgrass is usually present but rarely with high coverage. Intermediate wheatgrass was planted at two sites. No other species was found in more than three of the six plots sampled. This type appeared adjacent to the less alkaline/saline, more moist communities Baltic rush, woolly sedge, and clustered field sedge pasture with intermediate wheatgrass. Basin wildrye, black hawthorn or greasewood community are also typical adjacent community types. Management information applicable to this type is summarized in Hansen et al. (1995 page 431).

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	0	0	0
Grasses	81	50	98
Grasslikes	27	1	98
Forbs	11	1	20
Non-vascular	0	0	0

COMMON SPECIES	n=8 cover			
	constancy	average	min	max
Trees	0%			
Shrubs	0%			
Graminoids				
<i>Distichlis spicata</i>	100%	56	30	98
<i>Carex praegracilis</i>	75%	18	1	40
<i>Poa secunda</i> (juncifolia)	63%	30	8	40
<i>Spartina gracilis</i>	50%	15	3	30
<i>Juncus balticus</i>	38%	15	1	40
<i>Puccinellia lemmonii</i>	13%	3	3	3
<i>Schoenoplectus americanus</i>	13%	1	1	1
Forbs				
<i>Lactuca serriola</i>	50%	1	1	1
<i>Ranunculus cymbalaria</i>	38%	2	1	3
<i>Achillea millefolium</i>	25%	5	1	8
<i>Grindelia squarrosa</i>	25%	2	1	3
<i>Argentina anserina</i>	25%	1	1	1
<i>Potentilla argentea</i>	25%	1	1	1

Classification. This type is similar to the saltgrass community that occurs in western United States (CEGL001770) but may represent a new type. Clustered field sedge is absent from Hansen et al. (1995) saltgrass association in Montana. Crowe and Clausnitzer (1997) and Titus et al. (1998) describe a clustered field sedge association that has no saltgrass and occurs on wetter, perhaps less saline sites. Clustered field sedge is co-dominant with Baltic rush in plot 00RC022 and may represent the clustered field sedge association (CEGL00182) of Evans (1989) and Jankovsky-Jones et al. (2001) in southeast Idaho.

Saltgrass - Chairmaker's bulrush community type
Distichlis spicata* - *Schoenoplectus americanus
community type (DISSPI-SCHAME)

NVC code: none

Plots 00RC014, 00RC103, 00RC221

Location. This community is found in localized sites across the Columbia Plateau. This bulrush-grass community was sampled along lower Crab Creek in Grant County and Foster Creek in Douglas County. It is probable in other parts of the Columbia Basin.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	16.5	5	28
width of floodplain (ft)	562.5	125	1000
entrenchment ratio	20.9	1.8	40
stream gradient (%)	0.9	0.6	1
Rosgen types	2 E6, spring		

Fluvial setting. This community is associated with streambanks and depressions with fine textured soils that stay wet into the growing season. It was sampled in moderate to broad canyons with low stream gradients. This community was sampled at or near bankfull. Sites are generally sloping (shorelines) with soils that are fine-textured. Mottling and/or gleying were not detected in the top 18 inches of two sample sites.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.2	0	0.4
percent slope	4.7	1	10
position	abandon channel, floodplain, first terrace		

PERCENT OF GROUND COVER	average	min	max
Litter	83	65	95
Moss	0	0	0
Bareground	15	5	30
Gravel	2	0	5
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0	0	0
texture	fibric, silty clay loam		

Vegetation. This is a dense grassland community less than a foot tall dominated by a rhizomatous bulrush, grass and sedge. Chairmaker's bulrush is always present with 20-80% cover. It always occurs with saltgrass and usually with clustered field sedge, Baltic rush, or silverweed cinquefoil. Alkali bluegrass or Lemmon's alkaligrass can be abundant. Management information is not available for this type. Pertinent management information on key species appears in Table 3.

LAYER PERCENT COVER	average	min	max
Overstory trees	8	8	8
Understory trees	0	0	0
Shrubs	0	0	0
Grasses	40	40	40
Grasslikes	73	70	80
Forbs	30	20	40
Non-vascular	0	0	0

COMMON SPECIES	n=3 constancy	cover average	min	max
Trees				
<i>Elaeagnus angustifolia</i>	33%	8	8	8
Shrubs				
0%				
Graminoids				
<i>Schoenoplectus americanus</i>	100%	47	20	80
<i>Distichlis spicata</i>	100%	24	3	40
<i>Carex praegracilis</i>	67%	50	30	70
<i>Juncus balticus</i>	67%	27	3	50
<i>Hordeum jubatum</i>	67%	16	1	30
<i>Puccinellia lemmonii</i>	33%	30	30	30
<i>Poa secunda</i> (juncifolia)	33%	20	20	20
<i>Hordeum brachyantherum</i>	33%	8	8	8
<i>Leymus cinereus</i>	33%	3	3	3
<i>Elytrigia repens</i> var. <i>repens</i>	33%	3	3	3
<i>Spartina gracilis</i>	33%	3	3	3
Forbs				
<i>Argentina anserina</i>	67%	5	1	8
<i>Chenopodium album</i>	67%	3	3	3
<i>Crepis runcinata</i>	33%	40	40	40
<i>Lactuca serriola</i>	33%	30	30	30

Classification. *Schoenoplectus americanus* is synonymous with *Scirpus americanus* in Hitchcock and Cronquist (1973). Hansen et al. (1995) recognized a *Scirpus pungens* association in Montana that included all combinations of *S. pungens* and *S. americanus*. This type was described by Crawford (2001) and was earlier recognized by Evans (1989) for eastern Washington. It may be included in the general **western Chairmaker's bulrush western herbaceous association** (CEGL001841). That general type as described by Jankovsky-Jones et al. (2001) in southeast Idaho lacks saltgrass and other saline/alkaline indicators. Titus et al. (1998) list a possible similar type: the *Scirpus americanus* alkaline interior association.

Alkali cordgrass association
***Spartina gracilis* association (SPAGRA)**
 NVC code: CEGL001588

Plots 00RC062, 00RC215

Location. This dense grass community was sampled along lower Crab Creek in Adams and Grant counties. It is probable in other parts of the Columbia Basin.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	11.7	8.3	15
width of floodplain (ft)	30	30	30
entrenchment ratio	1.5	1.5	1.5
stream gradient (%)	1.8	0.5	3
Rosgen types	B1, E6		

Fluvial setting. This community is associated with stream terraces and depressions with coarse textured soils that stay moist into the growing season. It was sampled in along streams with moderate to low gradients. This community was sampled above the floodprone zone. Sites are generally flat with soils that are coarse textured, well drained, and alkaline. A mottled soil layer was encountered at 8 inches at one site.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.1	1.1	1.1
percent slope	5.3	0.5	10.0
Position	first and second terraces		

PERCENT OF GROUND COVER	average	min	max
Litter	98	95	100
Moss	0	0	0
Bareground	2	0	5
Gravel	0	0	0
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	percent of coarse fragments (n=1)	texture
	0	sand

Vegetation. This is community is a closed grassland dominated by native rhizomatous species. Alkali cordgrass usually occurs with clustered field sedge. Nevada bulrush or Baltic rush can be abundant. Saltgrass is often present but with low cover. Forbs are mostly weedy species in the two samples. This type is similar to the saltgrass - clustered field sedge and the basin wildrye / clustered field sedge communities. Applicable management information is summarized in Hansen (1995 page 467). Pertinent management information on key species appears in Table 3.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	3	3	3
Shrubs	0	0	0
Grasses	50	40	60
Grasslikes	50	40	60
Forbs	8	8	8
Non-vascular	0	0	0

COMMON SPECIES	n=2 constancy	cover average min max		
Trees				
Elaeagnus angustifolia	50%	3	3	3
Shrubs	0%			
Graminoids				
Spartina gracilis	100%	50	40	60
Carex praegracilis	100%	2	1	3
Scirpus nevadensis	50%	60	60	60
Juncus balticus	50%	40	40	40
Distichlis spicata	50%	8	8	8
Forbs				
Lactuca serriola	100%	5.5	3	8
Cirsium arvense	50%	3	3	3
Equisetum laevigatum	50%	3	3	3

Classification. This type is poorly described from literature in Colorado. Hansen's (1995) Prairie cordgrass (*Spartina pectinata*) association includes combinations of prairie and alkali cordgrass. Prairie cordgrass association in Washington occurs only on riverside environments.

Basin wildrye-Saltgrass association
***Leymus cinereus* - *Distichlis spicata* association**
(LEYCIN/DISSPI)
 NVC code: C EGL001481

Plots 98RC034, 98RC044, 98RC095

Location. This tall herbaceous community is located on the Columbia Plateau in Idaho, Oregon and Washington. This description is from samples from Cow Creek in Adams County and plots from Daubenmire (1970) in Douglas, Walla Walla, and Yakima counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	54.7	14	120
width of floodplain (ft)	846.7	340	1600
entrenchment ratio	16.0	1.3	42.9
stream gradient (%)	0.5	0.5	0.5
Rosgen types	C1, C6c, F1		

Fluvial setting. This community is associated with stream terraces, vernal pools, and depressions with deep fine textured soils that stay moist into the growing season. On Cow Creek it was sampled in broad canyons with low stream gradients. It is within the floodprone zone. Soils are fine-textured, moderately drained, and alkaline. Mottling was detected at 28 inches at one site and undetected in the top 24 inches of another sample.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.4	0.1	0.7
percent slope	2.0	0.5	5.0
Position	floodplain, 2 first terraces		

PERCENT OF GROUND COVER			
Litter	7	2	10
Moss	20	0	60
Bareground	69	20	98
Gravel	0	0	0
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=2)	0	0	0
texture	2 silt loam		

Vegetation. This community is composed of a tall bunchgrass usually over 4 feet tall scattered over a dense, shorter rhizomatous grass cover. Basin wildrye and saltgrass are always present with an average cover 30% and 50% respectively. Clustered field sedge averages 16% cover. Alkali bluegrass and prairie cordgrass are present in these plots but unusual in Daubenmire plots, whereas, cheatgrass occurred only in Daubenmire plots. Western yarrow was found in most plots. No other

species appears in more than 30% of plots. This is a low diversity community with 5 to 17 species per plot. Management information applicable to this type is summarized in Hansen et al. (1995 page 431).

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	0	0	0
Grasses	77	60	90
Grasslikes	8	3	13
Forbs	1	1	1
Non-vascular	0	0	0

COMMON SPECIES	n=3 constancy	cover		
		average	min	max
Trees	0%			
Shrubs	0%			
Graminoids				
<i>Poa secunda</i> (juncifolia)	100%	51	13	80
<i>Distichlis spicata</i>	100%	10	3	13
<i>Carex praegracilis</i>	100%	8	3	13
<i>Leymus cinereus</i>	100%	8	3	13
<i>Spartina gracilis</i>	100%	6	3	8
<i>Poa secunda</i>	33%	40	40	40
Forbs				
<i>Achillea millefolium</i>	67%	1	1	1
<i>Cirsium vulgare</i>	67%	1	1	1

Classification. This type is Daubenmire's (1970) basin wildrye / saltgrass association.

