Vegetation and Wetlands

Affected Environment

Regulatory Framework

Vegetation

NPS Management Policies (2006) establishes Service-wide vegetation management policy. These policies state, "Whenever possible, natural processes will be relied upon to maintain native plant and animal species and influence natural fluctuations in populations of these species." The 1997 Vegetation Management Plan (NPS) provides broad guidance and specific implementation plans for vegetation management in Yosemite. Specific statuary directives that influence vegetation management in Yosemite include Executive Order No. 13112 - Invasive Species. The 2008 Yosemite Invasive Plant Management Plan and its 2010 Update (NPS) and the Fire Management Plan for Yosemite National Park (NPS 2004b) are park-specific plans play a large part in protecting the integrity of vegetation in Yosemite. The Merced River Plan/DEIS defers to these plans in most cases to provide a framework for invasive plant management efforts and supports the use of fire to shape the ecosystems of the park.

Wetlands

The NPS will manage wetlands in compliance with NPS mandates and the requirements of the Clean Water Act (CWA), the Rivers and Harbors Appropriation Act of 1899 (Rivers and Harbors Act), Executive Order 11990 ("Protection of Wetlands"), the procedures described in Director's Order 77-1 ("Wetland Protection"), and its accompanying *Procedural Manual #77-1* (NPS 2008). Executive Order 11990 directs the NPS to (1) provide leadership and take action to prevent the destruction, loss, or degradation of wetlands; (2) preserve and enhance the natural and beneficial values of wetlands; and (3) avoid direct and indirect support of new construction in wetlands unless there are no practicable alternatives and the proposed action includes all practicable measures to minimize harm to wetlands. Any actions that may reduce or degrade wetlands are governed by the CWA and Rivers and Harbors Act, and regulated by the U.S. Army of Corps of Engineers (Corps) and the U.S. Environmental Protection Agency. The NPS will implement a "no net loss of wetlands" policy (NPS 2006, section 4.6.5).

Clean Water Act. The CWA requires the NPS to comply with all federal, state, interstate, and local requirements to control and abate water pollution. CWA section 404 regulates the discharge of dredged and fill materials into waters of the United States. Waters of the United States refers to oceans, bays, rivers, streams, lakes, ponds, and wetlands. Applicants must obtain a permit from the Corps for all discharges of dredged or fill material into waters of the United States, including wetlands, before proceeding with a proposed activity. Under CWA section 401, all projects that have a federal component and may affect state water quality (including projects that require federal agency approval, such as issuance of a section 404 permit) must also comply with CWA section 401.

Rivers and Harbors Act of 1899. Section 10 of the Rivers and Harbors Act prohibits the unauthorized obstruction or alteration of any navigable water of the United States. The act regulates construction of any structure in or over any navigable water. This includes any work that might affect the course,

location, condition, or physical capacity of such waters. Work must be recommended by the Chief of Engineers and authorized by the Secretary of the Army.

Executive Order 11990. "Protection of Wetlands" establishes the protection of wetlands and riparian systems as the official policy of the federal government. It requires all federal agencies to consider wetland protection as an important part of their policies and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. A Wetland Statement of Findings is prepared if adverse impacts on wetlands are identified. The Wetland Statement of Findings for the *Merced River Plan/DEIS* is included as Appendix O. The NPS Director's Order #77-1 ("Wetland Protection") gives implementation detail to Executive Order 11990.

Regional Vegetation

The major vegetation zones of the Sierra Nevada region form readily apparent, large-scale, north-south elevational bands along the axis of the Sierra Nevada range. In the Yosemite region, these vegetation zones include foothill-woodland, lower montane forest, upper montane forest, subalpine forest, and alpine zones; they are distributed from the lowest elevations on the western boundary of the park to the highest elevations along the crest of the Sierra Nevada range. Major east-west watersheds that dissect the Sierra Nevada range into steep canyons form a secondary pattern of vegetation.

A parkwide vegetation map — the first vegetation map of Yosemite since the 1930s — was created over a 10-year period, from 1997 to 2007. It combines detailed data from 1,500 aerial photographs and hundreds of field surveys to provide information on floristic classification. The map identifies 129 distinct vegetation classes, which are grouped into eight broad vegetation types. This map was used to determine the broad vegetation types that occur within the Merced River corridor. The broad vegetation types are discussed in more detail below.

Merced River Vegetation

As discussed above, Yosemite National Park supports eight major vegetation types, all of which occur within the Merced River corridor and are discussed below and presented in **table 9-2** and **figure 9-7**. Within these eight broad vegetation types, the parkwide vegetation map includes 129 distinct vegetation classes. The following narrative provides a general description of vegetation types within 1.5 miles of the Merced River (study area). Descriptions of plant communities, including distribution limits, habitat requirements, community sensitivities, and a list of plant species characteristically found in conjunction with each plant assemblage appear in the *Vegetation Management Plan* (NPS 1997c), the Parkwide Vegetation Map (NPS 2007), the *Merced River and Riparian Vegetation Assessment* (Cardno ENTRIX 2011), and the *2010 Assessment of Meadows in the Merced River Corridor, Yosemite National Park* (Ballenger et al. 2011).

TABLE 9-2: MAJOR VEGETATION TYPES IN THE MERCED RIVER CORRIDOR

Vegetation Type	Area per Segment (acres)								
	1	2	3	4	5	6	7	8	Total
Alpine (9,500 to 11,800 feet)*	87.8	0	0	0	6.5	0	0	0	94.3
Meadow (2,000 to 11,000)	1,801.3	324.1	67.6	28.8	389.0	0	140.6	0.9	2,752.3
Chaparral (2,000 to 10,000 feet)	1,669.1	991.4	2,270.6	74.9	694.0	0	166.4	66.6	5,933.0
Subalpine Coniferous Forest (8,000 to 9,500 feet)	9,610.4	45.8	0	0	3,108.9	0	0	0	12765.1
Upper Montane Coniferous Forest (6,000 to 8,000 feet)	16,525.7	3,697.0	1,572.0	0	11,611.8	23.3	990.5	28.4	34,448.7
Lower Montane Coniferous Forest (3,000 to 6,000 feet)	3,505.6	7,248.5	4,785.3	151.4	6,010.4	72.0	4,969.0	1,980.8	28,723.0
Lower Montane Broadleaf Forest (3,000 to 6,000 feet)	461.6	3,331.4	2,982.7	569.7	816.7	3.4	761.1	397.0	9,323.6
Foothill Woodland (1,800 to 3,000 feet)	0	0	9.8	324.8	0	0	0	0	334.6
Barren (1,800 to 11,800 feet)	14,143.4	2,319.5	455.7	27.6	2586.4	2.9	170.2	2.6	19,708.3
Developed	0.3	150.0	59.3	54.5	8.1	0.2	82.2	10.3	364.9

*Elevation ranges are approximated

SOURCE: NPS 1997; NPS 2007

Merced River Wetlands and Riparian Habitats

Wetlands and riparian areas are distinct habitats that provide a variety of hydrologic and ecological functions vital to ecosystem integrity. These functions include flood abatement, sediment retention, groundwater recharge, nutrient capture, and support of high levels of plant and animal diversity. Many riparian areas are classified as wetlands. Wetlands and riparian areas are relatively rare compared with the entire landscape. Modification of even small wetland areas can induce effects that are proportionally greater than elsewhere in an ecosystem due to the ecological importance of wetlands. Wetlands receive special protection under Executive Order 11990 ("Protection of Wetlands"), and section 404 of the CWA.

The NPS parkwide vegetation map classifies some riparian communities; however riparian and wetland areas are not classified independently under the eight broad-scale vegetation types used in the parkwide vegetation map, and the minimum mapping unit is too large to capture many riparian areas and wetlands. For the purposes of this document, the NPS used additional data to quantify and describe wetlands and riparian habitat. Wetland data were obtained from site-specific wetland delineations for limited areas in Yosemite Valley. National Wetland Inventory data (USFWS 1995),

supplemented with data from the Yosemite Parkwide Vegetation Map (1997), were used to describe wetlands in the Merced River corridor in areas where delineation data were not available (site-specific wetland delineation data was only available for limited areas in Yosemite Valley). Data on riparian habitats was obtained from the *Merced River and Riparian Vegetation Assessment* (Cardno ENTRIX 2011) for the river corridor through Yosemite Valley. Data from the Yosemite Parkwide Vegetation Map (1997) were used to describe riparian habitats outside of Yosemite Valley.

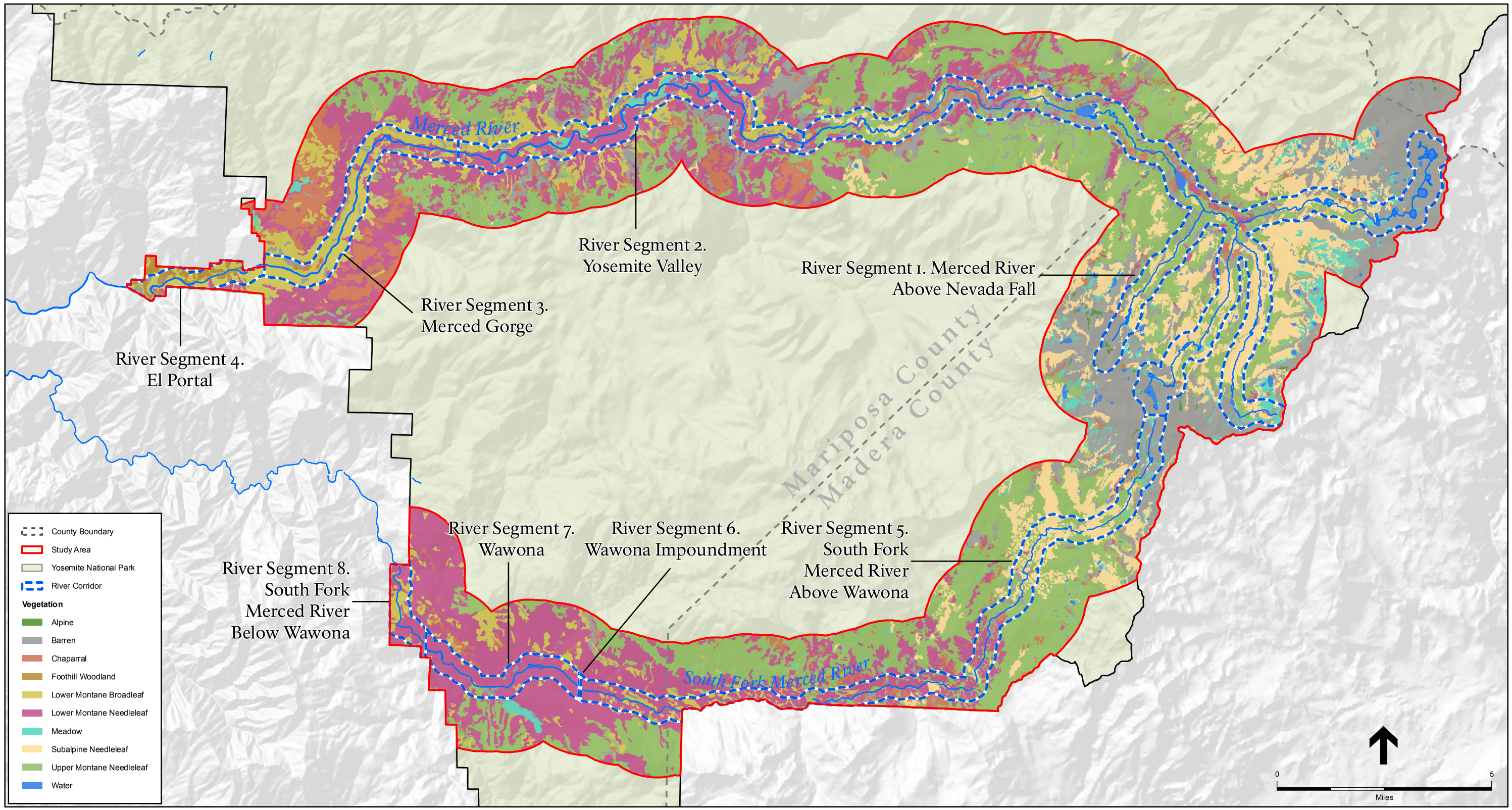
Wetland and riparian habitat data presented in this section are descriptive, including actual extent (location on the ground and acreage) for each segment of the Merced corridor within Yosemite National Park. This provides an overview of the types of wetlands and riparian habitats that occur across the study area. The intent is to provide general descriptions, functions, and values of wetland and water-dependent communities within the study area.

Wetland Classification and Definition

The NPS standard for identifying wetlands is a system developed by wetland ecologists and an interagency team for the U.S. Fish and Wildlife Service (USFWS) referred to as the Cowardin classification system (Cowardin et al. 1979). Wetlands, as defined by the USFWS, are transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water (Cowardin et al. 1979). For purposes of this classification, wetlands must have one or more of the following attributes:

- The land predominantly supports hydrophytes, at least periodically. Hydrophytes are plants that grow in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.
- The substrate is predominantly undrained hydric soils. Hydric soils are wet long enough to periodically produce anaerobic conditions.
- The substrate is saturated with water or covered by shallow water at some time during the growing season of each year (Cowardin et al. 1979).

The Corps uses three wetland parameters to define wetlands for regulatory purposes: hydrophytic vegetation, hydric soil, and wetland hydrology. When all three parameters are present, the wetland is considered a jurisdictional wetland. The Cowardin system defines more habitat types as wetlands than does the Corps definition as it recognizes some unvegetated sites (e.g., mudflats, stream shallows, saline lakeshores, playas) or sites lacking soil (e.g., rocky shores, gravel beaches) as wetland habitats if wetland hydrology is present. The reason these sites lack hydrophytic vegetation and/or hydric soil is due to natural chemical or physical factors. Although the Corps does not consider these sites to be wetlands, they are still subject to regulations under section 404 of the CWA as other waters of the United States. For purposes of this document, both Cowardin wetlands and waters of the United States as defined by the Corps are referred to as wetlands.



SOURCE: NPS, 1997, 2011

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Figure 9-7

Vegetation in the Project Area

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Specific wetland classes identified within the river corridor include riverine (rivers, creeks, and streams), palustrine (shallow ponds, riparian wetlands, wet meadows, marshes), and lacustrine (lakes and ponds). Using the Cowardin classification system, specific wetlands and deepwater classes within the Merced River corridor consist of the following subclasses:

- *Riverine upper perennial* — main channels of the Merced River and the South Fork Merced River (may be wetland or deepwater habitat depending on depth)
- *Riverine intermittent* — intermittent tributaries to the Merced River and South Fork Merced River (wetlands)
- *Palustrine emergent* — emergent wetland habitat (marsh, meadow) along the Merced River and South Fork Merced River subject to various flooding regimes
- *Palustrine forested* — riparian forest wetland habitat along the Merced River and South Fork Merced River subject to various flooding regimes
- *Palustrine scrub shrub* — riparian scrub (e.g., willow) wetland habitat along the Merced River and South Fork Merced River and its tributaries subject to various flooding regimes
- *Lacustrine littoral* – shallow lake margins that are less than 2 meters deep at low water and have less than 30% vegetation cover
- *Lacustrine limnetic* — portions of lakes that are more than 2 meters deep at low water (e.g., Merced Lake, Washburn Lake) along the Merced River (deepwater habitat)

The following discussion provides general descriptions for each wetland class identified within the Merced River ecosystem.

Riverine Upper Perennial. Riverine upper perennial habitat within the corridor includes the open and flowing water of the Merced River and the South Fork Merced River. It is the permanently flooded rock-, cobble-, or sand-bottom channel with little to no in-stream vegetation. Occasional sandbars form within and at the channel edge and typically support willows and emergent (grasses and herbs) vegetation. Based on the NPS guidelines, the majority of the main stem of the Merced River and the South Fork Merced River would be classified as riverine upper perennial wetland. Channel portions that lie at a depth of 2 meters below low water would be considered deep water. The main channel of the Merced River and the South Fork Merced River would likely be considered as jurisdictional by the Corps under section 404 of the CWA, not as wetlands but as other waters of the United States.

Riverine Intermittent. Numerous riverine intermittent drainages (other waters of the United States) are tributaries to the main stem Merced River and the South Fork Merced River. Almost all riverine intermittent drainages within the river corridor are classified as Cowardin wetlands and waters of the United States. These drainages often have a nonsoil substrate that is saturated and/or covered by shallow water at some time during the growing season. These wetlands are typically narrow and encompass the lowest portion of creekbeds. Very little wetland vegetation is found in these areas because of the intermittent nature of the flows within the drainage channels. All aboveground drainages within the river corridor are subject to the NPS protection policies under Executive Order 11990. These drainages are classified as other waters of the United States and would be subject to sections 401 and 404 of the CWA.

Palustrine Emergent. Palustrine emergent wetland habitat includes portions of alpine, subalpine, and montane meadows[1] and seeps. These wetland soils are generally deep and peaty, remaining saturated year-round or on a seasonal basis. Vegetation is dominated by grasses, sedges, rushes, and perennial herbs. The meadow wetlands in Yosemite National Park play a particularly critical role in the Merced River ecosystem. High spring flows create wet areas in side channels, low-lying wetlands, meadows, and cutoff channels. These areas support the concentration of organic matter, nutrients, microorganisms, and aquatic invertebrates throughout the relatively dry summer. When the flush of winter or spring flooding occurs, this stored aquatic biomass is washed into the main river channel, forming the base of the aquatic food chain. Examples of palustrine wetlands include portions of Cook's Meadow and meadows adjacent to Washburn and Merced Lakes. These meadow portions are considered wetlands under the Cowardin system, and portions of meadows may also meet the Corps' wetland criteria. Delineated palustrine emergent wetlands are subject to the NPS protection policies under Executive Order 11990 and section 404 of the CWA.

Palustrine Forested. Palustrine forested wetlands are the riparian forest habitats along the main stem of the Merced River and South Fork Merced River that are regularly inundated by normal high-water or flood flows. Palustrine forests within the upper reaches of the main stem of the Merced River and South Fork Merced River consist mainly of evergreen pines and firs, with occasional aspens. In Yosemite Valley, where the river is broad, shallow, and slow-moving, deciduous cottonwoods, willows, and alders dominate the riparian corridor. Substrate under the palustrine forest community varies from rock, gravel, sand, clays, loams, and mud. These areas are classified as either wetland or other waters of the United States by the Corps, depending on site-specific vegetation, soils, and hydrologic conditions, and would be subject to section 401 and/or 404 of the CWA.

Palustrine Scrub Shrub. This habitat type occurs sporadically along the banks of the main stem of the Merced River, the South Fork Merced River, and at lake margins. It is regularly inundated by normal high-water or flood flows. This habitat is dominated by various willows and often intergrades with meadow (palustrine emergent) and riparian (palustrine forest) communities. These communities are typically considered wetlands under the Cowardin system, would be subject to the NPS protection policies under Executive Order 11990, and typically meet the Corps' wetland criteria. These areas may meet the Corps' criteria of a wetland or other waters of the United States, depending on site-specific vegetation, soils, and hydrologic conditions, and may be subject to sections 401 and/or 404 of the CWA.

Lacustrine Littoral. Lacustrine littoral includes all wetland habitats within a lacustrine system. This classification extends from the shoreward boundary of the system to a depth of 2 meters below low water or to the maximum extent of emergent vegetation. These habitats are adjacent to deep-water lakes and reservoirs along the Merced River. These communities are typically considered wetlands under the Cowardin system, would be subject to the NPS protection policies under Executive Order 11990, and may meet the Corps' wetland criteria, depending on site-specific vegetation, soils, and hydrologic conditions, and may be subject to sections 401 and/or 404 of the CWA.

Lacustrine Limnetic. Lacustrine limnetic refers to deepwater lakes and reservoirs, such as Merced and Washburn lakes. Both lakes were formed along the Merced River by glacial activity. In-lake

[1] As discussed in this section, the term "meadow" can refer to both upland meadows and wetland meadows. When specifically discussing wetland meadows, the wetland nature of the meadow will be indicated.

vegetation is typically limited to rooted aquatic grasses, floating vascular plants, and algae. Meadow (palustrine emergent) and riparian (palustrine forest and palustrine scrub shrub) communities generally border lake margins.

These lakes provide important habitat for fish, amphibians, reptiles, and other aquatic species. Substrate varies from rock, gravel, sand, and mud. Lacustrine limnetic (deepwater lakes and ponds) are classified as deepwater habitat based on the Cowardin system (USFWS 1995). These areas are typically classified as other waters of the United States by the Corps and would be subject to regulation under section 404 of the CWA.

Areal Extent of Wetland and Riparian Habitats

There are wetlands and/or riparian habitats in every segment of the Merced River corridor. The classes and extent of wetlands and riparian habitats are summarized in **table 9-3**. In order to provide clarity to the discussion on wetlands and riparian habitats under the "Environmental Consequences" section below, the six Cowardin classes were consolidated into two broader classes ("Wetlands" and "Riparian Habitats").

TABLE 9-3: CLASSES AND AREAL EXTENT OF WETLANDS AND RIPARIAN HABITATS IN THE MERCED RIVER CORRIDOR

Wetland/Riparian Class		Area per Segment (acres)							
Name	Cowardin Class	1	2	3	4	5	6	7	8
Wetlands	Riverine/Lacustrine	404.5	141.0	96.2	42.3	89.5	0.4	64.0	27.7
	Palustrine Emergent Wetland (wet meadows)	216.5	261.2	0	1.7	69.8	0	0	0
Riparian Habitats	Palustrine Forested Wetland	0	116.7	11.8	5.2	0.9	0	0	0
	Palustrine Scrub Shrub Wetland	10.0	13.7	12.0	4.6	3.3	0	2.5	0
SOURCE: USFWS 1995; NPS 1997; NPS 2011									

Vegetation

Segment 1: Merced River Above Nevada Fall

At its headwaters, the Merced River begins in the lower alpine/subalpine forest zone. The river then descends through the upper montane forest zone and flows through Little Yosemite Valley within the lower montane forest zone. Vegetation in the upper main stem river corridor is classified into seven broad vegetation types: meadow, chaparral, lower montane broadleaf forest, lower montane coniferous forest, upper montane coniferous forest, subalpine coniferous forest, and alpine plant communities. There are also areas categorized as barren, which include talus and scree slopes, permanents snowfields, boulder fields, and other unvegetated areas. Segment 1 of the river is designated as Wilderness. Along many segments of the upper Merced River corridor, the river is bordered by a narrow riparian zone, and small wetlands occur throughout Segment 1. As mentioned above (see Merced River Wetlands and Riparian Habitats), riparian and wetland areas are not classified independently under the eight broad

vegetation types used in the parkwide vegetation map. These habitats are discussed in depth in the "Wetland and Riparian Habitats" subsection below.

Meadow Plant Communities. Numerous small meadows and adjacent riparian habitat are present in the upper reaches of the Merced River corridor above Nevada Fall (NPS 1997c, **figures 9-8** and **9-9**). These high-elevation meadows (above 7,000 feet) can be subdivided into alpine meadows (above 9,600 feet) and subalpine meadows (7,000 to 9,600 feet). Subalpine and alpine meadows are further subdivided into wet and dry types with both types sometimes occurring in the same meadow. High-elevation meadows within Segment 1 are considered a key element of the river's biological ORV.

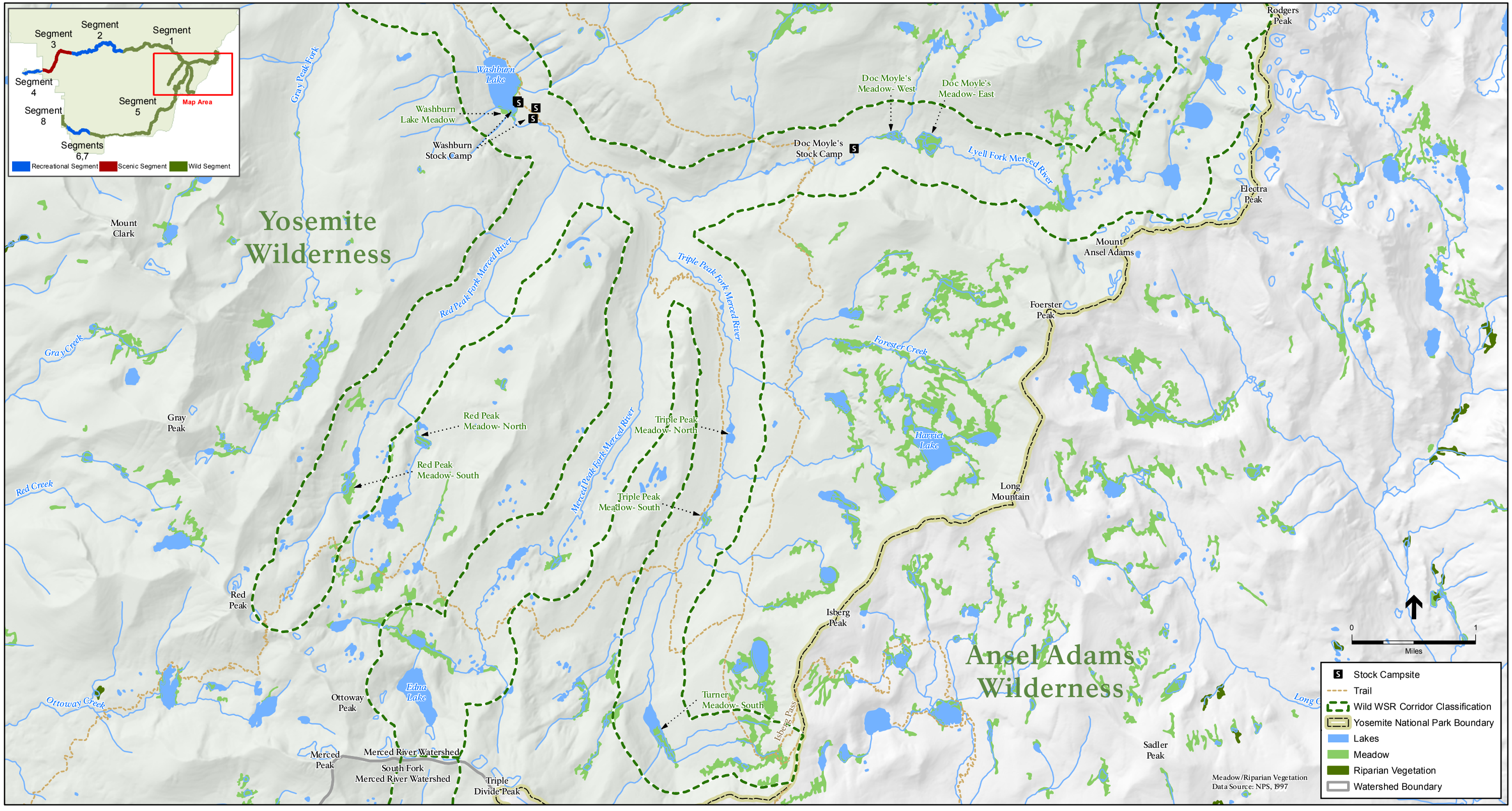
Alpine meadows form thin margins around small glacial lakes and are generally steeper, rockier, and support sparser and shorter vegetation than lower elevation meadows. Alpine meadows exhibited less conifer encroachment, no presence of non-native species, and little to no impacts from visitor use or pack stock. Formal NPS trails run through some alpine meadows in the Red Peak and Triple Peak Forks and exhibit trail braiding and rutting (Ballenger et al. 2011).

In many areas (for example, the margins of Merced and Washburn Lakes), subalpine meadows form a transition zone from the aquatic environment to drier coniferous forests. At these elevations (7,000 to 9,600 feet), larger meadow complexes are infrequent but are present in some locations. A large meadow plant community occurs within Echo Valley. These wetland plant communities are hydrologically driven by the groundwater and flooding regime of the Merced River (NPS 1997; Ballenger et al. 2011; Sawyer et al. 2009).

Although human presence in these areas now designated as wilderness has been ongoing for thousands of years, the upper reaches of the Merced River and its associated riparian and wetland communities remain intact and relatively free from disturbance. Although subalpine meadows historically experienced grazing impacts, most of the meadows in Segment 1 have not been grazed for several decades. The meadows at Merced Lake were grazed by NPS and concessioner stock until 1987, and they showed typical grazing-related impacts such as trampling, erosion, and a decline in herbaceous production when documented in 1961 (Sharsmith). Meadows in this area were closed to stock in the 1990s, with the exception of Merced Lake East Meadow, which currently serves as a holding area for NPS stock. This meadow has the highest levels of pack stock use in terms of vegetation and bare ground of any meadow in the corridor. The vegetation in Merced Lake-West and Merced Lake-Shore meadows appears to have recovered since these meadows were closed to grazing (Ballenger et al. 2012).

The recently completed *2010 Assessment of Meadows in the Merced River Corridor, Yosemite National Park* (Ballenger et al. 2011) provides detail on the current condition of meadow habitats in the Merced River corridor in Yosemite National Park. The authors found that subalpine meadows in the Merced River corridor are dominated by native graminoids,[2] a potentially healthy sign of meadow integrity because these species create dense sods that stabilize soils. Subalpine meadows in the Red Peak Fork and Triple Peak Fork have a relatively higher proportion of subshrubs and forbs. Bladder sedge (*Carex utriculata* and *C. vesicaria*) communities dominate most subalpine zone meadows in the Little Yosemite, Merced Lake, Doc Moyle's, and Washburn Lake meadows. The dominance of these

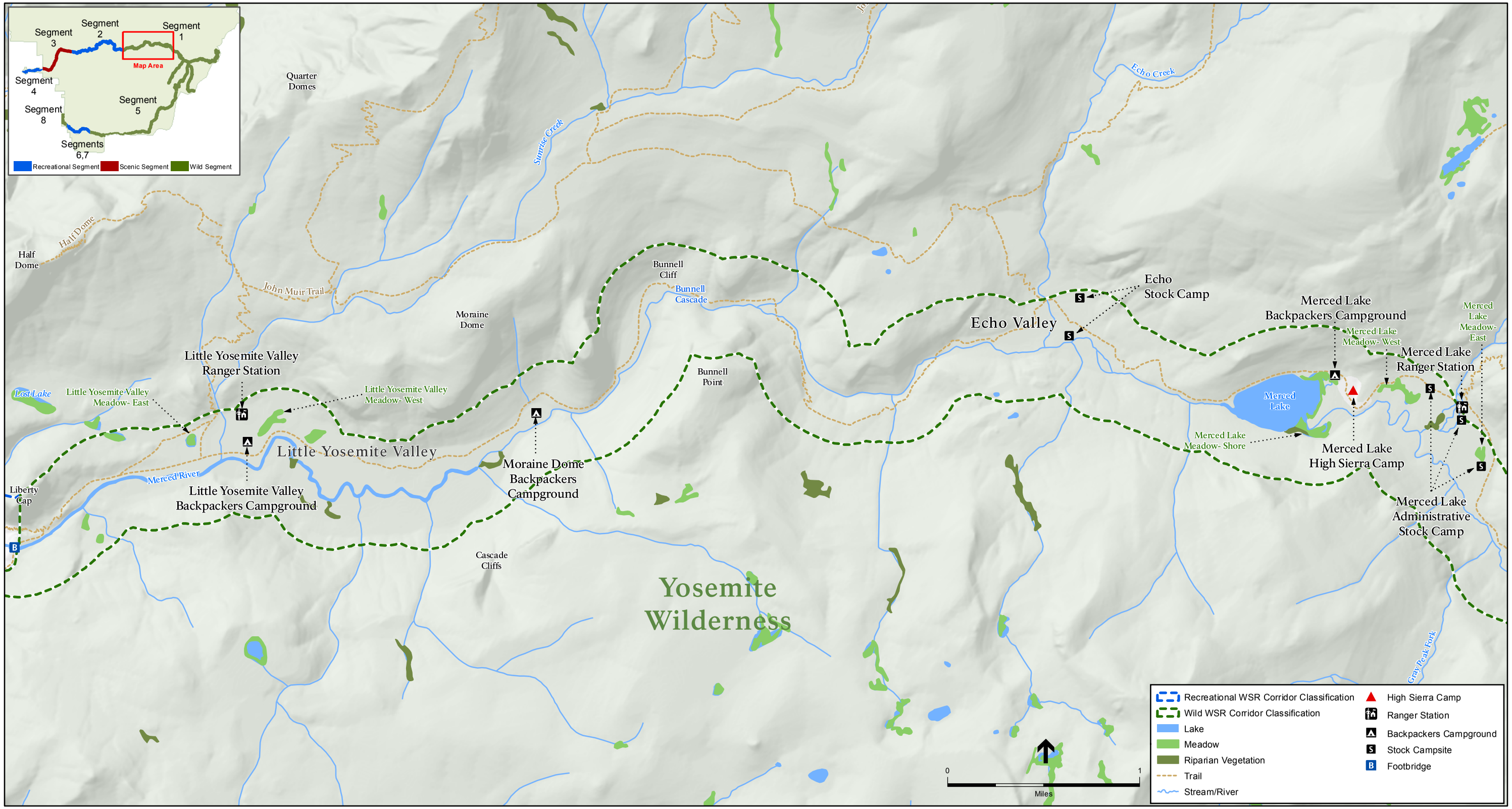
[2] Graminoids are grasses and grass-like plants, and include plants in the Poaceae (grasses), Cyperaceae (sedges), and Juncaceae (rushes) families.



SOURCE: NPS, 1997, 2011

Figure 9-8

Segment 1 - Merced River Above Nevada Fall Meadows



SOURCE: NPS, 1997, 2011

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Figure 9-9

Segment 1 - Little Yosemite Valley and Merced Lake High Sierra Camp Meadows

obligate wetland species indicates that these meadows stay wet later into the growing season when compared to many of the other meadows along Segment 1.

The extent of conifer encroachment in subalpine meadows varies widely, with some meadows (Merced Lake–East and Little Yosemite Valley–East) having no seedlings present and others (Turner Lake, Triple Peak-North and Red Peak-South) having three to four times the extent of conifer encroachment relative to other subalpine meadows.

With the exception of the Little Yosemite Valley area, nonnative species are uncommon in meadows of the Merced River high country, and were not observed in any meadows along the Merced River above Washburn Lake. Nonnative Kentucky bluegrass (*Poa pratensis* ssp. *pratensis*) is found in drier areas of Little Yosemite Valley–East and is found in abundance around cabins at Merced Lake High Sierra Camp (Colwell and Taylor 2011), while the nonnative bull thistle (*Cirsium vulgare*) is found in the wooded area outside Merced Lake East Meadow. Other nonnative plants, including velvet grass (*Holcus lanatus*), common mullein (*Verbascum thaspus*), yellow salsify (*Tragopogon dubius*), prickly lettuce (*Lactuca serriola*), timothy (*Phleum pretense*), and dandelion (*Taraxacum officinale*) were detected outside of the meadows during surveys in 2006–2010 in Little Yosemite Valley (Ballenger et al. 2011). These nonnative populations are controlled through annual hand-pulling.

The *2010 Assessment of Meadows in the Merced River Corridor, Yosemite National Park* (Ballenger et al. 2011) concluded that pack stock impacts or vulnerability to impact in subalpine meadows were a primary consideration for management of these areas. Potential issues related to pack stock use raised in the study include levels of use, timing of use, and suitability for use. The issues are particularly important for those subalpine meadows (such as Merced Lake and Doc Moyle's) with wet soils supporting hydrophytic sedge species.

Only limited data are available on the extent of stock use in Segment 1 of the Merced River. **Table 9-4** shows the total annual number of stock-use nights within Segment 1 by NPS administrative and commercial operators. The majority of stock-use nights occur at Merced Lake-East. The *Assessment of Meadows in the Merced River Corridor* found that pack stock impacts were absent or uncommon in most subalpine meadows, with the exception of Merced Lake–East, which had the highest levels of pack stock use of any meadow in the corridor, and Doc Moyle's–West, which had much lower levels of use and associated impacts. The study hypothesized that pack stock use contributes to lower vegetation cover and higher levels of bare ground at Merced Lake–East. The two meadows nearest Merced Lake–East (Merced Lake–West and Merced Lake–Shore) exhibited higher vegetative cover and lower bare ground levels when compared to Merced Lake–East, even though they had the same dominant plant species. Although grazed in the past, these two meadows were closed to stock use in the 1990s due to concerns over deteriorating conditions. Ballenger et al. (2011) concluded that these two meadows appeared to have recovered from previous stock impacts, and that they could provide a comparative baseline when monitoring conditions in Merced Lake–East. The study also found that Doc Moyle's–West may be recovering from heavy use of the site as a pack camp in the mid 20th century. Scattered signs of stock use, such as hoof punches and/or manure, were observed in five other subalpine meadows (Washburn Lake, Triple Peak, Merced Lake–Shore, Triple Peak–South, and Turner Lake). These signs are likely from stock use prior to 2010, as those meadows have no recorded 2010 stock use.

TABLE 9-4: STOCK-USE NIGHTS WITHIN SEGMENT 1 BY LOCATION (2004 TO 2010)[a]

Wilderness Stock Campsite Areas	2004	2005	2006	2007			2008			2009			2010			Total	2004 to 2010	High
	Commercially Guided Pack Trips	Commercially Guided Pack Trips	Commercially Guided Pack Trips	Commercially Guided Pack Trips	Administrative[b]	Total	Commercially Guided Pack Trips	Administrative[b]	Total	Commercially Guided Pack Trips	Administrative[b]	Total	Commercially Guided Pack Trips	Administrative[b]	Total		Average[c]	
Horsethief				12		12	8		8	50		50	21		21	**91**	13	50
Merced Lake – East					350	350		96	96		410	410	28	300	328	**1184**	296	410
Washburn Lake	23	36	20				28		28				28		28	**135**	19	36
Doc Moyle's	19			33		33			0				6		6	**58**	8	33
Echo		36					20		20							**56**	8	36
Total	**42**	**72**	**20**	**45**	**350**	**395**	**56**	**96**	**152**	**50**	**410**	**460**	**83**	**300**	**383**	**1524**	**344**	**460**

NOTES:

[a] Data shows the number of overnight stays by stock within the river segment. One stock-use night is equivalent to one overnight stay by one head of stock. Concessioner's stock used to supply the Merced Lake High Sierra Camp is not shown in the table.

[b] Administrative use within the Merced River corridor was not tracked by NPS staff until 2007. The stock-use night estimates do not include ranger patrols or sawyers but predominantly show stock use providing operational support for the NPS ranger operations and the backpacker campground facilities within Little Yosemite Valley and at Merced Lake.

[c] Average is for the stock use between 2007 and 2010. Although an average is presented for each wilderness stock campsite area, one caveat is necessary: year-to-year NPS administrative stock use levels can vary widely based on management and project work performed that year.

SOURCE: NPS 2011

There are no formal trails present in any of the subalpine meadows surveyed for the study. Most subalpine meadows had little or no informal trails present. Five subalpine meadows had some informal trails present, with Merced Lake–Shore having the most, likely due to its proximity to Merced Lake High Sierra Camp. The study could not differentiate between human and equine trailing on those sites with pack stock use (Ballenger et al. 2011). **Table 9-5** provides details on informal trails in subalpine meadows of the Merced River corridor.

TABLE 9-5: INFORMAL TRAILS IN SUBALPINE MEADOWS

Meadow Name	Informal Trails (length in meters)
Doc Moyle's–West	205.8
Doc Moyle's–East	60.6
Little Yosemite Valley–West*	0
Little Yosemite Valley–East	0
Merced Lake–Shore	1,637.5
Merced Lake–West	0
Merced Lake–East*	144.0
Red Peak–North	0
Red Peak–South	0
Triple Peak–North	0
Triple Peak–South	0
Turner Lake	0
Washburn Lake	144.2

NOTE: Includes informal trails within 50 meters of each meadow. * Indicates site was largely inundated at time of survey, so detection of informal trails may not have been possible.

SOURCE: Ballenger et al. 2011

Alpine Plant Communities. Alpine plant communities within the upper Merced River corridor are limited to alpine snow patch communities. These communities are above tree line dominated by herbaceous vegetation that has adapted to a very short growing season. Sites are seasonally saturated by snowmelt.

