CHAPTER 7: PLANT COMMUNITIES

Introduction

Plant communities of the ERP area are typical for the western foothills of the Sierra Nevada in the Central portion of the range. Lower elevations, which were once dominated by marshlands of the Central Valley, have been largely converted to irrigated agriculture. Stream channels have been converted to irrigation/flood canals, with some riparian vegetation within a generally open grassy levee system. Historic vernal pool grasslands have been largely replaced by farmland. Upstream, streams flow though non-native grassland (often grazed) and agricultural fields, with a thin margin of mixed native and non-native riparian species along the creeks. Grassland areas may include patches of valley oak woodland. Oak woodland and mixed oak woodland and scrub habitats become more predominant in the foothills, transitioning to heavier forested areas in the steeper portions of the watershed. Figures 7-1 and 7-2 identify vegetation communities within Placer County and the ERP planning area, respectively. These plant communities are affected significantly by the invasion of exotic plants, including a variety of non-native grasses and weedy species such as mustard, broom, and Himalayan blackberry. These species have largely replaced the native grass and forb habitats of the lower foothills. Thus, there is significant opportunity for ecological restoration, particularly of rangelands.

The information on plant communities associated with the stream channels is summarized below. More detailed information on data sources used to describe the communities, scientific names, general life history information, and site-specific survey information is presented in Appendix C.

Plant communities associated with the stream channels in these watersheds include mixed riparian forest, valley willow scrub, and valley freshwater marsh. These are generalized plant community names, based on a compilation of more detailed, complex and ecologically specific described plant communities. Riparian plant communities, and the individual plants within the community, provide a variety of ecologically beneficial functions including:

- Increasing the stability of stream banks and floodplain areas by holding soils in place with their roots;

- Slowing high stream flow by impeding its progress, resulting in nutrient and sediment deposition in upland areas adjacent to the stream channel. These depositional events are crucial components to riparian plant reproduction;

- Improving aquatic habitats by increasing bank stability;

- Creating complexity in the channel when flows scour around root wads or trees that fall into the channel, causing pool and riffle areas to form which, in turn, provide a nutrient source to aquatic invertebrates with leaf fall;

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- Providing a food source for fish through drop of insects onto the water surface;

- Reducing water temperatures by shading the water;

- Providing many of the fundamental components of upland habitats used by a variety of wildlife species. These components include a variety of tree, shrub, and grass/forb species that provide habitat complexity and vertical structural diversity, create a variety of nesting and foraging habitats, and provide excellent cover for a variety of species because of the vegetative complexity and density, and the close proximity of water.

The plant communities currently existing in these watersheds are different and/or significantly altered in species composition, quantity, and quality from those that occurred historically. A basic description of the plant communities and their distributions are presented below and are based on data from site visits and previous mapping completed by Placer County. A table of the common and scientific names of plants referred to in the text is included in Appendix C.

Description of Plant Communities

Mixed Riparian Forest

Mixed riparian forest is the predominant riparian plant community, occurring in proximity to the channels, in the watersheds. This community is characterized by a closed canopy (100 percent total cover) and is comprised, often as co-dominants, of any of the following tree species: valley oak, interior live oak, Fremont cottonwood, white alder, arroyo willow, and red willow. Interior live oak tends to occur at the outer edges of the riparian community, while alder, willows, and cottonwood occur close to the creeks. Other less common, or locally common, tree species include Oregon ash, California black walnut, sandbar willow, and Goodding's willow. Understory shrub species in the mixed riparian forest include saplings of the various tree species, Himalayan blackberry, California wild grape, button willow, California rose, and others. Herbaceous understory species include mugwort; creeping wild rye; Baltic rush; and a variety of nonnative weedy species including: Bermuda grass, velvet grass, Dallis grass, brome grasses, dock, nutsedge, and others.

The vegetative complexity of the riparian community at any given location depends on the structural complexity of the floodplain, which often varies markedly along a channel. Where stream channels are deeply incised (typical in many reaches), oaks, alders, and other trees typically occur in a narrow band along the upper portion of the banks with nominal understory. In reaches with well-developed terraces, or multiple channels, sandbar and other willows typically occupy the lower terraces with a variety of riparian species on the middle terraces and oaks along the upper banks. These areas generally support a well-developed understory.