Basin wildrye - clustered field sedge association
***Leymus cinereus* - *Carex praegracilis* association**
(LEYCIN-CARPRA)

NVC code: CEGL0001480

Plots 98RC084, 98RC163, 98RC252, 99RC144, 99RC202, 00RC124

Location. This grassland was sampled along Cow Creek in Adams County, along Lake and Sinking Creeks in Lincoln County and along Foster Creek in Douglas County. It occurs on appropriate sites across the Columbia Plateau.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	28.8	2.5	120
width of floodplain (ft)	290	18	1500
entrenchment ratio	12.4	1.3	53.6
stream gradient (%)	1	0	2
Rosgen types	C3, C4, C6, 2 E6, F6		

Fluvial setting. This community is associated with broad stream terraces or depressions with deep fine textured soils that stay wet into the growing season. It was sampled in 100 foot and wider canyons with less than 3% gradient. This community was sampled at and above the floodprone zone and was observed along the margins of wide vernal basins. One site is within the floodprone zone. Sites are generally flat with soils that are fine-textured loamy and well drained. Gleying was detected at 40 inches at one sample and was undetected in the top 36 inches of two samples. See representative stream profile S1 page 36 and L2 page 63.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.3	0.5	2.3
percent slope	5.2	0	25
Position	floodplain, first terrace, 2 second terraces, toeslope, basin		

PERCENT OF GROUND COVER	average	min	max
Litter	89	80	95
Moss	1	0	5
Bareground	9	5	20
Gravel	0	0	0
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0	0	0
texture	loam, 2 silt loam		

Vegetation. This is an open 5 to 8-foot tall bunchgrass community with a shorter, less than 2-foot tall, closed grassland ground cover dominated by rhizomatous grasses and sedges. Basin wildrye is always present and

often abundant with 40-60% cover. On disturbed sites its cover can be greatly reduced in favor of quackgrass. Clustered field sedge is always present with 30 to 40% cover. Kentucky bluegrass, prairie cordgrass and Baltic rush are common and may be abundant. Saltgrass can be a common species but subordinate to clustered field sedge. Claspings pepperweed, Rocky Mountain iris, and Canadian thistle are the most frequent forbs in samples. This type appeared adjacent to the less alkaline/saline more moist reed canarygrass and quaking aspen communities and saltgrass or greasewood communities. Management information is not available for this type. Pertinent management information on key species appears in Table 3.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	2	1	3
Grasses	62	50	80
Grasslikes	37	1	60
Forbs	20	3	40
Non-vascular	0	0	0

COMMON SPECIES	n=6 cover			
	constancy	average	min	max
Trees	0%			
Shrubs				
Symphoricarpos albus	17%	3	3	3
Rosa woodsii	17%	1	1	1
Graminoids				
Carex praegracilis	100%	35	1	60
Leymus cinereus	100%	32	1	60
Poa pratensis	83%	20	3	50
Distichlis spicata	67%	9	1	30
Spartina gracilis	67%	9	1	20
Juncus balticus	50%	10	8	13
Elytrigia repens var. repens	33%	26	13	40
Poa secunda (juncifolia)	33%	7	1	13
Agrostis interrupta	17%	13	13	13
Forbs				
Lepidium perfoliatum	83%	3	1	8
Cirsium arvense	67%	7	1	20
Lactuca serriola	67%	6	1	20
Potentilla argentea	33%	8	3	13

Classification. Daubenmire's (1970) basin wildrye / saltgrass association (CEGL001481) is similar to this type but contains more alkali bluegrass, an abundance of saltgrass, has less clustered field sedge, and no Kentucky bluegrass. The basin wildrye / saltgrass association is generally less diverse and is probably associated with more saline or alkaline soil. This type is similar to the basin wildrye bottomland community that occurs in western U.S.

Basin wildrye - cheatgrass community type
***Leymus cinereus* - *Bromus tectorum* community type**
(LEYCIN/BROTEC)

NVC code: none

Plots 98RC024, 98RC184, 98RC233, 99RC064, 02RC103

Location. This community was sampled in Lincoln and Adams counties and is likely to occur on appropriate sites across the Columbia Plateau.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	16.9	5	30
width of floodplain (ft)	154.6	10	500
entrenchment ratio	7.8	1.7	26.3
stream gradient (%)	1.7	1.5	2
Rosgen types	B3c, C3, E4, E5, E6		

Fluvial setting. This type is associated with a variety of drier fluvial landforms and upland sites. Valley gradient is less than 3%. It was sampled well above and just below the floodprone zone. Sites were flat to rolling with fine-textured and well-drained soil. See representative stream profile T3 page 23, L4 page 63, and G2 page 73.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	4.3	0.7	11.5
percent slope	5.3	0	15
position	2 intermittent channels, 2 first terrace, toeslope		

PERCENT OF GROUND COVER	average	min	max
Litter	87	70	100
Moss	0	0	0
Bareground	9	0	30
Gravel	0	0	0
Cobble-boulder	2	0	10
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=3)	3	0	10
texture	3 silt loam		

Vegetation. This grassland is often seen with a scattered tall basin wildrye layer (over 5 feet tall) over an annual and forb grass layer. Cheatgrass is the common link in these weedy sites. Other weeds that often are abundant include medusa head, Japanese brome, leporinum barley, prickly lettuce, tall tumble mustard, and giant sumpweed. This community appeared adjacent to more moist reed canarygrass or quackgrass communities and boxelder or upland communities. Similar communities are found outside the riparian zone. This is a retrogressed community probably on several different potential vegetation sites. Management information is not available to this type.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	1	1	1
Shrubs	16	3	30
Grasses	70	40	90
Grasslikes	1	1	1
Forbs	53	40	70
Non-vascular	0	0	0

COMMON SPECIES	n=5	cover		
	constancy	average	min	max
Trees				
<i>Alnus incana</i>	20%	1	1	1
Shrubs				
<i>Chrysothamnus viscidiflorus</i>	20%	30	30	30
<i>Artemisia tridentata</i> ssp. <i>tridentata</i>	20%	13	13	13
Graminoids				
<i>Leymus cinereus</i>	100%	38	20	90
<i>Bromus tectorum</i>	100%	28	1	60
<i>Poa secunda</i>	40%	5	3	8
<i>Bromus japonicus</i>	20%	20	20	20
Forbs				
<i>Lepidium perfoliatum</i>	40%	11	3	20
<i>Sisymbrium altissimum</i>	40%	3	3	3
<i>Amsinckia menziesii</i>	20%	60	60	60
<i>Iva xanthifolia</i>	20%	40	40	40
<i>Conium maculatum</i>	20%	30	30	30
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	20%	20	20	20
<i>Polemonium pectinatum</i>	20%	20	20	20
<i>Descurainia pinnata</i>	20%	13	13	13
<i>Descurainia sophia</i>	20%	13	13	13
<i>Chenopodium album</i>	20%	8	8	8
<i>Collinsia linearis</i>	20%	8	8	8

Classification. Crawford (1998, 2001) described this type. It is a common vegetation type throughout the inland Pacific Northwest and classified as a provisional type CEG001479.

Annual hairgrass - curlycup gumweed community type

***Deschampsia danthonioides* - *Grindelia squarrosa* community type (DESDAN-GRISQU)**

NVC code: none

Plots 98RC045, 98RC175, 98RC0192

Location. This herbaceous community is a previously unrecognized type although similar communities are known at other eastern Washington and Oregon locales. It was sampled in Adams, Douglas, and Grant counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	40	30	50
width of floodplain (ft)	420	340	500
entrenchment ratio	3.6	3.3	3.8
stream gradient (%)	0.5	0.5	0.5
Rosgen types	C1, E1		

Fluvial setting. This community occurs in vernal pools and depressions with gravelly to rocky soils. It was sampled in broad canyons with low stream gradients. It appears along streams in an exposed basalt scabland channel and in an abandoned scabland channel. Sites are generally concave and appear to rarely flood. They likely fill more frequently with precipitation. Soils are coarse-textured and well drained. See representative stream profile L1 page 63.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.2	0.1	0.3
percent slope	0	0	0
position	floodplain, abandoned channel		

PERCENT OF GROUND COVER	average	min	max
Litter	43	5	80
Moss	3	0	5
Bareground	25	15	35
Gravel	10	0	20
Cobble-boulder	20	0	40
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=1)	90	90	90
texture	gravel, stony		

Vegetation. This is an open herbaceous community that is less than a foot tall. Annuals and perennials with short growing seasons dominate this community. Annual hairgrass is usually present and common. Other annual grasses include cheatgrass, dense silkybent, and leporinum barley. Important forbs include curlycup gumweed, clasping pepperweed, and western yarrow. This type appeared adjacent to deeper soil sites in the floodplain with saltgrass - clustered field sedge

communities. Upland vegetation of annual grasses, stiff sagebrush scabland or sparsely vegetated bedrock was on higher sites. One plot was located in a vernal pond with a 1-4 inch layer of white, fine textured soil with little vegetation and may be included in this generalized community. Pertinent management information on key species appears in Table 3.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	0	0	0
Grasses	50	30	60
Grasslikes	3	3	3
Forbs	57	40	90
Non-vascular	0	0	0

COMMON SPECIES	n=2		cover	
	constancy	average	min	max
Trees	0%			
Shrubs				
Atriplex truncata	50%	1	1	1
Graminoids				
Deschampsia danthonioides	100%	29	8	50
Bromus tectorum	100%	5	1	8
Hordeum murinum ssp. leporinum	100%	1	1	1
Agrostis interrupta	50%	30	30	30
Poa secunda (juncifolia)	50%	8	8	8
Juncus bufonius	50%	3	3	3
Puccinellia lemmonii	50%	1	1	1
Puccinellia distans	50%	1	1	1
Forbs				
Lepidium perfoliatum	100%	21	1	40
Achillea millefolium	100%	5	1	8
Grindelia squarrosa	50%	40	40	40

Classification. This type is included in a proposed annual hairgrass community that occurs in eastern Washington, Oregon and California. It includes vernal pond zones 1 and 2 defined by Bjork (1997). One of the vernal pools described by Jankovsky-Jones et al. (2001) in southeast Idaho appears on depressions on basalt and had many of the same species as the community described here. The Oregon Natural Heritage Program list two or three vernal pool associations that may be included in this general type.

Bluebunch wheatgrass community type
***Pseudoroegneria spicata* community type**
(PSESPI)

NVC code: none

Plots 99RC20, 00RC082, 00RC093

Location. This herbaceous community is a previously unrecognized riparian type although similar communities are known in Washington and Oregon. Samples are from Douglas, Grant, and Lincoln counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	10.8	6	14
width of floodplain (ft)	7	2	13
entrenchment ratio	1.3	1.3	1.3
stream gradient (%)	5.3	1	8
Rosgen types	3 A3		

Fluvial setting. This community occurs near ephemeral and intermittent streams in moderate to narrow valleys. Streams have moderate to steep gradients. Sites are well above the floodprone zone unless where associated with ephemeral streams when appears in the floodprone zone. In either case, sites rarely flood. Soils are coarse-textured and well drained. See representative stream profile S7 page 36.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.8	-0.4	3.4
percent slope	5.5	5	6
position	floodplain, first terrace, streambank		

PERCENT OF GROUND COVER	average	min	max
Litter	48	30	65
Moss	13	5	20
Bareground	13	5	20
Gravel	16	12	20
Cobble-boulder	17	8	25
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0	0	0
texture	cobble, sandy loam		

Vegetation. This is an open herbaceous community that is around two feet tall and dominated by annual and perennial herbaceous plants. Shrubs are usually present as scattered individuals. Both Wyoming and Basin big sagebrush occur in this community. Bluebunch wheatgrass and Sandberg's bluegrass are always present although cheatgrass will have greater cover in many instances. Western yarrow is the most frequent forb species. Pertinent management information on key species appears in Table 3.