Chaparral Communities. Chaparral communities along the upper Merced River are characterized by montane chaparral (NPS 1997c). Montane chaparral is most often found on south-facing slopes in the coniferous forest zones. Since the majority of the annual precipitation comes as snow, there is a shorter growing season than in lower elevation chaparral communities. Plant species typical of this diverse community include mountain whitethorn (*Ceanothus cordulatus*), greenleaf manzanita (*Arctostaphylos patula)*, chinquapin (*Chrysolepis sempervirens*), bitter cherry (*Prunus emarginata*), buckbrush (*Ceanothus cuneatus*), deerbrush (*Ceanothus integerrimus*), currant (*Ribes* sp.), huckleberry oak (*Quercus vacciniifolia*), mountain mahogany (*Cercocarpus ledifolius*), and lupine (*Lupinus* spp.). Within the alpine and upper subalpine zones, montane chaparral is sparsely vegetated and typically consists of small, low-growing plants at the base of rocks or other semiprotected sites where sediment

and water collect and thin crusts made up of mosses, lichens, algae, and bacteria are present. These organisms form a biotic layer over unvegetated areas between shrubs, grasses, and flowering plants in undisturbed arid and semiarid lands of the world, including the alpine zone of the upper Merced River. These crusts function as soil builders. With a drop in elevation, chaparral plant communities dominate exposed slopes. Species in these areas are often prostrate (low growing), with occasional wind-pruned pines intermixed. Examples of chaparral communities occur near the confluence of the Merced Peak and Triple Peak Forks. Lower-elevation talus and scree fields colonized by dense shrubby trees and chaparral slowly succeed to coniferous forest communities.

Subalpine Coniferous Forest. Subalpine coniferous forests are relatively open and exposed, and increase in density along river and stream channels. The forest understory is naturally sparse and ranges from barren rock to sparse shrubs and grasses. The subalpine zone is characterized by long, severe winters and brief, cool summers. Trees in this zone range between 10 and 70 feet in height and are typically long-lived. Intensely strong winds on exposed ridges near treeline cause stunted forests, typically found at timberline, where trees are continually exposed to harsh weather conditions. Lodgepole pine (*Pinus contorta* ssp. *murrayana*) and whitebark pine (*Pinus albicaulis*) dominate subalpine coniferous forests, with mountain hemlock a common associate.

Lodgepole pine forest generally occurs at elevations with long, snowy winters, late-season snowpack, and cool, dry summers. Lodgepole pine often grows in dense, pure or almost pure stands. This species tolerates large variations in soil and moisture, but most commonly occurs on rocky, well-drained soils. At its lower limit, lodgepole is found in valley bottoms, cold basins, and wet areas around meadows surrounded by upper montane coniferous forest. The riparian type occurs at the same elevation with a mixture of understory shrubs and herbaceous perennials, surrounded by red fir. The more abundant xeric type is found on porous, decomposed granite substrate.

Whitebark pine forests occur on shallow, rocky soils just below treeline. The growing season is very short due to long, cold winters, and there is the possibility of snow or frost likely in any month. In many cases, whitebark pine forms pure stands of widely spaced trees. It can also form dense shrub-like krummholz about 3 feet high. Major associates include mountain hemlock and lodgepole pine.

Although Sierra juniper (*Juniperus grandis*) occurs throughout the upper Merced River zone, unusually large specimens of this species occur above Washburn Lake. Typical trees measure 30 feet in height and 6–8 feet in diameter.

Upper Montane Coniferous Forest. Western white pine (*Pinus monticola*), Jeffrey pine (*Pinus jeffreyi*), red fir (*Abies magnifica*), sugar pine (*Pinus lambertiana*), incense cedar (*Calocedrus decurrens*), lodgepole pine, and mountain hemlock (*Tsuga mertensiana*) dominate the higher elevations above Little Yosemite Valley. The red fir community occurs in the area of greatest snowfall accumulation in the Sierra Nevada. Snow generally remains until June and the growing season is concentrated into mid-summer. The red fir community usually occurs in large stands separated by barren areas, ridges, meadows, and dense stands of lodgepole pine, which occupy poorly drained sites. These dense forests, with frequently overlapping narrow crowns, cast deep shade on the forest floor. The understory is nearly absent and ground cover consists of abundant needle litter and fallen branches. Common associates in the red fir community include white fir, western white pine, and at the upper limit, lodgepole pine.

Western white pine occurs intermittently or as a co-dominant in the red fir community. On a small number of south- or west-facing slopes, it forms the dominant forest cover and may even occur in pure stands. This community generally occupies dry rocky areas and is composed of large, widely spaced trees. Often there is an understory of dwarfed montane chaparral composed of pinemat manzanita (*Arctostaphylos nevadensis*) and mountain whitethorn.

White fir occurs in the 6,000- to 7,000-foot elevation range along the river corridor. The diversity of both forest-dominant and understory species above Little Yosemite Valley exemplifies the variability of vegetation through this zone of the Sierra Nevada range. Understory species in the upper montane coniferous forests include a mix of scrub and chaparral, as well as young conifers and fern dells. Species composition is diminished in localized areas such as Merced Lake High Sierra Camp (denuded understory) and the burn area within Echo Valley (even-aged stands of young conifers).

Lower Montane Coniferous Forest. The lower montane coniferous forest along the upper Merced River is dominated by ponderosa pine (*Pinus ponderosa*) at lower elevations and Jeffrey pine at higher elevations, along with other coniferous species such as white fir, incense cedar, and sugar pine. This community favors dry, cold, well-drained sites, especially slopes, ridges, or cold air accumulation basins. In some areas, notably the south-facing slopes below Half Dome, it can form vast stands. In the more xeric and lower elevational limit of its habitat, Jeffrey pine is associated with dense understory stands of chaparral. In more mesic sites, or at higher elevations, it intergrades into upper montane coniferous forest. The plant species composition of the forest varies with elevation, slope, aspect, soils, water availability, and past and ongoing disturbance.

Little Yosemite Valley is dominated by mixed conifer communities of ponderosa pine, incense cedar, sugar pine, and occasional California black oaks and canyon live oaks. The most common understory shrubs are Mariposa manzanita (*Arctostaphylos viscida* ssp. *mariposa*), deerbrush, and bear-clover (*Chamaebatia foliolosa*). With a descent in elevation from the upper reaches of the Merced River into Little Yosemite Valley, the impacts associated with visitor use become more apparent. Forests to the north of the Merced River experience relatively heavy use (along major trail routes and camping sites), typically have little understory vegetation, and are dense with young trees, dead material, and ladder fuels. Forests south of the river receive almost no use and are more rich and pristine in nature. Typical nonnative species in this coniferous forest include European annual grasses, bull thistle, and common mullein.

Lower Montane Broadleaf Forests. Lower montane broadleaf forest along the upper Merced River includes areas dominated by California black oak (*Quercus kelloggii*) or canyon live oak (*Quercus chrysolepis*). These areas are not extensive in the upper Merced River corridor and only occur at the lowest elevations of these segments. This forest becomes more widespread at lower elevations. Lower montane broadleaf forests occur as persistent stands dominated by California black oaks or canyon live oaks with scattered pines. Most stands occur on mountain slopes, benches, and canyon bottoms. Primary associate species include white fir (*Abies concolor*), incense cedar, sugar pine, and Jeffrey pine.

Wetlands and Riparian Habitats. Numerous small wetland meadows[3] and adjacent riparian habitat are present in the upper reaches of the Merced River corridor above Nevada Fall. These high-elevation

[3] Not all meadows along the Merced River corridor can be classified as wetlands. For a more general discussion of meadows, please refer to "Meadow Plant Communities" above.

meadows typically occur on fine-textured, permanently to semi-permanently wet soils generally associated with perennial streams, seeps, lake margins, or depressions. Vegetation consists of low-growing, native, tussock-forming grasses, sedges, rushes, and perennial herbs. Within the alpine zone (generally above 9,600 feet — the highest portion of the Merced River's headwaters), wetland meadows often form thin margins around small glacial lakes. At lower elevations (such as Merced and Washburn lakes), subalpine wetland meadows (7,000–9,600 feet) link the aquatic river and lake habitats with the drier upland forests. In-lake vegetation is typically limited to rooted aquatic grasses, floating vascular plants, and algae. Meadow communities border lake margins, providing important wildlife habitat. These wetland plant communities are hydrologically driven by the groundwater and flooding regime of the Merced River (NPS 1997; Ballenger et al. 2011; Sawyer et al. 2009). For a more detailed discussion of the current condition of meadows in the upper Merced River watershed, please refer to "Meadow Plant Communities" above.

Much of the Merced River above Nevada Fall is bordered by a narrow riparian zone influenced by stream gradient, slope, sedimentation, and aspect. High-elevation tributaries to the Merced River (e.g., Merced Peak Fork and Triple Peak Fork) are sparsely vegetated with scattered patches of alpine riparian scrub and alpine willow thickets. As the river descends and the gradient becomes gentler, lodgepole pines, aspens (*Populus tremuloides*), willows (*Salix* spp.), and alders (*Alnus* spp.) become more prevalent. Willows often colonize where point bars form (at the margins of, or within, the river channel). Riparian species often intergrade with coniferous forest at or near the river's upper banks (NPS 1997; Sawyer et al. 2009). Riparian communities of the upper Merced River are generally intact, except in a few locations where human use is intense.

Segment 2: Yosemite Valley

Yosemite Valley is a broad, flat-bottomed valley formed by glaciation and subsequent alluvial deposition. Yosemite Valley is in the lower montane mixed conifer zone, and vegetation is classified into three broad types: meadow, lower montane broadleaf forest, and lower montane coniferous forest. California black oak forest is a major component of the broadly defined lower montane broadleaf forest. Because the NPS considers California black oak a highly valued biological and cultural resource, this community is described separately from other lower montane broadleaf forest communities. There are also areas categorized as barren, which in Yosemite Valley include talus slopes, developed sites, and other unvegetated areas. Along many segments of the Merced River corridor in Yosemite Valley, the river is bordered by a narrow riparian zone and small wetlands. In addition, many of the larger meadows of Yosemite Valley support wetland areas. As mentioned above, even though riparian and wetland areas are not classified independently under the eight broad vegetation types used in the parkwide vegetation map, they are discussed in depth in the "Wetland and Riparian Habitats" section below.

Fire History of Yosemite Valley: For more than 4,000 years, traditionally associated American Indians relied on Yosemite Valley's meadows and oak woodlands to provide food, medicine, and materials for baskets, string, and shelter. Yosemite's early inhabitants periodically set fires to promote the growth milkweed, dogbane, sedge root, and bunch grass (Gassaway 2005). Pre Euro-American fire regimes were characterized by frequent late season fires that varied in extent from local spot fires to larger burns (Taylor 2006). The presence of large diameter California black oak, ponderosa pine, incense cedar, and

Douglas-fir in photographs of Yosemite Valley taken in the 1860s and 1870s (Gibbens and Heady 1964; Gruell 2001) suggest that surface fires killed mainly seedlings and saplings. Thus, frequent fire promoted development of open forest conditions with a predominance of large diameter trees. When Euro-Americans began living in Yosemite Valley in the 1850s, traditional burning practices were stopped and fire suppression became official policy until the 1970s. Fire was a key disturbance process that influenced forest structure and composition in Yosemite Valley prior to Euro-American settlement. Fire regimes changed dramatically after Euro-American settlement as did the role of fire in shaping vegetation structure and dynamics. The most conservative estimate of how often sites burned during the pre Euro-American period indicates that forested areas in the Valley burned every 11-14 years (Taylor 2006).

Meadow Plant Communities. Low-elevation meadows on the Merced River floodplain are hydrologically driven communities that depend on river processes, including the frequency, duration, timing, and magnitude of flooding, and frequent low-intensity broadcast fires. The meadows in Yosemite Valley form transition zones from drier upland and California black oak communities to wetter riparian communities. The aquatic food chain in the Merced River is dependent on a connection with overflow channels in the meadows, which spill over during periods of high water, releasing concentrated food sources into the river.

Meadows in Yosemite Valley are larger in size than most mid-elevation meadows throughout the region and thus are rare and unusual at a regional scale (NPS 1997, **figure 9-10**). In addition, meadows in Yosemite Valley are highly diverse, both from a structural point of view, as the meadows contain a wide variety of microhabitats, and from a species point of view, as the meadows support high numbers of different native plant and animal species. About 30 different sedge species have been collected in Yosemite Valley meadows, which is considered by experts in the genus to be an exceptional degree of diversity (Ballenger et al. 2011). These meadows also support special status animal species, illustrating the exceptional species richness of Yosemite Valley. These attributes combine to make Yosemite Valley's meadows an extraordinary example of a regionally rare ecosystem, and contribute to the river's biological ORV.

The water tables in Yosemite Valley remain at or near the surface throughout the growing season. An accumulation of organic matter is typical in these meadows. Sedges, grasses, and other perennial and annual herbs form a dense cover. The most common sedges in many meadows include rough sedge (*Carex senta*) and wooly sedge (*Carex pellita*); these species occur in the most mesic areas. The most common grasses found in meadows include beardless wild rye (*Elymus triticoides*) and the nonnative Kentucky bluegrass. These grasses occur in dry portions of meadows where surface moisture is depleted during the growing season. Grasses commonly dominate the dense to moderate cover of perennial and annual herbs.

Over the past century the acreage of meadows in Yosemite Valley has decreased (**figure 9-11**) due to conifer encroachment (Gibbens and Heady 1964; Heady and Zinke 1978). Cooper and Wolf (2008) suggested that conifers have likely colonized former meadows for several reasons: (1) the installation of drains, water diversions, and other facilities caused hydrologic changes that lowered the summer water table; (2) the cessation of burning by American Indians allowed tree seedlings to persist; (3) disturbance caused by plowing meadows and planting hay crops and apple orchards allowed conifers to invade the bare soils after the widely rooted, sod-forming meadow species were destroyed; and (4) placement of fill to raise

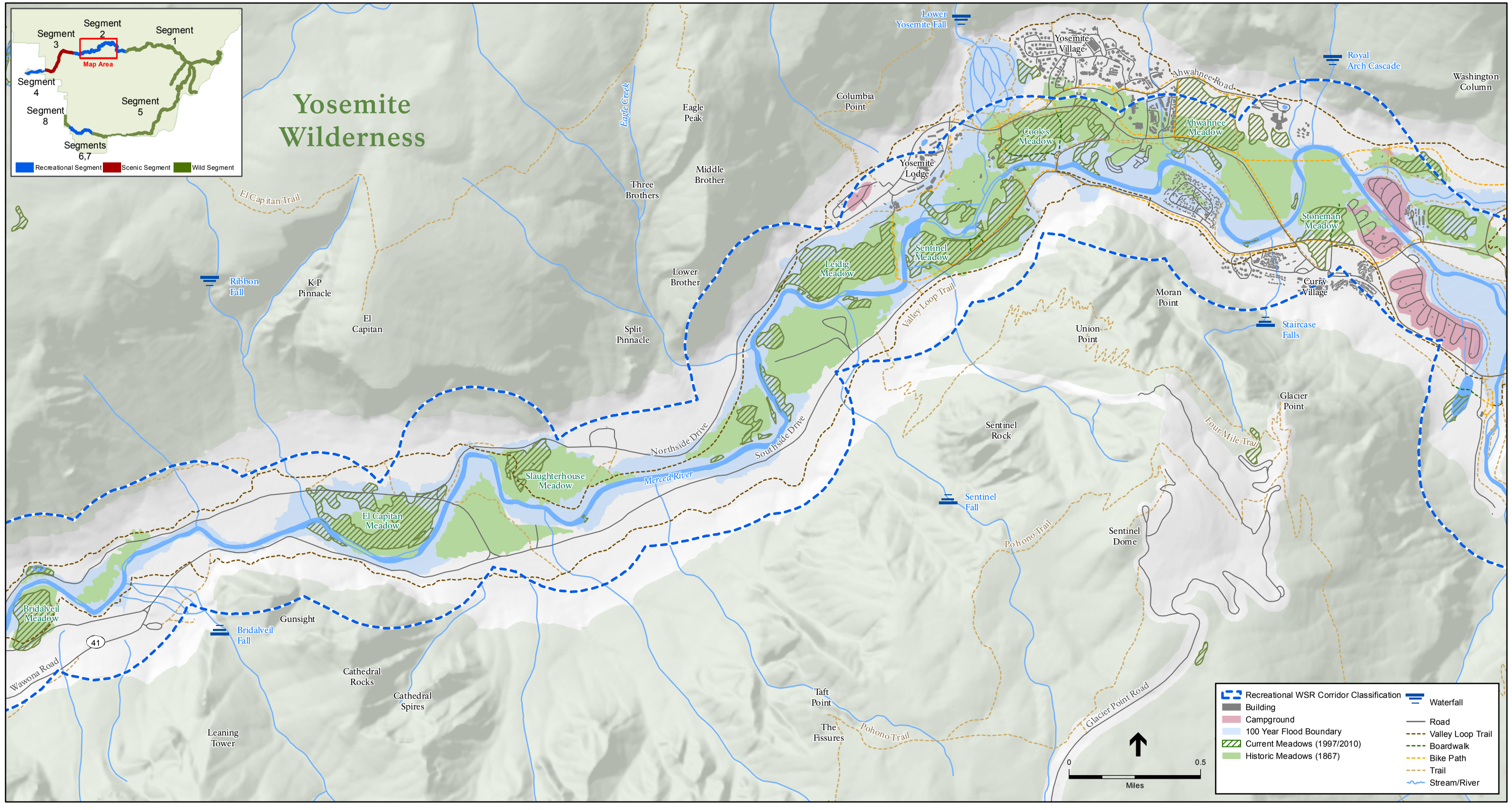
the ground elevation allowed upland species to invade. The widening of the Merced River — attributable to trampling on riverbanks, subsequent loss of vegetation, and accelerated erosion — also had an effect on natural river processes such as flooding, and natural erosion and sediment deposition (Madej 1991). These processes shape the dynamic habitat that sustains riparian vegetation and supply water to meadow communities.

Historic photos and accounts document the condition of Yosemite Valley meadows in relation to conifer encroachment through time. In 1866, State Geologist J.D. Whitney (1868) mapped 745 acres of meadows in Yosemite Valley. In 1937, NPS type mapping projects calculated 327 total meadow acres in Yosemite Valley. In 2010, botanists mapped 269 total meadow acres, a 64% decrease from the 1866 Yosemite Valley meadow (Ballenger et al. 2011) (**figure 9-11**).

The recently completed *2010 Assessment of Meadows in the Merced River Corridor, Yosemite National Park* (Ballenger et al. 2011) provides details on the current condition of meadow habitats in Yosemite Valley. The study examined a wide variety of attributes including vegetation, wetland extent, bare ground, nonnative species, conifer encroachment, and meadow stream condition. Disturbance from small mammal burrows, informal trails, and pack stock use was also documented.

Mean vegetation cover in Yosemite Valley meadows ranged from 50%–70%, with El Capitan and Leidig meadows having the lowest mean vegetation cover and Cook's Meadow having the highest. The authors found that graminoid species dominated Yosemite Valley meadows, which are a healthy component of meadow vegetation. However, nonnative plant species are common in Yosemite Valley meadows, with the highest extent of nonnatives in Stoneman and El Capitan meadows. The study also compared mean cover of nonnative plants across all meadows for different surface soil moisture categories and found that nonnative plant cover was lowest in saturated and inundated plots. Dry and moist plots had two to three times the cover of nonnative plants as plots with early-season saturated or inundated soils. Because El Capitan and Stoneman Meadows also had the lowest proportion of wetland area of Yosemite Valley meadows, the study suggests a connection between the extent of perennially wet soils and nonnative species in Yosemite Valley. Kentucky bluegrass was the most common nonnative recorded, which outcompetes native meadow species when soil moisture is reduced (Martin and Chambers 2001; Kluse and Allen-Diaz 2005). So far, most nonnative plants currently present in Yosemite Valley meadows are not well adapted to outcompete native plants in the wettest portions of the meadows with the exception of Kentucky blue grass and velvet grass (*Holcus lanatus*), and aggressive non-native plant which prefers wet conditions and is already established in Yosemite Valley). Close attention to early detection and eradication of nonnative meadow plants will help keep additional species and populations from encroaching into wetlands, and maintaining and restoring the hydrologic regime of Yosemite Valley meadows may help sustain native meadow vegetation (Ballenger et al. 2011).

Across all Yosemite Valley meadows surveyed, 50% of plots were considered wetlands under the Cowardin standards, based on dominant plant species and wetland indicator ratings. Leidig, Cook's, and Sentinel meadows had the highest proportion of wetland plots (84-86%). El Capitan and Stoneman meadows had the lowest proportion of wetland plots, with 50% and 52% respectively. Conifer seedlings are more frequent in El Capitan and Stoneman meadows than in Leidig and Sentinel meadows, presumably due to a longer inundation period in the latter set of meadows. The seedlings of many tree species cannot survive long periods of inundation (Koxlowski 1997).



SOURCE: NPS, 1997, 2010, 2011; Hoffman/State Geological Survey, 1867

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Figure 9-10

Segment 2 - Historic and Current Meadows

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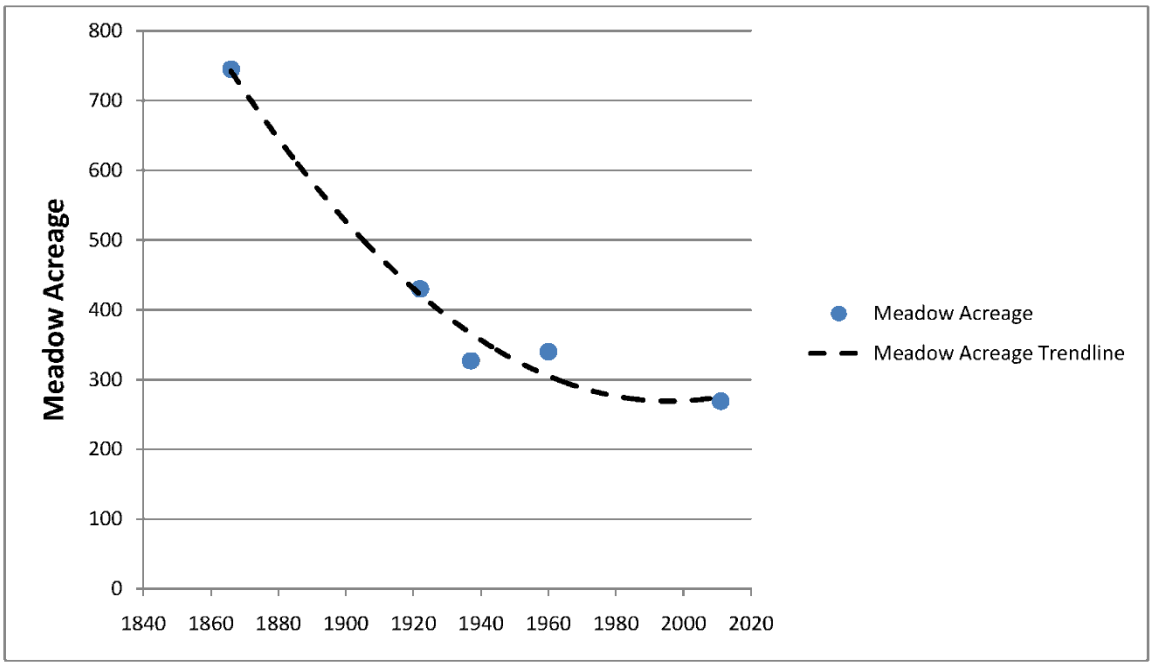


SOURCES: Whitney 1868; Gibbens and Heady 1964; Heady and Zinke 1978; Cooper and Wolf 2008; Ballenger et al. 2011.

Figure 9-11
Meadow Acreage in Yosemite Valley (1866-2011)

Informal trails are common in Yosemite Valley. The *2010 Assessment of Meadows in the Merced River Corridor, Yosemite National Park* (Ballenger et al. 2011) found that bare ground from informal trails was highest in El Capitan, Sentinel, and Bridalveil meadows. Cook's and Stoneman meadows had the lowest levels of bare ground from informal trails, possibly due to the presence of elevated boardwalks that concentrate visitor foot traffic, discouraging visitors from venturing cross country through the meadows and mitigating trampling effects. Although the meadows of Yosemite Valley have experienced a variety of human-related impacts over the past 150 years, the remaining meadows are still largely intact and are some of the most ecologically valuable meadows in the Sierra Nevada. The NPS is implementing a number of management programs to restore meadow communities along the Merced River within Yosemite Valley, including prescribed burning, treatment of nonnative plant populations, and restoration of native plants. For example, tens of thousands of conifer seedlings and saplings were removed from Yosemite Valley meadows in the last decade. Populations of high-priority nonnative species, such as Himalayan blackberry (*Rubus armeniacus*), bull thistle, St. John's wort (*Hypericum perforatum*), and velvet grass, were mapped and many of these populations were treated (Ballenger et al. 2011).

Other beneficial projects include the Cook's Meadow Restoration Project and the Eagle Creek Restoration Project, which were specifically designed to enhance meadow and riparian habitat. The Cook's Meadow project restored meadow hydrology by filling ditches and removing an abandoned roadbed. The Eagle Creek Restoration Project enhanced riparian streambank integrity by recontouring and revegetating eroded streambanks, de-compacting soils, and constructing fencing to direct visitors to areas that could accommodate higher levels of use such as sandbars. In Cook's Meadow, the NPS excavated paved interpretive trails that crossed the meadow and replaced them with elevated boardwalks. In Sentinel Meadow, the NPS constructed one boardwalk and fencing along the strip

parking area, helping to discourage the use of 29 informal trails by delineating access. Similarly, in Stoneman Meadow, the NPS constructed a boardwalk across the meadow to further discourage the use of 25 informal trails.

Lower Montane Broadleaf Forest. Lower montane broadleaf forest in Yosemite Valley includes areas dominated by California black oak or canyon live oak. This community is transitional between low-elevation broadleaved forests and higher elevation coniferous forests. Canyon live oak communities grow on both north- and south-facing talus slopes and often form pure or almost pure stands. Fires in this community are infrequent but intense, with a fire return interval of 20–50 years on south-facing slopes. Most trees and shrubs in this community crown sprout after fire.

California Black Oak Stands. California black oak stands are considered a subset of the lower montane broadleaf forest. They are discussed independently here because they are considered a key element of the river's cultural ORV.

Black oak acorn has been an important staple food for Indian people in Yosemite Valley for millennia (Anderson 1991; Hull and Moratto 1999). According to Bibby (1994:17), its historic importance is likely one reason why acorn, and the cultural knowledge regarding its preparation, has survived strongly among the contemporary associated tribes and groups. Although it is no longer a staple food, it has become symbolic of ancestral traditions and an important aspect of contemporary culture. For example, acorn soup is prepared for special occasions, especially traditional gatherings and ceremonial events. Several of the former inhabitants recall gathering acorn with their parents and/or grandparents, attesting to the multi-generational historical and place-based personal connections between black oaks and the people. Certain groups of trees, or even individual trees, continue to be associated with particular individuals who gathered in historic times (Bibby 1994:22).

California black oaks in Yosemite Valley form open stands of large, stately trees with an herbaceous understory. These stands are unique to the valley due to thousands of years of anthropogenic activities, including annual burning and removal of young conifers, and are found at the change in slope between upland colluvial deposits and lower meadow, water-driven alluvial areas. They form a band or ring of oaks around the valley floor, between the upland forest communities and the lower-lying meadow and riparian communities, totaling approximately 126 acres. California black oak stands mixed with ponderosa pine are found throughout the valley, and areas of California black oak with development are found in the east Valley, totaling an additional 280 acres. California black oaks also grow in dense stands on talus slopes near drainages.

The current structure of the California black oak population in Yosemite Valley follows a familiar pattern for oak species throughout California – a more or less predicted frequency distribution of adults but few to any saplings and young adults, but usually many young seedlings. California black oak communities in Yosemite Valley have experienced a decline in population size, density, vigor, recruitment rates, and stand structure. The decline has been caused by changes in natural or cultural fire processes, encroachment by conifers, browsing by deer and rodents, and from development and unmanaged visitor use in the early and mid-20th century (Fritzke 1997). Oak woodlands are also some of the most ecologically transformed terrestrial ecosystems in the Sierra Nevada due to alterations of

natural processes, development, and introduction of nonnative species. The conversion of oak woodlands has also had a substantial effect on wildlife species (UC Davis 1996).

California black oak communities are adapted to frequent low-intensity fires, similar to upland mixed conifer communities. Under natural conditions, the return interval for fire is estimated at 8–12 years (NPS 1990). The disruption of natural and aboriginal fire regimes has led to the rapid decline of black oak woodlands in the park (Angress 1985). Nonnative plant species have also become established in California black oak communities. Species include annual grasses, black locust (*Robinia pseudoacacia*), and extensive ground-covering stands of Himalayan blackberry.

Lower Montane Coniferous Forest. Mixed conifer communities are normally dominated by ponderosa pine and generally grow at elevations of 3,000–5,000 feet. This habitat also contains incense cedar, sugar pine, and occasional California black oaks. The most common understory shrubs are Mariposa manzanita, deerbrush, and bear-clover.

The mixed conifer community is naturally adapted to low-intensity, frequent fires. Nearly 100 years of fire suppression has resulted in a change from open forest to dense thickets of shade-tolerant tree species, including incense cedar, white fir, and Douglas-fir (*Pseudotsuga menziesii*). Under natural conditions, the return interval for fire is estimated at 8–12 years (NPS 1990). Present conditions, however, often generate fires of much greater intensity than under a natural fire regime. The intensity of the 1990 A-Rock Fire in the Foresta area was partially due to these conditions. Most undeveloped, mixed conifer areas of Yosemite Valley are now managed through a combination of mechanical removal of hazardous fuel and prescribed burning. These treatments simulate the natural and anthropogenic fire regimes of the Valley and help decrease stand densities to more natural levels.

In Yosemite Valley, the extent of the annosus root disease is unusual; there are only a few other large populations of this species of root rot on the western side of the Sierra Nevada (NPS 1998B). Annosus root disease is a widespread native fungus. In pines, the fungus first spreads through the root system, attacking the inner bark and sapwood, killing these tissues. Within 2 to 6 years after initial infection, the fungus reaches the root crown and girdles the tree. The tree dies, but the fungus remains active as a saprophytic, wood-decaying organism within roots and the butt of the dead tree and spreads to the root systems of adjacent trees. This fungus also spreads more readily in tightly spaced trees.

Yosemite has unnaturally dense stands of conifers in former California black oak, meadow, and riparian areas that have a high water table and frequent flooding. The conifer forest in Yosemite Valley may not be sustainable because of these unusually large centers of annosus. Significant annosus infestation centers in Yosemite Valley include former Upper River and Lower River campgrounds and Yellow Pine Campground, portions of Yosemite Lodge, and most of the Taft Toe area. Existing annosus centers in developed areas can be mitigated by landscaping with species that are not susceptible to infection, such as California black oak, canyon live oak, and big-leaf maple.

Nonnative, or introduced, plant species have become established in the mixed conifer zone, although not to the extent they have in meadows and California black oak communities. These species are the result of either deliberate or accidental introductions and are not part of the naturally evolved community. Many of these are indicators of past agricultural activities that occurred throughout the area. Approximately 180 nonnative species have been identified in the park, primarily in the

chaparral/oak and mid-elevation forests (Fritzke and Moore 1998). In the upland plant communities of Yosemite Valley, nonnative species are generally herbaceous and associated with ground disturbance (one-time or recurring). Typical species include European annual grasses and bull thistle.

Wetlands and Riparian Habitats. Wetlands in Yosemite Valley are formed in low-gradient land adjacent to the Merced River, its tributaries, or other bodies of water that are, at least periodically, influenced by flooding or high water tables.

Wetlands within Yosemite Valley have undergone systematic alteration since the middle of the 19th century as they were grazed, farmed, and used as recreational sites and corridors for travel. One of the earliest impacts on wetlands in Yosemite Valley occurred in 1879, with the blasting of El Capitan moraine in the west Valley. This action lowered the base hydrologic level and caused the Merced River to downcut several feet (Milestone 1978; NPS 1992). Vegetation in adjacent wetlands was probably altered, and wetland function would have been further compromised by actions designed to dewater these areas. Impacts on wet meadows would have been most severe immediately upgradient of the blast (El Capitan Meadow) and from that point upstream. The blasting of the moraine would have had minimal impact on Sentinel, Cook's, Stoneman, and Ahwahnee meadows.

Other alterations that took place in the early 20th century include drainage ditches that were constructed to dewater wet meadows to reduce mosquito breeding areas and provide open land for grazing and agriculture. Many of these drainage ditches remain in place and continue to dewater meadows in Yosemite Valley. Road construction has involved drainage measures and diversion of surface water adjacent to many of the valley's wetlands. Wetlands are fragmented by roads, trails, and infrastructure. This wetland complex was formerly much more interrelated and contiguous. Evidence of the impact of roads can be seen in Sentinel, El Capitan, and Stoneman meadows.

Riparian zones in Yosemite Valley extend outward from bank edges of the Merced River and its tributaries into adjacent meadow and forest communities. Riparian ecosystems play a critical role in a variety of processes. Situated at the interface between terrestrial and aquatic ecosystems, the riparian zone acts to buffer hydrology and erosional cycles, control and regulate biogeochemical cycles of nitrogen and other key nutrients, limit fire movements, and create unique microclimates for animal species (Rundel and Stuner 1998).

Riparian zones in Yosemite Valley are characterized by broadleaf deciduous trees, such as white alder (*Alnus rhombifolia)*, black cottonwood (*Populus trichocarpa*), big-leaf maple *(Acer macrophyllum)*, white fir, and willow species. Riparian areas within the valley are rich in species diversity and structure. Riparian vegetation is regularly disturbed by the deposition and removal of soil and the force of floodwaters. Plants in this zone colonize newly formed river-edge deposits readily. The distribution of riparian communities varies with soil saturation and frequency of disturbance. For example, big-leaf maple riparian forests grow on moist gravelly soils in protected spots on alluvial soils bordering streams, whereas sandbar willow woodlands occur on point and mid-channel bars that are washed over annually by spring floods (NPS 1994b).

Riparian communities are among the most productive and biologically diverse in Yosemite Valley. For much of the 20th century, these areas were among the most affected due to their proximity to water and the effects of trampling and the installation and maintenance of aboveground and belowground

infrastructure, which caused dewatering of riparian areas. Restoration efforts have generally been successful at improving the overall condition of the Valley's riparian communities. However, certain riparian areas within the Valley continue to experience impacts. For example, NPS staff continues to observe vegetation trampling and bank erosion from heavy use along the following areas: between El Capitan Bridge and Clark's Bridge, Clark's Bridge and Sentinel Bridge, and Happy Isles Road Bridge and Clark's Bridge; Cathedral, Swinging, Sentinel bridge picnic areas; and around the Upper Pines and Lower Pines Campgrounds and Housekeeping Camp. Additional riparian vegetation impacts are occurring along reaches that have been armored by revetments or other defensive structures for the protection of structures (i.e., bridges).

Primary stressors on the condition of riparian habitats along the Merced River are related to high recreation use, channel stabilization measures, and dewatering due to infrastructure. Measures to stabilize the channel were implemented to limit channel migration in areas where bank erosion was observed to protect infrastructure, property, and public safety. These measures, including constructing bank revetments and clearing channels of large wood, channelized the river and reduced riparian habitat complexity. Riparian wetlands along some reaches are also affected by the proximity of roads, bank protection measures that have been installed to protect roads, and numerous turnoffs and parking areas that provide easy access to the riparian corridor and the river. The recently completed *Merced River and Riparian Vegetation Assessment* (NPS 2011) evaluated the current condition of eight geomorphic reaches of the Merced River and its riparian corridor in Yosemite Valley by using a variety of different methods. The study found that riparian and wildlife habitat conditions along the Merced River through Yosemite Valley varied by geomorphic reach, and that these variations were caused by responses to assorted types of impacts. For example, the reach just below Happy Isles has wide riparian buffers with complex physical structure and provided good wildlife habitat. Conversely, the stretch just below Tenaya Creek had narrow riparian buffers and low vegetation structural complexity, providing poor wildlife habitat. The study found that the primary causes of decline of the riparian corridor along the Merced River riparian corridor were related to recreation use and the presence of infrastructure, which can limit the development of the riparian forest (NPS 2011). This same study observed evidence of at least moderate levels of human use throughout most of the study reaches. Areas with moderate to high levels of human use were concentrated near the developed areas between Clark Bridge and Sentinel Bridge and areas easily accessible from adjacent roads. Bank erosion was observed throughout the study reaches, particularly near bridges, recreation facilities, and around some meander bends. Areas with moderate to high human use also generally had fewer co-dominant species and generally exhibited lower riparian community structure complexity (NPS 2011).

Over the past two decades, the NPS has undertaken numerous efforts to restore the underlying natural processes that sustain wetlands and riparian habitats in Yosemite Valley. These efforts include prescribed burns, invasive plant eradication, fencing, and increasing inundation levels through restoration of natural drainage patterns, among others. A more detailed description of past and present restoration projects is included in the *Merced River and Riparian Vegetation Assessment* (Cardno ENTRIX 2011) and the *Assessment of Meadows in the Merced River Corrido*r (Ballenger et al. 2011). These efforts have been successful in improving the overall condition of riparian areas throughout the Valley. However, these reports also identify a number of persisting stressors on the

Valley's wetlands and riparian ecosystems, such as roads, parking areas, structures, campgrounds, and informal trails, which remain to date and are the focus of ongoing park management efforts.

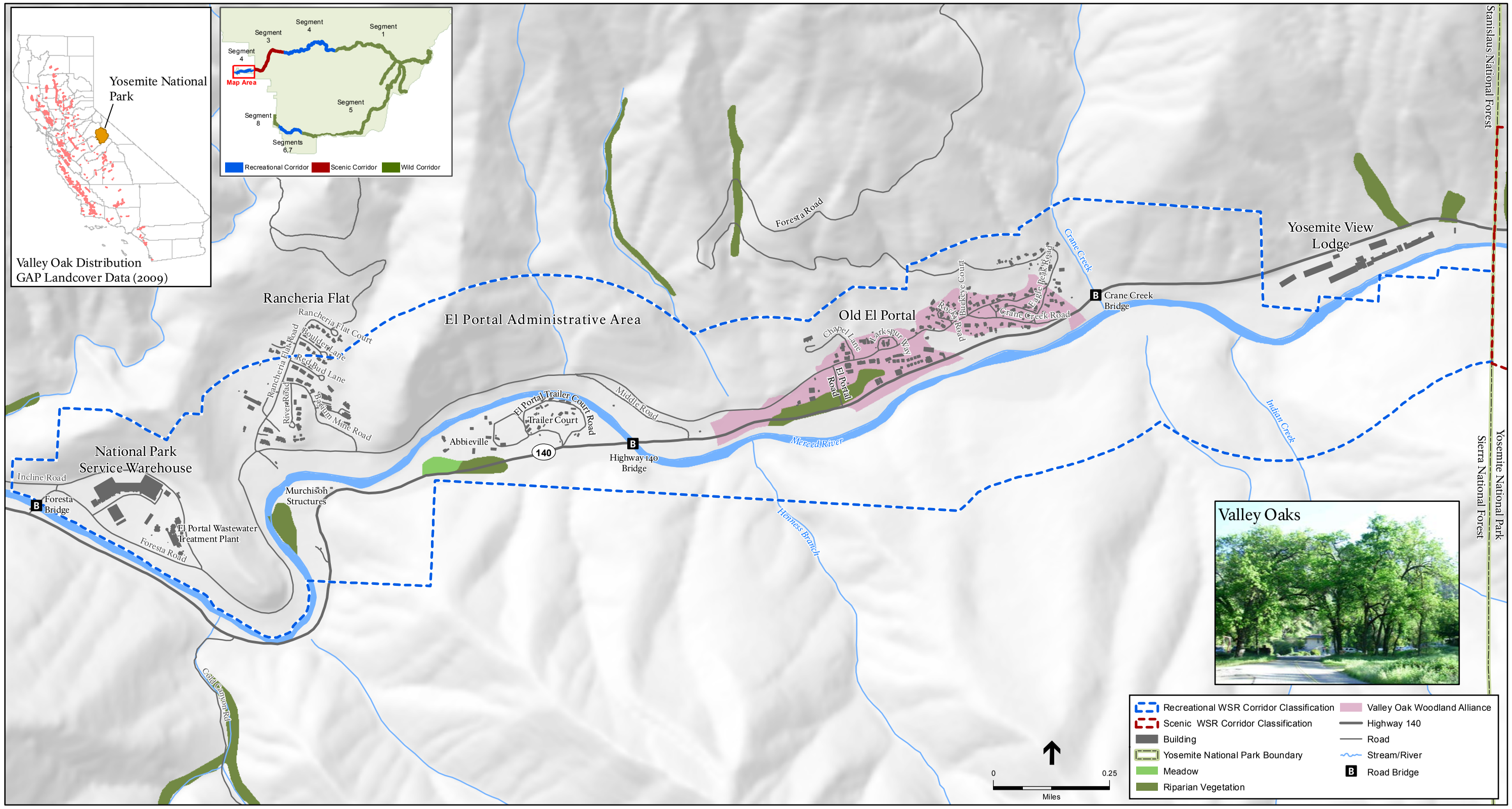
Segments 3 and 4: Merced Gorge and El Portal

The Merced Gorge travels through the lower montane forest zone and into the foothill-woodland zone, where it enters the El Portal area. Vegetation in the Merced Gorge and El Portal river corridor is classified into four broad vegetation types: chaparral, foothill woodland, lower montane broadleaf forest, and lower montane coniferous forest. Valley oak (*Quercus lobata*) woodland occurs in the El Portal area (**figure 9-12**). This community is an element of the broadly defined foothill woodland. Because the valley oaks in El Portal are a regionally rare species, this community is described separately from other foothill woodland communities. Along these segments, there also are areas categorized as barren, which include talus slopes, unvegetated riverine flats, exposed rock, and other unvegetated areas. There is a narrow band of riparian vegetation along the river course through the Merced Gorge, which is bordered by a dense mosaic of chaparral and forest and woodland communities on the steep canyon walls. As mentioned above, even though riparian and wetland areas are not classified independently under the eight broad vegetation types used in the parkwide vegetation map, they are discussed in depth in the "Wetland and Riparian Habitats" section below.