Mixed riparian forest in the study area is most extensive along the larger channels (Auburn Ravine and Coon Creek) in the middle elevations of the watersheds. Historically, riparian forest was probably much more extensive in the western portions of these watersheds, but much of this habitat has been eliminated through land use conversion to agricultural production. Riparian forest is lacking entirely along some channels in the lower elevations where they have been channelized.

Cattle heavily use the riparian corridors in large portions of the study area. The plant community reflects this use. In the more intensively grazed areas, the understory is significantly reduced and few seedling trees occur. Some of the deeply incised channels may also be a result of grazing practices, which have resulted in degradation of the vegetative community and reduced reproduction of the trees and shrubs.

Great Valley Willow Scrub

Great Valley Willow Scrub only occurs in a few locations within these watersheds, primarily in the lower elevations. Vegetation in this community generally consists of dense thickets of willow with occasional Fremont cottonwood and little to moderate understory. Understory vegetation can include annual grasses and forbs, as well as shrub cover including California rose and Himalayan blackberry. This community is closely associated with a water source and often occurs adjacent to valley freshwater marsh.

Valley Freshwater Marsh

This community varies significantly throughout the study area, ranging from the vegetated banks of slow moving creeks to large cattail-tule marshes. Perennial or nearly perennial, slow-moving (or standing) water is the common element of all freshwater marsh habitats. In deeper water areas (up to about three feet in depth), this community may be dominated by cattail and bulrush and often associated with floating mats of water primrose. In shallower water, and on saturated banks, several species of rush, spikerush and sedge occur along with nutsedge, smartweed, and a variety of nonnative, weedy species including ryegrass, Bermuda grass, Dallis grass, dock, and others. Thickets of willow (primarily sandbar and arroyo) occur occasionally within marsh areas and are considered part of the marsh habitat. Valley freshwater marsh includes areas of open water within and adjacent to the vegetated areas.

Valley freshwater marsh habitat in these watersheds occurs naturally in slow-moving waters and sloughs, beaver ponds, and backwater areas of the larger drainages. Freshwater marsh also typically develops along irrigation and roadside ditches, and within artificial ponds. The most extensive areas of valley freshwater marsh occur in the watersheds, west of Lincoln.

Distribution of Plant Communities

The distribution of plant communities associated with the stream channels in these watersheds is determined by the underlying soils, topography, and past and present land uses. In an undisturbed condition, the distribution of riparian plant communities generally

corresponds to soil type, which in turn is dictated by the underlying geology. These watersheds are underlain by basin, terrace, and foothill soil types, which are described in more detail in Appendix C. Past and/or present land uses, including placer mining, water diversions, farming, ranching, and urban development, have resulted in a defining effect on the distribution of plant communities.

Effects of Past and Present Land Uses on Plant Community Distribution

Portions of Auburn Ravine, Dutch Ravine, Doty Ravine, and Coon Creek were placer mined in the mid-to-late 1800s. This activity resulted in removal of riparian vegetation, excavation of soil, and redeposition of tailings. Large quantities of sediment, generated by hydraulic mining, were washed into stream channels and most of this sediment was deposited on the valley floor. Removal of trees for firewood/fuelwood, use as construction materials, and to facilitate grazing and farming also occurred throughout the area. In the western portion of the watersheds, the creeks have been largely confined to narrow channels and the riparian plant community reduced to a narrow band along the banks.

When Europeans began to settle in California, they introduced a host of exotic plants and animals into the region. Native plant communities were invaded with European species that often out-competed the native species. Many of these exotic plant species are now well established.

Anthropogenic alterations to the natural hydrology of the stream channels have also been significant. A network of canals and tunnels allows for the importation and transport of water from the Yuba and Bear rivers to the north and American River from the south to supply domestic, industrial, and irrigation water to lands in the foothills and valley floor. Increased flows, particularly during summer, influence the species composition of the riparian community, favoring more aggressive, nonnative species (e.g. Himalayan blackberry) over native riparian species that are better adapted to dry summer conditions.