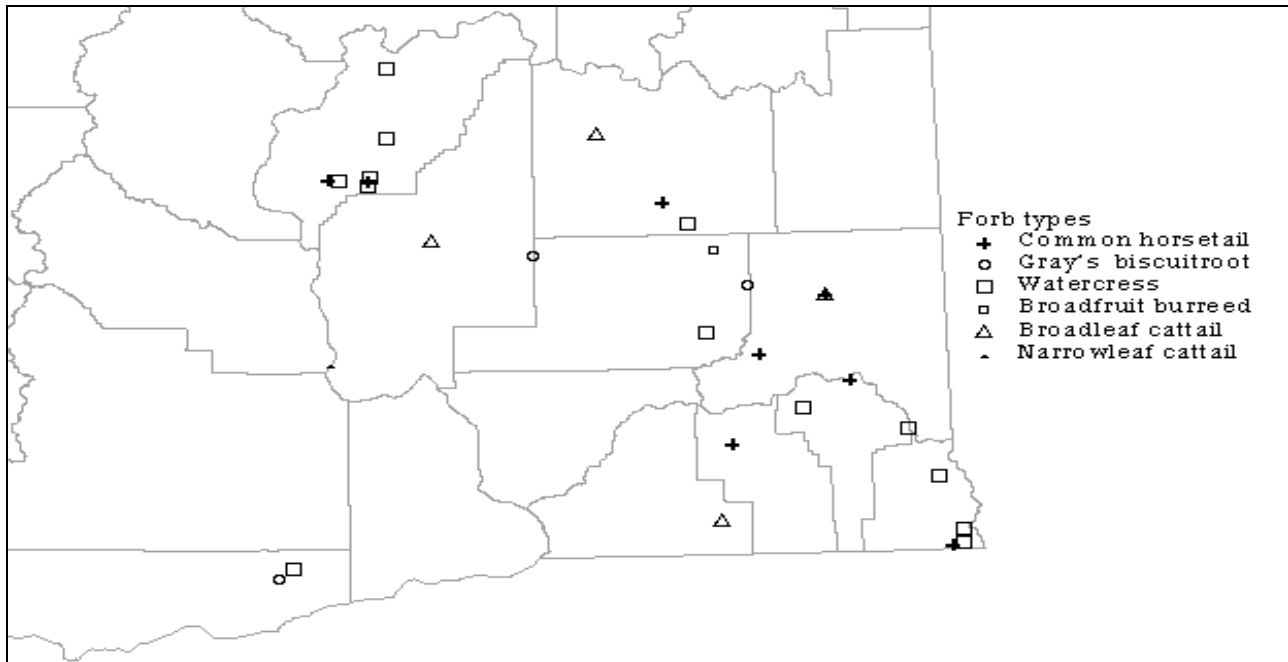
LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	13	1	30
Grasses	27	20	40
Grasslikes	0	0	0
Forbs	14	10	20
Non-vascular	5	5	5

COMMON SPECIES	n=3 constancy	cover average	min	max
Trees	0%			
Shrubs				
Artemisia tridentata ssp. tridentata	33%	30	30	30
Ericameria nauseosa ssp. nauseosa	33%	8	8	8
Artemisia tridentata ssp. wyomingensis	33%	3	3	3
Graminoids				
Bromus tectorum	100%	13	8	20
Poa secunda	100%	8	1	20
Pseudoroegneria spicata	100%	6	3	13
Elymus lanceolatus	33%	30	30	30
Vulpia spp	33%	10	10	10
Forbs				
Achillea millefolium	67%	1	1	1
Equisetum laevigatum	33%	20	20	20
Epilobium minutum	33%	8	8	8
Pteryxia terebinthina var. terebinthina	33%	8	8	8
Artemisia biennis	33%	3	3	3
Moss and Lichen	33%	5	5	5

Classification. This is a previously undescribed riparian type. It is similar to upland big sagebrush communities and is usually included within the variation of those types.

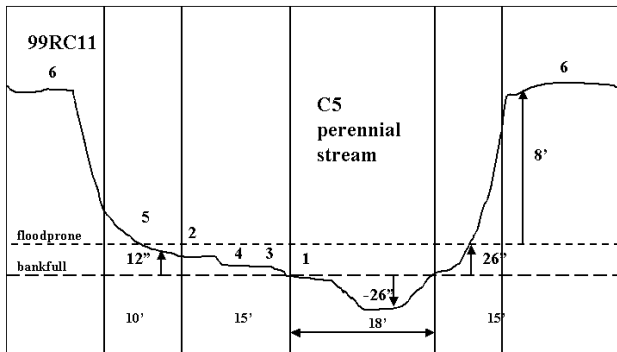
Forb Riparian Vegetation Types

Plot locations



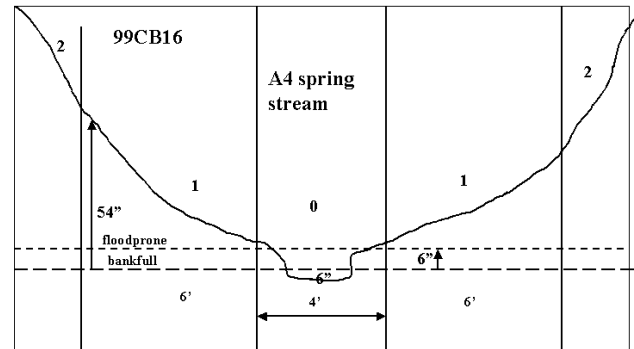
Selected stream profiles

F1



Stream and riparian vegetation profile at Coal Creek, Lincoln County. 1= reed canarygrass, 2= common horsetail, 3= woolly sedge – common spikerush and 4= Nebraska sedge - silverweed cinquefoil, 5= Baltic rush, and 6= basin wildrye - cheatgrass.

F2



Stream and riparian vegetation profile at Green Creek, Asotin County. 0 =watercress, 1=black hawthorn / common snowberry, and 2 = bunchgrass uplands.

Forb Riparian Types

Common Horsetail community type *Equisetum arvense* community type (EQUARV)

NVC code: none

Plots 99CB100, 99CB501 99CB502, 99CB701, 99CB702, 99CB704, 99RC112, 00RC191, 02RC092, 02RC132

Location. This herbaceous community type is similar to a type described in Oregon. Sample locations are in Aostin, Columbia, Douglas, Lincoln, and Whitman counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	12.5	4.5	36.7
width of floodplain (ft)	24.8	9	68
entrenchment ratio	1.9	1.2	2.6
stream gradient (%)	2.5	0.5	5
Rosgen types	A3, B1, 2 B6, C5, E3, F6		

Fluvial setting. This community appears in valleys with 1-3% gradients and 30 to 1000 feet wide. Surface slopes varied from 1 to 56%. Communities appear on various positions near bankfull to well above bankfull. Surface soil layer are 5 to 14 inches thick and have fine sandy loam to silty clay loam texture. Subsurface layers vary from gravel to buried histic soils. The higher terraces are sub-irrigated from adjacent slopes. Most of these sites have evidence of scouring flood events. See representative stream profiles F1 page 90 and S5 page 36.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.7	-0.6	7.5
percent slope	18.2	1	56
Position	2 floodplain, abandon channel, 2 channel shelves, 2 first terraces, streambank		

PERCENT OF GROUND COVER	average	min	max
Litter	67	0	99
Moss	1	0	10
Bareground	16	1	50
Gravel	4	0	20
Cobble-boulder	5	0	40
Bedrock	0	0	3
Water	7	0	70

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	22	1	60
texture	Silt loam, fine sandy loam, sandy clay loam, silty clay loam		

Vegetation. Common horsetail dominates or co-dominates all plots with 30-80% cover. Baltic rush is co-dominant on some of those sites. Kentucky bluegrass is the most consistent companion and sometimes occurs abundantly. Other species that dominated individual plots were smooth brome, common spikerush, and small-fruited bulrush.

Several tree and shrub species occur in this community and usually represent remnants of previous vegetation.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	6	1	10
Shrubs	4	1	13
Grasses	16	1	60
Grasslikes	37	1	90
Forbs	65	30	100
Non-vascular	1	1	1

COMMON SPECIES	n=10		cover	
	constancy	average	min	max
Trees				
<i>Salix alba</i>	10%	10	10	10
<i>Populus balsamorhiza</i> ssp. <i>trichocarpa</i>	10%	8	8	8
<i>Salix amygdaloides</i>	10%	5	5	5
<i>Acer negundo</i>	10%	1	1	1
<i>Betula occidentalis</i>	10%	1	1	1
<i>Crataegus douglasii</i>	10%	1	1	1
Shrubs				
<i>Philadelphus lewisii</i>	20%	5	1	10
<i>Salix exigua</i>	20%	5	1	10
<i>Artemisia ludoviciana</i>	20%	4	1	8
Graminoids				
<i>Poa pratensis</i>	70%	11	3	30
<i>Juncus balticus</i>	50%	33	1	90
<i>Eleocharis palustris</i>	40%	16	1	50
<i>Scirpus microcarpus</i>	30%	14	1	40
Forbs				
<i>Equisetum arvense</i>	100%	56	30	90
<i>Amsinckia lycopsoides</i>	50%	1	1	1
Moss and Lichen				
	20%	1	1	1

Classification. This may represent the common horsetail type described by Titus et al. (1998, 6 plots) or by Crowe and Clausnitzer (1997, 5 plots). The wide range of co-dominant species and environments indicate that this is either an early seral community with a wide natural range of variation or a cover type containing several yet described community types. Further sampling may indicate splitting this broad type into different community types. Several plots have affinities with this common horsetail type although dominated by different tree species: **Yellow willow / common horsetail** (*Salix lutea* / *Equisetum arvense*) community, plot 00RC201, **black cottonwood/ common horsetail**, plot 02RC131, and described types: **white alder/ common horsetail, water birch / common horsetail, and peachleaf willow/ common horsetail** community types. All are on a scoured reaches on which the woody component is likely a legacy of a previous community/fluvial environment.

Gray's biscuitroot community type
***Lomatium grayi* community type**
(LOMGRA)

NVC code: none

Plots 02RC022, 02RC143, 02RC0150

Location. This herbaceous community is a previously unrecognized type although similar communities are known at other eastern Washington and Oregon locales. It was sampled in Klickitat, Grant and Whitman counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	69.6	18	166.7
width of floodplain (ft)	67	60	76
entrenchment ratio	2.3	1.3	3.3
stream gradient (%)	1.8	1	3
Rosgen types	2 B3, E6		

Fluvial setting. This community occurs in ephemeral and intermittent streambeds and abandon channels with gravelly to cobbly channels. It was sampled in broad canyons with low stream gradients. Sites are generally concave and appear to occasionally flood appear to scour the channel when they do flood.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.6	-0.5	2.0
percent slope	4.3	1	10
Position	Channel, abandoned channel, first terrace		

PERCENT OF GROUND COVER			
Litter	16	10	25
Moss	3	0	8
Bareground	15	1	25
Gravel	58	35	90
Cobble-boulder	9	1	20
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=1)	73	70	80
texture	Sandy loam, sandy clay loam		

Vegetation. This is an open herbaceous community that is less than a foot tall. Annuals and perennials with short growing seasons dominate this community. Gray's biscuitroot is usually present and common although other biscuitroot species (*L. columbianum*, *L. dissectum*) have been observed to dominate similar fluvial surfaces elsewhere in eastern Washington. Sprouting shrubs and vines, white sagebrush and white clematis, are frequently present with less than 5% cover. Grasses, usually bulbous bluegrass, Sandberg's bluegrass and cheatgrass, typically display low cover although patches of rhizomatous grass (quackgrass) occur in areas with more fine textured soil. Important forbs include curlycup gumweed, field bindweed, and lambsquarters. This type appeared adjacent to deeper soil sites in the floodplain with Wyoming or

basin big sagebrush communities.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	0	0	0
Shrubs	2	1	3
Grasses	11	3	20
Grasslikes	0	0	0
Forbs	47	20	70
Non-vascular	10	10	10

COMMON SPECIES	n=3	cover		
	constancy	average	min	max
Trees	0%			
Shrubs				
<i>Artemisia ludoviciana</i>	67%	2	1	3
<i>Clematis ligusticifolia</i>	67%	1	1	1
Graminoids				
<i>Poa bulbosa</i>	100%	2	1	5
<i>Poa secunda</i>	67%	2	2	3
<i>Bromus tectorum</i>	67%	1	1	1
<i>Elytrigia repens</i> var. <i>repens</i>	33%	20	20	20
<i>Agropyron cristatum</i>	33%	1	1	1
<i>Bromus japonicus</i>	33%	1	1	1
<i>Pseudoroegneria spicata</i>	33%	1	1	1
Forbs				
<i>Lomatium grayi</i>	100%	46.67	20	70
<i>Convolvulus arvensis</i>	33%	8	8	8
<i>Chenopodium album</i>	33%	3	3	3
<i>Grindelia squarrosa</i>	33%	3	3	3
Moss and Lichen	33%	10	10	10

Classification. This type is a previously unrecognized community. It has environmental characteristics and floristic similarities with the white sagebrush associations, particularly those in ephemeral channels.