All of the communities in this area are adapted to frequent natural fires. Fire suppression has led to increased density of vegetation, especially on north-facing slopes. In 1990, the A-Rock Fire burned the south-facing slope directly above El Portal. Natural fires probably burned every 5–10 years in grassy areas, and every 25–40 years in chaparral areas (van Wagtendonk 1994).

Chaparral Communities. Chaparral communities along the Merced Gorge are largely confined to the canyon sides and open rocky areas. These areas are dominated by evergreen, thick-leaved species. The major components of this community are foothill pine (*Pinus sabiniana*), canyon live oak, interior live oak (*Quercus wislizeni*), Mariposa manzanita, deerbrush, whiteleaf manzanita (*Arctostaphylos viscida*), buckbrush, yerba santa (*Eriodictyon californicum*), and mountain mahogany. There is often a considerable accumulation of leaf litter with little or no understory vegetation. Chaparral communities often occur on rockier soils than adjacent foothill-woodlands or lower montane coniferous forests. The metamorphic rock formation that crosses the South Fork Merced River downstream of Wawona is home to several species of plants that are both rare and apparently specific to this substrate type. This same formation crosses the main stem of the Merced River at El Portal, and also is home to rare plant species, including state-listed ones (*Allium yosemitense, Lewisia congdonii, Eriophyllum congdonii*), in the vicinity of the river.

Foothill Woodlands. Foothill woodland communities include interior live oak woodland, foothill pine-oak woodland, and interior live oak chaparral. Interior live oak woodland is dominated by interior live oak; however, blue oak (*Quercus douglasii*), California buckeye (*Aesculus californica*), and California bay (*Umbellularia californica*) are also important. Ponderosa pine occurs as a common associated species. Typically dense canopies and abundant, persistent leaf litter occur on dry, rocky slopes with little soil development.



SOURCE: NPS, 1997, 2011

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Figure 9-12

Segment 4 - Valley Oak Woodlands

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Foothill pine–oak woodland is largely confined to the canyon sides and open rocky areas. It is dominated by evergreen thick-leaved species. The major components of this community are foothill pine, canyon live oak, interior live oak, Mariposa manzanita, deerbrush, buckbrush, and mountain mahogany. The vegetative cover is sparse and discontinuous, with an open canopy of emergent foothill pine or an understory of nonnative grasses and an abundance of native annual herbs.

Valley Oak Stands. Valley oak stands are considered a subset of the foothill woodland community.

Six species of oak grow in El Portal. One particularly noteworthy species is the valley oak, described in the next paragraph. The oak canopy provides shade, scenery, and wildlife habitat. The shrub layer retains many native elements such as western redbud (*Cercis occidentalis*), California buckeye, Mariposa manzanita, and yerba santa. Undeveloped areas often support a grassy understory that consists of mostly nonnative grasses along with native wildflowers. Yellow star-thistle (*Centaurea solstitialis)*, tocalote (*Centaurea melitensis*), and other extremely invasive species have recently become established in part of the understory flora. Historic and current development and landscaping have introduced many other nonnative species into this community, including the invasive tree-of-heaven (*Ailanthus altissima*), French broom (*Genista monspessulana*), and numerous herbaceous lawn grasses. Fruit trees and other landscape trees are also common. Programmatic efforts to reduce or control the spread of invasive species have been in place in Yosemite for several years.

Valley oaks are a keystone species in floodplain riparian habitats throughout California. A keystone species is one whose impact on its community or ecosystem is disproportionately large relative to its abundance or total biomass. Endemic to California, valley oak populations have experienced a widespread decline throughout the state. The California Native Plant Society considers the valley oak plant community, or *Quercus lobata* alliance, as rare and threatened throughout its range (Sawyer et al. 2009). Yosemite is home to one valley oak population, at the El Portal Administrative Site. This population is unique, as it is geographically isolated from most remaining populations centered in the Great Central Valley of California and lies at the extreme eastern boundary for the species' range.

The El Portal valley oak population contains trees with sizes ranging from small to very large (up to approximately 140 centimeters in diameter). Various factors limit the establishment of valley oaks in potential habitat in El Portal. For example, the dirt parking lot across from the train exhibit has expanded with cars parking under the dripline of mature oaks and grading has occurred in the area. The establishment of new oaks is also likely retarded by deer browsing. The understory of the valley oak population is heavily impacted, and an invasion of nonnative Himalayan blackberry exacerbates the issue. An additional stressor to the valley oak population is the loss of overbank flooding in the El Portal floodplain, due primarily to construction of the Yosemite Valley Railroad terminus and Highway 140 (Howard 1992). Despite these issues, the core population retains sufficient integrity as a vegetation community to be classified as valley oak woodland in Yosemite's parkwide vegetation map.

Lower Montane Broadleaf Forest. Lower montane broadleaf forest in the Merced Gorge includes areas dominated by canyon live oak and interior live oak, with scattered groves of California black oak. This community is transitional between foothill woodlands and coniferous forests. Interior live oak forest is dominated by interior live oak in a dense evergreen forest that forms a closed canopy. It ranges in site characteristics from broad alluvial riverbanks to steep, rocky south-facing slopes at lower

elevations. Most pure stands of interior live oak are small and appear to be seral stages of oak woodland with little herbaceous cover. Common associated species include foothill pine, canyon live oak, and blue oak. Understories tend to be brushy with characteristic species consisting of California buckeye, western redbud, and poison-oak (*Toxicodendron diversilobum*). Canyon live oak forest is typically found on rocky, steep slopes with little soil development in canyons on north-facing slopes at relatively low elevations, and on south-facing slopes at higher elevations. Canyon live oak often forms pure or almost pure stands covering several hundred acres with little understory. Associated species include incense cedar and California bay.

Lower Montane Coniferous Forest. Mixed conifer communities in the Merced Gorge are dominated by ponderosa pine and Douglas-fir. This habitat also contains incense cedar, sugar pine, and occasional California black oaks. The most common understory shrubs are Mariposa manzanita, deerbrush, and bear-clover. Areas where ponderosa pine are the dominant tree species often occur on south-facing slopes. Co-dominant species include incense cedar, sugar pine, white fir, California black oak, and canyon live oak. Shrubs such as whiteleaf manzanita and mountain whitethorn frequently occupy forest openings. Douglas-fir is typically dominant on steep north-facing canyon sides, but co-dominants can include white fir, incense cedar, ponderosa pine, and canyon live oak. The understory is typically sparse with canopy openings providing habitat for shrubs and perennial herbs.

Wetlands and Riparian Habitats. As the Merced River cascades through the gorge, the channel gradient and bank slopes steepen, the river channel narrows, and the floodplains become considerably smaller than those of the Yosemite Valley. Along this stretch of river, the riverbed and banks are comprised largely of boulders and cobbles, ranging in size from a few inches to several feet in diameter. The steep gradient, combined with the boulders and cobbles of the riverbed and bank, forms a series of continuous rapids between Yosemite Valley and El Portal. The Merced Gorge is lined with a narrow band of riparian vegetation along the river course.

Flooding has been an important aspect of the development of riparian communities along the Merced River and its tributaries that intersect drier adjacent vegetation types of El Portal. Localized seasonal flooding creates debris dams in tributary channels, thus furthering a diversity of scour and depositional soils for riparian species. On the Merced River, natural flooding and vegetative patterns are influenced by the construction of levees and application of riprap to confine the river. These structures have destroyed riparian vegetation and have limited their reestablishment in some places.

In the El Portal area, riparian communities occur along tributaries of the Merced River, on flat topographical shaded terraces above the river, in backwater channels, and in areas where runoff from upland sites collects in natural depressions. Native willows, Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), and Oregon ash (*Fraximus latifolia*) trees occur in wetter areas, as well as orchard components in some locations. Foothill pines and valley oaks tend to dominate the drier terraces adjacent to riparian sites.

Oxbows, river terraces, and seasonal river channels were a part of the riparian wetlands of the area, but have been affected by early to mid-20th century development in what is now the El Portal Administrative Site. Many of the sites that would be characterized as palustrine have been affected to some degree. For example, the wetland near Odger's Pond and the Abbieville wetland appear to

consist of oxbows or backwater channels that were cut off from hydrologic flows of the main stem of the Merced River during construction of Highway 140 in the 1920s (ESA 2004a). These areas continue to maintain palustrine wetland characteristics and riparian vegetation. They are likely connected to the Merced River in the underground water table and not through surface flows. The remaining wetland areas that appear on the USFWS (1995) wetland inventory are riverine perennial wetlands and are in proximity to the Merced River or other stream drainages. Direct human intrusion into the riparian areas of this river zone, especially to the south, is minimal because of the topography and difficulty of access.

Segments 5 and 8: South Fork Merced River Above and Below Wawona

These segments include nearly a full range of environments typical to the Sierra Nevada. Vegetation zones along the upper South Fork Merced River (Segment 5) include the alpine, subalpine, upper montane forest, and lower montane forest zones. Vegetation in the upper South Fork Merced River is classified into six broad vegetation types: meadow, chaparral, lower montane broadleaf forest, lower montane coniferous forest, upper montane coniferous forest and subalpine coniferous forest. There are also areas categorized as barren, which include talus slopes, permanents snowfields, boulder fields, rock outcrops, and other unvegetated areas.

Vegetation zones along the lower South Fork Merced River (Segment 8) include the lower montane forest and foothill-woodland zones. Vegetation in the lower South Fork Merced River is classified into three broad vegetation types: chaparral, lower montane broadleaf forest, and lower montane coniferous forest. These segments of the river are designated as Wilderness.

As mentioned above, even though riparian and wetland areas are not classified independently under the eight broad vegetation types used in the parkwide vegetation map, they are discussed in depth in the "Wetland and Riparian Habitats" section below.

Meadow Plant Communities. Meadow plant communities along the upper South Fork Merced River (Segment 5) range from small, isolated alpine meadows at high elevations to moderately sized meadows along the river corridor. Alpine and subalpine meadows along the South Fork Merced River are similar in composition to those described for the upper Merced River zone (Segment 1). The lower South Fork (Segment 8) does not support meadow communities.

Chaparral Communities. Alpine and subalpine chaparral communities along the upper South Fork Merced River are similar in composition to those described for the upper Merced River zone (Segment 1). Steeper canyon slopes above the upper South Fork Merced River, as well as the steep canyon slopes along the South Fork Merced River below Wawona, are dominated by montane chaparral, which contain a variety of manzanitas, ceanothus species such as buckbrush and deerbrush, chinquapin, mountain mahogany, huckleberry oak, and interior live oak.

Lower Montane Broadleaf Forest. Lower montane broadleaf forests along the upper South Fork Merced River are similar in composition to those described for the upper Merced River zone (Segment 1), although these communities are more widespread in Segment 5, especially toward the lower elevations of this segment. Similarly, lower montane broadleaf forests along Segment 8 are comparable to those discussed for Segments 3 and 4.

Coniferous Forest Communities. Coniferous forest communities along the upper South Fork Merced River are classified as subalpine, upper montane, and lower montane. Coniferous forests along the upper South Fork Merced River are rich in species (both over and understory) and are comparable in conditions to the forest communities described as occurring above Little Yosemite Valley within the upper Merced River (Segment 1). High elevations are dominated by whitebark pine, lodgepole pine, red fir, and aspen. The upper reaches of the canyon are narrow. The forest is relatively sparse through this zone, with most trees and forest species occurring along joints or gaps in the granite. Ponderosa pine and Douglas-fir are dominant at lower elevations along Segment 8, with incense cedar, sugar pine, and California black oak occurring as sub-dominants. The characteristics of the coniferous forests along the lower South Fork Merced River are similar to those in Segments 3 and 4.

Wetlands and Riparian Habitats. From its headwaters, the South Fork Merced River flows west at a relatively consistent but steep gradient through a glaciated alpine environment and then enters a V-shaped, unglaciated river valley. The upper South Fork Merced River supports limited riparian vegetation, primarily due to steep topography and high-velocity flows. The steep gradients along the upper and lower South Fork Merced River are not conducive to the establishment of an extensive riparian zone. Typical riparian species — willow, alder, aspen, and maple — are restricted to a narrow fringe along the river. High-elevation tributaries to the South Fork Merced River are either unvegetated, high-velocity, and rocky in nature or are only sparsely vegetated. Subalpine meadows along the South Fork Merced River are similar in composition to those described for the upper main stem of the Merced River. Vegetation in alpine lakes is typically limited to rooted aquatic grasses, floating vascular plants, and algae. The upper South Fork Merced River is generally pristine and remains virtually undisturbed by human-related effects. The steep gradient below Wawona along the South Fork Merced River prevents the establishment of an extensive riparian zone. The limited riparian vegetation along the lower reach remains relatively untouched by human intrusion. The riverbed and banks are largely composed of boulders and cobbles.

Segments 6 and 7: Wawona – Vegetation

Major vegetation zones in the central South Fork Merced River (Wawona) include the upper montane forest and lower montane forest zones. Vegetation in the central South Fork Merced River is classified into four broad categories: meadow, chaparral, lower montane broadleaf forest, and lower montane coniferous forest. As mentioned above (see Merced River Wetlands and Riparian Vegetation), even though riparian and wetland areas are not classified independently under the eight broad vegetation types used in the parkwide vegetation map, they are discussed in depth in the "Wetland and Riparian Habitats" section below.

Meadow Plant Communities. Wawona Meadow is an approximately 200-acre low-elevation meadow, the largest such meadow in Yosemite National Park. Unlike most low-elevation meadows in the park, conifer encroachment in Wawona Meadow is minimal. 44 acres of the lower portion of Wawona Meadow lies in the Merced River corridor and was converted into a nine-hole golf course in 1918. This area continues to be maintained as a golf course and also serves as a sprayfield for reclaimed water. Human alterations in the upper portion of the meadow include the construction of ditches in 1936 that dewater the meadow. The NPS is presently completing an ecological restoration project to fill these ditches and restore natural hydrology.

Chaparral Communities. Chaparral along the central South Fork Merced River (Wawona) is very limited and consists of small patches on south-facing, steep canyon walls above the north bank of the river. These patches are comprised of birchleaf mountain mahogany (*Cercocarpus betuloides*), buckbrush, and whiteleaf manzanita. The metamorphic rock formation that crosses the South Fork Merced River downstream of Wawona is home to several species of plants that are both rare and apparently specific to this substrate type. This same formation crosses the main stem of the Merced River at El Portal, and also is home to rare plant species, including state-listed ones (*Allium yosemitense, Lewisia congdonii, Eriophyllum congdonii*), in the vicinity of the river.

Coniferous and Broadleaf Forest Communities. Forest communities in the Wawona area include lower montane coniferous and deciduous forests. Humans have affected parts of Segment 6 and 7 since the turn of the century, and this has affected forest health and composition. Ponderosa pine is dominant in the Wawona area, with incense cedar, sugar pine, and California black oak occurring as sub-dominants. The understory is composed of shrub species such as manzanita, deerbrush, and bear-clover. This community is naturally adapted to frequent low-intensity fires; however, 100 years of fire suppression has resulted in a change from an open forest to dense thickets of trees in many areas. Under natural conditions, the fire return interval is estimated at 8–12 years (NPS 1990). Present conditions can generate fires of much greater severity than those under a natural fire regime. Fire management in Segment 7 is complicated by the numerous residences, private lands, and historic structures located within the Wawona segment of the corridor.

Wetlands and Riparian Habitats. In the Wawona area, Big Creek meanders through Wawona Meadow before reaching the South Fork Merced River. Wawona Meadow is a large floodplain meadow (part of a shallow alluvial valley) and has substantial gravel bars within the channel. In the portions where the gradient is gentlest, riparian vegetation (willows and alders) becomes more prevalent. Willows often colonize sandbars that are deposited at the margins of or within the river channel. In this area, the riparian corridor resembles the riparian corridor seen along the Merced River as it flows through Yosemite Valley. As with certain points within Yosemite Valley, trampling of riparian vegetation and associated erosion does occur in this area, resulting from heavy use in the vicinity of Wawona and the Wawona Campground.

Also found in this area is Sierra sweet bay (*Myrica hartwegii*), a shrub endemic to the Sierra Nevada. In Yosemite National Park, Sierra sweet bay is found at the average high water line of the South Fork Merced River downstream from Wawona and along Big Creek, a tributary to the South Fork Merced River (NPS 2012a). Portions of two sizeable populations of Sierra sweet bay occur in the park, one on the South Fork of the Tuolumne River and one on Big Creek and on the South Fork Merced River below the mouth of Big Creek. Both populations have been documented with herbarium specimens over the past 100 years. The NPS (2002) considers Sierra sweet bay a sensitive species, and the California Native Plant Society (CNPS Rank 4.3) identifies the plant as being of limited distribution. For these reasons, this rare plant has been identified as contributing to the river's biological ORV. Sierra sweet bay is discussed in depth in the "Special Status Species" section.

Environmental Consequences Methodology

Proposed management actions under each alternative are evaluated in terms of the context, intensity, and duration of the impacts, as defined below, and whether the impacts are considered beneficial or adverse to the natural environment. Generally, the methodology for natural resource impact assessment follows direction provided in the *Council of Environmental Quality Regulations for Implementing the National Environmental Protection Act*, section 1508.27.

This impact assessment considers the potential effects that implementation of the *Merced Wild and Scenic River Comprehensive Management Plan* could have on vegetation and wetland resources. Vegetation data in the project area derives from the Yosemite Parkwide Vegetation Map (1997) and other studies, including the *2010 Assessment of Meadows in the Merced River Corridor, Yosemite National Park* (Ballenger et al. 2011), the *Merced River and Riparian Vegetation Assessment* (Cardno/Entrix 2011), and the *Status of Rare Plants in the Merced River Corridor within Yosemite National Park* (Colwell and Taylor 2011). Wetland data in the project area derives from site-specific wetland delineations associated with past projects, and National Wetland Inventory data (USFWS 1995) supplemented with the Yosemite Parkwide Vegetation Map (1997) and other studies. Data on riparian habitats are taken from the *Merced River and Riparian Vegetation Assessment* (NPS 2011) for the Merced River corridor through Yosemite Valley. Data from the Yosemite Parkwide Vegetation Map (1997) are used to describe riparian habitats outside of Yosemite Valley. Quantitative analysis was used wherever possible; however, when quantitative analysis is not feasible, qualitative analysis is used. Qualitative analysis relies substantially on professional judgment, supported by extrapolation of relevant research, where appropriate, to reach reasonable conclusions as to the context, intensity, duration, and type of potential impact.

- **Context.** The context of the impact considers whether the impact would be local, segmentwide, parkwide, or regional. For the purposes of this analysis, local impacts would be those that occur in a specific area within a segment of the river. This analysis further identifies whether there are local impacts in multiple segments. Segmentwide impacts would consist of a number of local impacts within a single segment, or larger scale impacts that would affect the segment as a whole. Parkwide impacts would extend beyond the river corridor and the project area within Yosemite National Park. Regional impacts would be those that extend to the Sierra Nevada.

- **Intensity.** Three primary measures are used to evaluate the intensity of impacts on vegetation and wetlands: the size and type of resource, the integrity and condition of the resource, and the connectivity of the area to adjacent habitats. The greater the size of a resource, and the strength of its linkages with neighboring communities, the more valuable a resource becomes to the integrity and maintenance of biotic processes. These measures are used to describe both beneficial and adverse impacts.

  The intensity of an impact on vegetation is a measure of perceptible changes in native plant community size, continuity, or integrity. Impact intensity is characterized as negligible, minor, moderate, or major. Negligible impacts are those that would have no measurable or perceptible changes in native plant community size, continuity, or integrity. Minor impacts would be measurable or perceptible, but would be localized within an isolated area, and the overall viability of the native plant community would not be affected. Moderate impacts would cause a measurable and perceptible change in the native plant community (e.g., size, continuity, or integrity); however, the impact would remain localized and could be reversed.

Major impacts would be substantial and highly noticeable and could be permanent in their effects on native plant community size, diversity, continuity, or integrity. Impacts on vegetation are quantified where possible by determining the acreage of vegetation communities altered. The amount of each vegetation community that would be directly affected is determined by a comparative analysis of vegetation spatial data representing existing conditions and conditions under proposed management actions. Other potential direct and indirect effects to vegetation communities, such as loss of integrity or vulnerability to invasion by nonnative species, are analyzed qualitatively.

- **Duration.** The duration of an impact is the time required for native plant communities to recover from the implementation of an alternative. The duration of impact is characterized as short-term or long-term. A short-term impact would have an immediate effect on the size, continuity, or integrity of native plant communities and is usually associated with transitional types of activities, such as facility construction. In general, short-term impacts on vegetation are those that would last up to 20 years following implementation of an alternative. Long-term impacts would lead to a loss in the size, continuity, or integrity of native plant communities. In general, long-term impacts would last longer than 20 years after implementation of an alternative.

- **Type of Impact.** Impacts are considered adverse if implementation of an alternative would reduce the size, continuity, or integrity of a native plant community. Impacts are considered beneficial if implementation of an alternative would increase the size, continuity, or integrity of a native plant community.

Environmental Consequences of Alternative 1 (No Action)

All River Segments

The following discussion provides an overview of the types of impacts on vegetation and wetland resources that would occur in all segments of the Merced River corridor under Alternative 1(No Action). The No Action Alternative would be a continuation of current conditions and management.

Wetlands are afforded special protection under Executive Order 11990 (“Protection of Wetlands”) and NPS Director’s Order 77-1 (“Wetland Protection”). The NPS must avoid direct or indirect adverse impacts on wetlands or, where impacts cannot be avoided, minimize loss or degradation by every practicable effort. The CWA and Rivers and Harbors Act, as regulated by the Corps and the U.S. Environmental Protection Agency, govern actions that may reduce or degrade wetlands. In general, these regulations and associated management actions would continue to maintain existing wetland conditions throughout Segments 1–8, and lead to no net loss of wetlands. Some local beneficial impacts would occur under current management practices that protect or enhance existing wetlands.

All riprap and abandoned infrastructure within the Merced River channel and meadow floodplains would remain, which may continue to alter the free-flowing condition of the river and constrain the river from naturally migrating and changing course. This infrastructure includes remnants of former sewer treatment facilities, sewer and water lines, man-holes, and former bridge abutments, Although some large wood would remain in place within the river channel, the NPS would continue to remove large wood where there are threats to human safety or infrastructure. This action would continue to

influence habitat characteristics within the channel, such as riffle/pool complexes, cover for aquatic species, and stability of riverbanks.

The NPS would continue to implement ecological restoration projects identified in the 2009 *Settlement Agreement* and projects that qualify as a Categorical Exclusion under NEPA. The NPS would also continue to control invasive species as prescribed in the *Invasive Plant Management Plan* and *Update* (NPS 2010, 2008), as well as removing encroaching conifers from some meadows. These actions would increase habitat integrity by decreasing the presence of invasive plants and enhancing habitat quality for terrestrial and aquatic wildlife. Current actions under the No Action Alternative to enhance biological values would result in long-term, minor, beneficial effects for vegetation and wetlands throughout the Merced River corridor.

The No Action Alternative would perpetuate the kinds and amounts of use that exist today. No new structures would be constructed in the river corridor with the exception of minor structures that are small; temporary; easily removed; not habitable; designed to support existing uses, systems, and programs; located within the existing building footprint; and not created solely for commercial purposes. Temporary housing structures for employees displaced by the 2008 rockfall would remain in place as needed. Housing for NPS employees and park partner staff would remain in current locations and at current levels.

Many resource impacts deriving from visitor and administrative use in Segments 1–8 would remain. Informal trails, bike paths, campsites, roads, bridle paths, parking, staging areas, and trails would remain in sensitive areas such as meadows and riparian habitat. Traffic congestion, lack of parking spaces, and improper parking adjacent to or encroaching on the edges of meadows would continue to affect meadow habitat. Adverse impacts would be mitigated through continuation of current policies, including visitor education with an emphasis on Leave-No-Trace practices in Wilderness, and restrictions on amounts and locations of overnight use. Current visitor use and facility management actions under the No Action Alternative would result in long-term, minor, adverse impacts on vegetation and wetlands throughout the Merced River corridor.

Segment 1: Merced River above Nevada Fall

Continuation of current wilderness management policies, including protection of natural process, visitor education with an emphasis on Leave-No-Trace practices, and restrictions on amounts and locations of overnight use, would continue to protect vegetation and wetland resources in Wilderness segments of the Merced River corridor. In general, adverse impacts on vegetation and wetland resources in Segment 1 under the No Action Alternative would be local, long-term, and minor.

Vegetation and wetlands of the upper Merced River is generally intact, except where visitor use is intense (e.g., in the vicinity of the Little Yosemite Valley Backpackers Campground, Moraine Dome Backpackers Campground, Merced Lake High Sierra Camp and Backpackers Campground, and along major trail routes).

Local, adverse impacts on native meadow plant communities associated with stock traffic would continue. Types of adverse effects associated with continued stock use include the spread of noxious

weeds, as well as grazing, trampling, compaction, and erosion. These effects would result in some localized losses in the natural structure, diversity, and productivity of meadow and riparian habitats. The Merced Lake—East Meadow would continue to exhibit very low vegetation cover and high bare ground levels associated with high levels of administrative stock use (Ballenger et al. 2011). Adverse impacts on meadow plant communities associated with stock use would be local, long-term, and minor within Segment 1.

The degree to which vegetation communities would be affected under the No Action Alternative depends on the position of the community relative to existing infrastructure and visitor use, as well as its sensitivity to perturbation. Chaparral and forest communities in proximity to Merced Lake High Sierra Camp and Merced Lake Backpackers Campground, Little Yosemite Valley Backpackers Campground, Moraine Dome Backpackers Campground, and major trail routes would experience site-specific, long-term, minor adverse effects. In other areas of the upper main stem of the Merced River, continued use of existing facilities (e.g., trails) at a similar level of intensity would have negligible effects on vegetation.

Ongoing visitor use in localized areas of Segment 1, including near the Little Yosemite Valley Backpackers Campground, Moraine Dome Backpackers Campground, and Merced Lake High Sierra Camp and Merced Lake Backpackers Campground would continue to have an adverse effect on the integrity of some wet meadows in or adjacent to these areas. This includes local and minor adverse direct and indirect impacts on wet meadows and aquatic habitats from trampling, compaction, and erosion. Existing trails in some areas, such as the wet meadow complex surrounding Merced Lake, would also continue to adversely affect wetland and aquatic habitats through habitat fragmentation and by acting as barriers to localized plant and wildlife movements (barriers, in turn, affect seed sources, nutrients, and plant distribution patterns). Visitor use may create informal trails, which can fragment habitat, compact soil, and potentially disrupt hydrologic processes. Informal trails would remain in the wet meadow complex surrounding Merced Lake, Doc Moyle's Meadow, and Washburn Lake Meadow. Ongoing visitor use also would continue to contribute to the introduction or spread of noxious weeds. These ongoing and future adverse impacts would be long-term, and minor within localized areas of Segment 1.

Segment 2: Yosemite Valley

Under the No Action Alternative, the size, structure, productivity, and continuity of vegetation and wetlands within Yosemite Valley (Segment 2) would continue to be affected by existing infrastructure and visitor use. General human-related effects in Segment 2 include trampling, unintentional introduction and spread of nonnative species (both plants and wildlife), litter, erosion, and compaction. Visitor use would continue to adversely affect vegetation and wetlands in areas of high use by compacting soils, reducing vegetative cover, altering streambanks, and inducing erosion. Modifications to the river channel and floodplain (through soil compaction, loss of riparian vegetation, and accelerated erosion) influence important stream characteristics that may combine to accelerate widening of the Merced River, which in turn would affect vegetation patterns over time. Trampling and visitor use would also continue to adversely affect understory vegetation, introduce and spread nonnative species, and impede natural regeneration of native oaks, woody shrubs, and riparian and meadow vegetation in localized high use areas. Development may limit the size or

fragment species populations locally. The east Valley is highly developed and development has resulted in disconnected vegetation communities. Under the No Action Alternative, these vegetation communities would remain in their fragmented state.

Meadow size would continue to gradually decrease in most meadows in Segment 2 due to conifer encroachment and existing alterations to natural meadow hydrology. Existing infrastructure, such as roads, channelized tributaries, bridges, ditches, structures, and campgrounds, would continue to alter meadow hydrology, or directly preclude establishment of meadow vegetation. Hydrological alterations would continue to influence meadow plant species composition as soil conditions trend toward drier conditions. Dry conditions would also sustain and encourage nonnative plant invasion, with a resulting loss of native diversity and productivity, as most non-native meadow species are currently found in drier areas. Ongoing meadow maintenance activities, including the removal of encroaching conifers, would offset some of these adverse impacts. Linear features, such as some roads and bridges, would continue to disconnect the main Merced River channel from the meadow floodplain during minor flood events, and impose unnatural barriers to water movement.

Informal meadow trails would largely remain under the No Action Alternative. Riparian habitat would continue to be protected at the current level. Localized riverbank erosion and scouring associated with bridges would remain. Denuded riverbanks in proximity to east Yosemite Valley campgrounds would remain, with the exception of riverbank restoration actions at North Pines Campground, which were approved in the 2009 *Settlement Agreement*. Conifer encroachment would be managed with fire reintroduction and direct removal of sapling trees at current management levels. Impacts on meadow and riparian habitats, including habitat fragmentation, reduced productivity of riparian and adjacent aquatic communities, and potential disruption of connectivity between terrestrial and aquatic habitats would continue

Existing infrastructure, such as roads, bridges, ditches, structures, and campgrounds, would continue to indirectly affect upland vegetation patterns. For example, landscape irrigation would continue to affect native oaks. The development of linear features, such as roads and bridges, may act as unnatural barriers to plant colonization.

Existing infrastructure, such as roads, bridges, and ditches, that is near or adjacent to wetlands and riparian habitats would continue to adversely affect some of these features through alterations to the floodplain and localized hydrology. These hydrological alterations sometimes result in the conversion of wetland and riparian habitats to uplands, and ultimately result in a loss of wet meadow plant species and an increase in upland species, including conifer encroachment of wet meadow and riparian communities.

General visitor-related effects in high-use areas include trampling, litter, erosion, soil compaction, and the unintentional introduction and spread of nonnative plants and wildlife. Floodplain wetlands and the aquatic habitat of the Merced River would be adversely affected by these activities by further compacting soils, reducing vegetative cover, altering streambanks, and causing erosion. Ongoing activities that contribute toward the modification of the river channel and floodplain (through soil compaction, loss of riparian vegetation, the removal of large wood from the river channel, and accelerated erosion) influence important stream characteristics such as riffle/pool complexes,

substrate type, water quality, channel migration, and riparian and wet meadow cover. Some bridges would continue to cause hydrologic stress on upstream and downstream riparian areas. Along some stretches of the Merced River in eastern Yosemite Valley, riverbanks are largely denuded, affecting shading and nutrient dynamics in aquatic habitats. These effects may combine to accelerate bank erosion and widening of the Merced River (i.e., the channel could widen, flatten, and become shallower in reaction to the streambank destabilization caused by visitor use and trampling); increase water temperature; increase suspended sediment; reduce overbank flooding frequency; and reduce dissolved oxygen levels. Such changes to the physical characteristics of the river would be harmful to aquatic organisms, as well as riparian and wetland vegetation. These activities are focused in developed and high-use areas, particularly in east Yosemite Valley, and therefore tend to be localized. Overall, continued visitor-related effects on wetlands and riparian habitats would result in a local, long-term, moderate, adverse impact on wetland and riparian habitats within Segment 2.

Segments 3 and 4: Merced Gorge and El Portal

Valley oak stands are considered a subset of the foothill woodland. Of particular concern along Segment 4 are the valley oaks, a regionally rare species, occurring in the El Portal area. Currently, vehicles park under the dripline of the valley oaks. This practice compacts soil under the trees, affecting root health, water uptake, and soil aeration. Existing development and trampling in the vicinity limits the area where oak seedlings can be recruited. These adverse impacts on valley oaks in the El Portal area are considered local, long-term, and moderate.

Like other river segments, wetlands and riparian resources in Segments 3 and 4 would continue to be protected by existing regulations, policies, and management actions. Some wetlands and riparian habitats would continue to be adversely affected by existing infrastructure and visitor use. Wetlands and riparian habitats in Segments 3 and 4 tend to occur in narrow bands framing the Merced River, with several exceptions such as braided river channel at Cascades and west of the park boundary, and the El Portal pond. Visitor use within riparian areas of the Merced Gorge is minimal due to steep topography. The riparian zone would continue to be affected by infrastructure, including roads and pullouts, as well as trampling by visitors accessing the river. Roads, parking lots, and other impervious surfaces in or near the corridor would continue to release nonpoint-source pollutants into stormwater runoff that could subsequently discharge to the aquatic habitat of the Merced River. Impervious surfaces accumulate automobile-related pollutants, refuse, and other nonspecific pollutants that are easily transported to adjacent or nearby wetland resources through stormwater runoff. The riparian community through the Merced Gorge would continue to be affected by use of El Portal Road (and associated pollutants). Odger's Pond in El Portal is bisected by the Foresta Road and confined by Highway 140. The pond's natural hydrology is adversely affected by the proximity of these roads, though it does function as an overflow channel during extremely high floods. These adverse effects are considered local, long-term, and minor under the No Action Alternative for Segments 3 and 4. In general, adverse impacts on wetlands and aquatic resources in Segments 3 and 4 under the No Action Alternative are considered to be local, long-term, and minor.

Segments 5 and 8: South Fork Merced River Above and Below Wawona

Adverse effects on vegetation communities located in the upper and lower South Fork Merced River are generally associated with visitor and stock use. No development, other than a few trails, currently occur in the upper and lower portions of the South Fork Merced River. Access is difficult, and visitor and stock use is low. Any increases in visitor use of the upper and lower reaches of the South Fork Merced River would negatively affect vegetation by increasing erosion, soil compaction, trampling, and refuse; decreasing water quality and vegetative cover; and through the potential introduction of nonnative species. However, the intensity of these effects would be negligible over time because topography and limited trail access would continue to limit the majority of visitors that could access these portions of the South Fork Merced river. Continuation of current Wilderness management policies, including protection of natural process, visitor education with an emphasis on Leave-No-Trace practices, and restrictions on amounts and locations of overnight use, would continue to protect vegetation and wetland resources in the Wilderness segments of the Merced River corridor. Overall, adverse impacts in this segment would be local, long-term, and negligible.

Segments 6 and 7: Wawona

Although the upper portion of Wawona Meadow is large and generally intact, the lower meadow has been the site of repeated human intrusion since the turn of the century. The lower meadow continues to be affected by ditches, a golf course, a sprayfield for reclaimed water, and helicopter staging. Non-native plants including velvet grass, an aggressive invasive plant, dominate the golf course and provide a constant seed source for spread into the upper portions of Wawona Meadow. In addition, the continued use of the golf course precludes the area from potentially reverting to wet meadow habitat. These uses would remain and would continue to cause local, long-term, major, adverse effects on vegetation and wetlands in Wawona Meadow.

Visitor use would continue to affect additional wetlands and riparian habitat in Segment 7 by compacting soils, reducing vegetative cover, altering streambanks, and inducing erosion. For example, the proximity of campsites in the Wawona Campground to the South Fork Merced River promotes trampling and riverbank erosion, inhibiting vegetation growth. Similarly, the picnic area along Wawona Road provides an undesignated river access point, which promotes riparian vegetation trampling and moderate erosion. Roads, parking lots, and other impervious surfaces in or near the Merced River corridor would continue to release nonpoint-source pollutants into stormwater runoff that could subsequently discharge to low-lying wetlands and the aquatic habitat of South Fork Merced River. Abandoned metal pipes in South Fork Merced River side channels dewater the floodplain terrace, affecting wetland hydrology. Ongoing impacts to habitat due to visitor use and existing infrastructure would result in local, long-term, minor, adverse effects on wetland and riparian habitats of the central South Fork Merced River and Wawona.

Summary of the No-action Alternative Impacts

Existing development and human activity in the Merced River corridor affects vegetation patterns and wetland and riparian resources in localized areas. Implementation of the No Action Alternative would result in the continued impact on the size, structure, productivity, and continuity of habitats located

adjacent to or near existing infrastructure and areas that experience a high degree of visitor use. Existing infrastructure would also continue to alter ecosystem processes where they disrupt hydrology and act as barriers to species. Visitor use would continue to cause adverse effects, such as trampling, erosion, and compaction in localized areas. The combined effects of visitor use and existing infrastructure would in some cases lead to alterations in vegetation patterns (e.g., type conversion of wet meadow to conifer forest, or vegetated to non-vegetated) and modifications to the Merced River channel and floodplain (e.g., channel widening) in localized areas over the long-term.

Under the No Action Alternative, the NPS would continue to implement existing goals and policies under existing regulations (e.g., Executive Order 11990, Director's Order 77-1, CWA, Rivers and Harbors Act) and make incremental improvements to vegetation and wetland conditions on an ad-hoc basis, as opportunities and resource problems were presented. For example, constrained by existing developments and infrastructure, enhancement and reestablishment of wetlands would continue on a site-by-site basis instead of a parkwide or Valley-wide basis. Although substantial piecemeal improvements can take place under current direction, "reactive" resource management is not always effective at protecting sensitive resources over the long-term. Overall, effects could escalate as time passes and the effects on natural vegetative patterns worsened in some areas. These effects would be concentrated in areas of high visitor use such as Yosemite Valley, El Portal, and Wawona Meadow at the site of the Wawona Golf Course. Overall, long-term, moderate, adverse effects on vegetation and wetlands would continue under the No Action Alternative.

Cumulative Impacts of the No Action Alternative

Cumulative effects to vegetation and wetlands are based on analysis of past, present, and reasonably foreseeable actions in the Sierra Nevada region in combination with potential effects of the No Action Alternative. The projects identified below include those projects that have potential to affect local vegetation and wetland patterns (i.e., within the Merced River corridor), as well as large-scale or regional patterns. The spatial scale of the cumulative analysis for the Vegetation section is the Sierra Nevada.

Past Actions

Regional vegetation has been historically affected by logging, fire suppression, rangeland clearing, grazing, mining, draining, damming, diversions, and the introduction of nonnative species. Portions of the Merced River and South Fork Merced River corridors within Yosemite National Park are relatively unaltered by many of these past actions, especially in Wilderness areas where use has had little effect on vegetation. Development and use of infrastructure within Yosemite Valley and throughout the Sierra Nevada have caused long-term, adverse alterations to native vegetation patterns since European American occupation. Past restoration actions have reversed the adverse effects of some of these past actions, and have also contributed direct beneficial effects on vegetation communities.