All of these activities have changed the riparian community from its historic condition and distribution. In most cases, these alterations have had negative affects on the health and productivity of the riparian communities. Some of these alterations are, for all practical purposes, permanent changes in the plant communities. However, other changes are more transient, and opportunities to restore these riparian communities to a more historic condition are available.

Distribution in the Higher Elevations of the Watersheds

The upper watersheds consist of the foothill region of the area, beginning north and east of Auburn and extending to just east of Lincoln. Plant community distributions are based on a combination of field visits and previous Placer County mapping. A table, which references particular stream segments to more detailed data sheets, is presented in Appendix C.

Upper Coon Creek

The upper Coon Creek watershed consists of Coon Creek and its primary tributaries: Orr, Dry, and Rock Creeks, and Deadman Canyon. Orr Creek originates in Christian Valley, north of Auburn. This small drainage supports a stringer of riparian vegetation generally consisting of alders, willows, and interior live oak; ranging from less than 50 feet to over 100 feet in canopy width. Canopy cover is variable, ranging from less than 25 percent to 100 percent. Land use in the area surrounding Orr Creek is primarily rural residential.

Dry Creek originates east of Interstate 80, northeast of Auburn, and flows westerly through North Auburn before joining with Orr Creek to form Coon Creek. Dry Creek has been altered through placer mining, damming, channelization, and residential development, and the riparian habitat is highly variable in both distribution and species composition. The most extensive riparian habitat, dominated by alder and black oak, occurs in the vicinity of Halsey Afterbay, just west of Interstate 80. Dry Creek crosses Highway 49 before joining with Rock Creek, and continues west to its confluence with Orr Creek just west of Bell Road. The lower three miles of Dry Creek were placer mined. This area supports a relatively continuous riparian corridor and averages about 200 feet in canopy width. Canopy cover is highly variable, ranging from less than 26 % to 100 %, with most areas exceeding 76 %.

Rock Creek, a small tributary to Dry Creek, is about four miles in length. The entire creek was placer mined and is impounded by Rock Creek Dam near the Auburn Airport and forms Rock Creek Lake. Freshwater marsh and willow scrub community types are found at Rock Creek Lake. West of Highway 49, Rock Creek supports a relatively continuous corridor of mixed riparian forest dominated by valley oak, alder, and willow; with canopy width averaging approximately 200 feet. Canopy cover is mostly in the 76 to 100 percent category.

Deadman Canyon is a steep-sided, narrow ravine about 3.5 miles long. The canyon supports a well-developed riparian vegetation community, dominated by valley oak, alder, and willow, with canopy widths up to 100 feet. Canopy cover exceeds 50 percent, with most of this reach in the 76 to 100 percent category.

Coon Creek is formed by the confluence of Orr and Dry Creeks, just west of Bell Road. The channel runs through a rugged canyon area for about eight miles before leaving the upper watershed area just east of McCourtney Road. Riparian vegetation within the canyon averages less than 50 feet in canopy width. Canopy cover ranges from 26 to 75 percent.

Upper Doty Ravine and Upper Auburn Ravine

Upper Doty Ravine and upper Auburn Ravine are discussed together because they are similar in terms of geology, topography, history of placer mining, and vegetation communities. Doty Ravine is the primary tributary of Coon Creek. This watershed originates in the Bald Hill area north of Newcastle and flows westerly for about 8.5 miles before leaving the upper watershed just east of McCourtney Road. Major tributaries include Sailor's Ravine and Caps Ravine. Valley oak, alder, and willow dominate the

mixed riparian forest along this portion of Doty Ravine, with canopy widths ranging from less than 100 feet to about 400 feet. Canopy cover is variable, with the majority ranging from 26 to 75 percent and short reaches exceeding 75 percent.