Watercress community type
***Rorippa nasturtium-aquaticum* community type**
(RORNAS)

NVC code: none

Plots 98RC200, 99CB1300, 99CB1600, 99CB1800, 99CB2000, 99CB2100, 99RC180, 00RC130, 00RC200, 02RC010, 02RC071, 02RC080, 02RC201

Location. This community type is found throughout the western United States. In Washington, it has been sampled in Adams, Asotin, Douglas, Garfield, Grant, Klickitat, and Lincoln counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	16.5	7.2	33.3
width of floodplain (ft)	25.3	5.7	68
entrenchment ratio	2.7	1.2	12
stream gradient (%)	4.6	0.5	13
Rosgen types	A1, 2 A3a, A4, 2 B3, 2 B4, C2, C3, F3b, F4, spring		

Fluvial setting. This community typically occurred with moderate to low stream gradients and relatively narrow stream widths. This community occurred along spring-fed channels and at a spring source. It appears at and below the floodprone zone on sites that are perennially flooded. At time of sampling, most of the sites were under slow moving water. Any exposed surface was either rock or gravel. Most soils are organic and shallow although a gleyed horizon appeared 16 inches below a mucky, organic surface layer at one sample site. See representative stream profile S4 page 36.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	-0.7	-1.3	0.0
percent slope	4.5	0.5	13
Position	11 channel shelves, 2 spring channels		

PERCENT OF GROUND COVER			
Litter	24	0	90
Moss	3	0	15
Bareground	1	0	10
Gravel	8	0	40
Cobble-boulder	18	0	50
Bedrock	1	0	10
Water	45	5	94

SOIL SURFACE HORIZON			
percent of coarse fragments (n=3)	0	0	0
texture	hemic, sapric, sandy clay loam		

Vegetation. This is a dense herbaceous community dominated by annual aquatic species that typically is less than 6 inches tall. It may be underneath overhanging shrubs or tall marsh plants growing on adjacent, higher fluvial surfaces. Watercress is dominant in all sites and was always associated with either seep monkeyflower or

water speedwell or both. Species from adjacent less wet surfaces are present and varied by sites. This community occurred in the channel adjacent to white alder / Lewis' mockorange, black hawthorn, snowberry, serviceberry / western poison ivy community and Nebraska sedge communities.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	1	1	1
Shrubs	1	1	1
Grasses	8	1	40
Grasslikes	6	1	20
Forbs	54	1	100
Non-vascular	12	1	30

COMMON SPECIES	n=13 constancy	cover average	min	max
Trees				
Salix amygdaloides	8%	1	1	1
Shrubs				
Salix lutea	8%	1	1	1
Graminoids				
Agrostis stolonifera	38%	9	1	40
Polypogon monspeliensis	23%	2	1	3
Eleocharis palustris	15%	2	1	3
Glyceria striata	15%	3	3	3
Juncus balticus	15%	7	1	13
Phalaris arundinacea	8%	13	13	13
Forbs				
Rorippa nasturtium-aquaticum	92%	44	1	100
Veronica anagallis-aquatica	85%	4	1	20
Mimulus guttatus	69%	7	1	40
Urtica dioica	38%	1	1	3
Moss and Lichen				
	23%	12	1	30

Classification. Evans (1989) noted that was relatively common on slow moving streams and springs in central Washington. The Oregon Natural Heritage Program (1998) listed one plot for this association.

Broadleaf cattail association
***Typha latifolia* association (TYPLAT)**
 NVC code: CEGL002010

Plots 99RC211, 99CB503, 00RC211, 02RC130

Location. This herbaceous community is found throughout the United States. It has been observed in Adams, Lincoln, Grant, Benton and Yakima counties in the Columbia Basin and is described in the mountains of eastern Washington. Samples are from Lincoln, Columbia, Grant and Whitman counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	36.6	8.3	93.8
width of floodplain (ft)	514	15	1500
entrenchment ratio	12.4	1.1	53.6
stream gradient (%)	0.9	0.0	3
Rosgen types	B1, C6, 2 E6, 2 F1,F3		

Fluvial setting. This community is associated with river and lake shorelines prone to yearly flooding and with soils that often stay flooded throughout the growing season. It was sampled in valleys over 300 feet wide with 1% or less gradients. It occurs at or below bankfull. This community was sampled on streambanks and muddy point bars associated with slow-moving perennial streams and reservoirs, ponds or lakes. Soils typically have high organic content in surface layers and are associated with trapped fine-textured mineral particles. All sites were flooded at the time of sampling.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.1	-0.3	0.8
percent slope	0.9	0	3
position	2 channel shelves, floodplain, gravelbar, 2 streambanks, lake edge		

PERCENT OF GROUND COVER	average	min	max
Litter	33	5	59
Moss	0	0	0
Bareground	17	0	40
Gravel	0	0	1
Cobble-boulder	0	0	0
Bedrock	0	0	0
Water	50	0	80

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=3)	0	0	0
texture	2 hemic, silt loam		

Vegetation. This is a dense herbaceous community dominated by 10-foot tall hard-stem bulrush, an aggressive rhizomatous species. Hard-stem bulrush can be the only species present. Broadleaf cattail is a common associate and forms a transition to pure cattail-dominated communities. It is adjacent to the channel and wet meadow or salt meadow communities.

Management information applicable to this type is

summarized in Hansen et al. (1995 page 448) merged with soft-stem bulrush communities.

LAYER PERCENT COVER	average	min	max
Overstory trees	0	0	0
Understory trees	1	1	1
Shrubs	1	1	1
Grasses	11	3	20
Grasslikes	18	1	30
Forbs	77	30	100
Non-vascular	0	0	0

COMMON SPECIES	n=4	cover		
	constancy	average	min	max
Trees				
Salix alba	25%	1	1	1
Shrubs				
Salix exigua	25%	1	1	1
Graminoids				
Schoenoplectus acutus	50%	22	13	30
Phalaris arundinacea	50%	12	3	20
Scirpus microcarpus	50%	2	1	3
Juncus balticus	25%	30	30	30
Carex utriculata	0%			
Glyceria striata	0%			
Forbs				
Typha latifolia	100%	68	20	90
Equisetum arvense	50%	9	3	15
Rorippa nasturtium-aquaticum	25%	50	50	50
Lemna minor	25%	13	13	13
Polygonum hydropiper	25%	8	8	8

Classification. This is the same association as described by Jankovsky-Jones et al. (2001) in southeast Idaho. This community has been merged with hard and/or soft-stem bulrush communities (Crawford 2001). A **narrowleaf cattail** community (plot 00RC031) found along a “tidal” environment created by fluctuations along a reservoir edge maybe a distinct type from broadleaf cattail association.

Other Forb Riparian Types

Broadfruit burreed community ***Sparganium eurycarpum* plot (SPAEUR)**

Plot 98RC231

This herbaceous vegetation has been observed in Adams and Lincoln counties although not sampled in the latter. It also is recognized in Oregon and western Washington. This 5-foot tall herbaceous community was sampled on a channel shelf 6 inches below bankfull on B3c Rosgen stream type. This community is associated with sites prone to yearly flooding and with soils that can stay flooded throughout the growing season. It was sampled in a narrow canyon with low stream gradient. Soil was high in organic content in the surface layer and associated with fine-textured mineral soil. This is a dense herbaceous community is dominated by a rhizomatous species that looks superficially like broadleaf cattail. Broadleaf burreed dominated the sample and occurred with common spikerush. This site appeared along the channel and reed canarygrass communities. This type is undescribed from east of the Cascades. A similar cover type has been described from western Washington. Evans (1989) notes that this community is common in Lincoln County. Pertinent management information on key species appears in Table 2.

Perennial pepperweed ***Lepidium latifolium* community (LEPLAT)**

NVC code: none

Plots 00RC011, 00RC021

Perennial pepperweed is an exotic plant (Class B Weed, Wa. Department of Agriculture) that appears to be creating a new community type. This herbaceous vegetation has been observed in Grant and Yakima counties and is likely in surrounding counties. This 4 to 6-foot tall herbaceous community was sampled along the wet fringe of lower Crab Creek. This community is associated with sites prone to yearly flooding and with soils that can stay flooded throughout the growing season. It was sampled in a broad canyon with low stream gradient. Soil surface layers and associated with fine-textured mineral soil. The stream is a Rosgen E6 stream type that is part of a regulated hydrologic system dominated by irrigation. The soil surface is completely obscured by litter. This is a dense herbaceous community dominated by an aggressively invasive, rhizomatous species. Most of the associated species are wet site species that are tolerant of disturbance, such as, Baltic rush, Canada thistle, Fuller's teasel, and stinging nettle. Both broadleaf cattail and hardstem bulrush are present.

Aquatic Forb Riparian Types

Whitewater crowfoot community ***Ranunculus aquatilis* plot (RANAQU)**

NVC code: none

Plot 98RC0042

This submerged vegetation has been observed in aquatic beds across Washington and Oregon. It was sampled in the channel of a C1 Rosgen stream type and associated with perennially flooded channels with a rocky, cobbly bottom. It was in a broad canyon with low stream gradient. This is often a dense herbaceous community dominated by a perennial aquatic plants. The only other common vascular species were common duckweed, arumleaf arrowhead, and pondweed species. Algae, Moss and Lichen, and freshwater sponges have been observed with this community. The sample site occurs in the channel adjacent to a woolly sedge community. This type is undescribed although it may resemble the *Ranunculus aquatilis* - *Callitriche palustris* herbaceous vegetation (CEGL001984) described in Colorado. A similar communityt this one is recognized by Titus et al. 1998.

Canadian waterweed community ***Eleodea canadensis* plot (ELECAN)**

NVC code: none

Plot 99CB400

This submerged vegetation has been observed in aquatic beds across Washington and Oregon. It was sampled in the channel of a F3 Rosgen stream type and associated with perennially flooded channels with a rocky, cobbly bottom. It was in a broad canyon with low stream gradient. This is often a dense herbaceous community dominated by a perennial aquatic plants. Algae, and Moss and Lichen were observed in this community. The sample site occurs in the channel adjacent to the exotic dominated indigobush community. A similar communityt this one is recognized by Titus et al. 1998.

Columbia Basin Riparian Associations not sampled

Several reports from different parts of the Columbia Basin in Washington have listed riparian vegetation types, most of which have affinities to or are the equivalent to the those described in this report. The following is a list of types recognized by other authors but not discussed in this report. Each type appears with its expected environmental distribution in the Washington and the author of the type.

NVC code	Community type	Habitat	Source	plot #
	Tree- dominated			
CEGL000668	Populus balsamifera ssp. trichocarpa - Alnus rhombifolia Forest	river terrace	Daubenmire 1970	0
			Evans 1989	2
CEGL000667	Populus balsamifera ssp. trichocarpa / Alnus incana Forest	river terrace	Kovalchik 1992	10
CEGL000671	Populus balsamifera ssp. trichocarpa / Cicuta douglasii Forest	river terrace	Daubenmire 1970	0
none	Populus balsamifera ssp. trichocarpa / Equisetum hymenale Forest	floodplain	Salstrom & Easterly 1995	1
CEGL000577	Populus tremuloides / Carex pellita Forest	springs	Kovalchik 1992	3
CEGL001081	Betula occidentalis / Crataegus douglasii Shrubland	river terrace	Evans 1989	1
CEGL000948	Salix amygdaloides / Salix exigua Woodland	floodplain	Evans 1989	1
CEGL001215	Salix lucida ssp. caudata Shrubland [Provisional]	floodplain	Evans 1989	7
	Grass and Graminoid dominated			
CEGL001843	Scirpus maritimus Herbaceous Vegetation	river edge	Salstrom & Easterly 1995	4
CEGL001516	Sporobolus cryptandrus - Poa secunda	river bar	Daubenmire 1970 Tisdale 1986	4 6
CEGL001475	Phragmites australis Herbaceous Vegetation	pond edge	Evans 1989	2
	Forb dominated			
none	Apocynum cannabinum-A. (lindleyana, ludoviciana)	river bar	Salstrom & Easterly 1995	4
CEGL002001	Nuphar lutea ssp. polysepala Herbaceous Vegetation	pond	Kovalchik 1992	5