Cumulative impacts on wetland resources are based on analysis of past, present, and reasonably foreseeable future actions in the Sierra Nevada in conjunction with the potential effects of Alternative 1(No Action). Over half of the wetland area around the globe has been lost, and much of remaining wetland area is negatively impacted (Zedler and Kercher 2004). Wetlands are the most

altered and impaired habitat of the Sierra Nevada, and, as a small proportion of the landscape, are relatively rare (SNEP 1996). Dams, roads, and diversions in the Sierra Nevada have had a profound effect on streamflow patterns and wetlands. Broad valleys with wide riparian wetlands were often used as reservoir sites. Much of the flatwater on the western slope of the Sierra Nevada below 5,000 feet in elevation is artificial. These past actions have had long-term, adverse effects on regional wetland habitat.

Within Yosemite National Park past facility development (construction of dams, diversion walls, bridges, roads, pipelines, riprap, recreational use, agriculture, buildings, and campgrounds) and associated recreational use reduced extent and function of wetlands and other aquatic resources. Most loss of wetland area, such as wetland meadow expanse in Yosemite Valley, took place before the 1940s. However, most recent past projects have resulted in beneficial impacts on wetland and riparian habitats through restoration efforts and invasive plant species control, such as the Cook's Meadow Ecological Restoration Project.

Dams and diversions throughout most of the Sierra Nevada have profoundly altered stream-flow patterns and water temperatures. The removal of dam features can have beneficial impacts by restoring function to regional wetlands and riparian habitats. Past examples in Yosemite include the removal of Cascades Diversion Dam and Happy Isles Dam. Restoration and management projects may have site-specific and short-term, adverse effects (e.g., construction-related effects); however, the general goal of these projects is to increase coordinated resource management and to restore sensitive ecosystems. Therefore, these projects have a long-term, beneficial, cumulative impact on regional wetlands and riparian habitats.

Past projects and plans that contribute toward a cumulative effect on native plant and wetland communities include the following:

> ***Management and Restoration*** – *South Fork and Merced Wild and Scenic River Implementation Plan*, Cascades Diversion Dam Removal, Cook's Meadow Ecological Restoration, Fern Springs Restoration, Happy Isles Dam Removal, Happy Isles Fen Habitat Restoration Project, Happy Isles Gauging Station Bridge Removal, Merced River Ecological Restoration at Eagle Creek Project

Present Actions

Present development projects are not located within sensitive vegetation and wetland communities and incorporate measures to ensure the protection of any sensitive resources. Adverse impacts from present development actions are similar to those discussed for past actions. In general, the utility improvement projects include long-term improvements through the relocation of utilities outside sensitive areas, though construction of new utility lines under roads could influence subsurface drainage patterns. Current facility-related projects and plans that contribute toward a cumulative effect on native plant communities include the following:

> ***Facility Development*** – Crane Flat Utilities, *East Yosemite Valley Utilities Improvement Plan/Environmental Assessment*, Wahhoga Indian Cultural Center, Parkwide Communication Data Network, South Entrance Station Kiosk Replacement, Tioga Road Rehabilitation

Beneficial impacts for present management and restoration actions are similar to those discussed for past actions. Specific examples of present projects and plans with beneficial effects include the following:

> ***Management and Restoration*** – *Yosemite Vegetation Management Plan*, General Ecological Restoration, 2004 *Fire Management Plan/EIS*, Fuels reductions/forest rehabilitation projects (USFS), *Tuolumne Wild and Scenic River Comprehensive Management Plan*

Reasonably Foreseeable Future Actions

Adverse impacts resulting from reasonably foreseeable development in the future are limited, as little is planned. Increasing numbers of visitors would perpetuate and potentially increase adverse impacts where wetlands vegetation communities are near areas currently used for recreation. Beneficial impacts for reasonably foreseeable future actions are similar to those discussed for past actions. Specific examples of reasonably foreseeable future projects include the following:

- Changing demographics of visitors in Yosemite
- Climate change
- Concessioner Parking Lot Restoration
- Restoration of the Mariposa Grove Ecosystem
- Yosemite Wilderness Stewardship Plan/EIS

Overall Cumulative Impacts

Cumulative adverse effects would be related to increased development and access. Many of the aforementioned projects has the potential to have substantial site-specific adverse effects on vegetation resources during construction (short-term) and by direct displacement of resources (long-term). The larger effect of these actions is related to population and regional growth and their subsequent effect on natural resources, including native vegetation patterns. Examples of construction-related and human-use-related effects on vegetation patterns include direct displacement of vegetation (e.g., replaced with structures); introduction of nonnative species that invade adjacent natural areas and displace native species (e.g., spread by construction equipment and materials, vehicles, grazing animals, or backyard gardening); fragmentation of habitats, which decreases genetic diversity; alteration of natural patterns (e.g., fire suppression around structures, the introduction of night light); and increased erosion and sedimentation (e.g., during grading activities, overuse of trails). In total, regional development and growth could have a net long-term, major, adverse effect on regional vegetation resources that would not be compensated by regional planning or restoration projects discussed above.

Wetland and riparian systems of the Merced River have been substantially altered by development and visitor activities. These changes have negatively influenced wetland size, form, and function and the plants, wildlife, and aquatic species that inhabit them. Restoration projects and management plans to help restore ecosystem function have lessened impacts in some areas, and have also resulted in beneficial effects. With increased visitor demand, it is anticipated that long-term, minor to major, cumulative, adverse impacts on wetlands would occur adjacent to areas where visitor use is concentrated. Existing facilities that encroach on historic wetlands limits the potential for ecosystem-

scale restoration projects. In addition, the intrusion of conifers in wet meadows would eventually reduce the size and overall amount of wetland habitats in Yosemite National Park. However, the quality of wetlands would improve as a result of individual restoration projects.

Past impacts on wetlands in the Sierra Nevada have been long-term, adverse, and major. Present and foreseeable future actions would contribute to reversing the major adverse impacts of past actions in Sierra Nevada, and would produce long-term, minor, beneficial effects on wetlands. For example, the Tuolumne Wild and Scenic River Comprehensive Management Plan is expected to produce long-term, beneficial effects on wetlands and riparian habitats in the region. These past, present, and future effects, in conjunction with the local, long-term, minor, adverse impacts of Alternative 1, would result in long-term, minor, adverse, impacts on wetlands.

Environmental Consequences of Actions Common to Alternatives 2–6

As discussed in the "Environmental Consequences Methodology" section, ecological restoration activities may cause some local, short-term, minor, adverse impacts, but ultimately would result in beneficial impacts as natural ecological processes are restored. For example, construction activities associated with restoration management actions could have local, short-term, minor, adverse impacts on plant communities. Potential adverse impacts on vegetation include damage to or removal of vegetation, and the potential introduction and spread of invasive nonnative species. Vegetation that is removed would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities along the Merced River corridor. These local, short-term, minor, adverse impacts from implementation of restoration management actions are not discussed further under each individual restoration action.

River Segments 1–8

Impacts of Actions to Protect and Enhance River Values

Biological Resource Actions. The following discussion provides an overview of the types of impacts to vegetation resources that would be common to all segments under all action alternatives. All action alternatives include programmatic restorative management actions that would occur across all segments of the Merced River Corridor. Program level actions include the removal of underground infrastructure, removal of riprap, and the management of large wood. In order to improve the hydrologic function and restore ecological integrity, the NPS would remove abandoned underground infrastructure throughout the corridor. This infrastructure currently contributes to dewatering of meadows and wetlands, and alteration of the natural hydrologic regime of the Merced River. Removal of these facilities would have a corridorwide, long-term, moderate, beneficial impact on meadow, riparian, and wetland habitats. The park would implement bioengineered riverbank stabilization techniques and selective large wood management as appropriate to support riverbank stabilization and improve aquatic habitat complexity. All areas from which infrastructure and riprap are removed would be returned to natural conditions, including revegetating with appropriate native plants. Removal of this infrastructure and riprap would result in a corridorwide, long-term, moderate, beneficial impact on riparian plant communities.

Program level actions include the protection of the riparian zone from new development within 150 feet of the ordinary high water mark and the removal of campsites from within 100 feet of the ordinary high-water mark. The NPS would undertake certain measures to address ongoing vegetation impacts, including those resulting from unauthorized river access points, informal trails, and conifer encroachment into meadow areas, through various restoration techniques, fencing and area closures, and visitor education and visual cues. Toward that end, the park would utilize brochures, maps, signage, and improved trail delineation techniques to direct visitors away from sensitive areas. These programmatic restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor and associated plant communities and wetlands, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. Removing abandoned underground infrastructure, restoring informal trails, removing conifers from meadows, directing visitor use, removing riprap, and restoring free-flowing conditions along the Merced River corridor would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Thus, these management measures would have a corridorwide, long-term, moderate, beneficial impact on plant communities and wetlands along the corridor

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur across all segments under Alternatives 2-6 include removing 3,400 feet of riprap from the river bank and revegetating with riparian species, and replacing an additional 2,300 feet of riprap with bioengineered riverbank stabilization devices. Riprap placed along the banks of the Merced River inhibits the establishment of riparian vegetation. The removal of riprap and subsequent restoration of riparian habitat would result in a corridorwide, long-term, moderate, beneficial impact on native riparian plant communities.

Segment 1: Merced River above Nevada Fall

Impacts of Actions to Protect and Enhance River Values

Ecological restoration actions that would occur within Segment 1 under actions common to Alternatives 2–6 include measures to reduce impacts on plant communities. Under Alternatives 2-6, trails in Segment 1 would be rerouted out of wetlands and sensitive communities. New trail routes would avoid wetlands and sensitive habitats. Under Alternatives 2-6, the park would relocate sections of trail through wetlands in Echo Valley and mineral spring outflow between Merced Lake and Washburn Lake to less sensitive areas. The trail along wet sections of the Mist Trail would be hardened to avoid trail widening. Formal trails through meadows along the Triple Creek Fork cause extensive rutting and head cutting and would be rerouted to upland habitats, where possible. Informal trails in the Merced Lake Shore Meadow, adjacent to the Merced Lake High Sierra Camp, fragment meadow plant communities, stunt vegetation lining the lake shore, interrupt meadow hydrology, and compact soils. Under Alternatives 2-6, the park would decompact soils along informal trails at the Merced Lake Shore Meadow, fill ruts with native soils, and revegetate denuded areas with native plants. Merced Lake East Meadow near the Merced Lake Ranger Station has high levels of pack stock use, associated with lower vegetation cover and higher levels of bare ground. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 1.

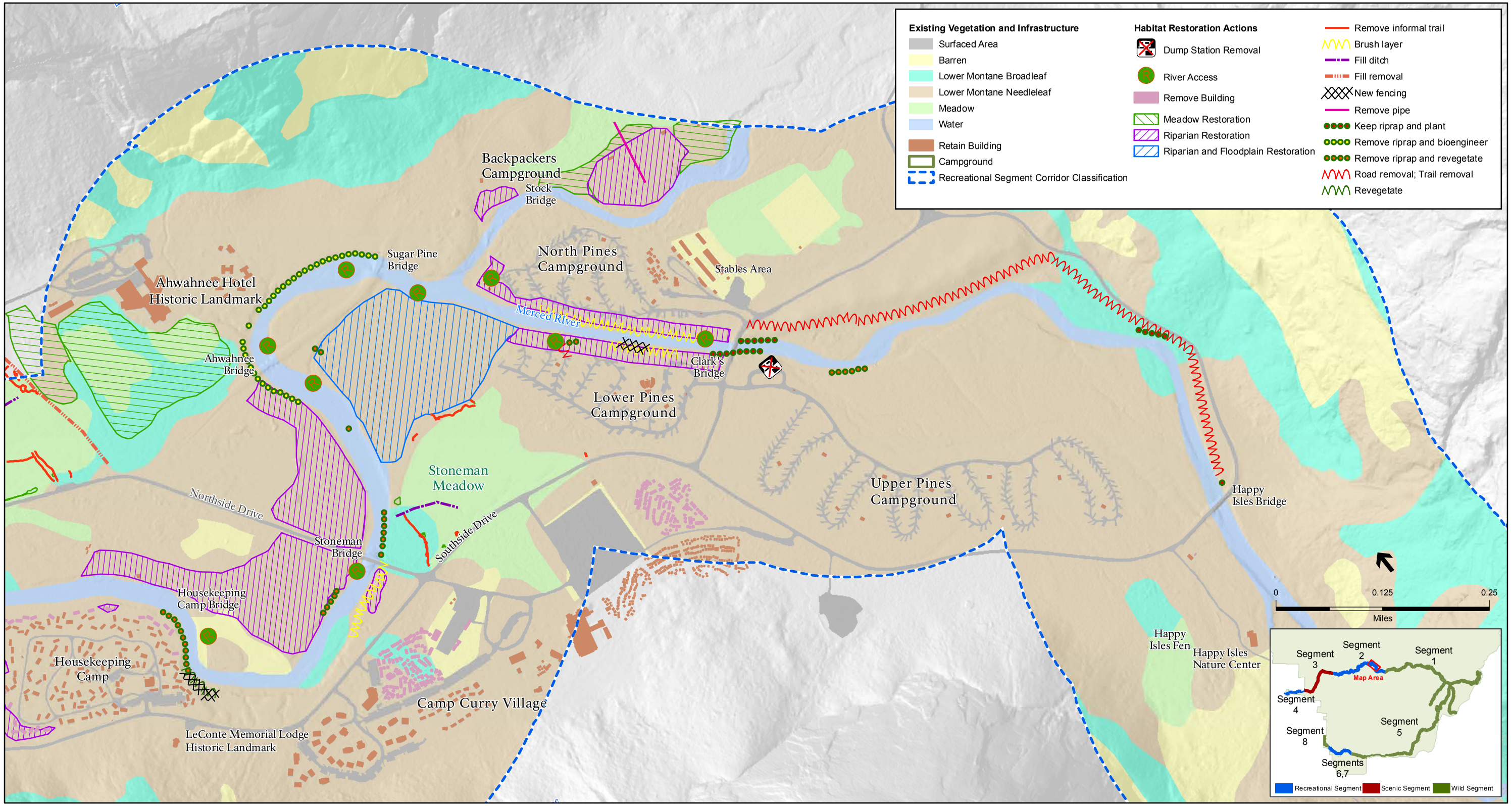
Segment 2: Yosemite Valley

Impacts of Actions to Protect and Enhance River Values

Actions to protect and enhance river values that would occur in Yosemite Valley under Alternatives 2-6 involve removal of abandoned infrastructure and other development affecting the Merced River's hydrologic function, extensive meadow restoration, and management of high visitor-use areas to address associated impacts on riparian habitats. The park would also restore six miles of informal trails in Yosemite Valley meadows. Removal of abandoned or obsolete infrastructures would reduce ongoing impacts on meadow hydrology and lessen channel scour. Upland restoration activities, including removal of informal trails, roadbeds, and parking areas, would improve meadow health. Habitat restoration actions in Segment 2 common to Alternatives 2-6 are displayed in **figures 9-13** through **9-16**. The types of habitat that would be affected by these restoration actions in Segment 2, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-6** and **9-7**. A total of 151 acres of vegetation would be enhanced or restored in Segment 2, including 35.84 acres of wetlands. Meadow restoration would include actions to improve hydrologic function, restore native vegetation, and remove inappropriate uses or facilities. Meadow habitat integrity, extent, and hydrological connectivity to the river would be enhanced through construction of wide box culverts (or other design components such as rolling dips, permeable subgrade, etc.), formalizing or removing shoulder parking, restoring natural topography, removing ditches and abandoned infrastructure, and improving roadways and trails. In addition, the NPS would decompact soils and revegetate denuded meadow and riparian habitat. Specific management actions would include filling ditches, removing encroaching conifers, relocating and/or elevating trails onto boardwalks, revegetation with willows and other native species, removing abandoned infrastructure, removal and restoration of informal trails and parking areas, decompacting soils, and improving road crossings in meadows. Overall these measures would improve the hydrologic function and restore the ecological integrity of Yosemite Valley meadows.

Programmatic actions also include improving the condition of plant communities at specific locations in Yosemite Valley (targeted 67 potential acres) by restoring the mosaic of meadow, riparian deciduous vegetation, black oak, and open mixed conifer forest. Management actions may include re-vegetation, prescribed fire, mechanical removal of conifers, and re-design of infrastructure. These actions will enhance the condition of the Merced River ecosystem by sustaining the diverse mosaic of interconnected plant communities.

Programmatic restorative management actions to improve the free-flowing condition of the river that would occur within Segment 2 under all action alternatives include in channel improvements, such as strategically placing large wood (log jams) to lessen the scouring from bridge structures. In the river reach upstream of the El Capitan moraine to the Sentinel picnic area, localized restoration would enhance channel complexity. Water quality would be improved by relocating the Upper Pines Dump Station. These actions would result in enhanced channel free flow, increased channel complexity, increased streambank stability, and restored riparian habitat segmentwide. Overall these measures would improve the free-flowing condition of the river and restore the ecological integrity of Yosemite Valley riparian habitats.

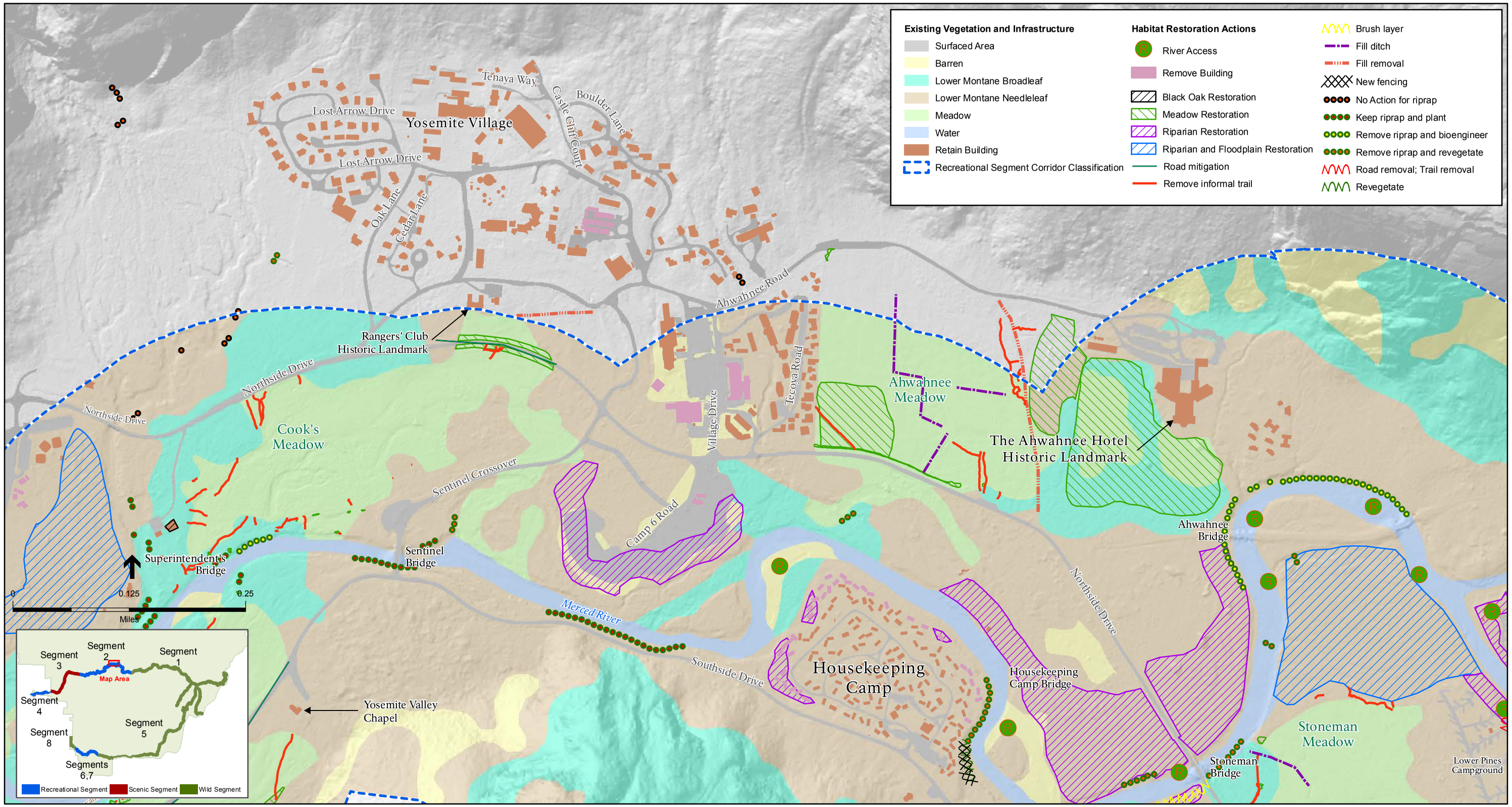


SOURCE: NPS, 1997, 2011, 2012

Merced River Comprehensive Management Plan and EIS . 210436

Figure 9-13

Curry Village Area: Common to Alternatives 2-6 Habitat Restoration Actions

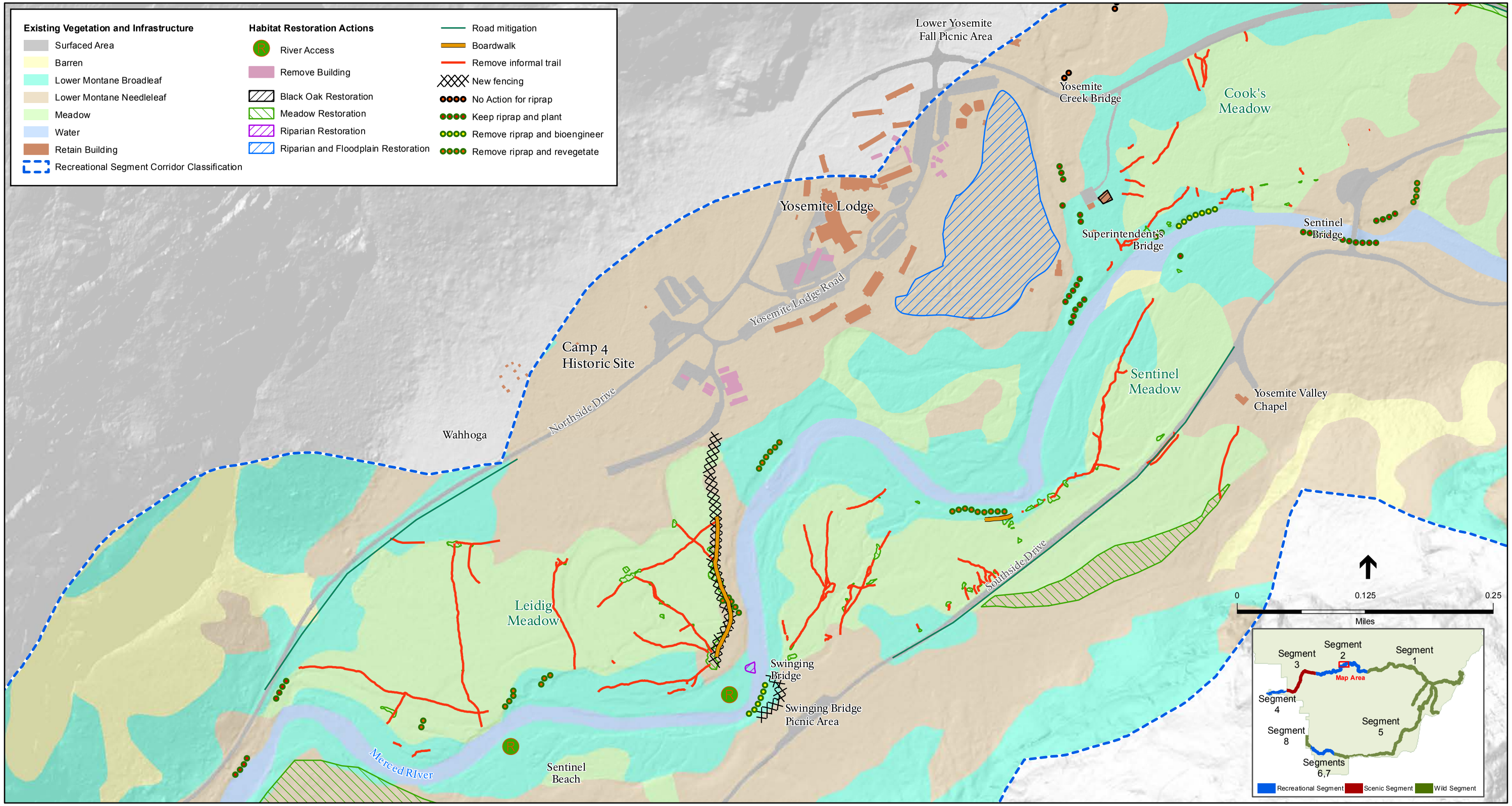


SOURCE: NPS, 1997, 2011, 2012

Merced River Comprehensive Management Plan and EIS . 210436

Figure 9-14

Yosemite Village Area: Common to Alternatives 2-6 Habitat Restoration Actions

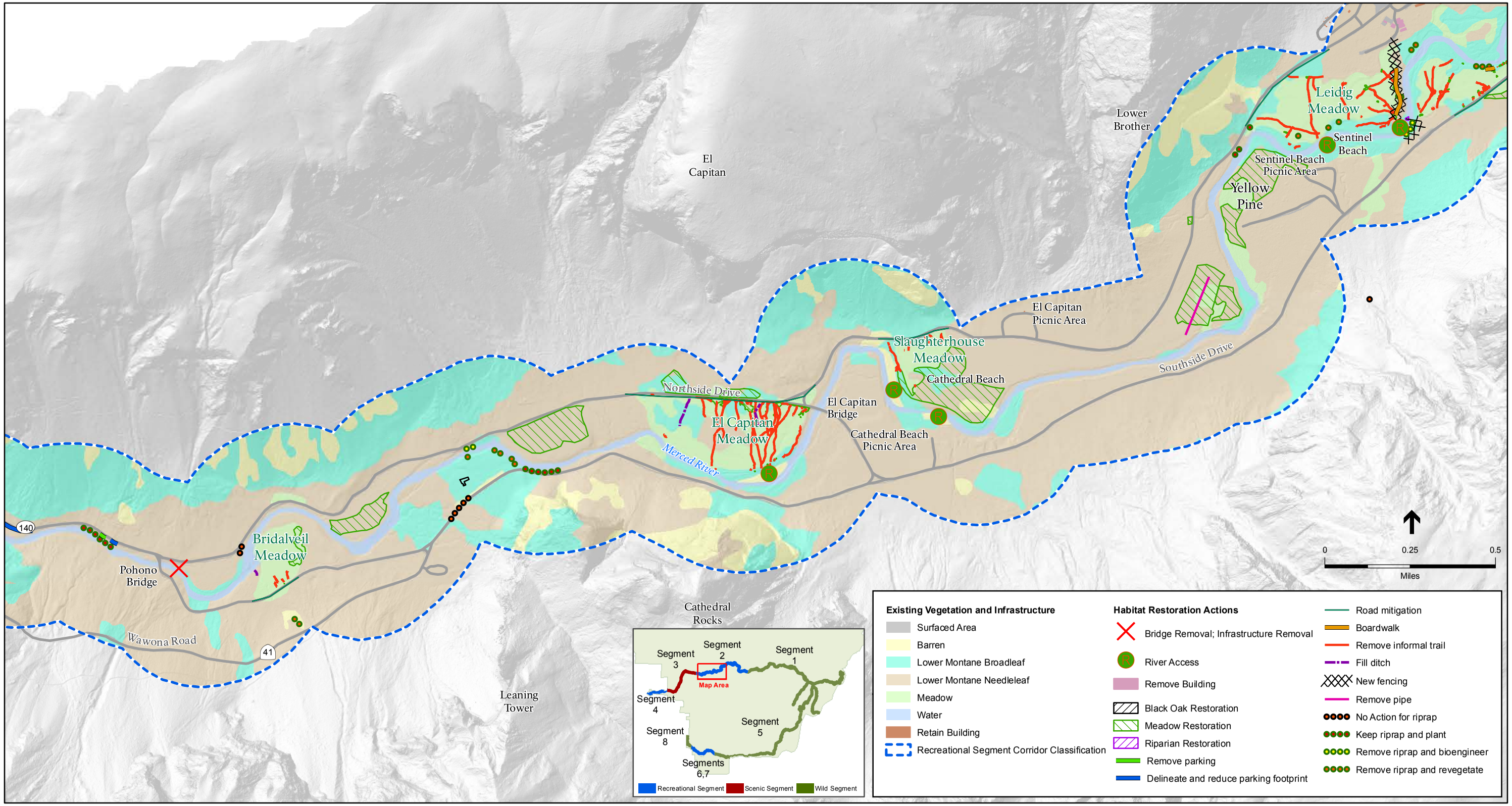


SOURCE: NPS, 1997, 2011, 2012

Merced River Comprehensive Management Plan and EIS . 210436

Figure 9-15

Yosemite Lodge Area: Common to Alternatives 2-6 Habitat Restoration Actions



SOURCE: NPS, 1997, 2011, 2012

Figure 9-16

West Yosemite Valley: Common to Alternatives 2-6 Habitat Restoration Actions

TABLE 9-6: SEGMENT 2 VEGETATION RESTORATION COMMON TO ALTERNATIVES 2-6[a]

Current Vegetation type	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Intermittently to seasonally flooded meadow	13	Meadow	16	Meadow	18
Semi-permanently to permanently flooded meadow	3				
Sparsely vegetated undifferentiated	2	Sparsely vegetated	2		
California black oak forest alliance	6	Black oak woodland	14	Black oak woodland	14
California black oak /(bracken fern) forest mapping unit	8				
Douglas-fir-(White fir-incense cedar-Pondera pine) forest mapping unit	1	Coniferous forest	58	A mosaic of meadow, black oak, and open canopy coniferous forest	58
Ponderosa pine-incense cedar forest alliance	18				
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	39				
Ponderosa pine-incense cedar forest alliance	8	Coniferous forest	25	Riparian & floodplain: cottonwood, willow, mix of upland deciduous & coniferous forest	25
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	17				
Urban/developed	4	Development	4	Riparian: cottonwood, willow, mix of upland deciduous & coniferous forest	36
Ponderosa pine-incense cedar forest alliance	20	Coniferous forest	32		
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	12				
Total	**151**		**151**		**151**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

TABLE 9-7: SEGMENT 2 WETLAND RESTORATION COMMON TO ALTERNATIVES 2-6

Wetland Type	Acres
Segment 2	
Palustrine Emergent	16.15
Palustrine Forested	18.85
Palustrine Scrub Shrub	0.84
Total amount of wetlands restored	**35.84**
SOURCE: NPS 2012c	

High visitor use along sensitive riverbanks in Yosemite Valley is causing vegetation trampling and soil compaction, resulting in riparian vegetation loss, riverbank erosion, and decreased soil infiltration. In some areas, trees are undercut as a result of trampling around the base of the tree, leading to potential channel widening. Under Alternatives 2-6, visitors accessing the river would be redirected to resilient sandbar points and sandy beaches through signage, campground maps, and brochures. Specific river access points would be designated. Parking would be relocated to more suitable areas. Picnic areas would be delineated by fencing and river terraces would be revegetated with native riparian species. Vulnerable steep slopes and riparian habitats would be fenced off to prevent further bank erosion. Some infrastructure (toilets, parking, and picnic tables) within the 10-year floodplain would be removed. The proposed redirection of visitor uses to resilient areas away from unstable slopes and sensitive locations along riverbanks, and the associated restoration of eroded and denuded areas, would generally have a beneficial effect on riparian plant communities.

These restoration management actions would improve hydrologic function and restore ecological integrity of the river corridor in Segment 2 and associated plant communities and wetlands, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the Merced River corridor. Removing abandoned underground infrastructure, restoring informal trails, directing visitor use, and restoring free-flowing conditions along the river corridor would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

Biological Resource Actions.

Ahwahnee Meadow: Actions common to Alternatives 2-6 to protect and enhance river values at the Ahwahnee Meadow include restoring an impacted portion of the Ahwahnee Meadow to natural meadow conditions and removing the tennis courts from black oak woodland. Disjunct portions of Ahwahnee Meadow would be reconnected by selectively removing conifers to restore approximately 5.65 acres of meadow habitat. Enhancing meadow connectivity would reduce meadow fragmentation and removal of the tennis courts from black oak woodland would allow for woodland habitat to be restored. Natural meadow topography would be restored by removing abandoned irrigation lines and fill, filling in ditches, and revegetating with native meadow species. Actions to restore Ahwahnee Meadow would have local, long-term, moderate, and beneficial impacts on vegetation and wetlands due to an increased amount of meadow and oak woodland habitat, a reduction in habitat fragmentation, and enhanced habitat function (restored topography and hydrological connectivity).

***Yosemite Valley Campgrounds*:** Common to Alternatives 2-6, the NPS would remove all campsites within 100 feet of the bed and banks of the Merced River in all Valley campgrounds and restore riparian habitat through the removal of asphalt parking spaces, base rock, and fill material. Soils would be decompacted and topography would be recontoured to natural conditions. Native riparian plant species would be planted to revegetate denuded areas. Riparian habitat protection would be achieved through redirecting visitors to more stable and resilient areas, and installation of new fencing (or adjusting existing fencing) to protect newly restored riparian zones. Restoration of the 100 feet buffer of floodplain and riparian habitat throughout Yosemite Valley would result in segmentwide, long-term, moderate, and beneficial impacts to riparian plant communities.

***El Capitan Meadow*:** Common to Alternatives 2-6, the NPS would reroute the climber use trail on the north side of the road to an appropriate route (a few meters to the east). Additionally, informal trails through meadow and oak woodland habitat would be removed and fencing or natural barriers and signs would be installed to keep visitors from trampling sensitive meadow vegetation. Existing culverts would be replaced and additional culverts would be installed to improve water flow underneath El Capitan Straight on Northside Drive. Encroaching conifer saplings would be removed from El Capitan Meadow. Restoration of El Capitan Meadow would result in local, long-term, minor, and beneficial impacts on meadow plant communities from reduction in trampling from foot traffic, increased hydrological connectivity, and reduced conifer encroachment into meadow habitat.

Additional actions common to Alternatives 2-6 in Yosemite Valley include: formalizing parking and river access from the Pohono Bridge to the Diversion Dam; adding 150 feet of boardwalk to the west of the existing boardwalk at Sentinel Meadow; expanding fenced areas to protect wetlands on the north end of Stoneman Meadow near Lower Pines Campground; restoring 20 acres of floodplains at the western portion of former Lower Pines Campground; removal of infrastructure and restoration of an additional 30 acres at the Former Upper and Lower Pines campgrounds; removing roadside parking along Sentinel Drive and restoring to natural conditions; relocating parking from Devil's Elbow to the east of the current parking lot and delineating a formal trail to access the sandbar; focusing visitor use and river access at Housekeeping Camp to two resilient beach locations on the western edge of Housekeeping Camp and across the footbridge; designating formal river access at Cathedral Beach Picnic Area and restoring riparian habitat; and filling approximately 2,155 feet of ditches throughout Valley meadows that are currently not serving current operational needs.

These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor and associated plant communities and wetlands, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. These would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Thus, these management measures would have a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternatives 2-6 include: removing the abandoned gauging station at Pohono Bridge, removing the footings and former river gauge base at Happy Isles, and restoring these areas to natural conditions. In addition, constructed log jams would be constructed in the channel between Clark's and Sentinel Bridges to address river widening and low channel complexity. These actions would result in enhanced channel free flow, increased channel complexity, increased streambank stability, and restored riparian habitat segment. Overall these measures would improve the free-flowing condition of the river and restore the ecological integrity of Yosemite Valley riparian habitats, resulting in segmentwide, long-term, moderate, beneficial impact on riparian plant communities and wetlands.

Cultural Resource Actions. Specific actions to enhance cultural resources in Segment 2 and common to Alternatives 2-6 include removing campsite 208 and bear box from the East Valley Campground. Additionally, bathroom foot traffic at this campground would be rerouted away from the milling

feature and the feature would be protected by fencing. The removal of campsite 208 and rerouting of foot traffic would have long-term, local, negligible, and beneficial impacts on vegetation.

Scenic Resource Actions. Specific projects to protect and enhance the river's scenic values that would occur within Segment 2 under Alternatives 2-6 include: selectively thinning conifers and other vegetation in the vicinities of The Ahwahnee and Meadow, Bridal Veil Falls and West Valley, Cooks and Sentinel Meadows, Curry Village, El Capitan, Housekeeping Camp, Yosemite Lodge, and other areas of the Valley; restoring grassland and oak habitat in the areas of Bridalveil Straight; repairing riverbank erosion at Clark's Bridge; and addressing informal trails and trampling at the east end of El Capitan Meadow. The trees proposed for removal under these actions is summarized in **table 9-8**. The estimated number of trees that would be removed is organized by species and size (NPS 2012b). Trees less than 6 inches diameter at breast height (DBH) can be removed in order to maintain a vista without additional compliance, and are not included in the estimates. A complete description of these scenic vista actions can be found in Appendix H.

TABLE 9-8: MAXIMUM NUMBER OF TREES REMOVED UNDER ALTERNATIVES 2–6 IN SEGMENT 2

Species	<12 inches DBH	<20 inches DBH	<30 inches DBH	<40 inches DBH	<50 inches DBH	<60 inches DBH	<70 inches DBH	Total
Black Oak	1	1	5	0	0	0	0	**7**
Cedar	794	476	234	147	36	2	1	**1,690**
Douglas Fir	1	6	1	0	3	0	0	**11**
Dogwood	1	0	0	0	0	0	0	**1**
White Fir	49	33	34	15	5	1	0	**137**
Live Oak	7	3	0	0	0	0	0	**10**
Ponderosa	355	277	443	386	94	9	3	**1,567**
Total	**1,208**	**796**	**717**	**548**	**138**	**12**	**4**	**3,423**

SOURCE: NPS 2012b

Trees that are removed under Alternatives 2–6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley. Adherence to proposed mitigation measures MM-GEO-1, MM-VEG-2, and MM-VEG-3, as applicable (see Appendix C) would reduce impacts to vegetation communities to segmentwide, long-term, minor, and adverse.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Actions to manage visitor use and facilities within Segment 2 that would occur under actions common to Alternatives 2-6 involve changes to campsites, visitor and administrative facilities, employee housing, and transportation. Under each action alternative, the NPS would remove or repurpose several visitor facilities, including the Curry Village Ice Rink; Happy Isles Snack Stand; Yosemite Village Store; Yosemite Lodge Post Office, Yosemite Lodge Pool, and Snack Stand; and Bank Building. The NPS would also construct new campsites in upland areas, and remove campsites from the rockfall

hazard zone. Concessioner employee housing within Yosemite Valley would be affected through the removal of temporary units at the Yosemite Lodge, Highland Court, Huff House, and Boys Town. New housing would be constructed at Huff House (164 beds). Each action alternative includes actions to improve pedestrian wayfinding and access. The park would also undertake a number of transportation and parking management measures; remediation, redesign, and expansion of existing parking areas; and construction of new parking lots in other areas. Vegetation that is removed under Alternatives 2–6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities common to Alternatives 2-6. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor, adverse impacts on plant communities in Yosemite Valley.

Camp 6 & Yosemite Village. Actions in the Camp 6 and Yosemite Village areas that are common to Alternatives 2-6 include the relocation of visitor vehicle services and concessioner general office functions to other buildings and the removal of the existing garage structure and concessioner general office; and transportation actions that formalize parking and public movement in the Camp 6 and Village Sport Shop area. Relocation of services and operations to other buildings would have no effect upon vegetation and wetlands. Construction activities at Camp 6 and Yosemite Village would result in direct, temporary and permanent losses of native vegetation as well as redevelopment of existing developed areas. The potential effects of these actions are described in greater under each action alternative.

Outside of previously developed areas, impacts from these actions occur entirely in lower montane broadleaf forest and lower montane coniferous forest; these vegetation types are among the most dominant communities in Segment 2. Losses to these vegetation communities would occur through vegetation clearing, grading, development, or other surface disturbance (e.g., driving over vegetation). In addition, potentially affected vegetation at Camp 6 and Yosemite Village are adjacent to already developed areas, and therefore currently experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Direct impacts to vegetation, including trampling or removal of rooted vegetation, would cause a reduction of total numbers of plants and/or a reduction or loss of total area, diversity, vigor, structure, or function of vegetative habitat. Direct impacts could also include decrease plant vigor or health from reduced water availability or dust accumulation on photosynthetic surfaces.

Vegetation that would be removed at Yosemite Village under actions common to Alternatives 2-6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as

applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

As part of these actions, informal parking along Sentinel Drive and several structures in the floodplain would also be removed. As discussed under the Impacts of Actions to Protect and Enhance River Values section above, these restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 2 and associated plant communities. This action would result in a localized, long-term, minor, beneficial impact to vegetation in Segment 2.