Auburn Ravine originates in the City of Auburn and flows south and west for about 12 miles before leaving this chapter's designated upper watershed just east of Lincoln. Primary tributaries include North, Dutch, and George's ravines. Auburn Ravine generally runs parallel to, and between 1 and 3 miles south of, Doty Ravine. Virtually all of Auburn Ravine and its tributaries were placer mined, and dredger tailings are common in the area. Except for the upper segment of Auburn Ravine, within the City of Auburn (which is largely channelized or in culverts), and the segment of Dutch Ravine that crosses under Interstate 80, most of the riparian habitat within these drainages is generally continuous and well developed. Canopy width ranges from less than 100 feet to over 500 feet. Dominant canopy species include: Fremont cottonwood, alder, valley oak, and willow. Canopy cover generally exceeds 50 percent.

Distribution in the Lower Elevations of the Watersheds

The lower watershed designations in this report consist of the terrace and basin soils regions beginning just east of Lincoln and extending west into Sutter County to the Sacramento River.

Lower Coon Creek and Lower Doty Ravine

After leaving the upper watershed, Coon Creek flows in a southwesterly direction to its confluence with the East Side Canal. Within Placer County, this reach of Coon Creek supports a more open, discontinuous riparian community, with some segments dominated by valley oak. In several areas, the channel is braided, resulting in dynamic erosion-deposition regimes that are conducive to development of a willow community. The riparian corridor in this area is generally less than 300 feet wide, but some segments exceed 500 feet. Canopy cover, within Placer County is less than 50 percent. Within Sutter County, the channel narrows, and meanders through extensive areas of rice fields. The riparian zone in this area averages about 50 feet in width, but expands to 300 feet adjacent to some meanders.

The reach of Doty Ravine between the eastern boundary of the lower watershed and Gladding Road supports some segments of well-developed mixed riparian forest community, with canopy width up to 500 feet. Canopy cover through this reach exceeds 50 percent. From Gladding Road, to its confluence with Coon Creek, the riparian community narrows to less than 100 feet. Canopy cover through this reach is variable, ranging from 26 to 100 percent.

Markham Ravine

Markham Ravine is a smaller drainage originating just east of Highway 65, flowing through the north side of the City of Lincoln westward to the East Side Canal. Historically, this drainage was probably intermittent, but now appears to be perennial, likely due to irrigation runoff. Riparian plant communities associated with the channel are generally limited to freshwater marsh with scattered willow scrub and some discontinuous stands of mixed riparian forest. The narrow band of riparian vegetation along the ravine, including trees and areas of marsh and understory vegetation, is typically under 50 feet in width. Canopy cover is less than 25 percent. A number of waterfowl ponds have been created along Markham Ravine in the vicinity of Dowd Road. Within Sutter County, Markham Ravine is essentially channelized to its confluence with the East Side Canal.

Lower Auburn Ravine

Lower Auburn Ravine consists of Auburn Ravine proper, Orchard Creek, and Ingram Slough. The ten-mile reach of Auburn Ravine, from the eastern boundary of the lower watershed downstream to Aitken Ranch (approximately one mile west of Fiddyment Road), supports some of the most extensive and best developed mixed riparian forest habitat in the four major watersheds. Except for some short reaches near Lincoln, the forest is continuous and has a canopy width of over 500 feet. Dominant canopy species include valley oak, Fremont cottonwood, Oregon ash, and willow. Canopy cover through this reach generally exceeds 50 percent. Downstream of Aitken Ranch, Auburn Ravine is largely channelized (typical width less than 30 feet) to its confluence with the East Side Canal. Canopy cover through this reach is less than 50 percent.

Orchard Creek and Ingram Slough

Orchard Creek originates in the hills southeast of Lincoln. Ingram Slough is a short tributary of Orchard Creek. These drainages merge west of Highway 65 and empty into Auburn Ravine just upstream of Aitken Ranch. Portions of Ingram Slough have been channelized. These drainages are mostly treeless, supporting a freshwater marsh community generally confined within the creek banks. Discontinuous pockets of willow scrub and occasional oaks also occur, particularly in the upper portion of the watershed, where canopy cover ranges from 26 to 75 percent. The typical width of the riparian community associated with Orchard Creek and Ingram Slough is less than 50 feet.