References

- Alt, D.D. and D.W. Hyndman. 1984. *Roadside Geology of Washington*. Mountain Press Publ.. Missoula. 282p.
- Anderson, M., P. Bourgeron, M.T. Bryer, R. Crawford, L. Engelking, D. Faber-Langendoen, M. Gallyoun, K. Goodin, D.H. Grossman, S. Landaal, K. Metzler, K.D. Patterson, M. Pyne, M. Reid, L. Sneddon, and A. Weakley. 1998. *International classification of ecological communities: terrestrial vegetation of the United States*. Vol. II. *National Vegetation Classification System: list of types*. The Nature Conservancy, Arlington, VI. 502p.
- Barrett, H., J. Cagney, R. Clark, J. Fogg, K. Gebhart, P.L. Hansen, B. Mitchell, D. Prichard, and D. Tippy. 1995-revised edition. *Riparian Area Management: Process for assessing proper functioning condition*. TR 1737-9. Bureau of Land Management. Denver, CO. 51p.
- Bjork, C.R. 1997. *Vernal Pools of the Columbia Plateau, Eastern Washington*. Report for The Nature Conservancy, WA Field Office, Seattle. 28p.
- Braatne, J.H. and B. Jamieson. 2001. *The impacts of flow regulation on riparian cottonwood forest on the Yakima River*. Report for the Bonneville Admin. Portland, OR. 47pp.
- Chappell, C.B. 1999. *Low elevation riparian vegetation on the western Olympic Peninsula: A preliminary classification and description*. Presented paper at Northwest Science 1999 annual meeting, Tacoma, WA. Abstract A122.
- Cowardin, L.M., V. Carter, F.C. Golet and E.T. La Roe. 1979. *Classification of wetland and deepwater habitats of the United States*. USDI. FWS/OBS-79/31. 103 p.
- Crawford, R.C. 1998. *Riparian and wetland vegetation classification and characterization along Cow Creek, Adams County, Washington*. Report to Adams County Conservation District and The Environmental Protection Agency, Seattle. 31 p.
- Crawford, R.C. 2000. *Riparian and wetland vegetation classification and characterization Lincoln County, Washington*. Report to the Bureau of Land Management, Lincoln County Conservation District, and The Environmental Protection Agency, Seattle. 75 pp.
- Crawford, R.C. 2001. *Initial riparian and wetland vegetation classification and characterization of the Columbia Basin in Washington*. Report to the Bureau of Land Management, Lincoln County Conservation District, and The Environmental Protection Agency, Seattle. 83 pp.
- Crowe, E.A. and R.R. Clausnitzer. 1997. *Mid-Montane Wetland Plant Associations of the Malheur, Umatilla and Wallowa-Whitman National Forests*. USDA For. Ser. PNW Tech Paper R6-NR-ECOL-TP-22-97. 299 p.
- Daubenmire, R.F. 1970. *Steppe Vegetation Washington*. Tech. Bull. 62 Wash. State University. 131 p.
- Evans, S. 1989. *Provisional Riparian and Aquatic Wetland Plant Communities of the Columbia Plateau, Washington*. Wash. Dept Ecology. File Report. 52 p.
- Federal Geographic Data Committee. 1997. www.nbs.gov/fgdc.veg/standards/vegstd.htm
- Fire Effects Information System [Data base]. Missoula, MT: U.S. D. A. Forest Service, Intermountain Research Station, Intermountain Fire Sciences. Laboratory. 1989. <http://www.fs.fed.us/database/feis/plants/tree/html>.
- Hansen, P.L., R.D. Pfister, K. Boggs, B.J. Cook, J. Joy, and D.K. Hinckley. 1995. *Classification and Management of Montana's Riparian and Wetland Sites*. University of Montana. Misc. Publ. No.54. 646 p.
- John, T., D. Tart. And R. Clausnitzer 1988. *Forested plant associations of the Yakima Indian Reservation*. Draft Filed Guide - BIA-SCS. Toppenish, WA. 135p.

- Jankovsky-Jones, M. C. Murphy, C. Coulter, R.K. Moseley. 2001. Riparian and Wetland plant associations of southwest Idaho. Idaho Fish and Game, Idaho Conservation Data Center. 191 pp. plus appendix.
- Kovalchik, B.L. 1987. Riparian zone associations: Deschutes, Ochoco, Fremont, and Winema National Forests. USDA For. Ser. PNW Tech Paper R6-NR-ECOL-TP-279. 171p.
- Kovalchik, B.L. 1992. Riparian zone associations on the National Forest of eastern Washington. USDA For. Ser. PNW DRAFT 203 p.
- Kovalchik, B.L. 2001. Classification and Management of Aquatic, Riparian, and Wetland Sites on the National Forests of eastern Washington. (Part 1: Series Descriptions) USFS PNW on-line draft. Portland, OR. 544 pp.
http://www.reo.gov/col/wetland_classification/wetland_classification.pdf.
- Kartesz, J.T. 1999. A Synonymized Checklist and Atlas with Biological Attributes for the Vascular Flora of the United States, Canada, and Greenland. First Edition. In: Kartesz, J.T., and C.A. Meacham. Synthesis of the North American Flora, Version 1.0. North Carolina Botanical Garden, Chapel Hill, NC.
- Lowrance, R., R. Leonard, and J. Sheridan. 1985. Managing riparian ecosystems to control nonpoint pollution. Jour. Soil and Water Cons. 40:87-91.
- Manning, M.E. and W.G. Paggett. 1996. Riparian Community Type Classification for Humbolt and Toiyabe National Forests, Nevada and Eastern California. R4-ECOL-95-01. 306 p.
- McCune, B. and M.J. Mefford. 1997. PC-ORD. Multivariate Analysis of Ecological Data, version 3.0. MjM Software Design, Gleneden Beach, OR.
- Miller, T. B. 1976. Ecology of riparian communities dominated by white alder in western Idaho. Unpublished thesis. University of Idaho, Moscow. 154 p.
- Padgett, W. G., A. P. Youngblood, and A. H. Winward. 1989. Riparian community type classification of Utah and southeastern Idaho. USDA Forest Service, Intermountain Region. Report R4-ECOL-89-01. Ogden, UT. 191 pp.
- Reid, M. and P. Bourgeron. 1993. Vegetation survey design for conservation: gradsect directed transects of riparian communities in northwestern Colorado. File Report The Nature Conservancy. Boulder, CO. 29 p.
- Rosgen, Dave. 1996. Applied River Morphology. Pagosa Springs, Co. Wildland Hydrology. 352p.
- Salstrom, D. and R. Easterly. 1995. Riparian plant communities: South shore and islands of the Columbia River on the Hanford site, Washington. Report to The Nature Conservancy and U.S. Department of Energy.
- Scott, M.L., J.M. Friedman, and G.T. Auble. 1996. Fluvial process and establishment of bottomland trees. Geomorphology 14:327-339.
- Stoffel, K.L., N.L. Joseph, S.Z. Waggoner, C.W. Gullick, M.A. Korosec and B. Bunning. 1991. Geologic Map of Washington – Northeast Quadrant. WA DNR Div of Geology and Earth Science. Geol. Map GM-39.
- Titus, J.H., M. Kerr, E. Crowe, and B. Kovalchik. 1998. Riparian zones of eastern Oregon. Oregon Natural Heritage File report. Oregon Dept. of Agriculture and The Nature Conservancy. Portland OR.
- USDA, NRCS. 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). [National Plant Data Center](http://plants.usda.gov), Baton Rouge, LA.
- Vander Haegen, M., F. C. Dobler, and D. J. Pierce. 2000. Shrubsteppe Bird Response to Habitat and Landscape Variables in Eastern Washington, U.S.A. Cons. Bio. 14(4): 1145-1160.
- Youngblood, A. P., W. G. Padgett, and A. H. Winward. 1985. Riparian community type classification of northern Utah and adjacent Idaho. Unpublished report prepared for USDA Forest Service, Intermountain Region, Ogden, UT. 104 pp.

Appendix A: Constancy and average cover of species.

Appendix A: Constancy and average cover of selected species.

CON = constancy expressed as percent of plots in which a species occurred. COV = average cover of species in plots in which it occurred.

Quaking aspen and Black cottonwood types

	POPTRE/ CORSER n=4		POPTRE/ SYMALB n=4		POPTRE/ CRADOU/ SYMALB 98RC0251	POPBAT/ SYMALB n=3		POPBAT- JUNSCO n=2		POPBAT/ CORSER 02RC031	POPBAT/ PHILEW 99CB1701	POPBAT/ SALEXI 00RC073
SPECIES	CON	COV	CON	COV	COV	CON	COV	CON	COV	COV	COV	COV
Overstory Trees												
<i>Alnus incana</i>	25%	30										
<i>Betula occidentalis</i>			25%	1							70	
<i>Populus balsamorrhiza</i> ssp. <i>trichocarpa</i>						100%	80	100%	60	80	90	40
<i>Populus tremuloides</i>	100%	19	100%	48	60							
<i>Prunus virginiana</i>	25%	8	25%	8		67%	6					1
<i>Ulmus pumila</i>								50%	8			
Understory Trees												
<i>Alnus incana</i>	25%	8						50%	60			
<i>Betula occidentalis</i>											20	
<i>Crataegus douglasii</i>			25%	1	50	33%	20				10	
<i>Juniperus scopulorum</i>								100%	30			
<i>Populus balsamorrhiza</i> ssp. <i>trichocarpa</i>						100%	8	100%	3			60
<i>Populus tremuloides</i>	100%	18	100%	18	8							
<i>Prunus virginiana</i>	75%	9	100%	3		100%	36				10	
<i>Salix alba</i>						33%	10					
<i>Ulmus pumila</i>								100%	6			
Shrubs												
<i>Acer glabrum</i>	25%	8				33%	3				1	
<i>Amelanchier alnifolia</i>	25%	1	25%	3		33%	20				1	
<i>Clematis ligusticifolia</i>	25%	3	50%	1		100%	3					
<i>Cornus sericea</i>	100%	73	50%	5	8	33%	13			95	3	
<i>Holodiscus discolor</i>	25%	3				33%	8			1	80	
<i>Philadelphus lewisii</i>						100%	9			1	80	
<i>Physocarpus malvaceus</i>						33%	10				1	

Ribes aureum	50%	5	75%	19	1	33%	3			1		
Ribes cereum var. cereum	25%	1				33%	1					
Rosa multiflora								100%	29			
Rosa woodsii	75%	10	100%	28	13			50%	3			
Rubus parviflorus											30	
Salix exigua								50%	8			50
Symphoricarpos albus	50%	3	100%	47		100%	77			20		
Toxicodendron rydbergii	50%	1									30	
Grasses and Grasslikes												
Agrostis stolonifera	25%	1			3			50%	1			20
Carex lanuginosa					8							
Elymus glaucus	50%	2	25%	1		33%	8					
Phalaris arundinacea	25%	8			60	67%	1	100%	3			
Poa pratensis	25%	3	50%	5		33%	20	50%	1	5		20
Forbs												
Amsinckia lycopsoides			50%	3								
Cirsium arvense	25%	20	50%	5		33%	1					1
Claytonia perfoliata ssp. perfoliata	50%	11	50%	3		33%	1			5	1	
Cynoglossum officinale						67%	1					
Equisetum arvense						33%	3					3
Equisetum laevigatum								100%	3			
Galium aparine	25%	3	50%	17	1	33%	1			10	3	
Heracleum maximum	25%	1	25%	8		33%	40					
Maianthemum stellatum	100%	14	50%	8		67%	7			10	30	
Osmorhiza berteroi			25%	13								
Osmorhiza pupurea						33%	1					3
Urtica dioica	75%	6	50%	16	1	100%	1					
Veronica anagallis-aquatica					13							
Mosses/Lichens											10	