Yosemite Lodge & Camp 4. Actions in the Yosemite Lodge and Camp 4 areas that are common to Alternatives 2-6 include the removal of temporary employee housing and the reconstruction of new housing. Under all alternatives, the NPS Volunteer Office (former Wellness Center), post office, swimming pool, and snack stand would all be removed, and the convenience shop and nature shop would be re-purposed. Construction and removal activities at Yosemite Lodge & Camp 4 would result in direct temporary and permanent losses of vegetation as well as redevelopment of existing developed areas. These losses would occur through vegetation clearing, grading, or other surface disturbance (e.g., driving over vegetation) and would occur entirely in lower montane coniferous forest. This is a dominant native vegetation community in Segment 2. In addition, vegetation communities at Yosemite Lodge & Camp 4 experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction.

For the same reasons discussed above for the Camp 6 and Yosemite Village area, actions that are common to Alternatives 2-6 at Yosemite Lodge and Camp 4 would result in local, short-term, minor, adverse impacts to vegetation in Segment 2.

Segments 3 and 4: Merced Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

To protect and enhance river values within the Merced Gorge and El Portal, the NPS would remove informal trails, nonessential roads, fill materials, and abandoned infrastructure throughout Segments 3 and 4. The Odger's fuel storage facility would be removed and the area restored. The NPS would also develop best management practices for revetment construction and repair throughout the Merced River corridor. Valley oaks would be protected in El Portal through mitigation measures related to overwatering, tree pruning, and protecting the ground surface within the dripline of oaks (MM-GEO-1 and MM-VEG-2, as applicable; see Appendix C). Informal trails and a nonessential road would be removed from two locations in El Portal. The types of habitat that would be affected by these restoration actions in Segment 4, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-9** and **9-10**. A total of 12 acres of vegetation would be restored or enhanced in Segment 4, including 0.05 acres of wetlands.

These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 4 and associated plant communities and wetlands. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Segment 4.

TABLE 9-9: SEGMENT 4 VEGETATION RESTORATION COMMON TO ALTERNATIVES 2-6[a]

Current Vegetation type	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Valley oak woodland alliance	1	Foothill broadleaf woodland	1	Valley oak woodland	1
canyon live oak-(Ponderosa pine-incense cedar) forest superassociation	11	Lower montane needleleaf	11	Riparian & floodplain	11
Total	**12**		**12**		**12**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance

TABLE 9-10: SEGMENT 4 WETLAND RESTORATION COMMON TO ALTERNATIVES 2-6

Wetland Type	Acres
Segment 2	
Palustrine Emergent	0.001
Palustrine Forested	0.05
Total amount of wetlands restored	**0.05**
SOURCE: NPS 2012c	

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 4 under Alternatives 2-6 include removing development, asphalt and imported fill from the Abbieville and Trailer Village areas. The areas would be recontoured and planted with native riparian species and oaks within the 150 foot riparian buffer. The Greenemeyer Sandpit contains fill material that precludes natural flooding and regeneration of riparian plant communities. Under Alternatives 2-6 the Greenemeyer Sandpit would be restored to natural conditions. Fill material would be removed and the topography recontoured. Native riparian vegetation would be planted to restore the natural vegetation for the site. Off-street roadside parking areas between Foresta Road and the Merced River will be formalized. These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 4 and associated plant communities and wetlands. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Segment 4.

Scenic Resource Actions. Specific projects to protect and enhance the river's scenic values that would occur within Segment 3 under Alternatives 2-6 include selectively thinning conifers in the area of the Cascade Falls viewpoint. Trees proposed to be removed are summarized in **table 9-11**. The estimated number of trees that would be removed is organized by species and size (NPS 2012b). Trees less than 6 inches diameter at breast height (DBH) can be removed in order to maintain a vista without additional compliance, and are not included in the estimates. A complete description of these scenic vista actions can be found in Appendix H.

TABLE 9-11: MAXIMUM NUMBER OF TREES REMOVED COMMON TO ALTERNATIVES 2–6 IN SEGMENT 3

Species	<12 inches DBH	<20 inches DBH	<30 inches DBH	<40 inches DBH	<50 inches DBH	<60 inches DBH	<70 inches DBH	Total
Cedar	6	0	0	1	0	0	0	**7**
Live Oak	0	1	0	0	0	0	0	**1**
Ponderosa	1	1	1	0	0	0	0	**3**
Red Fir	3	0	0	0	0	0	0	**3**
Total	**10**	**2**	**1**	**1**	**0**	**0**	**0**	**14**

SOURCE: NPS 2012b

Trees that are removed under Alternatives 2–6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley. Adherence to proposed mitigation measures MM-GEO-1, MM-VEG-2, and MM-VEG-3, as applicable (see Appendix C), would reduce impacts to segmentwide, long-term, minor, and adverse.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Under all the action alternatives, the Park would construct infill housing in El Portal Village Center. All housing redevelopment in this area will be outside the 100-year floodplain. All other redevelopment will be outside the 150-foot riparian buffer. Vegetation that is removed under Alternatives 2–6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities at El Portal, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor, adverse impacts on plant communities in El Portal.

Segments 5, 6, 7, and 8: South Fork Merced River

Impacts of Actions to Protect and Enhance River Values

Actions to protect and enhance river values that would occur within segments 6 and 7 under Alternatives 2–6 include measures to maintain river flows, manage campground waste, and protect cultural resources. The park would improve Wawona Campground wastewater and refuse management and facilities, remove abandoned infrastructure, and undertake numerous site-specific management measures to counteract or minimize ongoing impacts on cultural resources.

There are abandoned metal pipes in side channels on the South Fork Merced River that dewater the terrace. This infrastructure affects the natural hydrologic regime of the river. Under Alternatives 2-6,

abandoned metal pipes would be removed. The South Fork Merced River Wawona picnic area, Wawona Store picnic area, and Wawona Swinging Bridge receive high levels of use. There are no formal river access points at these sites, and visitors access the river by creating informal trails, causing loss of riparian vegetation and riverbank erosion. Under Alternatives 2-6, formal access points to the river would be established. This would help reduce impacts on riparian habitat and erosion. The types of habitat that would be affected by these restoration actions in Segment 7, as well as the types of habitat that would be enhanced or restored, are summarized in **table 9-12**. A total of three acres of vegetation would be restored in Segment 7.

TABLE 9-12: SEGMENT 7 VEGETATION RESTORATION COMMON TO ALTERNATIVES 2-6[a]

Current Vegetation type	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Ponderosa pine woodland alliance	1	Coniferous forest	3	Riparian: cottonwood, willow, mix of upland deciduous & coniferous forest	3
Ponderosa pine-incense cedar forest alliance	2				
Total	**3**		**3**		**3**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

These restoration management actions would improve hydrologic function and restore ecological integrity of the river corridor in Segment 7 and associated plant communities and wetlands. Overall, these actions would result in a segmentwide, long-term, minor, beneficial impact on plant communities and wetlands in Segment 7.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic values that would occur within Segment 6 under Alternatives 2-6 include implementation of the water conservation plan related to the minimum flow analysis for the South Fork Merced River. Although the NPS would retain current water collection and distribution system associated with the Wawona Impoundment, implementation of this action would reduce water withdrawal rates and improve the free-flowing condition of the South Fork Merced River by implementing the water conservation plan related to the minimum flow analysis for the South Fork Merced River. This management action would improve hydrologic function and restore ecological integrity of the river corridor in Segment 6 and associated plant communities and wetlands. Overall, this action would result in a segmentwide, long-term, minor, beneficial impact on plant communities and wetlands in Segment 6.

Cultural Resource Actions. Specific projects to protect and enhance the river's cultural values that would occur within Segment 7 under Alternatives 2-6 include removing 7 campsites from Wawona Campground that cause potential impacts to sensitive archeological resources. Overall, this action would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Segment 6.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Actions to manage visitor use and facilities within Segments 6 and 7 that would occur under Alternatives 2–6 involve construction of and improvements to administrative and visitor-serving facilities. Under Alternatives 2–6, the park would improve river access, restroom, picnic, and bus stops within Wawona.

Vegetation that is removed under Alternatives 2–6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities at Wawona, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor, adverse impacts on plant communities in Wawona.

The Wawona Maintenance yard currently extends to the riverbank and affects riparian habitat by soil compaction, storage of nonnative fill material, and storage of vehicles and other supplies. To reduce riparian impacts and restore the area, the NPS would remove staged materials, abandoned utilities, vehicles, and the parking lot from the riparian buffer and restore the area to natural conditions. NPS would also remove roadside parking between the Wawona Store and Chilnualna Falls Road. These restoration management actions would improve hydrologic function and restore ecological integrity of the South Fork Merced River corridor in Wawona and associated plant communities and wetlands. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Wawona. The only project-level action in the Wawona area that is common to Alternatives 2-6 involves the redesign of a bus stop to accommodate visitor use. This action would have local, long-term, negligible, adverse impacts on vegetation and wetlands.

Summary of Impacts Common to Alternatives 2–6

Alternatives 2–6 would restore approximately 166 acres of vegetation, including 35.89 acres of wetlands. Under all action alternatives, the NPS would address some existing adverse impacts on vegetation communities (mainly meadows, wetlands, and riparian habitats) and implement restorative management actions to improve and restore hydrologic function and restore ecological integrity throughout the Merced River corridor, remove and restore informal trails, direct the public onto established trails and river access points, restore native plant communities, protect sensitive habitat areas, and minimize risk of impacts on new and existing structures associated with flooding. Relocating facilities out of meadow and riparian areas; restoring informal trails; controlling river access; eliminating informal parking; and delineating formal parking areas, trailheads, and trails would be part of a comprehensive strategy to reduce existing adverse impacts on meadow, wetland, and riparian vegetation. Existing natural resource management actions, such as removal of nonnative invasive plants, would continue.

In the long term, these measures would improve hydrologic connectivity of meadows and floodplains to the Merced River and South Fork Merced River, enhance habitat complexity in riparian and aquatic

zones, reduce human and pack-related disturbances, and reduce nonnative species and conifer intrusion into sensitive habitat. Adverse effects from these actions would be local, short-term, and minor or negligible. The long-term effect would be segmentwide, moderate, beneficial impacts on vegetation communities within the Merced River corridor. These effects would be most prominent in areas of high human use, such as Yosemite Valley and Wawona (Segments 2 and 7).

Environmental Consequences of Alternative 2: Self-Reliant Visitor Experiences and Extensive Floodplain Restoration

Segment 1: Merced River above Nevada Fall

Impacts of Actions to Protect and Enhance River Values

Merced Lake East Meadow near the Merced Lake Ranger Station has high levels of pack stock use, which contributes to lower vegetation cover and higher levels of bare ground. Under Alternatives 2, grazing would be permanently removed from the Merced Lake East Meadow. The park would require administrative pack stock passing through the Merced Lake area to rely on pellet feed that is packed into the site instead of allowing pack stock to graze in the meadow. This would help protect meadow vegetation from high levels of grazing by reducing the level of vegetation trampling by administrative pack stock and reducing the dispersal of manure and roll pits. These actions would have local, minor beneficial impacts to vegetation over the long term.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Several actions related to management of visitor use and facilities would have the potential to affect vegetation and wetlands in Segment 1. Visitation within Segment 1 would be reduced through a decrease in the Little Yosemite Valley trailhead quota (from 150 to 25), closing of the Merced Lake High Sierra Camp, and wilderness campground modifications. Under Alternative 2, there would be a 100% reduction in the Merced River corridor's wilderness lodging units. All 60 units and associated facilities at the Merced Lake High Sierra Camp would be removed, resulting in approximately 11 acres of restored meadow and subalpine habitat. The park would reduce the total number of designated campsites within the corridor's wilderness. This change would result from the elimination of designated camping at Moraine Dome and conversion of the Little Yosemite Valley Backpackers Campground to dispersed camping. Dispersed camping at the Merced Lake Backpackers Campground would be increased, but facilities would be reduced. Areas either closed or converted to dispersed camping would be restored to natural conditions, including restoration of native vegetation communities.

These management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 1 and associated plant communities and wetlands. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Segment 1.

Merced Lake High Sierra Camp. The actions in the Merced Lake High Sierra Camp area proposed under Alternative 2 involve the conversion of the area to designated Wilderness, the closure of the Merced Lake High Sierra Camp, and the expansion of dispersed camping at Merced Lake Backpackers

Camping Area into the High Sierra Camp footprint. These actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Segment 1by reducing impacts on vegetation communities related to concentrated human use.

Segment 1 Impact Summary: Actions to manage visitor use and facilities within Segment 1 would have local, long-term, minor, beneficial impacts on plant communities and wetlands along the corridor.

Segment 2: Yosemite Valley

Impacts of Actions to Protect and Enhance River Values

Ecological management actions that would occur within Segment 2 under Alternative 2 include measures to restore and protect meadows, riparian habitat, and areas within the 100-year floodplain of the Merced River. Projects proposed in Segment 2 to protect and enhance river values involve removal of buildings from the Yosemite Lodge area; restoration of 10.9 acres of riparian habitat at the former Yosemite Lodge units and cabins; rerouting and re-vegetating the Valley Loop Trail through Slaughterhouse Meadow out of wetlands and meadows to an upland area; moving 780 feet of the Valley Loop Trail out of Bridalveil Meadow; removing several buildings at Yosemite Lodge out of the 100-year floodplain and restoring the area.

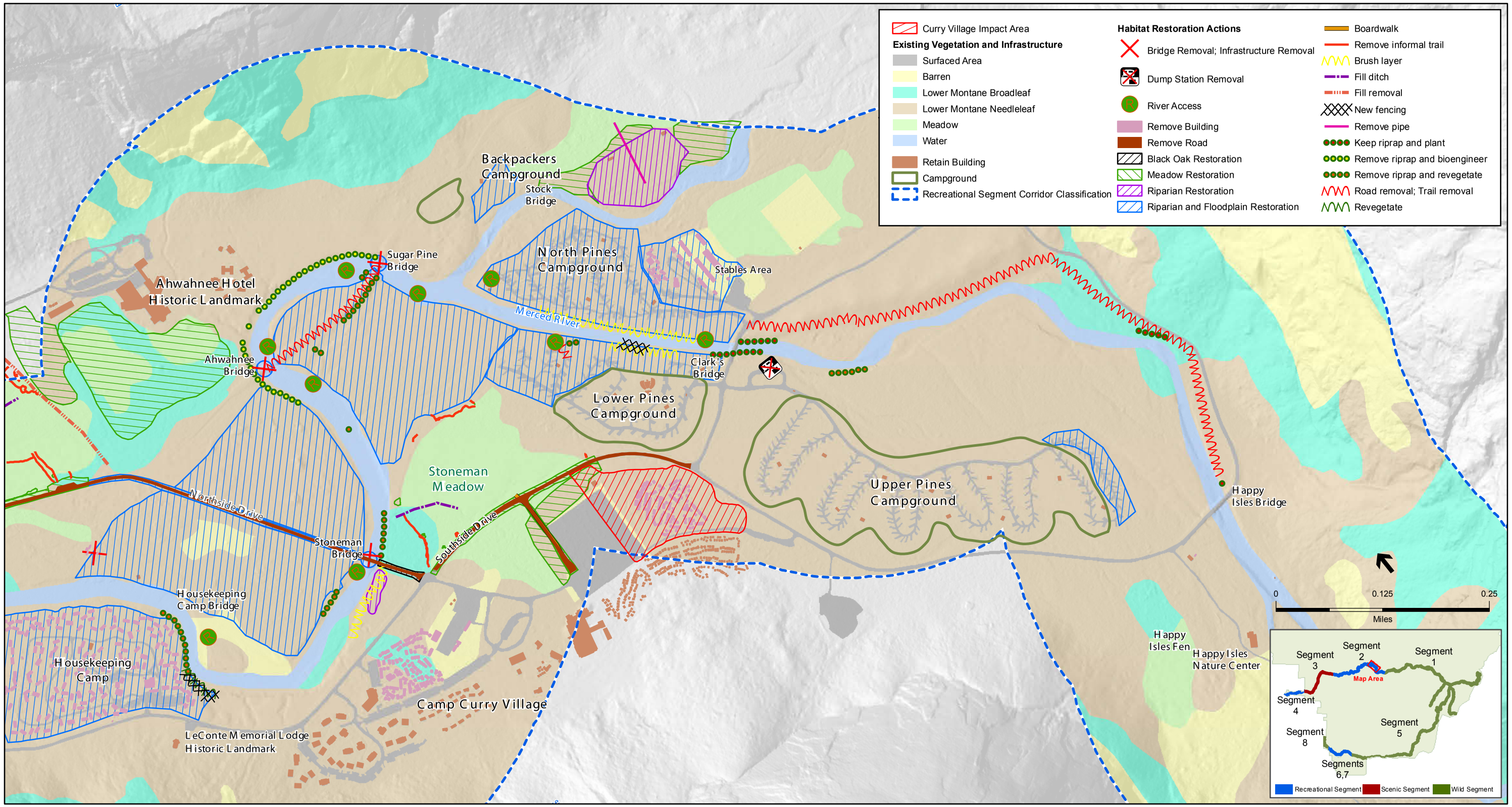
Habitat restoration actions in Segment 2 under Alternative 2 are displayed in **figures 9-17** through **9-20**. The types of habitat that would be affected by these restoration actions in Segment 2, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-13** and **9-14**. A total of 271 acres of vegetation would be restored in Segment 2, including 47.92 acres of wetlands (this includes restoration actions common to Alternatives 2-6).

Restoration of these areas would prevent further riverbank erosion, provide hydrologic connectivity for meadows and riparian habitats, reduce vegetation trampling, enhance the hydrologic function within the 2–10 year floodplains, enhance water quality, increase the amount of wildlife habitat, increase productivity within riparian and aquatic ecosystems, and reduce human presence and human-related impacts.

These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 2 and associated plant communities and wetlands, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. These actions would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

Biological Resource Actions.

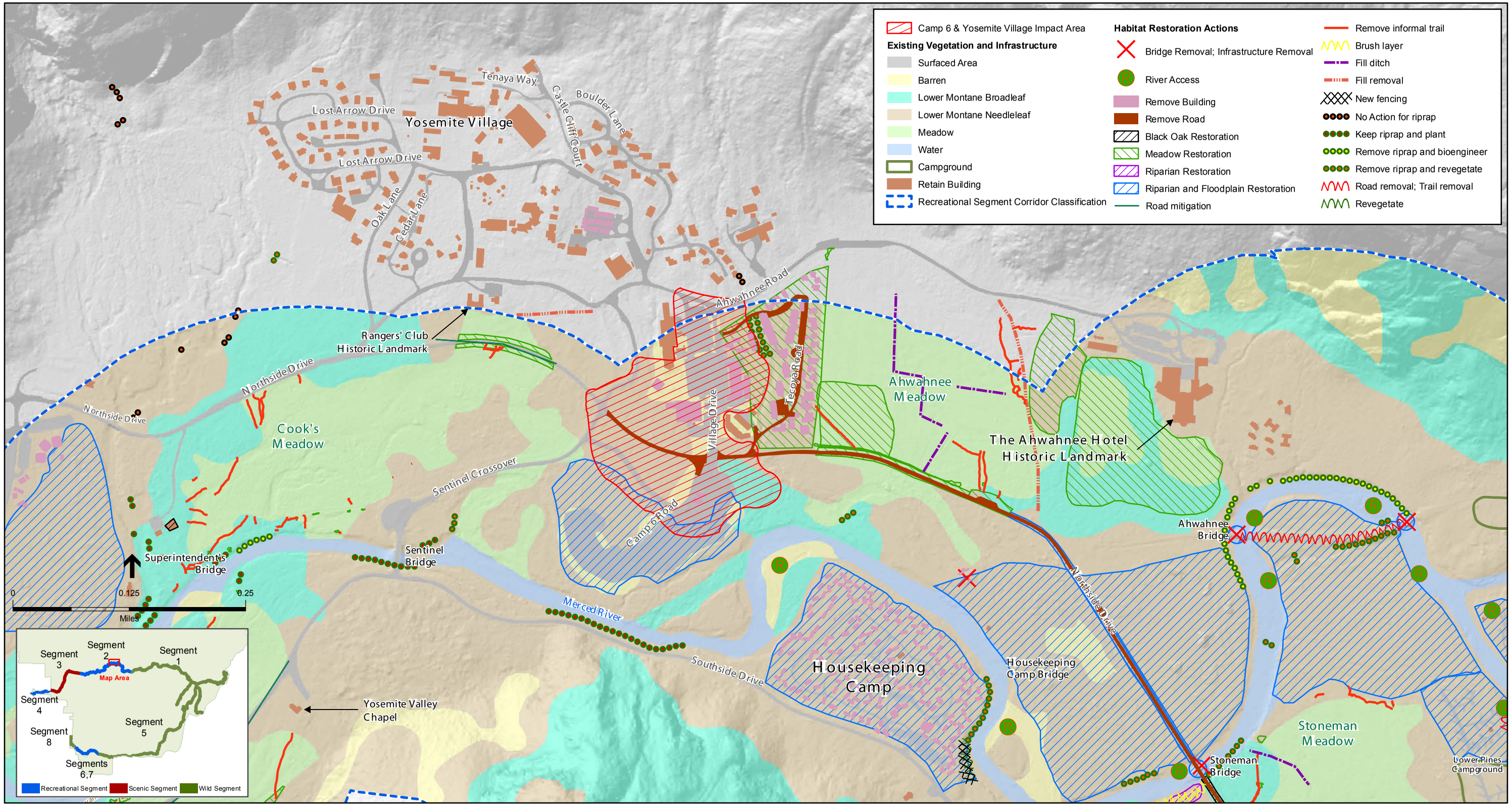
***Yosemite Valley Campgrounds*:** Under Alternative 2, specific restoration actions to enhance the river's biological values in Segment 2 include removing all campsites within 100 feet of the bed and banks of the Merced River and restoring 25.1 acres of floodplain/riparian habitat, and removing all informal trails and reducing roadside parking at El Capitan Meadow. Restoration of riparian habitat throughout Yosemite Valley would result in segmentwide, long-term, moderate, and beneficial impacts to vegetation.



SOURCE: NPS, 1997, 2011, 2012

Figure 9-17

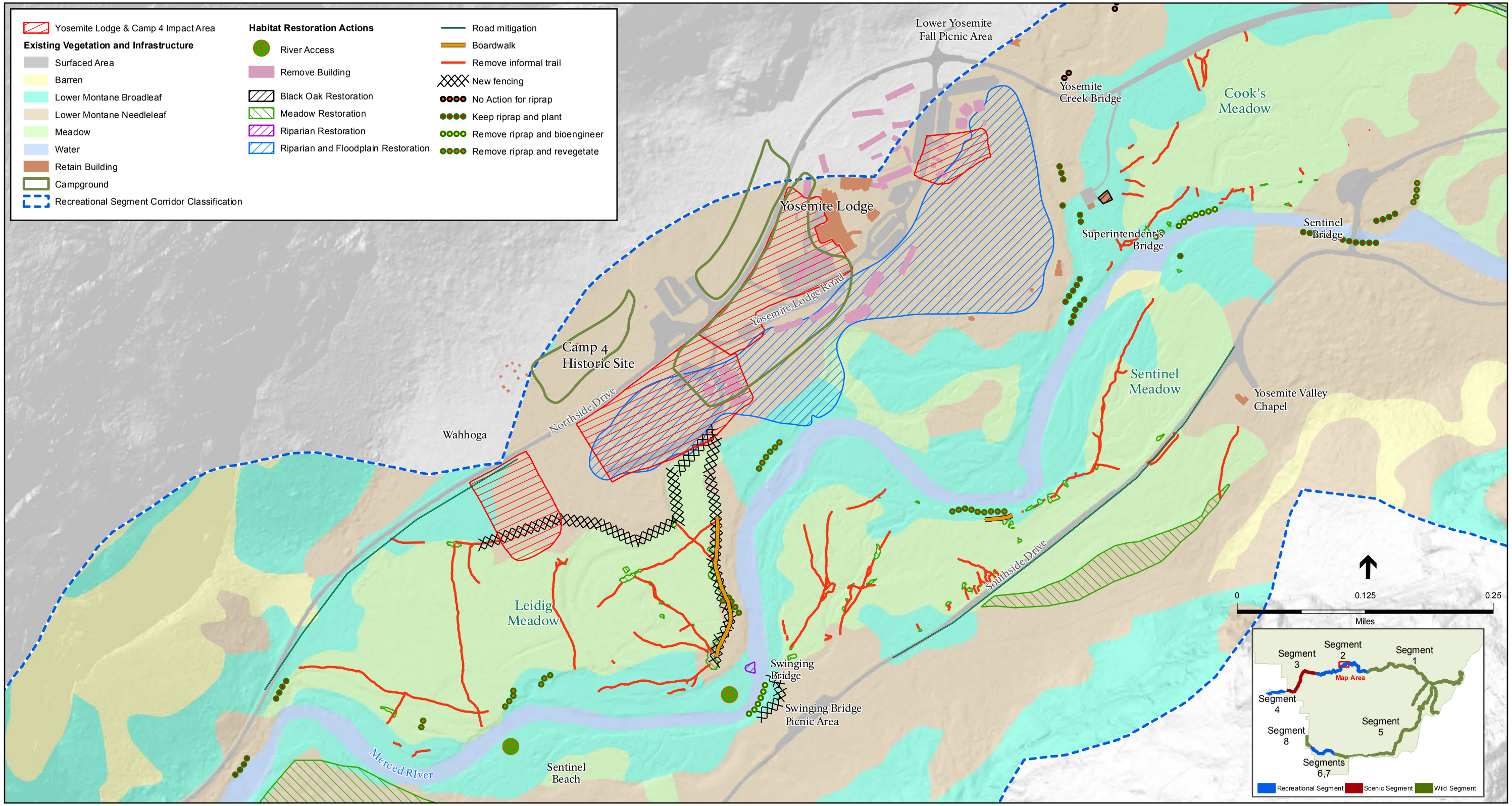
Curry Village Area: Alternative 2 Habitat Restoration Actions and Select Facilities Actions



SOURCE: NPS, 1997, 2011, 2012

Figure 9-18

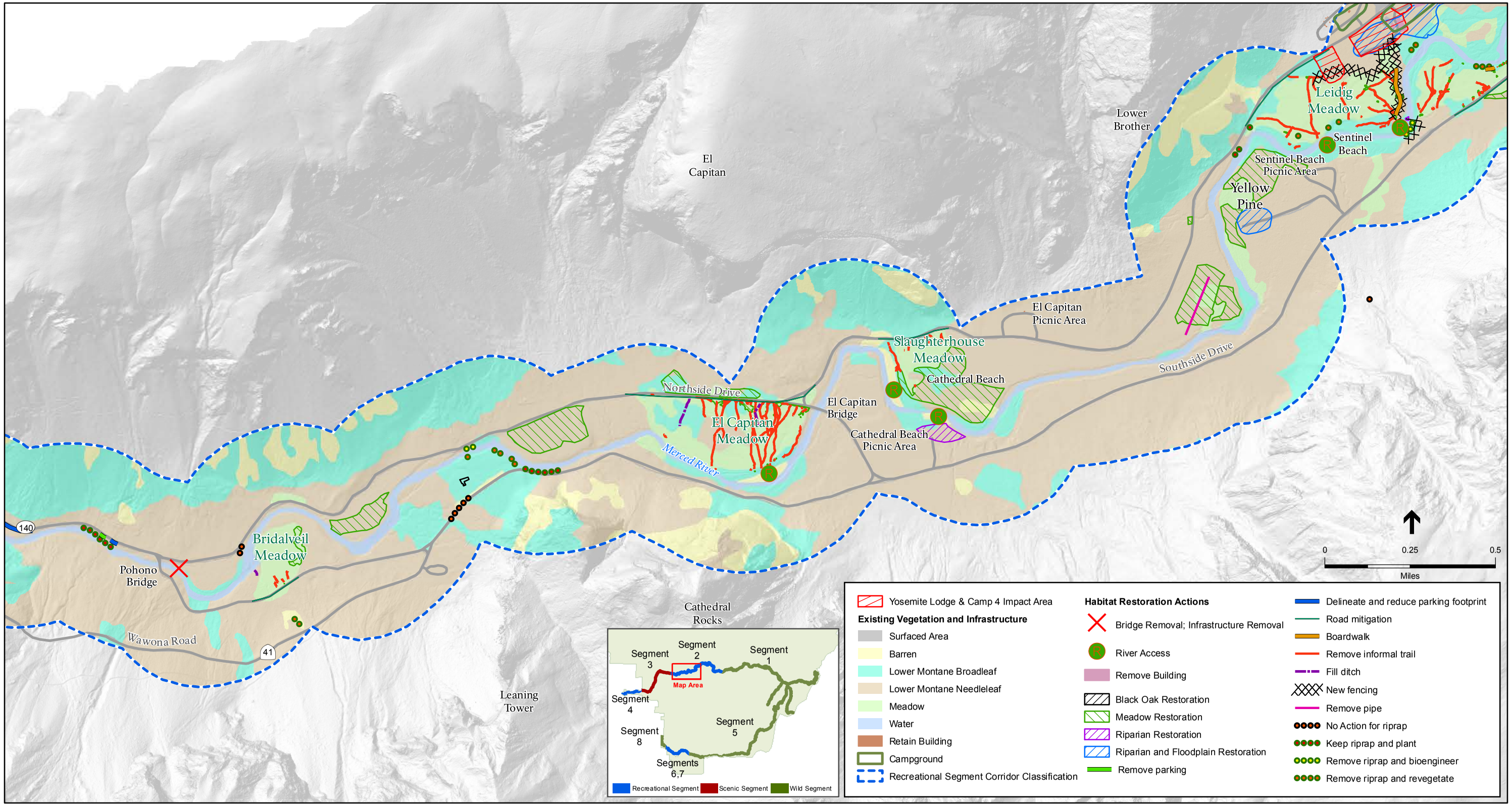
Yosemite Village Area: Alternative 2 Habitat Restoration Actions and Select Facilities Actions



SOURCE: NPS, 1997, 2011, 2012

Figure 9-19

Yosemite Lodge Area: Alternative 2 Habitat Restoration Actions and Select Facilities Actions



SOURCE: NPS, 1997, 2011, 2012

Figure 9-20

West Yosemite Valley: Alternatives 2 Habitat Restoration Actions and Select Facilities Actions

TABLE 9-13: SEGMENT 2 VEGETATION RESTORATION UNDER ALTERNATIVE 2[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Urban/Developed	0.4	Barren	0	Meadow	20
Intermittently to seasonally flooded meadow	15	Meadow	18		
Semi-permanently to permanently flooded meadow	3				
Sparsely vegetated undifferentiated	2	Sparsely vegetated	2		
Black cottonwood temporarily flooded forest alliance	1	Lower montane broadleaf	16	Lower montane broadleaf	16
California black oak forest alliance	7				
California black oak /(bracken fern) forest mapping unit	8				
Douglas-fir-(White fir-incense cedar-Pondera pine) forest mapping unit	1	Lower montane needleleaf	75	A mosaic of meadow, black oak, and open canopy coniferous forest	75
Ponderosa pine woodland alliance	0.3				
Ponderosa pine-incense cedar forest alliance	27				
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	47				
Urban/Developed	9	Barren	9	Riparian & floodplain	152
Black cottonwood temporarily flooded forest alliance	1	Lower montane broadleaf	1		
Ponderosa pine-incense cedar forest alliance	73	Lower montane needleleaf	142		
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	68				
Douglas-fir-(White fir-incense cedar-Pondera pine) forest mapping unit	1				
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	8	Lower montane needleleaf	8	Riparian	8
Total	**271**		**271**		**271**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

TABLE 9-14: SEGMENT 2 WETLAND RESTORATION UNDER ALTERNATIVE 2

Wetland Type	Acres
Segment 2	
Palustrine Emergent	20.07
Palustrine Forested	26.23
Palustrine Scrub Shrub	1.62
Total amount of wetlands restored	**47.92**
SOURCE: NPS 2012c	

***El Capitan Meadow*:** In addition to actions common to Alternatives 2-6, the NPS would remove all informal trails and reduce roadside parking through alternative striping and consolidate parking to the west end of the meadow to reduce impacts to El Capitan Meadow. Restoration of El Capitan Meadow and elimination of roadside parking adjacent to the meadow would result in local, long-term, minor, and beneficial impacts on vegetation from reduction in trampling from foot traffic and impacts to meadow habitat associated with roadside parking.

***Ahwahnee Meadow*:** Specific actions under Alternative 2 in Segment 2 to enhance the river's biological values at the Ahwahnee Meadow include: rerouting or removing trails which traverse wetlands in the Ahwahnee meadow and consolidating trail use with the Housekeeping Footbridge trail where possible, removing 900 feet of Northside Drive and relocating the bike path to the south of Ahwahnee Meadow, and restoring meadow contours and native vegetation. Meadow restoration, trail rerouting and removal, and removal of a portion of Northside Drive would result in local, long-term, moderate, and beneficial impacts on vegetation at the Ahwahnee Meadow as wetland fragmentation and vegetation trampling is reduced, and wetland connectivity to the river is enhanced.

***Stoneman Meadow*:** Under Alternative 2, the park would restore Stoneman Meadow by removing 1,335 feet of Southside Drive and re-aligning the road through Boys Town area. The Orchard Parking Lot would be redesigned and engineering solutions would be applied to promote water flow and improve meadow health to increase drainage from the cliff walls to Stoneman Meadow. The meadow boardwalk would be extended through wet areas to Curry Village (up to 275 feet). Restoration of Stoneman Meadow and protection of sensitive wetland habitat would result in local, long-term, minor to moderate, and beneficial impacts on meadow vegetation.

***Former Upper and Lower Rivers Campgrounds*:** Specific actions to enhance biological values of the Merced River at the Former Upper and Lower Rivers Campgrounds in Alternative 2 include restoring 30 acres of the 10-year floodplain. Under Alternative 2, the park would remove the remaining asphalt, decompact soils of former roads and campsites, and re-establish seasonal channels and natural topography that have been filled. Additionally, the park would remove the Lower River amphitheater structure and fill. Following habitat restoration, temporary fencing would be installed to protect the restoration areas and to allow for recovery. Restoration of the Former Upper and Lower Rivers Campgrounds would result in local, long-term, moderate, and beneficial impacts on riparian vegetation.

These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 2 and associated plant communities and wetlands,

address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. These actions would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternative 2 include: relocating unimproved Camp 6 parking and rerouting a portion of Northside Drive; removing the Stoneman, Ahwahnee and Sugar Pine Bridges; and restoring these areas to natural conditions. These actions would result in enhanced channel free flow, increased channel complexity, increased streambank stability, and restored riparian habitat segmentwide. Overall these measures would improve the free-flowing condition of the river and restore the ecological integrity of Yosemite Valley riparian habitats, resulting in segmentwide, long-term, moderate beneficial impacts on plant communities and wetlands in Segment 2.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Alternative 2 would significantly reduce the maximum daily visitation to Yosemite Valley from current levels to facilitate maximum resource restoration and reduce crowding and congestion within Segment 2. Actions to manage visitor use and facilities under Alternative 2, specifically those concerning vehicle access and number of overnight accommodations, would result in a 33% decrease in daily Yosemite Valley visitation, from approximately 20,900 to 13,900. Day use visitation would decrease by 36%, while overnight visitation would decrease by 26%. Under Alternative 2, there would also be a reduction in Valley lodging units. Changes in lodging would include the removal of units from Housekeeping Camp, conversion of the Yosemite Lodge to a day use facility, and an increase in units at Curry Village. The park would reduce the total number of campsites within the Valley. This change stems largely from campsite removals at Upper Pines, Lower Pines, and North Pines campgrounds, and additions at Yosemite Lodge.

Actions to significantly limit day use activities, overnight capacities, and day parking would effectively reduce the built environment and human presence within the Valley. Restoration of habitat following the removal of facilities and parking lots would increase the extent and contiguity of plant communities and wetlands; limiting day use activities and roadside parking would reduce impacts on sensitive habitats, such as riparian woodland and wet meadows; and reducing overnight capacities would reduce human pressures on vegetation and wetlands in general.

Relocation of facilities to other locations within the corridor could have long-term, negligible to moderate, adverse effects on vegetation, depending on site-specific conditions and project design. Local, minor to moderate, short-term, adverse effects could occur from construction and demolition of facilities along the Merced River. Vegetation that is removed under Alternative 2 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as

applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to local, minor and adverse.

The overall reduction in infrastructure, lodging units, and campsites and subsequent restoration under Alternative 2 would benefit vegetation communities in Yosemite Valley in the long-term. These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 2 and associated plant communities and wetlands, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. These actions would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

Curry Village & Campgrounds. Actions under Alternative 2 in Segment 2 related to managing visitor use and facilities at Curry Village include the construction of 78 hard-sided units at Boys Town. The units would be constructed within previously developed areas as well as within vegetation communities adjacent to the existing Curry Village site.

Construction activities at Curry Village would result in direct, temporary and permanent losses of native vegetation and wetlands (see **table 9-15**) as well as redevelopment of existing developed areas. Outside of previously developed areas, impacts to vegetation would occur in lower montane coniferous forest and, to a much lesser extent, meadow. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-15 below, only a small percentage of these vegetation communities would be affected by the facility actions at Curry Village. Impacts to meadow habitat would occur in a small meadow area currently disconnected from the larger Stoneman Meadow to the north by Happy Isle Loop Road. In addition, vegetation communities at Curry Village are adjacent to already developed areas, and therefore currently experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

TABLE 9-15: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT CURRY VILLAGE & CAMPGROUNDS – ALTERNATIVE 2

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.03	<0.1%
Lower Montane Coniferous	6.35	<0.1%
Redevelopment[b]	1.97	N/A
Wetland (Palustrine Emergent)	0.04	<0.1%
Wetland (Riverine Intermittent)	0.02	<0.1%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Direct impacts to vegetation, including trampling or removal of rooted vegetation, would cause a reduction of the total numbers of plants and/or a reduction or loss of total area, diversity, vigor, structure, or function of vegetative habitat. Direct impacts could also include decrease plant vigor or health from reduced water availability or dust accumulation on photosynthetic surfaces.

Vegetation that would be removed at Curry Village under Alternative 2 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Construction activities at Curry Village would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands associated with Stoneman Meadow and intermittent channels flowing through the area. Approximately 0.06 acres of potentially jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 2. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

Camp 6 and Yosemite Village. Actions under Alternative 2 in Segment 2 related to managing visitor use and facilities at Camp 6 and Yosemite Village include measures to formalize and relocate parking facilities and Northside Drive outside the 10-year floodplain. The Camp 6/Village Center Parking Area would be formalized to include 550 designated parking spaces by redeveloping part of the current administrative footprint. In addition, 100 parking spaces would be added at Yosemite Village. Northside Drive would be rerouted south of the parking areas and out of the dynamic 10-year floodplain. Fill material would be removed from the floodplain and the area would be restored to meadow and floodplain ecosystems. Expanded parking areas and new road construction activities at Yosemite Village would result in direct, temporary and permanent losses of native vegetation and wetlands (see **table 9-16**) as well as redevelopment of existing disturbed areas.

As noted in table 9-16, over half of the area affected by the above actions would occur at sites that are already developed. Outside of previously developed areas, impacts to vegetation would occur entirely in lower montane broadleaf forest and lower montane coniferous forest; these types are among the most dominant native vegetation communities in Segment 2. Losses to these communities would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-16, only a small percentage of these vegetation communities would be

TABLE 9-16: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT CAMP 6 & YOSEMITE VILLAGE – ALTERNATIVE 2

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Lower Montane Coniferous	9.03	0.1%
Lower Montane Broadleaf	1.37	<0.1%
Redevelopment[b]	11.55	N/A
Wetland (Palustrine Emergent)	0.77	0.3%
Wetland (Palustrine Forested)	1.52	1.3%
Wetland (Riverine Intermittent)	0.35	0.2%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

impacted by the actions at Camp 6 and Yosemite Village. In addition, potentially affected vegetation is adjacent to already developed areas, and therefore experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

Vegetation that would be removed at Camp 6 and Yosemite Village under Alternative 2 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse. The rerouting of Northside Drive at Camp 6 outside the 10-year floodplain would result in the restoration of floodplain and meadow habitats. As discussed under the Impacts of Actions to Protect and Enhance River Values section above, this restoration management action would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 2 and associated plant communities. Overall, this action would result in a localized, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

Parking areas and new road construction activities at Camp 6 and Yosemite Village would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands located adjacent to the Northside Drive and Sentinel Crossover intersection, palustrine forested wetlands associated with the Merced River, and intermittent channels flowing through the area. Approximately 2.61 acres of potentially jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 2. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow,

circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

Yosemite Lodge and Camp 4. Actions under Alternative 2 in Segment 2 related to managing visitor use and facilities at Yosemite Lodge and Camp 4 include the conversion of Yosemite Lodge to a day-use facility and the addition of 250 parking spaces; redevelopment west of Yosemite Lodge to provide an additional 150 day use parking spaces and area for 15 tour buses; the removal of old and temporary housing at Highland Court and the Thousands Cabins; the conversion of Highland Court to a walk-in campground; and the relocation of the pedestrian crossing at Northside Drive and Yosemite Lodge Drive to alleviate pedestrian/vehicle conflicts.