East Side Canal

The East Side Canal is a constructed drainage that intercepts flows from Coon Creek, Markham Ravine, and Auburn Ravine and conveys them south to the Cross Canal. The canal is approximately 150 feet wide and contained by levees. The dominant plant community within the canal is freshwater marsh, with areas of willow scrub dominated by sandbar and Goodding's willow.

Cross Canal

The Cross Canal conveys flows from the East Side Canal and several smaller drainages south of Auburn Ravine, west to the Sacramento River. The canal is approximately 500 feet in width. Unlike the East Side Canal, the Cross Canal supports a well developed and diverse riparian forest community, dominated by valley oak, cottonwood, and Goodding's willow. Freshwater marsh, which dominates the East Side Canal, is uncommon in the Cross Canal. However, during high flow events or high water surface elevations in the Sacramento River, the Cross Canal and East Side Canal can be backwatered, with suitable spawning habitat (flooded vegetation) for splittail, a fish species of concern.

Invasive Species

Nonnative plant species are well established in the riparian habitats described above. Nonnative grasses such as Bermuda grass, Dallis grass, and velvet grass are common and widespread. Other nonnative plant groups that occur include nutsedge, eucalyptus, periwinkle, dock, and brome grasses.

Although a number of exotic species occur in riparian areas, none is more extensive or has the potential to change the structure, function, and plant species composition of riparian habitats as significantly as Himalayan blackberry. This species was recorded at 20 of the 23 sample sites visited, and generally dominated the shrub understory (33 to 99 percent cover). Himalayan blackberry quickly invades open, disturbed areas and withstands periods of inundation. Periodic flooding may be conducive to the growth and spread of this species. It reproduces by rooting at cane tips, developing shoots on lateral roots, and from root pieces or cane cuttings. This species quickly forms nearly impenetrable masses up to ten feet high and can spread by ten feet or more annually. This rapid growth and ability to spread quickly allows this species to out compete other riparian species. Extensive areas of diverse riparian understory have been turned into monocultures by this prolific species.

One of the most serious implications of riparian understory domination by Himalayan blackberry is the species' affect on regeneration of native plant species. Many common riparian trees (e.g., cottonwood, willow) produce large quantities of seed that is released during the wet season and remains viable for only a short time. These seeds require direct contact with open areas of moist, sandy soil for germination, making them perfectly adapted to germinate and grow in recently deposited alluvium following flood events. Where stream bank and floodplain areas are overgrown with masses of vegetation, such as blackberry thickets, the germination potential for these tree species is significantly reduced or eliminated.

Himalayan blackberry does provide cover and food for a variety of wildlife species. Berries are eaten by birds and mammals; while deer, rabbits, and beaver eat the buds and stems. Dense blackberry thickets provide nest sites for many bird species and are also used by rabbits and squirrels. The vines are also valuable in stabilizing banks and preventing erosion on infertile, disturbed sites.

Special Status Plant Species

Special status plants are those species formally listed as rare, threatened, or endangered by the State or federal government, proposed for such listing, or otherwise recognized by the State or federal government, local jurisdiction, or recognized conservation organization as a sensitive species. Three special status plant species may potentially occur and riparian trees covered by Placer County's Tree Ordinance occur within the riparian zones of these watersheds. Suitable habitats for the special status plant species are available, but no record of occurrence is documented. These species and their status are briefly summarized below.

Table 7-1. Special Status Plant Species Potentially Occurring in the Study Area

Common Name	Scientific Name	Status*	Potential to Occur in Project Area (Previous Studies)
Sanford's arrowhead	*Sagitaria sanfordi*	FSC; CNPS 1B	Could potentially occur; suitable habitat is present; no records from study area.
Red Bluff dwarf rush	*Juncus leiospermus* var. *leiospermus*	CNPS 1B	Could potentially occur; no records from study area.
Rose mallow	*Hibiscus lasiocarpus*	CNPS 2	Could potentially occur; no records from study area.
Riparian Trees	Various	Subject to Placer Co. Tree Preservation Ordinance	Present throughout the study area.