Oregon white oak, White alder, and Conifer types

SPECIES	QUEGAR/ PHILEW- SYMALB n=3		QUEGAR/ ELGL 02RC063	ALNRHO/ EQUARV n=3		ALNRHO/ PHILEW n=7		ALNRHO/ BETOCC n=2		ALNRHO/ PHILEW- CORSER 02RC054	ALNRHO/ CELRET 99CB2301	PINPON/ SYMALB floodplain 00RC231	JUNOCC/ PHILEW- SALLAS 02RC013	JUNOCC/ PSESPI 02RC023
	CON	COV	COV	CON	COV	CON	COV	CON	COV	COV	COV	COV	COV	COV
Overstory Trees														
Acer macrophyllum	33%	60												
Alnus rhombifolia	33%	60		100%	63	100%	73	100%	55	80	100			
Betula occidentalis								100%	63					
Juniperus occidentalis													20	20
Pinus ponderosa												50		
Populus balsamorrhiza ssp. trichocarpa	67%	13												
Quercus garryana	100%	28	80			14%	1							
Understory Trees														
Acer macrophyllum	33%	30												
Alnus rhombifolia	33%	8		67%	17	71%	19	100%	15	1	10			
Betula occidentalis				33%	1	14%	3	100%	25					
Celtis laevigata var. reticulata						14%	1				60			
Crataegus douglasii								100%	7					
Juniperus occidentalis													1	1
Pinus ponderosa	33%	1												
Populus balsamorrhiza ssp. trichocarpa	33%	1				14%	1							
Prunus virginiana	67%	50				43%	2					3		
Quercus garryana	100%	4	5			29%	2			1				
Shrubs														
Acer glabrum								100%	2		1			
Amelanchier alnifolia												40		
Artemisia tridentata ssp. tridentata													1	5
Clematis ligusticifolia	33%	1				71%	2	50%	1	1			1	
Cornus sericea				67%	1	43%	2	100%	5	20				
Holodiscus discolor	100%	7		33%	1	43%	4	100%	7					1
Philadelphus lewisii	100%	23		67%	2	100%	36	100%	70	40	3	50	10	
Ribes lacustre						14%	1	100%	1		1			
Rosa woodsii	67%	5		33%	1	29%	1					13	5	
Rubus laciniatus											10			
Rubus parviflorus								100%	20					

Rubus ursinus				33%	1	29%	1				30				
Salix lasiolepis						14%	1							20	
Sambucus nigra ssp. cerulea						14%	1	100%	1		1				
Symphoricarpos albus	100%	23				14%	1	100%	25	1			20		1
Toxicodendron rydbergii	33%	1		33%	1	14%	1						20		
Grasses and Grasslikes															
Bromus inermis						14%	1						8		
Bromus sterilis	67%	5													
Bromus tectorum			1			86%	3					30		30	30
Carex deweyana				33%	1			100%	2						
Carex geyeri			20												
Elymus glaucus	100%	6	60	67%	1	71%	10	50%	1	5	1		8		
Phalaris arundinacea				33%	30										
Phleum pratense				33%	1										
Poa bulbosa	33%	1	8			29%	3							60	50
Poa pratensis	67%	5	10	67%	20	14%	1	100%	2		1		3		
Poa secunda															5
Pseudoroegneria spicata															30
Trisetum canescens						43%	5								
Forbs															
Claytonia perfoliata ssp. perfoliata	33%	3				100%	16	100%	1	30	1				
Lomatium dissectum	67%	1	1			29%	2								
Maianthemum stellatum	67%	1													
Dipsacus fullonum ssp. sylvestris				67%	1	14%	10					1			
Equisetum arvense				100%	37	14%	1								
Solanum dulcamara				33%	3	14%	1	100%	1						
Galium triflorum			2			29%	7								
Galium aparine						43%	3	50%	1	10	30		1		
Circaea alpina								100%	5						
Cirsium arvense				33%	1			100%	2						
Equisetum hyemale								50%	10						
Equisetum telmateia								50%	40						
Heracleum maximum								100%	10						
Hydrophyllum fendleri var. albifrons								100%	6						
Hypericum perforatum				67%	1			50%	1						
Urtica dioica				33%	1	29%	1	100%	6		3				
Mosses/Lichens				67%	11	29%	9	100%	13						

Thinleaf alder and Water birch types

SPECIES	ALNINC/ CORSER n=3		ALNINC/ SALLUT 00RC141	ALNINC/ ROSWOO 99RC173	ALNINC- BETOCC 99RC174	BETOCC/ CORSER n=5		BETOCC/ SYMALB n=3		BETOCC/ ROSWOO n=5		BETOCC/ PHILEW n=4		BETOCC/ EQARLA n=2	
	CON	COV	COV	COV	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
Overstory Trees															
<i>Alnus incana</i>	100%	73	40		20										
<i>Betula occidentalis</i>	33%	5			30	100%	34.2	33%	13	100%	64	75%	87	50%	30
<i>Crataegus douglasii</i>						20%	13								
<i>Prunus virginiana</i>								33%	8						
<i>Salix lucida</i> ssp. <i>caudata</i>	33%	13													
Understory Trees															
<i>Alnus incana</i>	33%	1	3	40											
<i>Betula occidentalis</i>	67%	11.5		1		100%	17.7	100%	12	60%	20.3	100%	30	50%	20
<i>Crataegus douglasii</i>						20%	20					25%	50		
<i>Elaeagnus angustifolia</i>														50%	1
<i>Populus tremuloides</i>	33%	1						33%	3						
<i>Prunus virginiana</i>	33%	3	1					100%	23.7	40%	4.5	50%	1		
Shrubs															
<i>Amelanchier alnifolia</i>	33%	1						100%	17.7			50%	1		
<i>Artemisia ludoviciana</i>					1					40%	3	25%	1		
<i>Clematis ligusticifolia</i>	67%	3		3	13	20%	1	100%	11.3	80%	9.25	75%	9	100%	5.5
<i>Cornus sericea</i>	100%	46.7				100%	54	67%	11.5						
<i>Holodiscus discolor</i>	33%	1						33%	20						
<i>Philadelphus lewisii</i>	33%	8				40%	16.5	67%	16.5	20%	1	100%	38	50%	1
<i>Ribes aureum</i>	67%	11.5	13		3	80%	5	33%	13	40%	3	50%	2		
<i>Ribes cereum</i> var. <i>cereum</i>	33%	1	3					33%	8						
<i>Ribes inerme</i>			30												
<i>Rosa woodsii</i>	67%	4.5	30	3	40	100%	6	67%	5.5	100%	10.8				
<i>Salix bebbiana</i>			3												
<i>Salix exigua</i>				1		20%	3								
<i>Salix lutea</i>	33%	20	40											50%	1
<i>Salix scouleriana</i>						20%	8	33%	20						
<i>Symphoricarpos albus</i>	33%	20	8			40%	7	100%	53.3	20%	3	25%	1		
<i>Toxicodendron rydbergii</i>						20%	8	33%	13	20%	1	75%	10	50%	8

Redosier dogwood, Black hawthorn, Rose, and Exotic tree and shrub types

SPECIES	CORSER n=6		CRADOU/ SYMALB n=2		CRADOU/ ROSWOO n=7		(POPTRE) CRADOU/ HERMAX 02RC172	CRADOU/ HERMAX 99CB1103	ROSA (WOO,NUT) n=3	SALALB n=3		ACENEG n=3		AMOFRU n=3		
	CON	COV	CON	COV	CON	COV	COV	COV	CON	COV	CON	COV	CON	COV	CON	COV
Overstory Trees																
Acer negundo											33%	20	100%	47		
Betula occidentalis	10%	8														
Crataegus douglasii					57%	63	20									
Gleditsia triacanthos													67%	27		
Juglans nigra													33%	50		
Pinus ponderosa								10								
Populus tremuloides							50									
Prunus virginiana	10%	3														
Salix alba											100%	70				
Understory Trees																
Acer negundo											33%	1	100%	31		
Alnus incana	10%	8														
Crataegus douglasii			100%	100	100%	36	8	60			33%	1				
Gleditsia triacanthos													67%	20		
Populus tremuloides	10%	3					3									
Prunus virginiana	50%	3			29%	16	3	3					67%	11		
Salix alba											100%	18				
Shrubs																
Amelanchier alnifolia			100%	10				10								
Amorpha fruticosa															100%	77
Artemisia ludoviciana	10%	1			43%	2			67%	1						
Cornus sericea	100%	76					3									
Holodiscus discolor			50%	20												
Philadelphus lewisii	30%	8	100%	51	14%	8							33%	40		
Physocarpus malvaceus			50%	20												
Ribes aureum	80%	12			100%	7			33%	13	33%	13				
Rosa nutkana									33%	13						
Rosa woodsii	80%	13			100%	22	3		67%	50						
Spiraea betulifolia			100%	15												
Symphoricarpos albus	40%	6	100%	55	57%	6	1						33%	1		

Sandbar, Yellow, Arroyo, Peachleaf, and Bebb willow types

SPECIES	SALEXI n=10		SALLUT- SALEXI n=6		SALLUT/ CORSER n=2		SALLUT- PHILEW 00RC151	SALLUT/ EQUAR 00RC201	SALLAS n=3		SALAMY/ EQUARV 02RC081	SALAMY- BETOCC 00RC172	SALBEB 02RC193
	CON	COV	CON	COV	CON	COV	COV	COV	CON	COV	COV	COV	COV
Trees													
<i>Alnus rhombifolia</i>										33%	1		
<i>Betula occidentalis</i>			17%	1								20	3
<i>Crataegus douglasii</i>	20%	3											
<i>Elaeagnus angustifolia</i>	10%	3											1
<i>Populus balsamorrhiza</i> ssp. <i>trichocarpa</i>			17%	13			1						
<i>Prunus virginiana</i>	10%	13											
<i>Salix amygdaloides</i>											100	80	
Shrubs													
<i>Artemisia ludoviciana</i>	20%	8	17%	1									
<i>Artemisia tridentata</i> ssp. <i>tridentata</i>									33%	1			
<i>Clematis ligusticifolia</i>	30%	1.67					13		67%	2.5	20		
<i>Cornus sericea</i>					29%	40		1					1
<i>Holodiscus discolor</i>							1		67%	1.5			
<i>Philadelphus lewisii</i>							20		100%	3	1		
<i>Ribes aureum</i>	20%	1							67%	4			
<i>Rosa nutkana</i>			17%	20								1	
<i>Rosa woodsii</i>	30%	3.33	17%	1	14%	30			33%	1			1
<i>Salix bebbiana</i>					14%	8							90
<i>Salix exigua</i>	100%	61	100%	51	14%	20		3					
<i>Salix lasiolepis</i>									100%	98.7			
<i>Salix lutea</i>	30%	1	100%	36	29%	60	80	70					
<i>Symphoricarpos albus</i>	10%	1			14%	1							
Grass and Grasslikes													
<i>Agrostis scabra</i>									67%	1			
<i>Agrostis stolonifera</i>	20%	4.5	50%	40	29%	2	1						1
<i>Bromus commutatus</i>									33%	2			
<i>Bromus inermis</i>			33%	17							13		
<i>Bromus japonicus</i>	10%	50											
<i>Bromus tectorum</i>	40%	20.3			14%	1			100%	1.67	1		
<i>Carex lanuginosa</i>													1

<i>Elymus glaucus</i>									33%	1			
<i>Elytrigia repens</i> var. <i>repens</i>	60%	14.3	33%	7									
<i>Glyceria striata</i>	10%	5											
<i>Lolium arundinaceum</i>			50%	15									
<i>Phalaris arundinacea</i>	70%	47.3	33%	25	14%	13		8				70	3
<i>Pharagmites australis</i>													3
<i>Poa bulbosa</i>	10%	1							67%	1			
<i>Poa palustris</i>			33%	7									
<i>Poa pratensis</i>	20%	2	17%	30	14%	3							
<i>Scirpus microcarpus</i>								30				1	1
<i>Trisetum canescens</i>									33%	2			
Forbs													
<i>Achillea millefolium</i>									33%	1			
<i>Anthriscus scandicina</i>	10%	1	17%	1									
<i>Apocynum cannabinum</i>	10%	8											3
<i>Cardaria draba</i>	20%	20.5											
<i>Circaea alpina</i>					14%	8							
<i>Cirsium arvense</i>	60%	4.5	33%	2									
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>					14%	3			33%	20			
<i>Conium maculatum</i>	30%	6.33											
<i>Equisetum arvense</i>	10%	1	33%	3	14%	3	1				30		3
<i>Equisetum hyemale</i>	20%	5.5	50%	4				70					30
<i>Equisetum laevigatum</i>	10%	1	33%	8								20	
<i>Euthamia occidentalis</i>	20%	4.5	17%	8									
<i>Galium aparine</i>	30%	2.33			29%	5.5			67%	1			
<i>Heracleum maximum</i>					14%	13							
<i>Lycopus americanus</i>			50%	3									
<i>Mimulus guttatus</i>	20%	5.5			14%	3			33%	2			
<i>Plantago major</i>	20%	4			14%	3							
<i>Polemonium pectinatum</i>	10%	1											
<i>Potentilla argentea</i>									67%	1			
<i>Rumex salicifolius</i>	40%	9.25			14%	1			33%	1			
<i>Solidago canadensis</i>	40%	1.5	17%	1									3
<i>Urtica dioica</i>	20%	2	33%	1	29%	3			67%	1	1	3	1
<i>Veronica anagallis-aquatica</i>	10%	13	17%	3	14%	3							
Mosses/Lichens	10%	5	33%	11					33%	5			10