Like other proposed facility projects, construction activities at Yosemite Lodge would result in direct temporary and permanent losses of native vegetation and wetlands as well as the redevelopment of existing disturbed areas (**table 9-17**). Impacts to vegetation would occur entirely in lower montane coniferous forest, the dominant natural vegetation community in Segment 2. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-17, only a small percentage of this vegetation community would be impacted. In addition, potentially affected vegetation communities are adjacent to already developed areas, and therefore experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

TABLE 9-17: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT YOSEMITE LODGE AND CAMP 4 – ALTERNATIVE 2

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.12	<0.1%
Lower Montane Coniferous	14.90	0.2%
Lower Montane Broadleaf	0.57	<0.1%
Redevelopment[b]	3.69	N/A
Wetland (Palustrine Emergent)	0.12	<0.1%
Wetland (Riverine Intermittent)	0.03	<0.1%
Wetland (Riverine Perennial)	0.02	<0.1%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Like other development actions proposed under this alternative, vegetation that would be removed at Yosemite Lodge under Alternative 2 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Construction activities at Yosemite Lodge and Camp 4 would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur to palustrine emergent wetlands along the Merced River and in intermittent channels flowing through the area. Approximately 0.17 acre of potentially jurisdictional wetland features would be directly and permanently impacted by the proposed actions at Yosemite Lodge and Camp 4 under Alternative 2. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

As summarized in **table 9-18**, actions to manage visitor use and facilities would result in the loss of approximately 32.37 acres of vegetation primarily located near previously developed areas, resulting in a long-term, local, minor, adverse impacts to the affected plant communities. Actions to manage visitor use and facilities would result in the loss of 2.87 acres of potentially jurisdictional wetlands.

TABLE 9-18: SUMMARY OF VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES IN SEGMENT 2 – ALTERNATIVE 2

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.15	<0.1%
Lower Montane Coniferous	30.28	0.4%
Lower Montane Broadleaf	1.94	<0.1%
Redevelopment[b]	17.21	N/A
Wetland	2.87	0.5%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Segment 2 Impact Summary: Actions to protect and enhance river values within Segment 2 under Alternative 2 would result in the restoration of approximately 271 acres of vegetation and 47.92 acres of wetland, resulting in long-term, segmentwide, major, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in the loss of approximately 32.37 acres of vegetation primarily located near previously developed areas, resulting in a long-term, local, minor to moderate, adverse impacts to the affected plant communities. Actions to manage visitor use and facilities would result in the loss of 2.87 acres of potentially jurisdictional wetlands.

Segments 3 and 4: Merced Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

Currently, vehicles park under the dripline of the 38 valley oak trees. This practice compacts soil under the trees, affecting root health, water uptake, and soil aeration. Additionally, existing development and trampling in the vicinity limits the area where oak seedlings can be recruited. Under Alternative 2, valley oaks in El Portal would be enhanced by creating an oak recruitment area of 2.25 acres in Old El Portal in the vicinity of the current bulk fuel storage area, including the adjacent parking lots. Parking and new building construction within the oak recruitment area would be prohibited. Nonnative fill would be removed and soils decompacted. Appropriate native understory plant species would be planted. The fuel storage area would be relocated outside of the river corridor. Overall, these actions would result in local, long-term, moderate, beneficial impacts on valley oaks in El Portal.

The types of habitat that would be affected by these restoration actions in Segment 4, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-19** and **9-20**. A total of 13 acres of vegetation would be enhanced or restored in Segment 4, including 0.05 acre of wetlands (this includes restoration actions common to Alternatives 2-6).

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Under Alternative 2, user capacity is largely affected by the increase in employee housing at El Portal in this segment. In Alternative 2, NPS employee housing would be added to Abbieville, El Portal Village Center, and Rancheria Flat; employee parking would be added at Rancheria, El Portal, and Abbieville. While all new units would be constructed outside of the 100-year floodplain, they would fall within the Merced River corridor. This increase in capacity in El Portal is a function of the decrease in employee housing capacity in Yosemite Valley (Segment 2). Administrative campsites from the Yellow Pine Campground would also be relocated to this area. The addition of employee housing and park facilities development would increase the total built environment within Segment 4.

Relocation of facilities to other locations within the corridor could have long-term, negligible to moderate, adverse effects on vegetation, depending on site-specific conditions and project design. Local, minor to moderate, short-term, adverse effects could occur from construction and demolition of facilities along the Merced River. Vegetation that is removed under Alternative 2 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities at El Portal, as new construction would primarily occur in or adjacent to previously disturbed locations or in more

TABLE 9-19: SEGMENT 4 VEGETATION RESTORATION UNDER ALTERNATIVE 2[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Valley oak woodland alliance	2	Foothill broadleaf woodland	2	Valley oak woodland	2
Sparsely vegetated riverine flat	2	Sparsely vegetated	2	Riparian & floodplain	11
canyon live oak-(Ponderosa pine-incense cedar) forest superassociation	9	Lower montane broadleaf	9		
Total	**13**		**13**		**13**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

TABLE 9-20: SEGMENT 4 WETLAND RESTORATION UNDER ALTERNATIVE 2

Wetland Type	Acres
Segment 4	
Palustrine Emergent	0.001
Palustrine Forested	0.05
Total amount of wetlands restored	**0.05**

SOURCE: NPS 2012c

resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor, adverse impacts on plant communities in El Portal.

Segments 3 and 4 Impact Summary: Actions to protect and enhance river values within Segments 3 and 4 under Alternative 2 would result in the restoration of 13 acres of vegetation and 0.05 acres of wetland, resulting in long-term, local, moderate, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in short-term, local, minor, adverse impacts to vegetation and wetlands.

Segments 5, 6, 7, and 8: South Fork Merced River

Impacts of Actions to Protect and Enhance River Values

The Wawona Golf Course is located in a former meadow, altering vegetation patterns, compacting soils, and interrupting meadow hydrology. Under Alternative 2, the Wawona Golf Course would be decommissioned and the area restored to native meadow habitat through recontouring topography and re-vegetation. These actions would collectively improve meadow and wetland habitat integrity,

increase the extent of Wawona Meadow, and enhance contiguity of the meadow habitat with the rest of Wawona Meadow. These actions would also enhance hydrological connectivity between meadow, riparian, and floodplain habitats. Overall, these actions would result in a local, long-term, major, beneficial impact on plant communities and wetlands in Wawona.

The types of habitat that would be affected by these restoration actions in Segment 7, as well as the types of habitat that would be enhanced or restored, are summarized in **table 9-21**. A total of 52 acres of vegetation would be restored in Segment 7 (this includes restoration actions common to Alternatives 2-6).

TABLE 9-21: SEGMENT 7 VEGETATION RESTORATION UNDER ALTERNATIVE 2[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Urban/Developed	40	Barren	40	Meadow	40
Ponderosa pine woodland alliance	3	Lower montane needleleaf	3	Riparian & floodplain: cottonwood, willow, mix of upland deciduous & coniferous forest	3
Ponderosa pine-incense cedar forest alliance	8	Lower montane needleleaf	8	Riparian: cottonwood, willow, mix of upland deciduous & coniferous forest	9
Ponderosa pine woodland alliance	1	Lower montane needleleaf	1		
Total	**52**		**52**		**52**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 7 under Alternative 2 include the relocation of stock use campsites from sensitive resource areas to Wawona Stables. Overall, this action would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Under Alternative 2, the operations of the Wawona Stables would be eliminated and two stock campsites would be relocated to this area from the current Wawona Stock Camp. The Wawona tennis courts would be removed. Campsites in Wawona Campground are located in proximity to the river, resulting in trampling of riparian vegetation and riverbank erosion. Under Alternative 2, campsites within the 100-year floodplain would be removed and the area would be restored. Soils would be decompacted and the area would be replanted with riparian vegetation. This would reduce visitor use in this area, resulting in a decrease of vegetation trampling. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Wawona Campground. Facilities actions at the Wawona Campground would involve removal of 32 sites that are either within the 100-year floodplain or in culturally sensitive areas. This would reduce

visitor use in this area, resulting in a decrease of vegetation trampling. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Segments 5, 6, 7 and 8 Impact Summary: Actions to protect and enhance river values within Segments 5, 6, 7 and 8 under Alternative 2 would result in the restoration of 52 acres of vegetation, resulting in long-term, segmentwide, major, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in long-term, local, minor, beneficial impacts to vegetation and wetlands.

Summary of Impacts from Alternative 2: Self-reliant Visitor Experiences and Extensive Floodplain Restoration

Alternative 2 would restore up to approximately 347 acres of vegetation, including 47.97 acres of wetlands, as a result of actions common to Alternatives 2-6 and those specific to Alternative 2. Actions to manage visitor use and facilities would result in the loss of 32.37 acres of vegetation and 2.87 acres of wetlands as a result of actions specific to Alternative 2.

Past development and human activity in the Merced River corridor have in some cases adversely affected vegetation communities and regional vegetation patterns. Actions associated with Alternative 2 are expected to have corridorwide, long-term, major, beneficial impacts on vegetation in the Merced River corridor. Restoration actions associated with Alternative 2 would restore meadow and riparian areas, improve and restore hydrologic function, and restore ecological integrity throughout the river corridor; remove and restore informal trails; and direct the public onto established trails and river access points. This is part of a comprehensive strategy to reduce existing adverse impacts on meadow, wetland, and riparian vegetation. Existing natural resource management actions, such as removal of nonnative invasive plants, would continue. Adverse effects from these actions would be local, short-term, and minor or negligible. Notable actions the NPS would implement under Alternative 2 include

- restricting recreational use of rivers and riverbanks to reduce riverbank erosion
- removing, restoring, relocating, or repurposing park facilities to efficiently utilize park facilities and reduce the built environment within the park; some facilities would be built to accommodate visitors or employees
- managing total visitors to the park and visitor demands for day parking space, lodging, and camping space
- removing facilities within the 100-year floodplain of the Merced River and restoring riverbanks, meadows, and riparian habitat
- enhancing meadow, riparian, and river hydrologic function, complexity, and connectivity
- improving the free flow, complexity, and water quality of the Merced River

Generally, Alternative 2 is focused on intensive restoration of meadow, riparian, and riverbank habitats in Yosemite Valley (Segment 2), by emphasizing day use of the Valley over overnight stays; removing many facilities that are located in the 100-year floodplain and are jeopardized by flood; repurposing park facilities to improve efficiency of use; and providing adequate lodging, camping, and

parking space for visitors and employees. Adverse effects from these actions would be associated with the active construction or restoration phase, and would be local, short-term, and minor or negligible. Were all of these measures to be combined, the long-term effect would be a major, corridorwide, beneficial impact on vegetation communities as habitats are restored and fragmentation and edge effects reduced. These effects would be most pronounced in areas of high human use, such as Yosemite Valley and Wawona (Segments 2 and 7).

Cumulative Impacts from Alternative 2: Self-reliant Visitor Experiences and Extensive Floodplain Restoration

The past, present, and reasonably foreseeable plans and projects that could have a cumulative impact on vegetation resources are the same as those listed under the No Action Alternative. Alternative 2 would result in segmentwide, long-term, minor to moderate, beneficial impacts on vegetation communities within the Merced River corridor. These actions are focused on restoring and improving aquatic, meadow, and riparian habitat quality within the Merced River corridor. The past, present, and future actions in the region would have varying effects on vegetation and wetlands, with some projects restoring or enhancing vegetation and wetlands, and many others resulting in the loss or decline of vegetation and wetlands. For projects that would result in the loss of wetland features regulated under section 404 of the CWA, losses would be typically compensated at a ratio of 1:1 (no net loss). Compensation typically occurs through creation or enhancement of wetlands, either on-site or at a designated mitigation bank. However, even with these protections in place, wetlands may be lost over time through unregulated activities or negatively impacted through nonpoint source pollution, nonnative species, and changes in surface and subsurface hydrology over time.

The actions under Alternative 2 would have long-term, beneficial effects on vegetation and wetlands, including vegetation-related ORVs, within the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region (e.g., introduction and spread of nonnative species, direct displacement of vegetation by structures), the actions under Alternative 2 would have a minimal beneficial effect. Overall, cumulative actions on vegetation and wetlands would result in long-term, minor, adverse effects on regional vegetation patterns.

Environmental Consequences of Alternative 3: Dispersed Visitor Experiences and Extensive Riverbank Restoration

Segment 1: Merced River above Nevada Fall

Impacts of Actions to Protect and Enhance River Values

Under Alternatives 3, preliminary grazing capacities for the Merced Lake East Meadow would be developed. When the meadow recovers, administrative grazing at established capacities would be allowed. The meadow would be monitored annually for five years, and use levels would be adapted as needed. This adaptive management of grazing in the meadow would help protect meadow vegetation from the effects of high levels of grazing by reducing the level of vegetation trampling by administrative pack stock and reducing the dispersal of manure and roll pits, and would benefit habitat

connectivity and meadow hydrology. These actions would result in long-term, local, minor beneficial impacts to vegetation.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Several actions related to management of visitor use and facilities would have the potential to affect vegetation and wetlands in Segment 1 under Alternative 3. Visitation within Segment 1 would be reduced through a decrease in the Little Yosemite Valley trailhead quota (from 150 to 75), conversion of the Merced Lake High Sierra Camp, and wilderness campground modifications. Under Alternative 3, there would be a 100% reduction in the Merced River corridor's wilderness lodging units. All 60 units and associated facilities at the Merced Lake High Sierra Camp would be removed, resulting in approximately 11 acres of meadow and subalpine restoration. The area would be used as a temporary pack camp for up to 15 people. The park would reduce the total number of designated campsites within the corridor's wilderness. This change would result primarily from the decrease in designated camping in Little Yosemite Valley Areas either closed or converted to dispersed camping would be restored to natural conditions, including restoration of native vegetation communities.

These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 1 and associated plant communities and wetlands. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Segment 1.

Merced Lake High Sierra Camp. The actions in the Merced Lake High Sierra Camp area proposed under Alternative 3 involve the conversion of the area to designated Wilderness, removal of all infrastructure from the Merced Lake High Sierra Camp, and use of the former camp area as a temporary stock camp. As discussed for Alternative 2, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Segment 1by reducing effects on vegetation communities from concentrated visitor use.

Segment 1 Impact Summary: Actions to manage visitor use and facilities within Segment 1 under Alternative 3 would have local, long-term, minor, beneficial impacts on plant communities and wetlands along the corridor.

Segment 2: Yosemite Valley

Impacts of Actions to Protect and Enhance River Values

Ecological management actions that would occur within Segment 2 under Alternative 3 in addition to those common to Alternatives 2-6 include measures to restore and protect meadows, riparian habitat, and areas within the 100-year floodplain of the Merced River. Some of these actions are similar or identical to those proposed for Alternative 2. Projects proposed in Segment 2 to protect and enhance river values involve removal of buildings from the Yosemite Lodge area; restoration of 10.9 acres of riparian habitat at the former Yosemite Lodge units and cabins; rerouting the Valley Loop Trail through Slaughterhouse Meadow out of wetlands and meadows to an upland area; moving 780 feet of

the Valley Loop Trail out of Bridalveil Meadow; and removing several buildings at Yosemite Lodge out of the 100-year floodplain and restoring the area.

Habitat restoration actions in Segment 2 under Alternative 3 are displayed in **Figures 9-21** through **9-24**. The types of habitat that would be affected by these restoration actions in Segment 2, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-22** and **9-23**. A total of 230 acres of vegetation would be restored in Segment 2, including 46.74 acres of wetlands (this includes restoration actions common to Alternatives 2-6).

Restoration of these areas would prevent further riverbank erosion, provide hydrologic connectivity for meadows and riparian habitats, reduce vegetation trampling, enhance the hydrologic function within the 2–10 year floodplains, enhance water quality, increase the amount of wildlife habitat, increase productivity within riparian and aquatic ecosystems, and reduce human presence and human-related impacts.

These restoration management actions would improve the hydrologic function and restore the ecological integrity of plant communities and wetlands in the Merced River corridor in Segment 2, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. These actions would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

Biological Resource Actions.

***Yosemite Valley Campgrounds*:** Under Alternative 3, specific restoration actions to enhance the river's biological values in Segment 2 include removing all campsites within 150 feet of the bed and banks of the Merced River and restoring 12 acres of floodplain/riparian habitat, and designating river access at the North Pines Campground. Restoration of riparian habitat throughout Yosemite Valley would result in segmentwide, long-term, moderate, beneficial impacts to vegetation and wetlands.

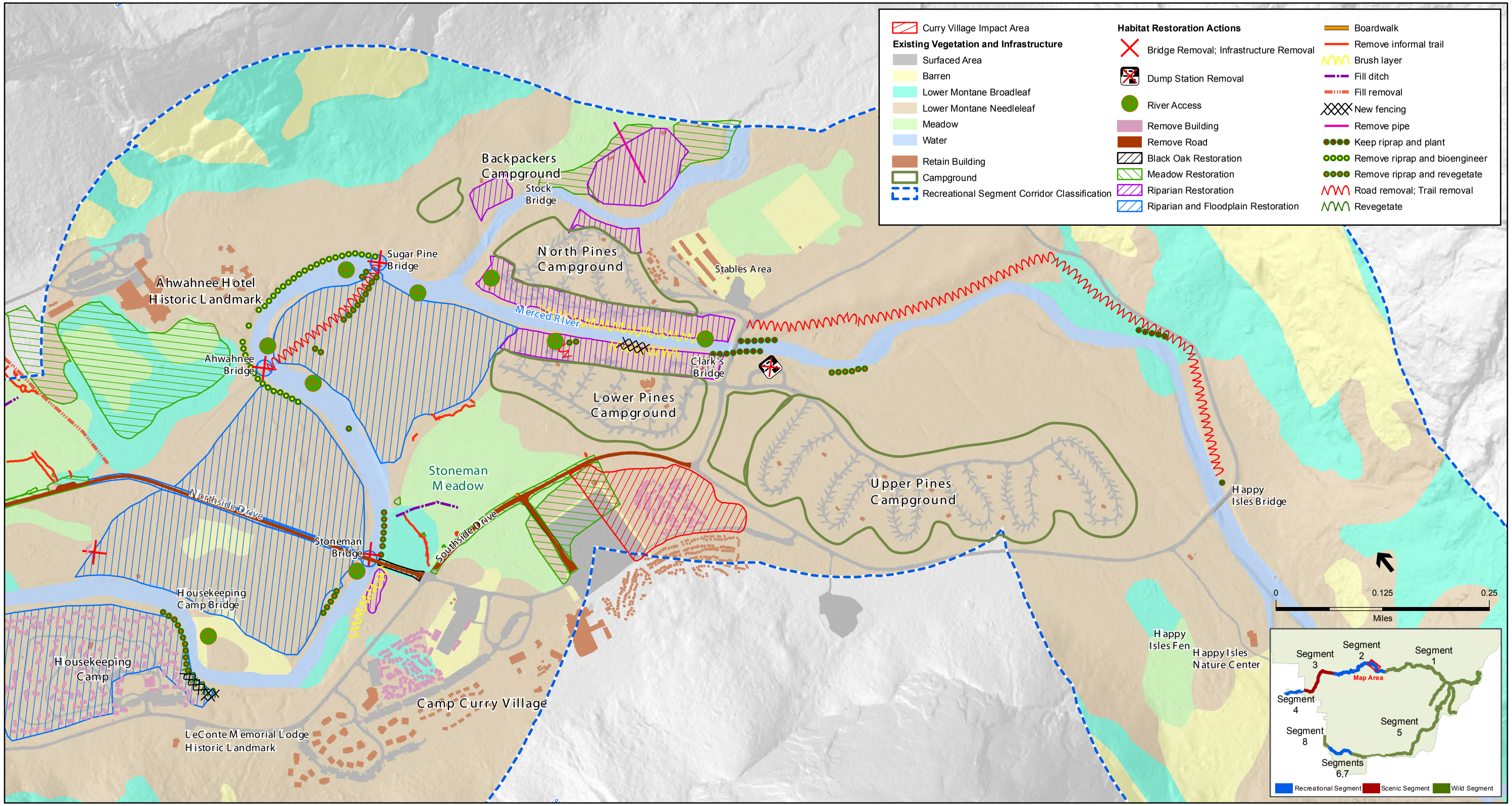
***El Capitan Meadow*:** In addition to actions common to Alternatives 2-6, the NPS would use restoration fencing and signing to designate appropriate meadow access points, remove all informal trails in sensitive and frequently inundated areas and in areas that trails incise meadow and promote habitat fragmentation. Restoration of El Capitan Meadow and rerouting or removal of informal trails would result in local, long-term, minor to moderate, beneficial impacts on vegetation and wetlands from reduction of trampling from foot traffic that causes habitat fragmentation.

***Ahwahnee Meadow*:** Similar to Alternative 2, specific actions under Alternative 3 in Segment 2 to enhance the river's biological values at the Ahwahnee Meadow include: rerouting or removing trails which traverse wetlands in the Ahwahnee meadow and consolidating trail use with the Housekeeping Footbridge trail where possible; removing 900 feet of Northside Drive and relocating the bike path to the south of Ahwahnee Meadow; and restoring meadow contours and native vegetation. Meadow restoration, trail rerouting and removal, and removal of a portion of Northside Drive would result in local, long-term, moderate, and beneficial impacts on vegetation and wetlands at the Ahwahnee Meadow as wetland fragmentation and vegetation trampling is reduced, and wetland connectivity to the river is enhanced.

TABLE 9-22: SEGMENT 2 VEGETATION RESTORATION UNDER ALTERNATIVE 3[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Urban/Developed	2	Barren	2	Meadow	21
Intermittently to seasonally flooded meadow	14	Meadow	17		
Semi-permanently to permanently flooded meadow	3				
Sparsely vegetated undifferentiated	2	Sparsely vegetated	2		
Black cottonwood temporarily flooded forest alliance	1	Lower montane broadleaf	16	Lower montane broadleaf	16
California black oak forest alliance	7				
California black oak /(bracken fern) forest mapping unit	8				
Douglas-fir-(White fir-incense cedar-Pondera pine) forest mapping unit	1	Lower montane needleleaf	68	A mosaic of meadow, black oak, and open canopy coniferous forest	68
Ponderosa pine woodland alliance	1				
Ponderosa pine-incense cedar forest alliance	20				
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	46				
Urban/Developed	7	Barren	7	Riparian & floodplain: cottonwood, willow, mix of upland deciduous & coniferous forest	105
Black cottonwood temporarily flooded forest alliance	1	Lower montane broadleaf	1		
Ponderosa pine-incense cedar forest alliance	45	Lower montane needleleaf	97		
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	52				
Douglas-fir-(White fir-incense cedar-Pondera pine) forest mapping unit	1				
Ponderosa pine-incense cedar forest alliance	8	Lower montane needleleaf	20	Riparian: cottonwood, willow, mix of upland deciduous & coniferous forest	20
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	11				
Total	**230**		**230**		**230**

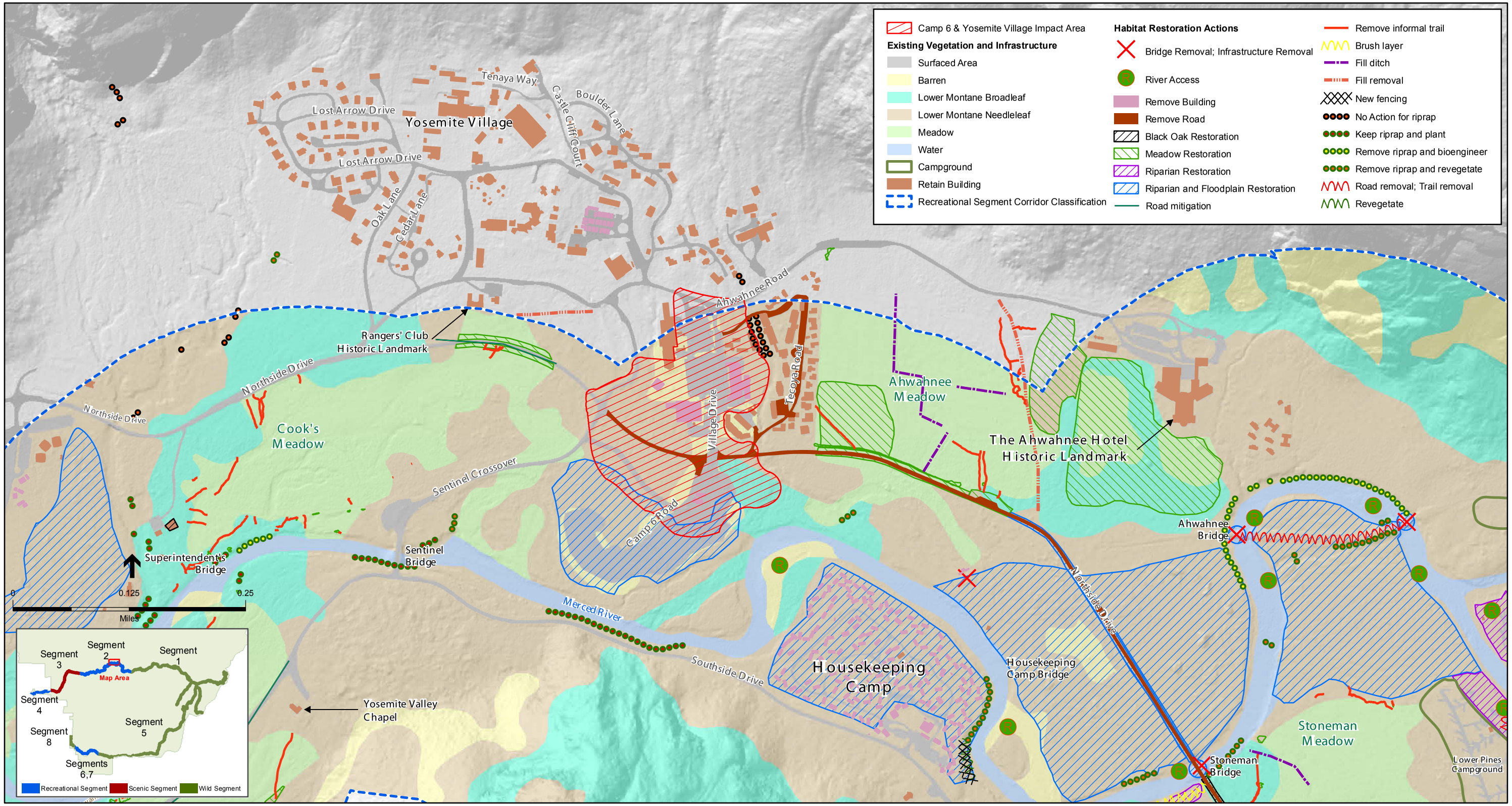
[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.



SOURCE: NPS, 1997, 2011, 2012

Figure 9-21

Curry Village Area: Alternative 3 Habitat Restoration Actions and Select Facilities Actions



SOURCE: NPS, 1997, 2011, 2012

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Figure 9-22

Yosemite Village Area: Alternative 3 Habitat Restoration Actions and Select Facilities Actions

Yosemite Lodge & Camp 4 Impact Area

Existing Vegetation and Infrastructure

- Surfaced Area
- Barren
- Lower Montane Broadleaf
- Lower Montane Needleleaf
- Meadow
- Water
- Retain Building
- Campground
- Recreational Segment Corridor Classification

Habitat Restoration Actions

- River Access
- Remove Building
- Black Oak Restoration
- Meadow Restoration
- Riparian Restoration
- Riparian and Floodplain Restoration
- Road mitigation
- Boardwalk
- Remove informal trail
- New fencing
- No Action for riprap
- Keep riprap and plant
- Remove riprap and bioengineer
- Remove riprap and revegetate

Lower Yosemite Fall Picnic Area
Yosemite Creek Bridge
Cook's Meadow
Yosemite Lodge
Superintendent's Bridge
Sentinel Bridge
Yosemite Lodge Road
Camp 4 Historic Site
Northside Drive
Wahhoga
Sentinel Meadow
Yosemite Valley Chapel
Leidig Meadow
Swinging Bridge
Swinging Bridge Picnic Area
Southside Drive
Merced River
Sentinel Beach

0 0.125 0.25
Miles

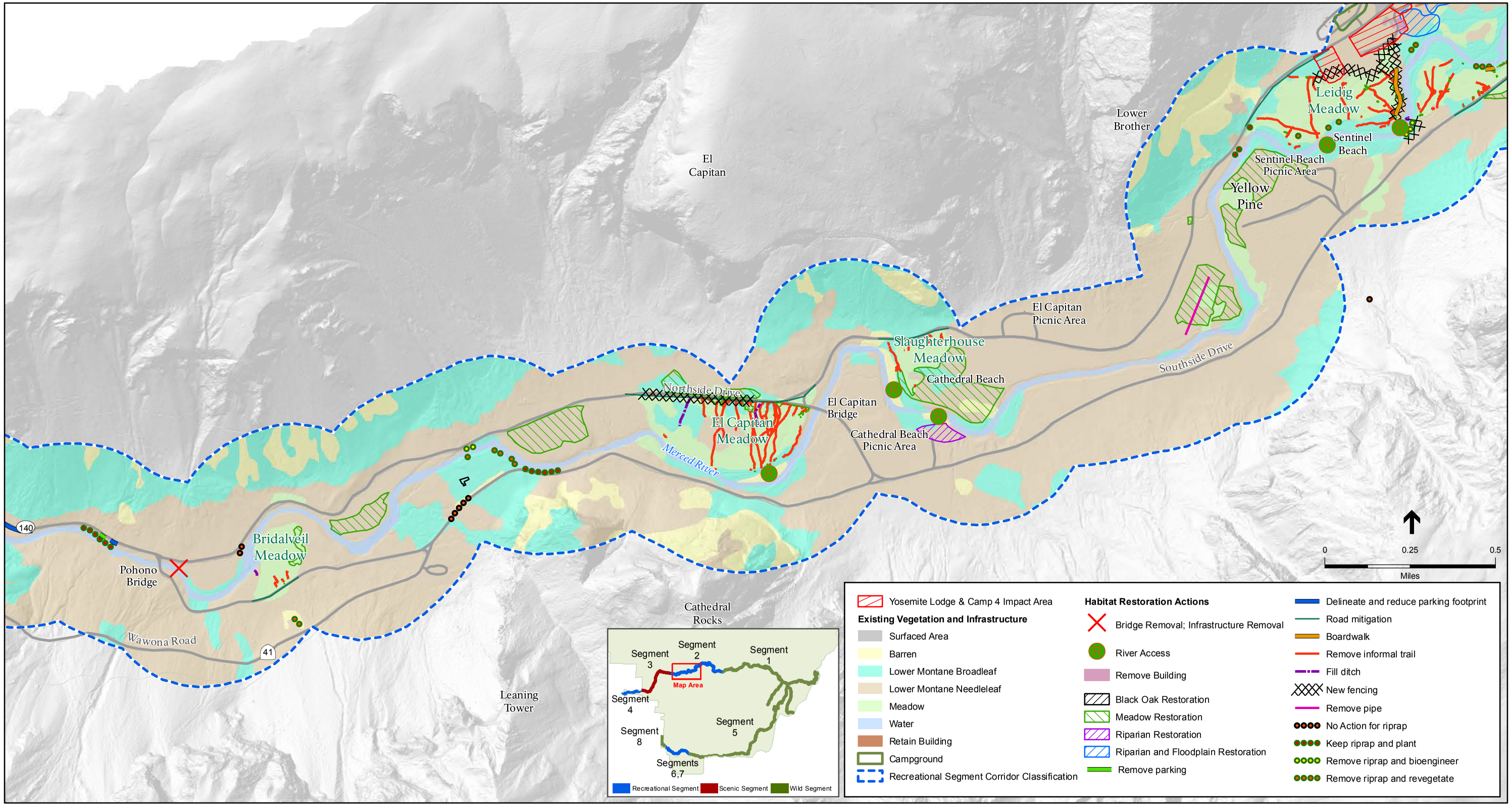
Segment 1
Segment 2
Segment 3
Segment 4
Segment 5
Segment 8
Segments 6,7
Map Area

Recreational Segment
Scenic Segment
Wild Segment

SOURCE: NPS, 1997, 2011, 2012

Figure 9-23

Yosemite Lodge Area: Alternative 3 Habitat Restoration Actions and Select Facilities Actions



SOURCE: NPS, 1997, 2011, 2012

Figure 9-24

West Yosemite Valley: Alternatives 3 Habitat Restoration Actions and Select Facilities Actions

TABLE 9-23: SEGMENT 2 WETLAND RESTORATION UNDER ALTERNATIVE 3

Wetland Type	Acres
Segment 2	
Palustrine Emergent	19.64
Palustrine Forested	25.74
Palustrine Scrub Shrub	1.36
Total amount of wetlands restored	**46.74**
SOURCE: NPS 2012c	

***Stoneman Meadow*:** Like Alternative 2, under Alternative 3 the park would restore Stoneman Meadow by removing 1,335 feet of Southside Drive and re-aligning the road through the Boys Town area. The Orchard Parking Lot would be redesigned to promote water flow and improve meadow health by increasing drainage from the cliff walls to Stoneman Meadow. The meadow boardwalk would be extended over wet areas to Curry Village (up to 275 feet). Restoration of Stoneman Meadow and protection of sensitive wetland habitat would result in local, long-term, major beneficial impacts on vegetation and wetlands.

***Former Upper and Lower Rivers Campgrounds*:** Specific actions to enhance biological values of the Merced River at the Former Upper and Lower Rivers Campgrounds in Alternative 3 are similar to Alternative 2, which include restoring 30 acres of the 10-year floodplain. Restoration of the Former Upper and Lower Rivers Campgrounds would result in local, long-term, major beneficial impacts on vegetation and wetlands.

These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 2 and associated plant communities and wetlands, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. These actions would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate to major beneficial impact on plant communities and wetlands in Segment 2.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternative 3 include: relocating unimproved Camp 6 parking; removing Stoneman, Ahwahnee and Sugar Pine bridges; and restoring these areas to natural conditions. These actions would result in enhanced channel free flow, increased channel complexity, increased streambank stability, and restored riparian habitat throughout the segment. Overall these measures would improve the free-flowing condition of the river and restore the ecological integrity of Yosemite Valley riparian habitats, resulting in segmentwide, long-term, moderate beneficial impacts on plant communities and wetlands in Segment 2.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Alternative 3 would reduce the maximum daily visitation allowed in Yosemite Valley from current levels to allow for increased resource restoration and reduce crowding and congestion. Actions to manage visitor use and facilities under Alternative 3, specifically those concerning vehicle access and number of overnight accommodations, would result in a 37% decrease in daily Yosemite Valley visitation, from approximately 20,900 to 13,200. Day use visitation would decrease by 43%, while overnight visitation would decrease by 23%. Under Alternative 3, there would be a net reduction in Yosemite Valley lodging units. This is largely due to the removal of units from Housekeeping Camp, Curry Village, and Yosemite Lodge. The park would increase the total number of campsites within the Valley. This change is largely due to new campsite development east of Camp 4, west of Backpackers Campground, and in the Upper Pines Loop Addition.

Actions to significantly limit day use activities, overnight capacities, and day parking would effectively reduce the built environment and human presence within the Valley. Restoration of habitat following the removal of facilities and parking lots would increase the extent and contiguity of plant communities and wetlands; limiting day use activities and roadside parking would reduce impacts on sensitive habitats, such as riparian woodland and wet meadows; and reducing overnight capacities would reduce human pressures on vegetation and wetlands in general.

Relocation of facilities to other locations within the corridor could have long-term, negligible to moderate, adverse effects on vegetation, depending on site-specific conditions and project design. Local, minor to moderate, short-term, adverse effects could occur from construction and demolition of facilities along the Merced River. Vegetation that is removed under Alternative 3 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor, adverse impacts on plant communities in Yosemite Valley.

The overall reduction in infrastructure, lodging units, and campsites and subsequent restoration under Alternative 3 would benefit vegetation communities in Yosemite Valley in the long-term. These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 2 and associated plant communities and wetlands, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. These actions would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

Curry Village & Campgrounds. Actions under Alternative 3 in Segment 2 related to managing visitor use and facilities at Curry Village include the reorganization of Curry Village and the rerouting of

South Side Drive at Boys Town. Construction activities at Curry Village would result in direct temporary and permanent losses of native vegetation and wetlands as well as the redevelopment of existing developed areas (**table 9-24**). Outside of previously developed areas, impacts to vegetation would primarily occur in lower montane coniferous forest and, to a much lesser extent, meadow. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-24 below, only a small percentage of these vegetation communities would be affected by the facility actions at Curry Village. Impacts to meadow habitat would occur in a small meadow area currently disconnected from the larger Stoneman Meadow to the north by Happy Isle Loop Road. In addition, vegetation communities at Curry Village are adjacent to already developed areas, and therefore currently experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

TABLE 9-24: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT CURRY VILLAGE & CAMPGROUNDS – ALTERNATIVE 3

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.03	<0.1%
Lower Montane Coniferous	6.35	<0.1%
Redevelopment[b]	1.97	N/A
Wetland (Palustrine Emergent)	0.04	<0.1%
Wetland (Riverine Intermittent)	0.02	<0.1%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Direct impacts to vegetation, including trampling or removal of rooted vegetation, would cause a reduction of the total numbers of plants and/or a reduction or loss of total area, diversity, vigor, structure, or function of vegetative habitat. Direct impacts could also include decrease plant vigor or health from reduced water availability or dust accumulation on photosynthetic surfaces.

Vegetation that would be removed at Curry Village under Alternative 3 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Construction activities at Curry Village would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands associated with Stoneman Meadow and intermittent channels flowing through the area. Approximately 0.06 acres of potentially jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 3. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

Camp 6 and Yosemite Village. Actions under Alternative 3 in Segment 2 related to managing visitor use and facilities at Camp 6 and Yosemite Village include measures to formalize and relocate parking facilities and Northside Drive outside the dynamic 10-year floodplain. The Camp 6/Village Center Parking Area would be formalized to include 550 designated parking spaces by redeveloping part of the current administrative footprint. In addition, 100 parking spaces would be added at Yosemite Village. Northside Drive would be rerouted south of the parking areas and north of the 10-year floodplain. Fill material would be removed from the floodplain and the area would be restored to meadow and floodplain ecosystems. Expanded parking areas and new road construction activities at Yosemite Village would result in direct temporary and permanent losses of native vegetation and wetlands (see **table 9-25**) as well as redevelopment of existing disturbed areas.

TABLE 9-25: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT CAMP 6 AND YOSEMITE VILLAGE – ALTERNATIVE 3

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Lower Montane Coniferous	9.03	0.1%
Lower Montane Broadleaf	1.37	<0.1%
Redevelopment[b]	11.55	N/A
Wetland (Palustrine Emergent)	0.77	0.3%
Wetland (Palustrine Forested)	1.52	1.3%
Wetland (Riverine Intermittent)	0.35	0.2%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

As noted in table 9-25, over half of the area affected by the above actions would occur at sites that area already developed. Outside of previously developed areas, impacts to vegetation would occur entirely in lower montane broadleaf forest and lower montane coniferous forest; these types are among the most dominant native vegetation communities in Segment 2. Losses to these communities would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-25, only a small percentage of these vegetation communities would be impacted by the actions at Camp 6 and Yosemite Village. In addition, potentially affect vegetation communities are adjacent to already developed areas, and therefore experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

Vegetation that would be removed at Camp 6 and Yosemite Village under Alternative 3 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

The rerouting of Northside Drive outside the 10-year floodplain would result in the restoration of floodplain and meadow habitats. As discussed under the Impacts of Actions to Protect and Enhance River Values section above, this restoration management action would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 2 and associated plant communities. Overall, this action would result in a localized, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

Parking areas and new road construction activities at Camp 6 and Yosemite Village would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands located adjacent to the Northside Drive and Sentinel Crossover intersection, palustrine forested wetlands associated with the Merced River, and intermittent channels flowing through the area. Approximately 2.64 acres of potential jurisdictional wetland features would be directly and permanently impacted by proposed actions under Alternative 3. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

Yosemite Lodge and Camp 4. Actions under Alternative 3 in Segment 2 related to managing visitor use and facilities at Yosemite Lodge and Camp 4 include: the removal of old and temporary housing at Highland Court and the Thousands Cabins; the construction of two new concessioner housing areas and

the construction of 78 employee parking spaces; redevelopment west of Yosemite Lodge to provide an additional 150 day use parking spaces and area for 15 tour buses; relocation of existing tour bus drop off area to Highland Court to provide 3 bus loading/unloading spaces; and the relocation of the pedestrian crossing at Northside Drive and Yosemite Lodge Drive to alleviate pedestrian/vehicle conflicts.