* FSC = Federal Species of Concern
CNPS 1B = California Native Plant Society Rare or Endangered in California and elsewhere
CNPS 2 = Rare or Endangered in California, more common elsewhere

Sanford's arrowhead occurs in slow moving streams or sloughs with silty or muddy substrates. This species could potentially occur in suitable habitat in the western portion of the watersheds. Red Bluff dwarf rush occurs in vernal pools, seasonal seeps, and ephemeral drainages and other wet places in chaparral and woodland communities. Rose mallow occurs in riparian areas with freshwater marsh vegetation.

Riparian trees, regardless of size, are subject to the County's Tree Preservation Ordinance. Unless exempted, the Ordinance requires an environmental review to be conducted and mitigation measures to be identified prior to removal of riparian trees.

Management Concerns

From a plant community perspective, riparian corridors are in a highly altered and moderately to severely degraded condition. All of the watersheds have been affected to

varying degrees by placer mining, tree removal, water management, agricultural development, flood management, and/or urban development. Plant communities that existed approximately 150 years ago have largely been replaced with communities that are, in most areas, less extensive, and less diverse in species richness and structural complexity. The natural hydrologic regime (winter flooding and summer low or lack of flow) that occurred historically has been significantly changed by anthropogenic influences. As a result of these influences, particularly stream channelization and other flood management practices and the use of the primary channels to convey water to downstream locations in summer, plant species composition and riparian community dynamics have been radically altered. A more detailed description of the management issues outlined in Table 7-2 below is presented in Appendix C.

Despite the altered and degraded condition of the riparian corridors, they remain one of the most important and productive habitats for wildlife. Not only do riparian areas provide fundamental habitat elements (food, water, cover, breeding areas) required by all wildlife, they also provide linkages between different habitat types and corridors for movement and dispersal.

Based on the data available and field observations, the following management concerns and issues have been identified:

Table 7-2. Management Issues for Plant Communities Occurring Within the ERP Planning Area

Management Issue	Negative Ecological and Social Impacts	Positive Ecological and Social Impacts
PCM 1. Impacts of the introduced Himalayan blackberry on plant community composition, tree reproduction, understory structure.	PCN 1.1. Reduces or eliminates reproduction of native plant species through competition or elimination of suitable seedbeds. PCN 1.2. Reduces species diversity through competition for space.	PCP 1.1. None identified.
PCM 2. Impacts of the introduced Himalayan blackberry on wildlife habitat quality.	PCN 2.1. Reduces wildlife habitat diversity and complexity by creating a near monoculture understory in certain areas.	PCP 2.1. Provides high quality habitat for certain wildlife species.
PCM 3. Impacts of the introduced Himalayan blackberry on flood management.	PCN 3.1. Can reduce channel capacity to move flood waters more quickly to downstream areas. PCN 3.2. Can raise water levels and thus increase the frequency of over bank flow. PCN 3.3. Increased bank stability from the root system can decrease gravel recruitment to the stream channel.	PCP 3.1. Reduces water velocity, resulting in less scour and more sediment deposition in the floodplain. PCP 3.2. Root system can provide stability to stream banks, resulting in less bank erosion, slope failure, and less sediment delivery to the channel.
PCM 5. Riparian corridors, particularly in the lower watersheds, have been narrowed by a combination of anthropogenic activities, including: stream channelization, grazing practices, land use conversion to intensive farming, and flood management.	PCN 5.1. Can result in high flows being more quickly transported to downstream areas, resulting in increased scour, bank erosion, and reduced sediment and nutrient deposition in the adjacent floodplain. PCN 5.2. Limits the structure and function of a traditional floodplain. Plant community diversity, structure, and positive ecological contributions are reduced or eliminated.	PCP 5.1. Reducing the width of riparian corridors provides the maximum usable area for farming and ranching. PCP 5.2. A lack of or greatly reduced riparian corridor can result in high flows being more quickly transported to downstream areas.