Netleaf hackberry, Mockorange, Chokecherry, Serviceberry, White sagebrush and Smooth sumac types

SPECIES	CELRET/ PHILEW n=4		PHILEW/ SYMALB n=4		PHILEW/ CLELIG n=6		PRUVIR n=3		AMEALN- PHILEW n=3		AMEANL/ TOXRAD n=2		ARTLUD n=10		RHUGAL n=3	
	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV
Overstory Trees																
Betula occidentalis	25%	30														
Celtis laevigata var. reticulata	100%	78														
Prunus virginiana							67%	12								
Understory Trees																
Betula occidentalis	25%	10														
Celtis laevigata var. reticulata	100%	23													33%	1
Crataegus douglasii	50%	1					33%	1								
Populus balsamohiza ssp. trichocarpa			33%	3	33%	3							10%	1		
Prunus virginiana	50%	40	33%	10	33%	10	100%	25			50%	20	10%	1		
Shrubs																
Amelanchier alnifolia									67%	42	100%	22				
Artemisia ludoviciana							33%	1	33%	30	50%	1	100%	16		
Artemisia tridentata ssp. tridentata							33%	1	33%	3			20%	5		
Artemisia tridentata ssp. wyomingensis									67%	17						
Clematis ligusticifolia	50%	1	33%	20	33%	20	33%	1	33%	3	50%	3	20%	5		
Eriogonum niveum									67%	7			20%	1	33%	5
Holodiscus discolor	50%	2					67%	1								
Philadelphus lewisii	100%	30	100%	27	100%	27	33%	20	33%	30	50%	8	40%	2		
Physocarpus malvaceus			33%	1	33%	1										
Rhus glabra	75%	4					33%	1							100%	53
Ribes aureum	50%	3	33%	3	33%	3	67%	7			50%	8	10%	1		
Rosa canina	50%	1					33%	3					10%	1		
Rosa woodsii			33%	1	33%	1	67%	28			100%	8	10%	1		
Rubus ursinus	50%	40	33%	1	33%	1	33%	20								
Salix exigua	25%	10					67%	7					10%	3		
Salix lasiolepis							33%	20								
Sambucus nigra ssp. cerulea	75%	5														
Symphoricarpos albus			100%	7	100%	7	33%	1								
Toxicodendron rydbergii	100%	3	33%	30	33%	30	33%	1			100%	30				
Grass and Grasslikes																
Achnatherum occidentale															33%	30

Agrostis interrupta									33%	8	50%	1	30%	8		
Bromus japonicus								33%	8	33%	3	50%	10	30%	30	
Bromus tectorum	100%	48	67%	9	67%	9	100%	28	100%	33	100%	9	80%	15	100%	53
Calamagrostis rubescens			33%	5	33%	5										
Dichanthelium oligosanthes var. scribnerianum															33%	60
Elymus glaucus			67%	9	67%	9	33%	10			50%	3	10%	1		
Elymus lanceolatus									33%	8			10%	13		
Elytrigia repens var. repens													60%	10		
Festuca idahoensis							33%	3			50%	1				
Leymus cinereus									33%	3	50%	8	20%	2		
Muhlenbergia richardsonis													20%	3		
Phalaris arundinacea			33%	10	33%	10							10%	1	33%	1
Poa bulbosa	25%	1					33%	60	67%	12			30%	8	67%	6
Poa palustris			67%	6.5	67%	7										
Poa pratensis	25%	40	67%	5.5	67%	6	33%	1					20%	1	33%	30
Poa secunda							33%	8	33%	3			10%	1		
Poa secunda (junifolia)									100%	8			30%	8		
Polypogon monspeliensis											50%	13	20%	1		
Pseudoroegneria spicata			33%	3	33%	3			100%	3			10%	1	33%	30
Forbs																
Achillea millefolium	25%	1					33%	1	67%	1			80%	1		
Anthriscus scandicina							33%	5							33%	60
Arctium minus	25%	1	33%	1	33%	1							10%	1		
Cirsium arvense			67%	1	67%	1							30%	2		
Claytonia perfoliata ssp. perfoliata	75%	2					67%	9					10%	1	33%	1
Collinsia grandiflora			33%	1	33%	1							10%	1	33%	1
Cynoglossum officinale	100%	3	33%	1	33%	1	33%	1					20%	1	67%	1
Dipsacus fullonum ssp. sylvestris	50%	2					33%	1			50%	3	30%	2	33%	1
Equisetum arvense			33%	1	33%	1							10%	40		
Galium aparine	50%	2	33%	3	33%	3	33%	8	33%	8			30%	3	33%	1
Heracleum maximum			33%	3	33%	3										
Hydrophyllum fendleri var. albifrons			33%	1	33%	1									33%	1
Lactuca serriola	75%	1	33%	13	33%	13	33%	1	33%	1			30%	2	67%	1
Polemonium pectinatum							33%	3								
Urtica dioica	50%	2									50%	3	10%	1	33%	1
Verbascum thapsus	50%	2											30%	6	33%	1
Viola glabella			33%	30	33%	30									33%	40
Mosses/Lichens	25%	10	67%	10	67%	10										

Sedge, Rush and Bulrush types

SPECIES	CARPEL-ELEPAL n=7		CARPEL-ARGANS n=4		CARPEL-CARSIM n=2		CARNEB-ARGANS n=6		CARAQU 02RC032	CARURT n=3		ELEPAL n=6		JUNBAL-ARGANS n=5		JUBA- PHAARU 99RC62	SCHACU n=3		SCIFLU 99CB2402
	CON	COV	CON	COV	CON	COV	CON	COV	COV	CON	COV	CON	COV	CON	COV	COV	CON	COV	COV
Trees																			
<i>Elaeagnus angustifolia</i>	14%	13																	
<i>Populus balsamorhiza</i> ssp. <i>trichocarpa</i>									1										
<i>Populus tremuloides</i>									1										
Shrubs																			
<i>Salix exigua</i>	29%	2										17%	2						
Grass and Grasslikes																			
<i>Agrostis exarata</i>	14%	1								33%	3								
<i>Agrostis stolonifera</i>	43%	2	25%	3	50%	8						33%	5.5	20%	1				
<i>Calamagrostis canadensis</i>	14%	3	25%	3															
<i>Carex aquatilis</i> var. <i>aquatilis</i>									90										
<i>Carex lanuginosa</i>	100%	59	100%	73	100%	34	50%	17								1			
<i>Carex nebrascensis</i>			25%	3	50%	30	100%	65											
<i>Carex praegracilis</i>					50%	1								40%	37				
<i>Carex simulata</i>					100%	45													
<i>Carex stipata</i>										33%	13								
<i>Carex utriculata</i>										100%	57								
<i>Eleocharis palustris</i>	86%	15	50%	2	50%	8	50%	5		33%	3	100%	70			3	33%	1	3
<i>Eleocharis rostellata</i>					50%	1													
<i>Glyceria grandis</i>												17%	8						
<i>Glyceria striata</i>							17%	8		67%	16	17%	1						
<i>Hordeum brachyantherum</i>														40%	1				
<i>Hordeum jubatum</i>			50%	2						33%	1	17%	1	40%	3				
<i>Juncus balticus</i>	86%	21	100%	43	100%	11	83%	24		33%	3	50%	26	100%	85	80	33%	1	
<i>Juncus longistylis</i>			25%	1															
<i>Juncus tenuis</i>																			1
<i>Phalaris arundinacea</i>	43%	17	25%	3	50%	3	50%	34		100%	15	50%	8.7			13	33%	1	30
<i>Phleum pratense</i>																20			
<i>Poa pratensis</i>	14%	3			50%	3	17%	1	5										
<i>Polypogon monspeliensis</i>							17%	8				33%	2	40%	2				
<i>Schoenoplectus acutus</i>			25%	1						67%	17						100%	92	
<i>Schoenoplectus americanus</i>	29%	7	50%	2	50%	1	17%	13				17%	13	20%	1				3
<i>Schoenoplectus fluviatilis</i>																			80
<i>Scirpus microcarpus</i>	14%	1			50%	3													

Forbs																	
Achillea millefolium			50%	1													
Anthriscus scandicina										67%	11						
Apocynum cannabinum					50%	1											
Argentina anserina			100%	4			67%	9						100%	30		
Berula erecta	29%	16										17%	1	20%	1		
Chenopodium album	29%	2					17%	1									3
Cicuta douglasii	14%	8	25%	1	100%	14											
Cirsium arvense	29%	1	75%	18			67%	12		33%	30	17%	5	20%	13	1	
Epilobium ciliatum ssp. glandulosum			25%	13			17%	8									
Epilobium ciliatum ssp. watsonii	71%	1			50%	3	67%	3		67%	2					33%	1
Equisetum arvense	57%	25			50%	13	33%	3									3
Equisetum laevigatum	14%	1												20%	1		
Equisetum palustre					100%	39											
Euthamia occidentalis	14%	13	25%	3			33%	6				33%	11	20%	1		
Impatiens capensis										33%	20						
Iris missouriensis							17%	1						60%	7		
Lemna minor	29%	30					17%	50								33%	13
Lycopus asper	43%	6	25%	3	50%	8	50%	5				17%	3			3	
Mentha arvensis			25%	1			33%	3		33%	8			20%	13		
Mimulus guttatus	29%	1			50%	1	33%	3	1	67%	22	50%	5			1	
Polygonum amphibium			50%	6			17%	20				17%	1			33%	1
Polygonum hydropiperoides			50%	19						67%	8	17%	1			67%	2
Ranunculus cymbalaria	14%	3					17%	1				17%	1				
Ranunculus macounii			25%	1						33%	3						
Ranunculus repens			25%	3			17%	1									
Rorippa nasturtium-aquaticum	14%	3					33%	2		67%	24	33%	30				
Rumex salicifolius			25%	1			50%	1		33%	3	67%	12	20%	1		
Sagittaria cuneata	14%	1										67%	3			33%	1
Scutellaria galericulata					50%	13				33%	13			20%	1		
Solanum dulcamara	14%	1			50%	1											
Solidago canadensis	57%	4			50%	13	17%	3									
Sparganium eurycarpum										67%	2					33%	1
Triglochin maritimum														20%	3		
Typha latifolia	29%	3			50%	1				100%	13					33%	20
Urtica dioica									40	33%	1						
Verbena hastata					100%	2											
Veronica anagallis-aquatica	14%	3	25%	3			67%	5				50%	5.3	20%	8	33%	3
Xanthium strumarium			25%	1			17%	1				17%	1				
Mosses/Lichens												17%	1				