Like other proposed facility projects, construction activities at Yosemite Lodge would result in direct temporary and permanent losses of native vegetation and wetlands as well as the redevelopment of existing disturbed areas (**see table 9-26**). Impacts to vegetation would occur entirely in lower montane coniferous forest, the dominant natural vegetation community in Segment 2. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-26, only a small percentage of this vegetation community would be impacted. In addition, potentially affected vegetation is adjacent to already developed areas, and therefore experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

TABLE 9-26: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT YOSEMITE LODGE AND CAMP 4 – ALTERNATIVE 3

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Lower Montane Coniferous	14.80	0.2%
Lower Montane Broadleaf	0.08	<0.1%
Redevelopment[b]	3.69	N/A
Wetland (Riverine Intermittent)	0.03	<0.1%
Wetland (Riverine Perennial)	0.02	<0.1%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Like other development actions proposed under this alternative, vegetation that would be removed at Yosemite Lodge under Alternative 3 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Construction activities at Yosemite Lodge and Camp 4 would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur along the Merced River and in intermittent channels flowing through the area. Approximately 0.05 acres of potentially jurisdictional

wetland features would be directly and permanently impacted by the proposed actions under Alternative 3. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

In summary, as shown in **table 9-27**, actions to manage visitor use and facilities would result in the loss of 31.66 acres of vegetation primarily located near previously developed areas, resulting in long-term, local, minor, adverse impacts these communities. Actions to manage visitor use and facilities would result in the loss of 2.75 acres of potentially jurisdictional wetlands.

TABLE 9-27: SUMMARY OF VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES IN SEGMENT 2 – ALTERNATIVE 3

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.03	<0.1%
Lower Montane Coniferous	30.18	0.4%
Lower Montane Broadleaf	1.45	<0.1%
Redevelopment[b]	17.21	N/A
Wetland	2.75	0.5%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Segment 2 Impact Summary: Actions to protect and enhance river values within Segment 2 under Alternative 3 would result in the restoration of approximately 230 acres of vegetation and 39.85 acres of wetland, resulting in long-term, segmentwide, major, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in the loss of 31.66 acres of vegetation primarily located near previously developed areas, resulting in long-term, local, minor to moderate, adverse impacts these communities. Actions to manage visitor use and facilities would result in the loss of 2.75 acres of potentially jurisdictional wetlands.

Segments 3 and 4: Merced Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

Currently, vehicles park under the dripline of the 38 valley oak trees. This practice compacts soil under the trees, affecting root health, water uptake, and soil aeration. Additionally, existing development and trampling in the vicinity limits the area where oak seedlings can be recruited. Under Alternative 3, valley oaks in El Portal would be enhanced by creating an oak recruitment area of 2.25 acres in Old El Portal in the vicinity of the current bulk fuel storage area, including the adjacent parking lots. Parking and new building construction within the oak recruitment area would be prohibited. Nonnative fill would be removed and soils decompacted. Appropriate native understory plant species would be planted. The fuel storage area would be relocated outside of the river corridor. Overall, these actions would result in local, long-term, moderate, beneficial impacts on valley oaks in El Portal.

The types of habitat that would be affected by these restoration actions in Segment 2, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-28** and **9-29**. A total of 13 acres of vegetation would be restored in Segment 4, including 0.05 acres of wetlands (this includes restoration actions common to Alternatives 2-6).

TABLE 9-28: SEGMENT 4 VEGETATION RESTORATION UNDER ALTERNATIVE 3[a]

Current Vegetation	Acres	Current Vegetation Type	Acres	Proposed Future Vegetation Type	Acres Restored or Enhanced
Valley oak woodland alliance	1	Foothill broadleaf woodland	1	Valley oak woodland	1
Sparsely vegetated riverine flat	2	Sparsely vegetated	2	Riparian & floodplain: cottonwood, willow, mix of upland deciduous & coniferous forest	12
canyon live oak-(Ponderosa pine-incense cedar) forest superassociation	10	Lower montane broadleaf	13		
Total	**13**		**13**		**13**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

TABLE 9-29: SEGMENT 4 WETLAND RESTORATION UNDER ALTERNATIVE 3

Wetland Type	Acres
Segment 4	
Palustrine Emergent	0.001
Palustrine Forested	0.05
Total amount of wetlands restored	**0.05**
SOURCE: NPS 2012c	

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Under Alternative 3, user capacity is mostly affected by the increase in employee housing at El Portal. In Alternative 3, NPS employee housing would be added to Abbieville, El Portal Village Center, and Rancheria Flat; employee parking would be added at Rancheria, El Portal, and Abbieville. While all new units would be built outside of the 100-year floodplain, they would fall within the river corridor. This increase in capacity in El Portal is a function of the decrease in employee housing capacity in the valley (Segment 2). The addition of employee housing and park facilities development would increase the total built environment within Segment 4.

Relocation of facilities to other locations within the corridor could have long-term, negligible to moderate, adverse effects on vegetation, depending on site-specific conditions and project design. Local, minor to moderate, short-term, adverse effects could occur from construction and demolition of facilities along the Merced River. Vegetation that is removed under Alternative 3 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities at El Portal, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor, adverse impacts on plant communities in El Portal.

Segments 3 and 4 Impact Summary: Actions to protect and enhance river values within Segments 3 and 4 would result in the restoration of 13 acres of vegetation and 0.05 acres of wetland, resulting in long-term, local, moderate, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in short-term, local, minor, adverse impacts to vegetation and wetlands.

Segments 5, 6, 7, and 8: South Fork Merced River

Impacts of Actions to Protect and Enhance River Values

The Wawona Golf Course is located in a former meadow, altering vegetation patterns, compacting soils, and interrupting meadow hydrology. Under Alternative 3, the Wawona Golf Course would be decommissioned and the area restored to native meadow habitat through recontouring and revegetation. These actions would collectively improve meadow and wetland habitat integrity, increase the extent of meadows, and enhance contiguity of meadow habitats as well as hydrological connectivity between meadow, riparian, and floodplain habitats. Overall, these actions would result in a local, long-term, moderate, beneficial impact on plant communities and wetlands in Wawona.

The types of habitat that would be affected by these restoration actions in Segment 7, as well as the types of habitat that would be enhanced or restored, are summarized in **table 9-30**. A total of 48 acres of vegetation would be restored in Segment 7 (this includes restoration actions common to Alternatives 2-6).

TABLE 9-30: SEGMENT 7 VEGETATION RESTORATION UNDER ALTERNATIVE 3[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Urban/Developed	40	Barren	40	Meadow	41
Ponderosa pine woodland alliance	1	Lower montane needleleaf	1		
Ponderosa pine-incense cedar forest alliance	1				
Ponderosa pine woodland alliance	1	Lower montane needleleaf	7	Riparian: cottonwood, willow, mix of upland deciduous & coniferous forest	7
Ponderosa pine-incense cedar forest alliance	5				
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	1				
Total	**48**		**48**		**48**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 7 under Alternative 3 include the relocation of stock use campsites from sensitive resource areas to Wawona Stables. Overall, this action would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Under Alternative 3, the operations of the Wawona stables would be eliminated and two stock campsites would be relocated to this area from the current Wawona stock camp. The Wawona tennis courts would be removed. The area would be restored to natural conditions. Soils would be decompacted and the area would be replanted with riparian vegetation. This would reduce visitor use in this area, resulting in a decrease of vegetation trampling. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Wawona Campground. Facilities actions at the Wawona Campground would involve removal of 27 sites that are either within the 100-year floodplain or in culturally sensitive areas. This would reduce visitor use in this area, resulting in a decrease of vegetation trampling. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Segments 5, 6, 7 and 8 Impact Summary: Actions to protect and enhance river values within Segments 5, 6, 7 and 8 under Alternative 3 would result in the restoration of 48 acres of vegetation, resulting in long-term, segmentwide, major, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in long-term, local, minor, beneficial impacts to vegetation and wetlands.

Summary of Impacts from Alternative 3: Dispersed Visitor Experiences and Extensive Riverbank Restoration

Alternative 3 would restore approximately 302 acres of vegetation, including 46.79 acres of wetlands, as a result of actions common to Alternatives 2-6 in conjunction with actions specific to Alternative 3. Actions to manage visitor use and facilities would result in the loss of approximately 31.66 acres of vegetation and the permanent loss of 2.75 acres of potentially jurisdictional wetlands as a result of actions specific to Alternative 3.

Past development and human activity in the Merced River corridor have in some cases adversely affected vegetation communities and regional vegetation patterns. Actions associated with Alternative 3 are expected to have corridorwide, long-term, major, beneficial impacts on vegetation in the Merced River corridor. Restoration actions associated with Alternative 3 would restore meadow and riparian areas, improve and restore hydrologic function, and restore ecological integrity throughout the corridor, remove and restore informal trails, and direct the public onto established trails and river access points. This is part of a comprehensive strategy to reduce existing adverse impacts on meadow, wetland, and riparian vegetation. Existing natural resource management actions, such as removal of nonnative invasive plants, would continue. Adverse effects from these actions would be local, short-term, and minor or negligible. Notable actions the park would implement under Alternative 3 include:

- restricting recreational use of rivers and riverbanks to reduce riverbank erosion
- removing, restoring, relocating, or repurposing park facilities to efficiently utilize park facilities and reduce the built environment within the park; some facilities would be built to accommodate visitors or employees
- managing total visitors to the park and visitor demands for day parking space, lodging, and camping space
- removing facilities within 150 feet of the Merced River and restoring riverbanks, meadows, and riparian habitat
- enhancing meadow, riparian, and river hydrologic function, complexity, and connectivity
- improving the free flow, complexity, and water quality of the Merced River

Generally, Alternative 3 is focused on intensive restoration of meadow, riparian, and riverbank habitats in Yosemite Valley (Segment 2); removing many facilities that are located within 150 feet of the river and are jeopardized by flood; repurposing park facilities to improve efficiency of use and; providing adequate lodging, camping, and parking space for visitors and employees. Adverse effects from these actions would be associated with the active construction or restoration phase, and would be local, short-term, and minor or negligible. When combined, the long-term effect of all of these measures would be a major, corridorwide, beneficial impact on vegetation communities as habitats are restored and fragmentation and edge effects reduced. These effects would be most pronounced in areas of high human use, such as Yosemite Valley and Wawona (Segments 2 and 7).

Cumulative Impacts from Alternative 3: Dispersed Visitor Experiences and Extensive Riverbank Restoration

The past, present, and reasonably foreseeable plans and projects that could have a cumulative impact on vegetation resources are the same as those listed under Alternative 1. Alternative 3 would result in segmentwide, long-term, minor to moderate, beneficial impacts on vegetation communities within the Merced River corridor. These actions are focused on restoring and improving aquatic, meadow, and riparian habitat quality within the Merced River corridor. The past, present, and future actions in the region would have varying effects on vegetation and wetlands, with some projects restoring or enhancing vegetation and wetlands, and many others resulting in the loss or decline of vegetation and wetlands. For projects that would result in the loss of wetland features regulated under section 404 of the CWA, losses would be typically compensated at a ratio of 1:1 (no net loss). Compensation typically occurs through creation or enhancement of wetlands, either on-site or at a designated mitigation bank. However, even with these protections in place, wetlands may be lost over time through unregulated activities or negatively impacted through nonpoint source pollution, nonnative species, and changes in surface and subsurface hydrology over time.

The actions under Alternative 3 would have long-term, beneficial effects on vegetation and wetlands, including vegetation-related ORVs, within the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region (e.g., introduction and spread of nonnative species, direct displacement of vegetation by structures), the actions under Alternative 3 would have a minimal beneficial effect. Overall, cumulative actions on vegetation and wetlands would result in long-term, minor adverse effects on regional vegetation patterns.

Environmental Consequences of Alternative 4: Resource-based Visitor Experiences and Targeted Riverbank Restoration

Segment 1: Merced River above Nevada Fall

Impacts of Actions to Protect and Enhance River Values

Under Alternative 4, grazing would be eliminated and administrative pack stock would be required to carry pellet feed in Merced Lake East Meadow, as described for Alternatives 2. Beneficial effects to vegetation would be the same as described for Alternative 2.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Several actions related to management of visitor use and facilities would have the potential to affect vegetation and wetlands in Segment 1 under Alternative 4. Visitation within Segment 1 would be reduced through a decrease in the Little Yosemite Valley trailhead quota (from 150 to 100), closure of the Merced Lake High Sierra Camp, and wilderness campground modifications. Under Alternative 4, there would be a 100% reduction in the Merced River corridor's wilderness lodging units. All 60 units and associated facilities at the Merced Lake High Sierra Camp would be removed, resulting in the restoration of approximately 11 acres of meadow and subalpine habitats. The park would reduce the total number of designated backpacker campsites within Wilderness. This change would result

primarily from the decrease in designated camping at Little Yosemite Valley Backpackers Campground and removal of bear boxes (composting toilet remains). Designated camping at Moraine Dome would continue and dispersed camping at the Merced Lake Backpackers Campground would be expanded in response to removal of designated campsites, but facilities would be reduced (i.e., flush toilets and wastewater system would be replaced with composting toilets and bear boxes removed).

These restoration management actions would improve hydrologic function and restore ecological integrity of the river corridor in Segment 1 and associated plant communities and wetlands. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Segment 1.

Merced Lake High Sierra Camp. The actions in the Merced Lake High Sierra Camp area proposed under Alternative 4 involve the conversion of the area to designated Wilderness, the closure of the Merced Lake High Sierra Camp, and restoration of the former camp area to natural conditions. These actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Segment 1.by reducing impacts on vegetation communities from concentrated visitor use, overnight camping, and presence of infrastructure.

Segment 1 Impact Summary: Actions to manage visitor use and facilities within Segment 1 under Alternative 4 would have local, long-term, minor, beneficial impacts on plant communities and wetlands in the river corridor.

Segment 2: Yosemite Valley

Impacts of Actions to Protect and Enhance River Values

Ecological management actions that would occur within Segment 2 under Alternative 4 include measures to restore and protect meadows, riparian habitat, and areas within the 100-year floodplain of the Merced River. Some of these proposed actions are generally similar or identical those in Alternatives 2 and/or Alternative 3. Projects proposed in Segment 2 to protect and enhance river values, in addition to actions common to alternatives 2-6 involve rerouting the Valley Loop Trail through Slaughterhouse Meadow out of wetlands and meadows to an upland area; restoration of 10.9 acres of riparian habitat at the former Yosemite Lodge units and cabins; and moving 780 feet of the Valley Loop Trail out of Bridalveil Meadow.

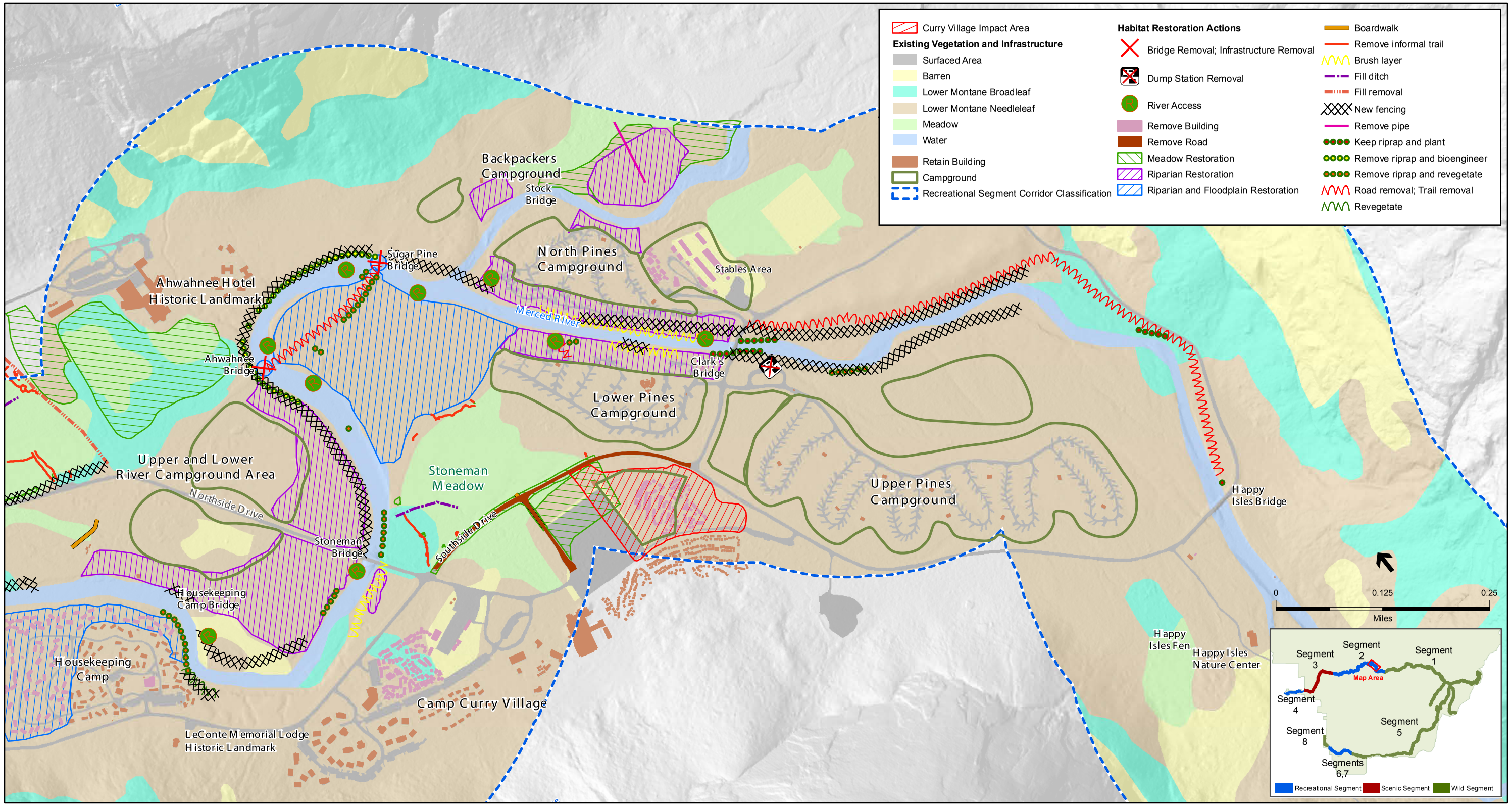
Habitat restoration actions in Segment 2 under Alternative 4 are displayed in **figures 9-25** through **9-28**. The types of habitat that would be affected by these restoration actions in Segment 2, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-31** and **9-32**. A total of 194 acres of vegetation would be restored in Segment 2, including 44.52 acres of wetlands (this includes restoration actions common to Alternatives 2-6).

Restoration of these areas would prevent further riverbank erosion, provide hydrologic connectivity for meadows and riparian habitats, reduce vegetation trampling, enhance the hydrologic function within the floodplain, enhance water quality, increase the amount of wildlife habitat, increase productivity within riparian and aquatic ecosystems, and reduce human presence and human-related impacts.

TABLE 9-31: SEGMENT 2 VEGETATION RESTORATION UNDER ALTERNATIVE 4[a]

Current Vegetation	Acres	Current Vegetation Type	Acres	Proposed Future Vegetation Type	Acres Restored or Enhanced
Urban/Developed	2	Barren	2	Meadow	21
Intermittently to seasonally flooded meadow	14	Meadow	17		
Semi-permanently to permanently flooded meadow	3				
Sparsely vegetated undifferentiated	2	Sparsely vegetated	2		
Black cottonwood temporarily flooded forest alliance	1	Lower montane broadleaf	15	Lower montane broadleaf	15
California black oak forest alliance	6				
California black oak /(bracken fern) forest mapping unit	8				
Douglas-fir-(White fir-incense cedar-Pondera pine) forest mapping unit	1	Lower montane needleleaf	67	A mosaic of meadow, black oak, and open canopy coniferous forest	67
Ponderosa pine woodland alliance	1				
Ponderosa pine-incense cedar forest alliance	20				
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	45				
Black cottonwood temporarily flooded forest alliance	1	Lower montane broadleaf	1	Riparian & floodplain: cottonwood, willow, mix of upland deciduous & coniferous forest	46
Ponderosa pine-incense cedar forest alliance	15	Lower montane needleleaf	45		
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	29				
Douglas-fir-(White fir-incense cedar-Pondera pine) forest mapping unit	1				
Urban/Developed	4	Barren	4	Riparian: cottonwood, willow, mix of upland deciduous & coniferous forest	45
Ponderosa pine-incense cedar forest alliance	25	Lower montane needleleaf	41		
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	16				
Total	**194**		**194**		**194**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

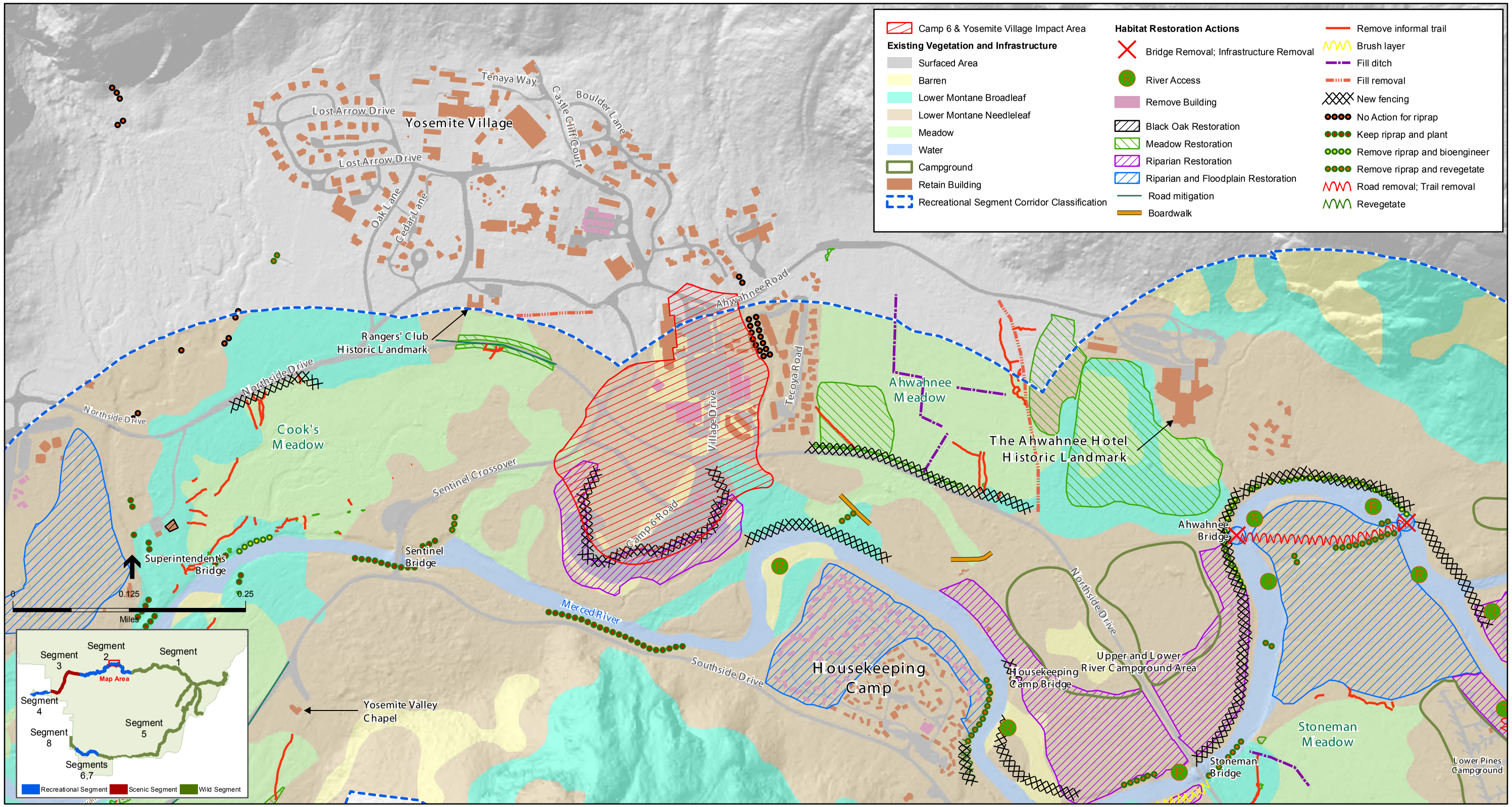


SOURCE: NPS, 1997, 2011, 2012

Merced River Comprehensive Management Plan and EIS . 210436

Figure 9-25

Curry Village Area: Alternative 4 Habitat Restoration Actions and Select Facilities Actions



SOURCE: NPS, 1997, 2011, 2012

Figure 9-26

Yosemite Village Area: Alternative 4 Habitat Restoration Actions and Select Facilities Actions

Yosemite Lodge & Camp 4 Impact Area

Existing Vegetation and Infrastructure

- Surfaced Area
- Barren
- Lower Montane Broadleaf
- Lower Montane Needleleaf
- Meadow
- Water
- Retain Building
- Campground
- Recreational Segment Corridor Classification

Habitat Restoration Actions

- River Access
- Remove Building
- Black Oak Restoration
- Meadow Restoration
- Riparian Restoration
- Riparian and Floodplain Restoration
- Road mitigation
- Boardwalk
- Remove informal trail
- New fencing
- No Action for riprap
- Keep riprap and plant
- Remove riprap and bioengineer
- Remove riprap and revegetate

Lower Yosemite Fall Picnic Area
Yosemite Creek Bridge
Cook's Meadow
Yosemite Lodge
Yosemite Lodge Road
Superintendent's Bridge
Sentinel Bridge
Camp 4 Historic Site
Northside Drive
Wahhoga
Sentinel Meadow
Yosemite Valley Chapel
Leidig Meadow
Swinging Bridge
Swinging Bridge Picnic Area
Southside Drive
Merced River
Sentinel Beach

0 0.125 0.25
Miles

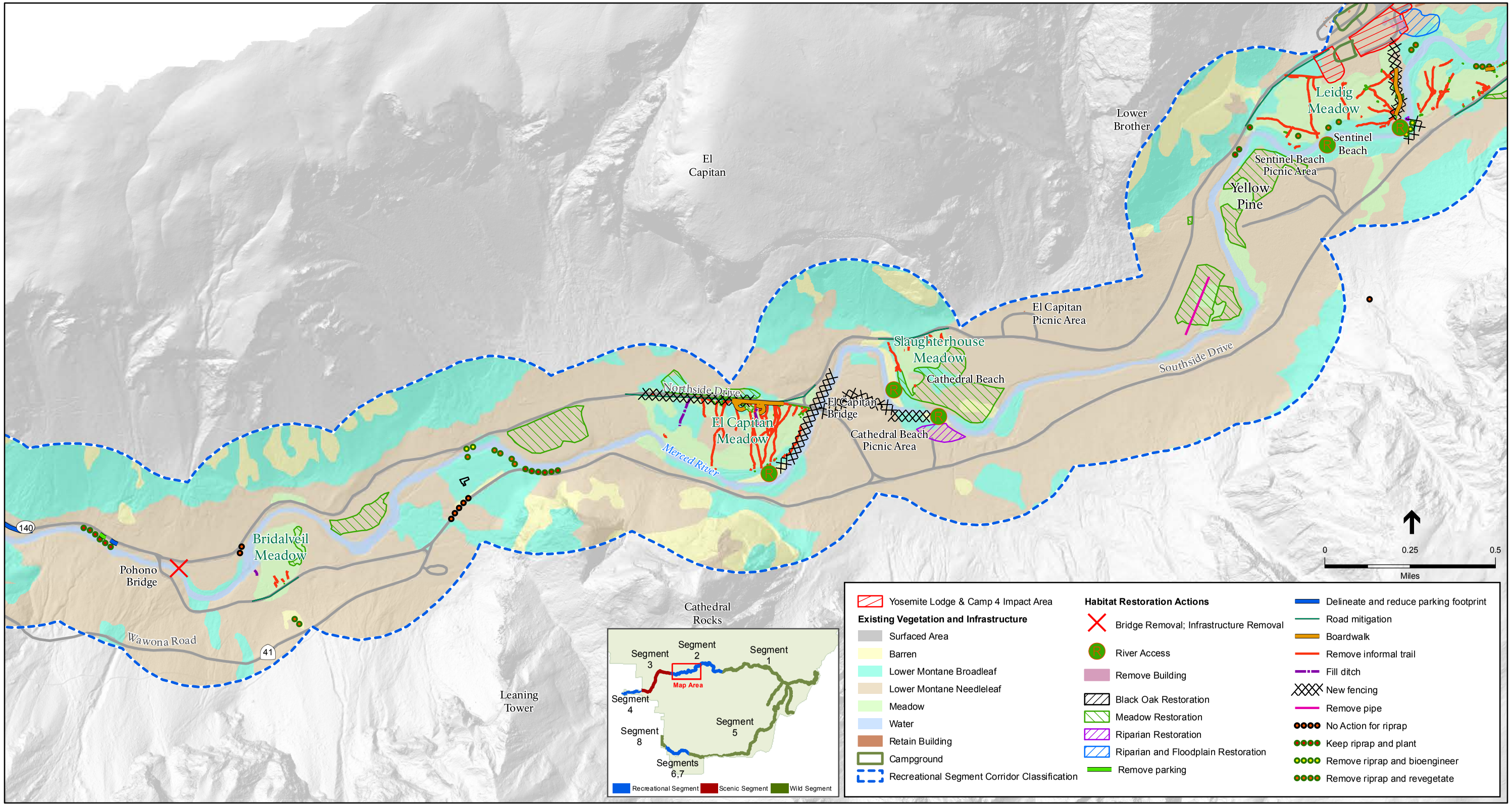
Segment 1
Segment 2
Segment 3
Segment 4
Segment 5
Segment 8
Segments 6,7
Map Area
Recreational Segment
Scenic Segment
Wild Segment

SOURCE: NPS, 1997, 2011, 2012

Merced River Comprehensive Management Plan and EIS . 210436

Figure 9-27

Yosemite Lodge Area: Alternative 4 Habitat Restoration Actions and Select Facilities Actions



SOURCE: NPS, 1997, 2011, 2012

Figure 9-28

West Yosemite Valley: Alternatives 4 Habitat Restoration Actions and Select Facilities Actions

TABLE 9-32: SEGMENT 2 WETLAND RESTORATION UNDER ALTERNATIVE 4

Wetland Type	Acres
Segment 2	
Palustrine Emergent	18.36
Palustrine Forested	24.96
Palustrine Scrub Shrub	1.20
Total amount of wetlands restored	**44.52**
SOURCE: NPS 2012c	

These restoration management actions would improve the hydrologic function and restore the ecological integrity of the plant communities and wetlands in the Merced River corridor in Segment 2, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. These actions would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in segment 2.

Biological Resource Actions.

***Yosemite Valley Campgrounds*:** Like Alternative 3, specific restoration actions under Alternative 4 to enhance the river's biological values in Segment 2 include removing all campsites within 150 feet of the bed and banks of the Merced River and restoring 12 acres of floodplain/riparian habitat, and designating river access at the North Pines Campground. Restoration of riparian habitat throughout Yosemite Valley would result in segmentwide, long-term, moderate, beneficial impacts to vegetation and wetlands.

***El Capitan Meadow*:** In addition to actions common to Alternatives 2-6, Alternative 4 would install restoration fencing along the northern perimeter of El Capitan Meadow to designate appropriate meadow access points along boardwalks and viewing platforms. Alternative 4 would remove all informal trails in sensitive and frequently inundated areas and in areas that trails incise meadow and promote habitat fragmentation. Restoration of El Capitan Meadow and rerouting or removal of informal trails would result in local, long-term, minor to moderate, beneficial impacts on vegetation and wetlands from reduction of trampling from foot traffic that causes habitat fragmentation.

***Ahwahnee Meadow*:** Specific actions under Alternative 4 in Segment 2 to enhance the river's biological values at the Ahwahnee Meadow include: removing fill in sections of trails that passes through meadow and wetland habitats and replace the trails with boardwalk. However, unlike Alternatives 2 and 3, Northside Drive and the adjacent bike path would remain under Alternative 4. Hydrological connectivity between both sides of Northside Drive would be enhanced by increasing the number of culverts. Trail improvement and meadow restoration would result in local, long-term, minor to moderate, and beneficial impacts on vegetation and wetlands at the Ahwahnee Meadow as wetland fragmentation and vegetation trampling is reduced, and wetland connectivity to the river is enhanced.

***Stoneman Meadow*:** Like Alternatives 2 and 3, specific actions in Alternative 4 to enhance the biological values of the Merced River include restoring Stoneman Meadow by removing 1,335 feet of Southside Drive and re-aligning the road through Boys Town area. The Orchard Parking Lot would be

redesigned and engineering solutions would be applied to promote water flow and improve meadow health to increase drainage from the cliff walls to Stoneman Meadow. The meadow boardwalk would be extended through wet areas to Curry Village (up to 275 feet). Restoration of Stoneman Meadow and protection of sensitive wetland habitat would result in local, long-term, minor to moderate, and beneficial impacts on vegetation and wetlands.

***Former Upper and Lower Rivers Campgrounds*:** Specific actions to enhance biological values of the Merced River at the Former Upper and Lower Rivers Campgrounds in Alternative 4 include restoring the topography of 16.5 acres of the floodplain. While this area is largely undeveloped, Alternative 4 would remove remaining asphalt, decompact soils of former roads and campsites re-establish river cut-off channels by removing imported fill, place large box culverts under the road to allow water flow, and fence and close the riparian zone at former Upper River to protect the riverbank from trampling associated with new walk-in campgrounds. Restoration of the Former Upper and Lower Rivers Campgrounds would result in local, long-term, minor, and beneficial impacts on vegetation and wetlands.

These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 2 and associated plant communities and wetlands, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. These actions would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, minor to moderate, beneficial impact on plant communities and wetlands in Segment 2.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternative 4 include: relocating unimproved Camp 6 parking; placing large wood and constructed logjams along the base of Stoneman Bridge; removing the Ahwahnee and Sugar Pine Bridges; and restoring these areas to natural conditions. These actions would result in enhanced channel free flow, increased channel complexity, increased streambank stability, and restored riparian habitat segmentwide. Overall these measures would improve the free-flowing condition of the river and restore the ecological integrity of Yosemite Valley riparian habitats, resulting in segmentwide, long-term, moderate beneficial impacts on plant communities and wetlands in Segment 2.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Alternative 4 would reduce the maximum daily visitation allowed in Yosemite Valley from current levels to allow for increased resource restoration and reduce crowding and congestion. Actions to manage visitor use and facilities under Alternative 4, specifically those concerning vehicle access, would result in a 19% decrease in daily Yosemite Valley visitation, from approximately 20,900 to 17,000. Day use visitation would decrease by nearly 29%. However, due in part to increases in campground facilities, overnight visitation would increase by about 7%. Under Alternative 4, there would be a net reduction in Valley lodging units. This would be achieved through removal of units from Housekeeping Camp and Curry Village. The park would increase the total number of campsites within the Valley. This increase would be largely due to the development of new campsites near Yosemite Lodge (west) and Camp 4 (east), as well as at Boys Town, Upper Pines Campground, Curry Village stables, and the former Upper River and Lower River campgrounds.

Restoring habitat following the removal of facilities and parking lots would increase the extent and contiguity of plant communities and wetlands; limiting day use activities and roadside parking would reduce impacts to sensitive habitats, such as riparian woodland and wet meadows; and reducing overnight capacities would reduce human pressures on plant communities and wetlands in general.

Relocation of facilities to other locations within the corridor could have long-term, negligible to moderate, adverse effects on vegetation, depending on site-specific conditions and project design. Local, minor to moderate, short-term, adverse effects could occur from construction and demolition of facilities along the Merced River. Vegetation that is removed under Alternative 4 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities at Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor to moderate, adverse impacts on plant communities in Yosemite Valley.

Former Upper and Lower River Campground Area. Construction of new walk-in campgrounds and picnic area in undeveloped areas at the former Upper and Lower Campgrounds would preclude the ecological restoration of the former riparian/wetland/California black oak complex in the area. Fencing along the riverbank would mitigate potential additional trampling damage to riparian areas. Construction activities at Upper and Lower River Campground would result in direct, temporary and permanent losses of native vegetation as well as the redevelopment of existing developed areas. Outside of previously developed areas, impacts to vegetation would occur in lower montane coniferous forest. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation).Losses of vegetation communities, while long-term, would be local, adverse and moderate.

Curry Village & Campgrounds. Actions under Alternative 4 in Segment 2 related to managing visitor use and facilities at Curry Village include the reorganization of Curry Village; the rerouting of South Side Drive at Boys Town; and the construction of a 40-site campground at Boys Town. Construction activities at Curry Village would result in direct, temporary and permanent losses of native vegetation and wetlands (see **table 9-33**) as well as the redevelopment of existing developed areas. Outside of previously developed areas, impacts to vegetation would occur in lower montane coniferous forest and, to a much lesser extent, meadow. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-33 below, only a small percentage of these vegetation communities would be affected by the facility actions at Curry Village. Impacts to meadow habitat would occur in a small meadow area currently disconnected from the larger Stoneman Meadow to the north by Happy Isle Loop Road. In addition, vegetation communities at Curry Village are adjacent to already developed areas, and therefore currently experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

TABLE 9-33: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT CURRY VILLAGE & CAMPGROUNDS – ALTERNATIVE 4

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.03	<0.1%
Lower Montane Coniferous	6.35	<0.1%
Redevelopment[b]	1.97	N/A
Wetland (Palustrine Emergent)	0.04	<0.1%
Wetland (Riverine Intermittent)	0.02	<0.1%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Direct impacts to vegetation, including trampling or removal of rooted vegetation, would cause a reduction of the total numbers of plants and/or a reduction or loss of total area, diversity, vigor, structure, or function of vegetative habitat. Direct impacts could also include decrease plant vigor or health from reduced water availability or dust accumulation on photosynthetic surfaces.

Vegetation that would be removed at Curry Village under Alternative 4 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Construction activities at Curry Village would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands associated with Stoneman Meadow and intermittent channels flowing through the area. Approximately 0.06 acres of potentially jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 4. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

Camp 6 and Yosemite Village. Actions under Alternative 4 in Segment 2 related to managing visitor use and facilities at Camp 6 and Yosemite Village include measures to formalize and relocate parking facilities 150 feet away from the river in order to facilitate riparian restoration goals. The Camp 6/Village Center Parking Area would be formalized to include 750 designated parking spaces by redeveloping part of the current administrative footprint. In addition, 100 parking spaces would be added at Yosemite Village. The intersection at Northside Drive and Village Drive (Camp 6 intersection) would be re-aligned to meet standards for a proper four-way intersection and improve performance. A three-way intersection at Sentinel Drive and the entrance to the parking area would be added to improve traffic flow and alleviate congestion. An entry road to Camp 6 parking lot from Sentinel Drive would be added to improve traffic flow and alleviate congestion at nearby intersections. On-grade pedestrian crossings with proper sight lines would be provided to alleviate pedestrian/vehicle conflicts. Expanded parking area and new road construction activities at Yosemite Village would result in direct temporary and permanent losses of native vegetation and wetlands as well as redevelopment of existing disturbed areas (see **table 9-34**).