Table 7-2. Management Issues for Plant Communities Occurring Within the ERP Planning Area

Management Issue	Negative Ecological and Social Impacts	Positive Ecological and Social Impacts
	PCN 5.3. Generally has a negative impact on fish habitat quality through reduced bank stability, loss of shade potential (resulting in warmer summer water temperatures), reduced recruitment of woody debris (to provide habitat complexity), reduced nutrient input to the stream (through reduced leaf fall), and reduced fish food sources (by reducing the opportunity for insects to fall directly into the water and drift downstream). PCN 5.4. Reduces habitat diversity and complexity for a variety of wildlife species. Can result in the reduction/elimination of species, including listed or sensitive species identified in the wildlife resources chapter of this report.	
PCM 6. Grazing management practices have reduced or eliminated many riparian plant communities in the watersheds.	PCN 6.1. Excessive grazing in riparian zones generally results in degradation of the plant communities. This reduction or elimination of riparian vegetation reduces the value of the area as wildlife habitat and generally changes the wildlife species composition. This is particularly true in Mediterranean climates where rainfall is highly seasonal and forage tends to dry out in summer leaving riparian vegetation as the only alternative forage. Livestock eat and trample plants so that reproduction is limited or eliminated. Eventually, the riparian community may disappear completely. WRN 4.2. Excessive grazing in	PCP 6.1. Reduction or elimination of the tree/shrub community and replacing it with grass, increases the area available for livestock grazing.

Table 7-2. Management Issues for Plant Communities Occurring Within the ERP Planning Area

Management Issue	Negative Ecological and Social Impacts	Positive Ecological and Social Impacts
	riparian areas results in accelerated streambank erosion, increased width/depth ratios, and soil compaction.	
PCM 7. Artificially high summer flow volumes have changed the natural hydrologic regime in the channel and adjacent riparian corridor.	PCN 7.1. These changes in spatial and temporal distribution of summer flows have resulted in changes in the riparian community in terms of species diversity, species composition, and the reproductive potential of some species. PCN 7.2 Permanent summer flow may be a primary cause of the proliferation of Himalayan blackberry.	PCP 7.1. Use of the stream channels to convey water to downstream areas is the most cost effective way to move that water to the ultimate user. PCP 7.2. Increased summer flow volumes results in lower summer water temperatures, increased aquatic species and habitat diversity and provides miles of anadromous fish habitat that would be absent under a natural hydrologic regime. PCP 7.3. Increased summer flows provides habitat for wildlife species that would not have been present under a natural hydrologic regime. PCP 7.4. Increased summer flows may increase growth rates and density of riparian vegetation.

Summary of Findings

Based on the management issues and conflicts and benefits identified in the table above, the following is a summary of findings with respect to plant community management issues in the watersheds:

- Himalayan blackberry, a non-native species, has occupied substantial areas of the riparian zones in the watersheds. This species has a negative impact on riparian plant community structure, diversity, and species composition. In addition, wildlife habitat values have been positively enhanced for some species, but the overall impact to wildlife habitat and wildlife species is considered negative;

- Reductions in the riparian corridor width, from a variety of anthropogenic

activities, have resulted in changes in floodwater routing, flood water surface elevations, and timing and magnitude of flood peaks at particular locations. These changes have had both positive and negative consequences;

- Reductions in the riparian corridor width, from a variety of anthropogenic activities, have resulted in changes in the structure, function, species composition, and diversity of riparian plant communities in these watersheds;

- Reductions in the riparian corridor width, from a variety of anthropogenic activities, have resulted in changes in the quantity, quality, diversity, and structure of wildlife habitats associated with the riparian zone. In addition, habitats for special status species have been reduced or eliminated because of the artificially narrowed width of the riparian plant community;

- Livestock management, as it is currently practiced in the watersheds, has an overall negative impact on the riparian plant community by reducing the reproduction potential of many species; changing the species composition, diversity, and structure of the plant community; and generally contributing to a reduction in the quality of the stream channels, wildlife habitat, and aquatic habitats;

- Changes in the riparian community have resulted in detrimental changes in sediment and nutrient deposition in the floodplain; and

- Artificially high summer flow levels have a negative impact on some riparian plant and wildlife species. However, these same summer flows have a positive impact on aquatic habitats, some wildlife species, and water users who are able to deliver water to downstream areas in a cost-effective manner.