Grass types

SPECIES	AGRSTO-ELYREP n=9		ALOGEN n=3		BROINE 99RC194	DESCES	ELYREP n=6		GLYSTR n=6		PHAR n=36		SPAPEC 99CB2403
	CON	COV	CON	COV	COV	COV	CON	COV	CON	COV	CON	COV	COV
Trees													
Populus balsamorhiza ssp. trichocarpa	11%	3											
Salix alba	11%	3											
Shrubs													
Salix exigua	11%	1									11%	2	3
Salix lutea	11%	3											1
Grass and Grasslikes													
Agrostis capillaris	11%	13									3%	8	
Agrostis stolonifera	100%	33	67%	30		6			83%	41	14%	4	
Alopecurus geniculatus			100%	36									
Bromus inermis	22%	3			98				17%	1	11%	6	
Bromus tectorum	22%	6	33%	1			17%	60			3%	3	
Carex aquatilis var. aquatilis									17%	20			
Carex lanuginosa			33%	1		17			33%	8	3%	3	
Carex nebrascensis						20			50%	34			
Carex praegracilis						8	33%	25			6%	8	
Deschampsia cespitosa						45							
Eleocharis palustris	22%	8	67%	35		12	17%	8	17%	1	22%	3	1
Elytrigia intermedia	11%	1					33%	55					
Elytrigia repens var. repens	89%	12					100%	58	17%	3	17%	17	
Glyceria striata	11%	3	33%	13					100%	32	3%	1	
Juncus balticus	67%	5	33%	1		45	17%	1	50%	35	6%	7	
Juncus bufonius	22%	1	33%	3		2			17%	8			1
Leymus cinereus	11%	3					17%	1					
Lolium arundinaceum	11%	70					17%	8			3%	13	
Phalaris arundinacea	44%	2	67%	8			33%	7	67%	24	100%	85	20
Poa compressa											3%	50	
Poa palustris									33%	11			
Poa pratensis	22%	8	33%	1		6	50%	10	50%	2	25%	7	
Polypogon monspeliensis	44%	2	33%	20			17%	3	33%	1	8%	2	
Schoenoplectus acutus	11%	3									8%	1	
Schoenoplectus americanus													3
Schoenoplectus fluvatilis													3
Spartina pectinata													100

Forbs													
Achillea millefolium							17%	10			3%	1	
Argentina anserina						1					3%	8	
Artemisia biennis							17%	1	33%	1			
Cicuta douglasii	11%	3					17%	1	17%	3	3%	8	
Cirsium arvense	56%	2	33%	13		1	83%	7	17%	3	31%	4	
Cirsium vulgare	11%	1							17%	8	6%	1	
Conium maculatum							17%	15			3%	1	
Dipsacus fullonum ssp. sylvestris	11%	3					17%	8			8%	7	
Epilobium ciliatum ssp. watsonii	22%	2	33%	1		8			17%	20	14%	2	
Equisetum arvense									17%	1	22%	3	1
Equisetum laevigatum	22%	27					33%	7			3%	8	1
Equisetum sp									17%	1	6%	3	
Euthamia occidentalis	22%	2					33%	5			25%	10	
Galium aparine							17%	3	17%	1	3%	1	
Glycyrrhiza lepidota													3
Impatiens capensis									17%	3			
Iris missouriensis	11%	13					17%	3					
Lactuca serriola	11%	3	33%	1			17%	30			3%	1	
Lemna minor			33%	1					33%	18			
Lycopus asper	11%	50				1			17%	13	6%	2	
Matricaria discoidea									33%	2	3%	1	
Medicago lupulina	22%	2	67%	2			17%	1	33%	3			
Melilotus alba	11%	3	33%	3									
Melilotus officinalis	11%	70											
Mentha arvensis	22%	5	33%	3					17%	1			
Mimulus guttatus	22%	1	33%	8					67%	6	11%	3	
Plantago major	56%	6							17%	1	6%	2	
Polygonum amphibium			33%	30			17%	1	33%	1	3%	3	
Potentilla rivalis	11%	13									3%	1	
Ranunculus cymbalaria	11%	3	67%	1					17%	3			
Rorippa nasturtium-aquaticum			33%	20					50%	11	14%	4	
Rumex crispus	11%	3	33%	1							3%	1	1
Rumex salicifolius	67%	3	33%	1			50%	3	50%	7	19%	3	
Solanum dulcamara									17%	8	11%	5	
Solidago canadensis									17%	1	22%	2	1
Trifolium repens	22%	42	33%	1									
Urtica dioica	11%	1	33%	1			17%	8	17%	30	22%	2	
Veronica anagallis-aquatica	22%	1	67%	2					67%	8	11%	2	
Mosses/Lichens	22%	7							33%	8	6%	6	

Black greasewood, Saltgrass, Basin wildrye, Cordgrass, Annual hairgrass, and Bluebunch wheatgrass types

SPECIES	SARVER/ DISSPI n=4		DISSPI/ CARPRA n=8		DISSPI- SCHAME n=3		SPAGRA n=2		LEYCIN/ DISSPI n=3		LEYCIN/ CARPRA n=6		JUNBAL n=2		LEYCIN/ BROTEC n=5		PSESPI n=3		DESDAN n=3		
	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	CON	COV	
Trees																					
<i>Elaeagnus angustifolia</i>					33%	8	50%	3													
Shrubs																					
<i>Artemisia ludoviciana</i>													50%	1	20%	3					
<i>Artemisia tridentata</i> ssp. <i>tridentata</i>															20%	13	33%	30			
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>																	33%	3			
<i>Chrysothamnus viscidiflorus</i>															20%	30					
<i>Ericameria nauseosa</i>															20%	1	33%	8			
<i>Rosa woodsii</i>											17%	1	50%	1	20%	3					
<i>Sarcobatus vermiculatus</i>	100%	43											50%	1							
Grass and Grasslikes																					
<i>Agrostis interrupta</i>	50%	8	38%	2								17%	13							33%	30
<i>Agrostis stolonifera</i>												17%	1	50%	13						
<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>												17%	8								
<i>Bromus japonicus</i>															20%	20	33%	8	33%	3	
<i>Bromus tectorum</i>	50%	10					50%	3					50%	3	100%	28	100%	13	100%	13	
<i>Carex praegracilis</i>	50%	1	75%	18	67%	50	100%	2	100%	8	100%	35	50%	30	20%	1					
<i>Deschampsia danthonioides</i>																				67%	29
<i>Distichlis spicata</i>	100%	46	100%	56	100%	24	50%	8	100%	10	67%	9									
<i>Eleocharis palustris</i>					33%	1															
<i>Elymus lanceolatus</i>																	33%	30			
<i>Elytrigia intermedia</i>	50%	2	38%	11					33%	20											
<i>Elytrigia repens</i> var. <i>repens</i>			25%	1	33%	3					33%	27	50%	3					33%	1	
<i>Hordeum jubatum</i>	25%	1	25%	1	67%	16							50%	1					33%	1	
<i>Hordeum murinum</i> ssp. <i>leporinum</i>																				67%	1
<i>Juncus balticus</i>	25%	1	38%	15	67%	27	50%	40			50%	10	100%	65							
<i>Juncus bufonius</i>																				33%	3
<i>Leymus cinereus</i>	50%	7			33%	3			100%	8	100%	32			100%	38					
<i>Poa bulbosa</i>									33%	1										33%	13
<i>Poa pratensis</i>							50%	3	33%	1	83%	20	50%	50							

Poa secunda									33%	40							100%	8	33%	8
Poa secunda (juncifolia)			63%	30	33%	20			100%	51	33%	7			40%	6			33%	1
Polypogon monspeliensis			13%	1															33%	1
Pseudoroegneria spicata																	100%	6		
Puccinellia lemmonii			13%	3	33%	30													33%	1
Schoenoplectus americanus	25%	1	13%	1	100%	47														
Scirpus nevadensis			13%	3			50%	60												
Spartina gracilis			50%	15	33%	3	100%	50	100%	6	67%	9								
Taeniatherum caput-medusae																			33%	30
Vulpia spp									33%	1							33%	10		
Forbs																				
Cirsium vulgare			13%	1					67%	1	17%	1								
Equisetum laevigatum			13%	3	33%	1	50%	3			17%	1			20%	1	33%	20		
Aster ericoides var. pansus			13%	3							17%	1								
Lepidium latifolium			13%		33%	8							50%	1						
Triglochin maritimum			13%	8																
Potentilla argentea			25%	1							33%	8								
Achillea millefolium			25%	5					67%	1	33%	8	50%	3	20%	3	67%	1	100%	4
Grindelia squarrosa			25%	2															33%	40
Argentina anserina			25%	1	67%	5														
Lactuca serriola	75%	1	50%	1	33%	30	100%	6			67%	6	50%	13	20%	3	33%	1	67%	5
Lactuca tatarica var. pulchella											33%	5	50%	3						
Descurainia pinnata											17%	3			20%	13			33%	3
Sisymbrium altissimum											17%	3	50%	20	40%	3			33%	80
Chenopodium album	50%	5			67%	3	50%	1			17%	1			20%	8				
Senecio serra											17%	1			20%	3				
Sonchus sp.											17%	3	100%	20						
Urtica dioica											17%	1	50%	1	20%	1				
Cirsium arvense							50%	3			67%	7	100%	45	20%	3				
Lepidium perfoliatum	25%	3									83%	3			40%	12			100%	16
Potentilla rivalis															20%	3			33%	1
Plantago patagonica																			67%	2
Asclepias speciosa	25%	1											50%	1						
Lomatium columbianum																		33%	1	
Polemonium pectinatum															20%	20				
Pteryxia terebinthina var. terebinthina																		33%	8	
Solidago canadensis							50%	3							20%	1				
Sphaeralcea munroana															20%	1				
Mosses/Lichens																		33%	5	

Forb types

	RORNAS n=13		EQUARV n=10		LOMGRA n=3		TYPLAT n=4		TYPANG- TYPLAT 00RC031	SPAEUR 98RC0231	ELOCAN 99CB400	RANAQU 98RC0042
SPECIES	CON	COV	CON	COV	CON	COV	CON	COV	COV	COV	COV	COV
Understory trees												
Populus balsamorhiza ssp. trichocarpa			10%	8								
Salix alba			10%	10			25%	1	1			
Salix amygdaloides	8%	1	10%	5								
Shrubs												
Amelanchier alnifolia			10%	8								
Artemisia ludoviciana			20%	5	67%	2						
Artemisia tridentata ssp. wyomingensis					33%	1						
Clematis ligusticifolia			10%	3	67%	1						
Cornus sericea			20%	1								
Philadelphus lewisii			20%	6								
Ribes aureum			20%	1								
Salix exigua			20%	6			25%	1	1			
Grasses and Grasslikes												
Agrostis stolonifera	38%	9	10%	3								
Bromus inermis	8%	1	10%	3								
Bromus tectorum	8%	1			67%	1						
Carex lanuginosa	8%	1										
Carex nebrascensis	8%	8										
Eleocharis palustris	15%	2	40%	16	33%	1				13		
Elytrigia repens var. repens					33%	20						
Glyceria striata	15%	3	20%	2								
Juncus balticus	15%	7	50%	33			25%	30				3
Phalaris arundinacea	8%	13	20%	17			50%	12	1	3		1
Poa bulbosa			20%	1	100%	2						
Poa pratensis	8%	1	70%	11					1			
Poa secunda					67%	3						
Schoenoplectus acutus	8%	3	10%	1			50%	22	3			
Schoenoplectus americanus	8%	1	10%	1								3

Scirpus microcarpus			30%	14			50%	2				
Forbs												
Amsinckia lycopsoides			50%	1								
Anthriscus scandicina	23%	4										
Arctium minus	8%	1	20%	1								
Berula erecta	23%	23										
Chenopodium album					33%	3						
Cicuta douglasii	15%	6										
Cirsium arvense			30%	5								
Conium maculatum	8%	10	20%	41								
Convolvulus arvensis					33%	8						
Descurainia pinnata					33%	1	25%	1				
Dipsacus fullonum ssp. sylvestris	8%	10	30%	4			25%	1				
Elodea canadensis											20	
Epilobium ciliatum ssp. watsonii	31%	3	10%	1								
Equisetum arvense	31%	13	100%	56			50%	9				
Grindelia squarrosa					33%	3						
Lemna minor	38%	5					25%	13		3		3
Lomatium grayi					100%	47						
Lycopus asper	15%	2	20%	1								
Mimulus guttatus	69%	7	20%	2	33%	1	25%	1				
Ranunculus aquatilis	8%	1										70
Rorippa nasturtium-aquaticum	92%	44	20%	21			25%	50				
Rumex crispus	15%	1	40%	1								
Sagittaria cuneata												20
Senecio serra			10%	30								
Solidago canadensis	15%	1	30%	7								
Sparganium eurycarpum										98		
Typha angustifolia									40			
Typha latifolia	15%	1	20%	1			100%	68	60			
Urtica dioica	38%	1	10%	13								
Veronica americana	8%	1	30%	5								
Veronica anagallis-aquatica	85%	4	10%	1			25%	1	3			1
Zannichellia palustris											1	
Mosses/Lichens	23%	12	20%	1	33%	10					20	