TABLE 9-34: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT CAMP 6 AND YOSEMITE VILLAGE – ALTERNATIVE 4

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.28	<0.1%
Lower Montane Coniferous	12.22	0.2%
Lower Montane Broadleaf	0.81	<0.1%
Redevelopment[b]	14.18	N/A
Wetland (Palustrine Emergent)	1.21	0.4%
Wetland (Palustrine Forested)	0.96	0.8%
Wetland (Riverine Intermittent)	0.39	0.3%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

As noted in table 9-34, over half of the area affected by the above actions would occur at sites that are already developed. Outside of previously developed areas, impacts to vegetation would occur almost entirely in lower montane broadleaf forest and lower montane coniferous forest; these types are among the most dominant native vegetation communities in Segment 2. Impacts to meadow habitat would occur in an area currently impacted by its proximity to Sentinel Drive. Losses to these communities would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-34, only a small percentage of these vegetation communities would be impacted by the actions at Camp 6 and Yosemite Village. In addition, potentially affected vegetation communities are adjacent to already developed areas, and therefore experience high levels of visitation

and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

Vegetation that is removed at Yosemite Village under Alternative 4 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Parking areas and new road construction activities at Camp 6 and Yosemite Village would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands located adjacent to the Northside Drive and Sentinel Crossover intersection, palustrine forested wetlands associated with the Merced River, and intermittent channels flowing through the area. Approximately 2.56 acres of potential jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 4. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, moderate and adverse.

Yosemite Lodge and Camp 4. Actions under Alternative 4 in Segment 2 related to managing visitor use and facilities at Yosemite Lodge and Camp 4 include: the removal of old and temporary housing at Highland Court and the Thousands Cabins; the construction of two new concessioner housing areas and the construction of 78 employee parking spaces; redevelopment west of Yosemite Lodge to provide an additional 150 day use parking spaces and area for 15 tour buses; relocation of existing tour bus drop off area to Highland Court to provide 3 bus loading/unloading spaces; and the construction of a pedestrian underpass to alleviate pedestrian/vehicle conflicts.

Like other proposed projects, construction activities at Yosemite Lodge would result in direct temporary and permanent losses of native vegetation and wetlands as well as the redevelopment of existing disturbed areas (see **table 9-35**). Impacts to vegetation would occur entirely in lower montane coniferous forest, the dominant natural vegetation community in Segment 2. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-35, only a small percentage of this vegetation community would be impacted. In addition, potentially affected vegetation is adjacent to already developed areas, and therefore experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

TABLE 9-35: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT YOSEMITE LODGE AND CAMP 4 – ALTERNATIVE 4

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Lower Montane Coniferous	14.80	0.2%
Lower Montane Broadleaf	0.08	<0.1%
Redevelopment[b]	3.69	N/A
Wetland (Riverine Intermittent)	0.03	<0.1%
Wetland (Riverine Perennial)	0.02	<0.1%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Like other development actions proposed under this alternative, vegetation that is removed at Yosemite Lodge and Camp 4 under Alternative 4 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Construction activities at Yosemite Lodge and Camp 4 would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur along the Merced River and in intermittent channels flowing through the area. Approximately 0.05 acres of potentially jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 4. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

In summary, as shown in **table 9-36**, actions to manage visitor use and facilities would result in the loss of 34.57 acres of vegetation primarily located near previously developed areas, resulting in long-term, local, minor, adverse impacts to these communities. Actions to manage visitor use and facilities would result in the permanent loss of 2.67 acres of potentially jurisdictional wetlands.

TABLE 9-36: SUMMARY OF VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES IN SEGMENT 2 – ALTERNATIVE 4

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.31	<0.1%
Lower Montane Coniferous	33.37	0.5%
Lower Montane Broadleaf	0.89	<0.1%
Redevelopment[b]	19.84	N/A
Wetland	2.67	0.4%5

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Segment 2 Impact Summary: Actions to protect and enhance river values within Segment 2 under Alternative 4 would result in the restoration of 194 acres of vegetation and 44.52 acres of wetland, resulting in long-term, segmentwide, major, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in the loss of 34.57 acres of vegetation primarily located near previously developed areas, resulting in long-term, local, minor to moderate, adverse impacts to these communities. Actions to manage visitor use and facilities would result in the permanent loss of 2.67 acres of potentially jurisdictional wetlands.

Segments 3 and 4: Merced Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

Currently, vehicles park under the dripline of the 38 valley oak trees. This practice compacts soil under the trees, affecting root health, water uptake, and soil aeration. Additionally, existing development and trampling in the vicinity limit the area where oak seedlings can be recruited. Under Alternative 4, valley oaks in El Portal would be enhanced by creating an oak recruitment area of one acre in Old El Portal in the vicinity of the current bulk fuel storage area, including the adjacent parking lots. Parking and new building construction within the oak recruitment area would be prohibited. Nonnative fill would be removed and soils decompacted. Appropriate native understory plant species would be planted. The fuel storage area would be relocated outside of the river corridor. Overall, these actions would result in local, long-term, moderate, beneficial impacts on valley oaks in El Portal.

The types of habitat that would be affected by these restoration actions in Segment 4, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-37** and **9-38**. A total of 12 acres of vegetation would be enhanced or restored in Segment 4, including 0.05 acres of wetlands (this includes restoration actions common to Alternatives 2-6).

TABLE 9-37: SEGMENT 4 VEGETATION RESTORATION UNDER ALTERNATIVE 4[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Valley oak woodland alliance	1	Foothill broadleaf woodland	1	Valley oak woodland	1
Sparsely vegetated riverine flat	2	Sparsely vegetated	2	Riparian & floodplain: cottonwood, willow, mix of upland deciduous & coniferous forest	11
canyon live oak-(Ponderosa pine-incense cedar) forest superassociation	9	Lower montane broadleaf	9		
Total	**12**		**12**		**12**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

TABLE 9-38: SEGMENT 4 WETLAND RESTORATION UNDER ALTERNATIVE 4

Wetland Type	Acres
Segment 4	
Palustrine Emergent	0.001
Palustrine Forested	0.05
Total amount of wetlands restored	**0.05**
SOURCE: NPS 2012c	

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Under Alternative 4, day parking would be expanded by 200 parking spaces at the Abbieville site; this area would be used primarily for visitor access to Yosemite Valley. NPS employee housing would be added to Abbieville, El Portal Village Center, and Rancheria Flat; a total of 292 employee parking spaces would be added at these locations. While all new units would be built outside of the 100-year floodplain, they would fall within the Merced River corridor. This increase in capacity in El Portal is a function of the decrease in employee housing capacity in Yosemite Valley (Segment 2). The addition of employee housing and park facilities development would increase the total built environment within Segment 4.

Relocation of facilities to other locations within the corridor could have long-term, negligible to moderate, adverse effects on vegetation, depending on site-specific conditions and project design. Local, minor to moderate, short-term, adverse effects could occur from construction and demolition of facilities along the Merced River. Vegetation that is removed under Alternatives 2–6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities at El Portal, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce

short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor, adverse impacts on plant communities in El Portal.

Segments 3 and 4 Impact Summary: Actions to protect and enhance river values within Segments 3 and 4 would result in the restoration of 12 acres of vegetation and 0.05 acres of wetland, resulting in long-term, local, moderate, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in short-term, local, minor, adverse impacts to vegetation and wetlands.

Segments 5, 6, 7, and 8: South Fork Merced River

Impacts of Actions to Protect and Enhance River Values

The Wawona Golf Course would not be removed under Alternative 4, and therefore effects related to its continued operation would be the same as described for Alternative 1. Actions specifically targeted to protect culturally sensitive areas would also benefit vegetation and wetlands, including the relocation or removal of select campsites and stock campground sites that are within the 100-year floodplain or culturally sensitive areas. The removal of select campsites within the floodplain would result in a local, long-term, minor, beneficial impact on riparian vegetation.

The types of habitat that would be affected by these restoration actions in Segment 7, as well as the types of habitat that would be enhanced or restored, are summarized in **table 9-39**. A total of seven acres of vegetation would be restored in Segment 7 (this includes restoration actions common to Alternatives 2-6).

TABLE 9-39: SEGMENT 7 VEGETATION RESTORATION UNDER ALTERNATIVE 4[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Ponderosa pine woodland alliance	1	Lower montane needleleaf	7	Riparian: cottonwood, willow, mix of upland deciduous & coniferous forest	7
Ponderosa pine-incense cedar forest alliance	5				
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	1				
Total	**7**		**7**		**7**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 7 under Alternative 4 include the relocation of stock use campsites from sensitive resource areas to Wawona Stables. Overall, this action would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Under Alternative 4, the operations of the Wawona stables would be eliminated and two stock campsites would be relocated to this area from the current Wawona stock camp. The area would be restored. Soils would be decompacted and the area would be replanted with riparian vegetation. This would reduce visitor use in this area, resulting in a decrease of vegetation trampling. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Wawona Campground. Facilities actions at the Wawona Campground would involve removal of 27 sites that are either within the 100-year floodplain or in culturally sensitive areas. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Segments 5, 6, 7 and 8 Impact Summary: Actions to protect and enhance river values within Segments 5, 6, 7 and 8 under Alternative 3 would result in the restoration of seven acres of vegetation, resulting in long-term, segmentwide, minor, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in long-term, local, minor, beneficial impacts to vegetation and wetlands.

Summary of Impacts from Alternative 4: Resource-based Visitor Experiences and Targeted Riverbank Restoration

Alternative 4 would restore approximately 223 acres of vegetation, including 44.57 acres of wetlands, as a result of actions common to Alternatives 2-6 and those specific to Alternative 4. Actions to manage visitor use and facilities would result in the loss of approximately 34.57 acres of vegetation and the permanent loss of 2.67 acres of potentially jurisdictional wetlands as a result of actions specific to Alternative 4.

Past development and human activity in the Merced River corridor have in some cases adversely affected vegetation communities and regional vegetation patterns. Actions associated with Alternative 4 are expected to have corridorwide, long-term, moderate, beneficial impacts on vegetation in the Merced River corridor. Restoration actions associated with Alternative 4 would restore meadow and riparian areas, improve and restore hydrologic function and restore ecological integrity throughout the corridor, remove and restore informal trails, and direct the public onto established trails and river access points. This is part of a comprehensive strategy to reduce existing adverse impacts on meadow, wetland, and riparian vegetation. Existing natural resource management actions, such as removal of nonnative invasive plants, would continue. Adverse effects from these actions would be local, short-term, and minor or negligible. There would be local, long-term, moderate, adverse impacts on native vegetation communities from construction of some facilities. Notable actions the park would implement under Alternative 4 include

- restricting recreational use of rivers and riverbanks to reduce riverbank erosion
- removing, restoring, relocating, or repurposing park facilities to efficiently utilize park facilities and reduce the built environment within the park; some facilities would be built to accommodate visitors or employees

- managing total visitors to the park and visitor demands for day parking space, lodging, and camping space
- removing facilities within 150 feet of the Merced River and restoring riverbanks, meadows, and riparian habitat
- enhancing meadow, riparian, and river hydrologic function, complexity, and connectivity
- improving the free flow, complexity, and water quality of the Merced River

Generally, Alternative 4 is focused on intensive restoration of meadow, riparian, and riverbank habitats in Yosemite Valley (Segment 2); removing many facilities that are located within 150 feet of the river and are jeopardized by flood; repurposing park facilities to improve efficiency of use; adding additional campground facilities; and providing adequate lodging, camping, and parking space for visitors and employees. Adverse effects from these actions would be associated with the active construction or restoration phase, and would be local, short-term, and minor or negligible. However, there would be local, long-term, moderate, adverse impacts on vegetation communities from construction of some facilities. These effects would be most pronounced in areas of high human use, such as Yosemite Valley and Wawona (Segments 2 and 7). When combined, the long-term effect of all of these measures would be a corridorwide, moderate, beneficial impact on vegetation communities as habitats are restored and fragmentation and edge effects reduced.

Cumulative Impacts from Alternative 4: Resource-based Visitor Experiences and Targeted Riverbank Restoration

The past, present, and reasonably foreseeable plans and projects that could have a cumulative impact on vegetation resources are the same as those listed under the No Action Alternative. Alternative 4 would result in segmentwide, long-term, minor to moderate, beneficial impacts on vegetation communities within the Merced River corridor. These actions are focused on restoring and improving aquatic, meadow, and riparian habitat quality within the Merced River corridor. The past, present, and future actions in the region would have varying effects on vegetation and wetlands, with some projects restoring or enhancing vegetation and wetlands, and many others resulting in the loss or decline of vegetation and wetlands. For projects that would result in the loss of wetland features regulated under section 404 of the CWA, losses would be typically compensated at a ratio of 1:1 (no net loss). Compensation typically occurs through creation or enhancement of wetlands either on-site or at a designated mitigation bank. However, even with these protections in place, wetlands may be lost over time through unregulated activities or negatively impacted through nonpoint source pollution, nonnative species, and changes in surface and subsurface hydrology over time.

The actions under Alternative 4 would have long-term, beneficial effects on vegetation and wetlands, including vegetation-related ORVs, within the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region (e.g., introduction and spread of nonnative species, direct displacement of vegetation by structures), the actions under Alternative 4 would have a minimal beneficial effect. Overall, cumulative actions on vegetation and wetlands would result in long-term, minor, adverse effects on regional vegetation patterns.

Environmental Consequences of Alternative 5: Enhanced Visitor Experiences and Essential Riverbank Restoration

Segment 1: Merced River above Nevada Fall

Impacts of Actions to Protect and Enhance River Values

Under Alternative 5, grazing in Merced Lake East Meadow would be managed as described for Alternatives 3. Beneficial effects to vegetation would be the same as described for Alternative 3.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Several actions related to management of visitor use and facilities would have the potential to affect vegetation and wetlands in Segment1 under Alternative 5. Visitation within Segment 1 would not be expected to change appreciably under Alternative 5; wilderness access quotas would remain as under Alternative 1 (No Action) and modifications to overnight accommodations would be nominal. Under Alternative 5, the Merced Lake High Sierra Camp would remain in operation and continue to host overnight guests and through-hikers during the summer months. However, the camp's 60 beds would be reduced to 42 (11 units). The park would not reduce the total number of designated campsites within the Merced River corridor's wilderness. Designated camping at Moraine Dome and Little Yosemite Valley Backpackers Campground would continue with overnight quotas of 150 people per day in Little Yosemite Valley. The Merced Lake Backpackers Campground would remain. Overall, these actions would result in a local, long-term, negligible, beneficial impact on plant communities and wetlands in Segment 1.

Merced Lake High Sierra Camp. The project-level actions in the Merced Lake High Sierra Camp area proposed under Alternative 5 involve retention of the Merced Lake High Sierra Camp, reducing the capacity to 42 beds, and replacing the flush toilets with composting toilets. These actions would result in a local, long-term, negligible, beneficial impact on plant communities and wetlands in Segment 1.by reducing impacts on vegetation communities from visitor use and presence of infrastructure.

Segment 1 Impact Summary: Actions to manage visitor use and facilities within Segment 1 under Alternative 5 would have local, long-term, negligible, beneficial impacts on plant communities and wetlands in the river corridor.

Segment 2: Yosemite Valley

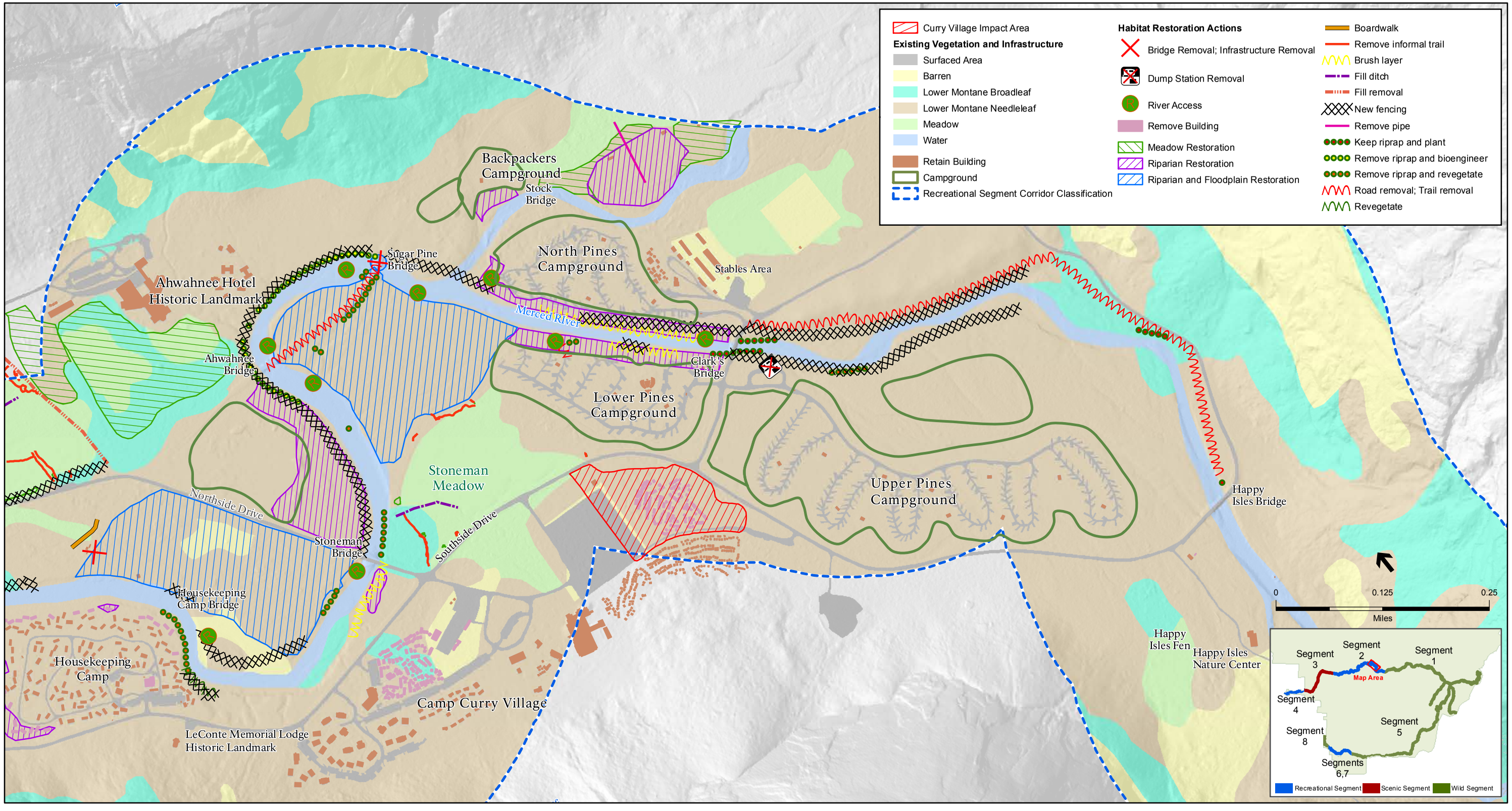
Impacts of Actions to Protect and Enhance River Values

Projects proposed in Segment 2 under Alternative 5 to protect and enhance river values involve constructing a boardwalk for the Valley Loop Trail through sensitive wet meadow habitat in Slaughterhouse Meadow; restoration of 10.9 acres of riparian habitat at the former Yosemite Lodge units and cabins; and moving 780 feet of the Valley Loop Trail out of Bridalveil Meadow. Habitat restoration actions in Segment 2 under Alternative 5 are displayed in **figures 9-29** through **9-32**. The types of habitat that would be affected by these restoration actions in Segment 2, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-40** and **9-41**. A total of

TABLE 9-40: SEGMENT 2 VEGETATION RESTORATION UNDER ALTERNATIVE 5[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Intermittently to seasonally flooded meadow	13	Meadow	16	Meadow	18
Semi-permanently to permanently flooded meadow	3				
Sparsely vegetated undifferentiated	2	Sparsely vegetated	2		
Black cottonwood temporarily flooded forest alliance	1	Lower montane broadleaf	15	Lower montane broadleaf	15
California black oak forest alliance	6				
California black oak /(bracken fern) forest mapping unit	8				
Douglas-fir-(White fir-incense cedar-Pondera pine) forest mapping unit	1	Lower montane needleleaf	65	A mosaic of meadow, black oak, and open canopy coniferous forest	65
Ponderosa pine woodland alliance	1				
Ponderosa pine-incense cedar forest alliance	20				
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	43				
Black cottonwood temporarily flooded forest alliance	1	Lower montane broadleaf	1	Riparian & floodplain: cottonwood, willow, mix of upland deciduous & coniferous forest	44
Ponderosa pine-incense cedar forest alliance	19	Lower montane needleleaf	41		
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	22				
Urban/Developed	2	Barren	2		
Urban/Developed	4	Barren	4	Riparian: cottonwood, willow, mix of upland deciduous & coniferous forest	40
Ponderosa pine-incense cedar forest alliance	22	Lower montane needleleaf	36		
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	14				
Total	**182**		**182**		**182**

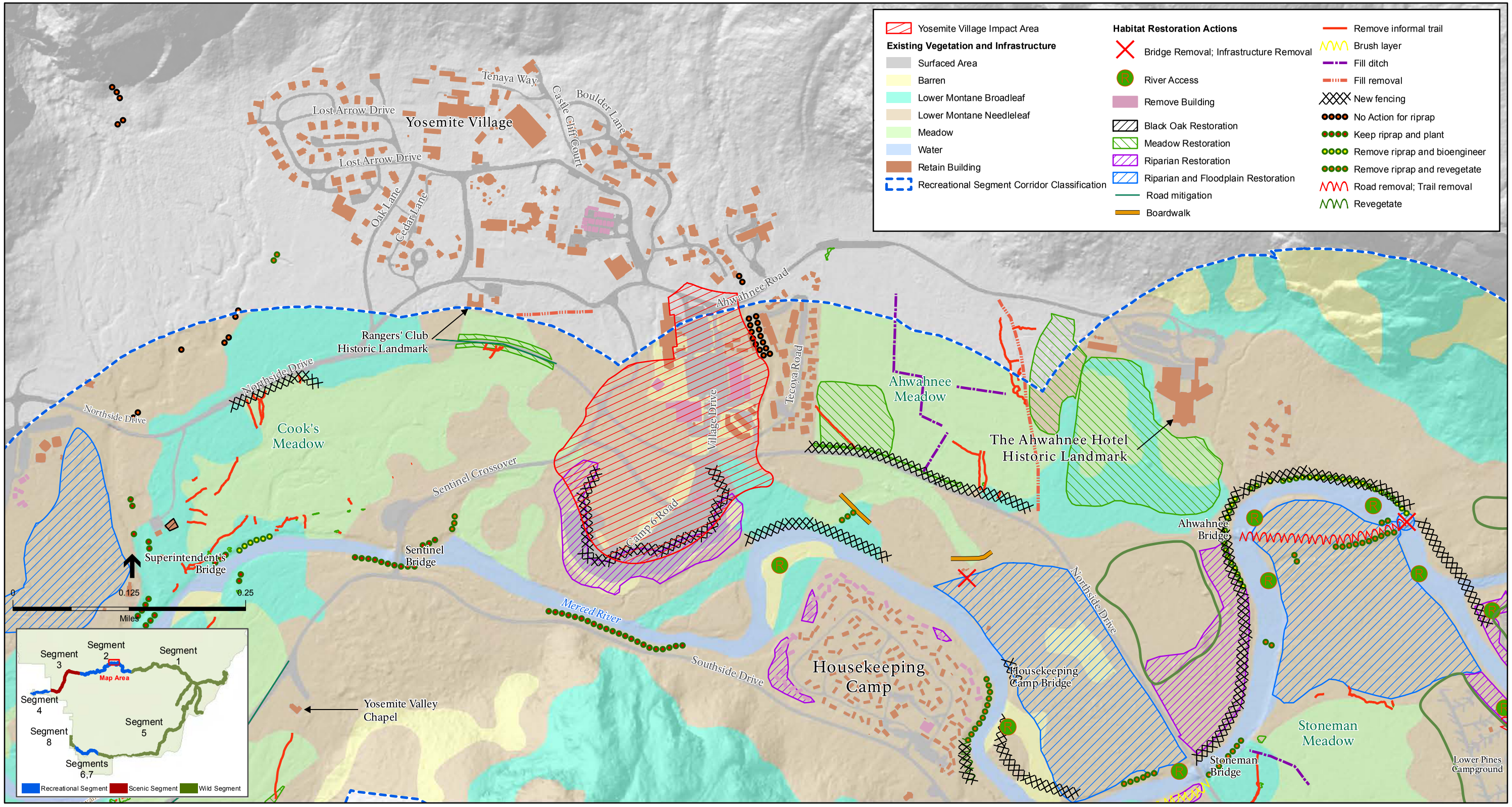
[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.



SOURCE: NPS, 1997, 2011, 2012

Figure 9-29

Curry Village Area: Alternative 5 Habitat Restoration Actions and Select Facilities Actions



SOURCE: NPS, 1997, 2011, 2012

Figure 9-30

Yosemite Village Area: Alternative 5 Habitat Restoration Actions and Select Facilities Actions

Yosemite Lodge & Camp 4 Impact Area

Existing Vegetation and Infrastructure

- Surfaced Area
- Barren
- Lower Montane Broadleaf
- Lower Montane Needleleaf
- Meadow
- Water
- Retain Building
- Campground
- Recreational Segment Corridor Classification

Habitat Restoration Actions

- River Access
- Remove Building
- Black Oak Restoration
- Meadow Restoration
- Riparian Restoration
- Riparian and Floodplain Restoration
- Road mitigation
- Boardwalk
- Remove informal trail
- New fencing
- No Action for riprap
- Keep riprap and plant
- Remove riprap and bioengineer
- Remove riprap and revegetate

Lower Yosemite Fall Picnic Area
Yosemite Creek Bridge
Cook's Meadow
Yosemite Lodge
Superintendent's Bridge
Sentinel Bridge
Yosemite Lodge Road
Camp 4 Historic Site
Northside Drive
Wahhoga
Sentinel Meadow
Yosemite Valley Chapel
Leidig Meadow
Swinging Bridge
Swinging Bridge Picnic Area
Southside Drive
Merced River
Sentinel Beach

0 0.125 0.25
Miles

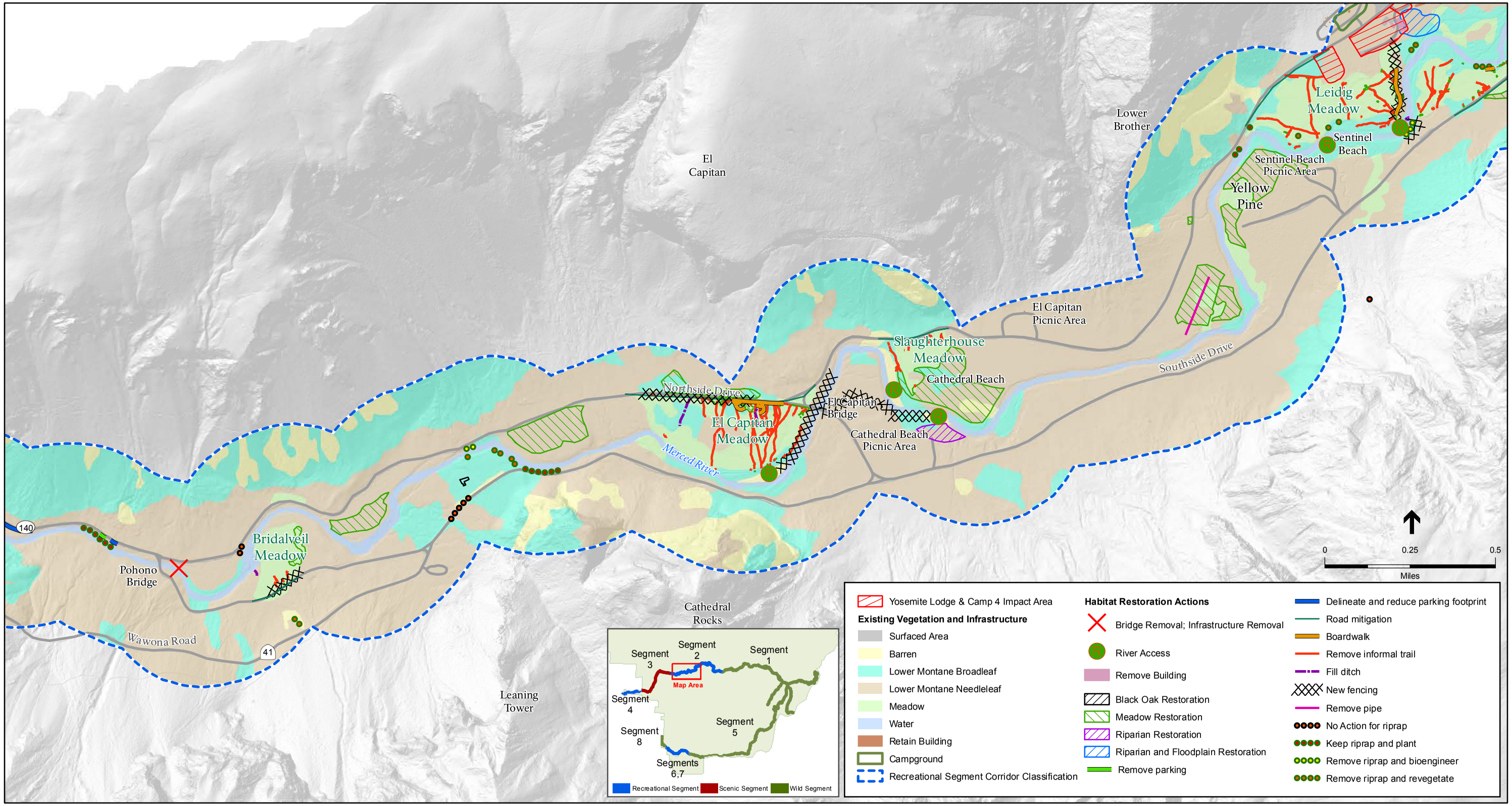
Segment 1
Segment 2
Segment 3
Segment 4
Segment 5
Segment 8
Segments 6,7
Map Area

Recreational Segment
Scenic Segment
Wild Segment

SOURCE: NPS, 1997, 2011, 2012

Figure 9-31

Yosemite Lodge Area: Alternative 5 Habitat Restoration Actions and Select Facilities Actions



SOURCE: NPS, 1997, 2011, 2012

Figure 9-32

West Yosemite Valley: Alternatives 5 Habitat Restoration Actions and Select Facilities Actions

TABLE 9-41: SEGMENT 2 WETLAND RESTORATION UNDER ALTERNATIVE 5

Wetland Type	Acres
Segment 2	
Palustrine Emergent	16.93
Palustrine Forested	22.30
Palustrine Scrub Shrub	1.14
Total amount of wetlands restored	**40.37**
SOURCE: NPS 2012c	

182 acres of vegetation would be restored in Segment 2, including 40.37 acres of wetlands (this includes restoration actions common to Alternatives 2-6).

These restoration management actions would improve the hydrologic function and restore the ecological integrity of plant communities and wetlands in the Merced River corridor in Segment 2, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. Removing abandoned underground infrastructure, restoring informal trails, removing conifers from meadows, directing visitor use, removing riprap, and restoring free-flowing conditions along the river corridor would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

Biological Resource Actions.

***Yosemite Valley Campgrounds*:** Specific restoration actions under Alternative 5 to enhance the river's biological values in Segment 2 include removing all campsites within 100 feet of the bed and banks of the Merced River and restoring 6.5 acres of floodplain/riparian habitat, and designating river access at the North Pines Campground. Restoration of riparian habitat throughout Yosemite Valley would result in segmentwide, long-term, minor to moderate, beneficial impacts to vegetation and wetlands.

***El Capitan Meadow*:** In addition to actions common to Alternatives 2-6 and similar to Alternative 4, Alternative 5 would install restoration fencing along the northern perimeter of El Capitan Meadow to designate appropriate meadow access points along boardwalks and viewing platforms. Alternative 5 would remove all informal trails in sensitive and frequently inundated areas and in areas that trails incise meadow and promote habitat fragmentation. Restoration of El Capitan Meadow and rerouting or removal of informal trails would result in local, long-term, minor to moderate, beneficial impacts on vegetation and wetlands from reduction of trampling from foot traffic that causes habitat fragmentation.

***Ahwahnee Meadow*:** Similar to Alternative 4, specific actions under Alternative 5 in Segment 2 to enhance the river's biological values at the Ahwahnee Meadow include: removing fill in sections of trails that passes through meadow and wetland habitats and replace the trails with boardwalk. Unlike Alternatives 2 and 3, Northside Drive and the adjacent bike path would remain under Alternative 5. Hydrological connectivity between both sides of Northside Drive would be enhanced by increasing the number of culverts. Trail improvement and meadow restoration would result in local, long-term,

minor to moderate, beneficial impacts on vegetation and wetlands at the Ahwahnee Meadow as wetland fragmentation and vegetation trampling is reduced, and wetland connectivity to the river is enhanced.

***Stoneman Meadow*:** Specific actions in Alternative 5 to enhance the biological values of the Merced River include enhancing Stoneman Meadow by redesigning the Orchard Parking Lot to promote water flows and restore drainage from the cliff walls to the meadow. Improving hydrological connectivity between the Orchard Parking Lot cliff walls and Stoneman Meadow would result in local, long-term, minor, beneficial impacts on vegetation and wetlands.

***Former Upper and Lower Rivers Campgrounds*:** Specific actions to enhance biological values of the Merced River at the Former Upper and Lower Rivers Campgrounds under Alternative 5 include restoring 35.6 acres of riparian and floodplain habitat at Lower Rivers Campground. While this area is largely undeveloped, Alternative 5 would remove remaining asphalt, decompact soils of former roads and campsites and re-establish former river cut-off channels that have been filled within the restoration area. Large box culverts would be placed under the road to allow water flow, and the riparian zone at former Upper River would be fenced and closed to protect the riverbank from trampling associated with the addition of walk-in campgrounds. Restoration taking place in the Former Upper and Lower Rivers Campground area would result in local, long-term, minor, beneficial impacts on vegetation and wetlands.

These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 2 and associated plant communities and wetlands, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. These actions would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternative 5 include: relocating unimproved Camp 6 parking; removing the Sugar Pine Bridge; placing large wood and constructed logjams along the base of Stoneman Bridge; and improving trail connectivity and routing in the vicinity of the Ahwahnee Bridge. These actions would result in enhanced channel free flow, increased channel complexity, increased streambank stability, and restored riparian habitat segmentwide. Overall these measures would improve the free-flowing condition of the river and restore the ecological integrity of Yosemite Valley riparian habitats, resulting in segmentwide, long-term, moderate beneficial impacts on plant communities and wetlands in Segment 2.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Actions to manage visitor use and facilities under Alternative 5, specifically those concerning vehicle access and overnight accommodations, would result in a 5% decrease in daily Yosemite Valley visitation, from approximately 20,900 under Alternative 1 to 19,900. Day use visitation would decrease by 14%. However, due largely to increases in lodging and campground facilities, overnight visitation would increase by about 16%). Under Alternative 5, there would be a net increase in Yosemite Valley lodging

units. This would largely result from the increase in units at Curry Village and removal of units from Housekeeping Camp. The park would increase the total number of campsites within the Valley.

Relocation of facilities to other locations within the corridor could have long-term, negligible to moderate, adverse effects on vegetation, depending on site-specific conditions and project design. Local, minor to moderate, short-term, adverse effects could occur from construction and demolition of facilities along the Merced River. Vegetation that is removed under Alternative 5 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities at Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor to moderate, adverse impacts on plant communities in Yosemite Valley.

Former Upper River Campground Area. Construction of new walk-in campgrounds and picnic area in undeveloped areas at the former Upper River Campground would preclude the ecological restoration of the former riparian/wetland/California black oak complex in the area. Fencing along the riverbank would mitigate potential additional trampling damage to riparian areas. Construction activities at Upper River Campground would result in direct, temporary and permanent losses of native vegetation as well as the redevelopment of existing developed areas. Outside of previously developed areas, impacts to vegetation would occur in lower montane coniferous forest. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation).Losses of vegetation communities, while long-term, would be local, adverse and moderate.

Curry Village & Campgrounds. Actions under Alternative 5 in Segment 2 related to managing visitor use and facilities at Curry Village include the reorganization of Curry Village including the construction of 98 hard-sided units. The units would be constructed within previously developed areas as well as within habitats adjacent to the existing Curry Village site.

Construction activities at Curry Village would result in direct, temporary and permanent losses of native vegetation and wetlands (see **table 9-42**) as well as the redevelopment of existing developed areas. Outside of previously developed areas, impacts to vegetation would occur in lower montane coniferous forest and, to a much lesser extern, meadow. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-42 below, only a small percentage of these vegetation communities would be affected by the facility actions at Curry Village. Impacts to meadow habitat would occur in a small meadow area currently disconnected from the larger Stoneman Meadow to the north by Happy Isle Loop Road. In addition, vegetation communities at Curry Village are adjacent to already developed areas, and therefore currently experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

TABLE 9-42: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT CURRY VILLAGE & CAMPGROUNDS – ALTERNATIVE 5

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment [a]
Segment 2		
Meadow	0.03	<0.1%
Lower Montane Coniferous	6.35	<0.1%
Redevelopment[b]	1.97	N/A
Wetland (Palustrine Emergent)	0.04	<0.1%
Wetland (Riverine Intermittent)	0.02	<0.1%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Direct impacts to vegetation, including trampling or removal of rooted vegetation, would cause a reduction of total numbers of plants and/or a reduction or loss of total area, diversity, vigor, structure, or function of vegetative habitat. Direct impacts could also include decrease plant vigor or health from reduced water availability or dust accumulation on photosynthetic surfaces.

Vegetation that is removed at Curry Village under Alternative 5 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Construction activities at Curry Village would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands associated with Stoneman Meadow and intermittent channels flowing through the area. Approximately 0.06 acres of potentially jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 5. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

Camp 6 and Yosemite Village. Actions under Alternative 5 in Segment 2 related to managing visitor use and facilities at Camp 6 and Yosemite Village include measures to formalize and relocate parking facilities 150 feet away from the river in order to facilitate riparian restoration goals. The Camp 6/Village Center Parking Area would be formalized to include 850 designated parking spaces by redeveloping part of the current administrative footprint. In addition, 100 parking spaces would be added at Yosemite Village. Northside Drive would be re-routed to the south of the Yosemite Village day-use parking area. A pedestrian underpass and a roundabout at the Village Drive/Northside Drive (Camp 6) intersection would be constructed to address traffic congestion and pedestrian/vehicle conflicts. A three-way intersection at Sentinel Drive and the entrance to the parking area would be added to improve traffic flow and alleviate congestion at nearby intersections. Expanded parking area and new road construction activities at Yosemite Village would result in direct temporary and permanent losses of native vegetation and wetlands as well as the redevelopment of existing disturbed areas (see **table 9-43**).

TABLE 9-43: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT CAMP 6 AND YOSEMITE VILLAGE – ALTERNATIVE 5

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.28	<0.1%
Lower Montane Coniferous	12.22	0.2%
Lower Montane Broadleaf	0.81	<0.1%
Redevelopment[b]	14.18	N/A
Wetland (Palustrine Emergent)	1.21	0.4%
Wetland (Palustrine Forested)	0.96	0.8%
Wetland (Riverine Intermittent)	0.39	0.3%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

As noted in table 9-43, over half of the area affected by the above actions would occur at sites that are already developed. Outside of previously developed areas, impacts to vegetation would occur almost entirely in lower montane broadleaf forest and lower montane coniferous forest; these types are among the most dominant native vegetation communities in Segment 2. Impacts to meadow habitat would occur in an area currently impacted by its proximity to Sentinel Drive. Losses to these communities would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-43, only a small percentage of these vegetation communities would be impacted by the actions at Camp 6 and Yosemite Village. In addition, potentially affected vegetation communities are adjacent to already developed areas, and therefore experience high levels of visitation and human-related impacts such as vegetation trampling

and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

Vegetation that would be removed at Camp 6 and Yosemite Village under Alternative 5 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Parking areas and new road construction activities at Camp 6 and Yosemite Village would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands located adjacent to the Northside Drive and Sentinel Crossover intersection, palustrine forested wetlands associated with the Merced River, and intermittent channels flowing through the area. Approximately 2.56 acres of potential jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 5. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, moderate and adverse.

Yosemite Lodge and Camp 4. Actions under Alternative 5 in Segment 2 related to managing visitor use and facilities at Yosemite Lodge and Camp 4 include: the removal of old and temporary housing at Highland Court and the Thousands Cabins; the construction of two new concessioner housing areas and the construction of 78 employee parking spaces; redevelopment west of Yosemite Lodge to provide an additional 300 day use parking spaces and area for 15 tour buses; relocation of existing tour bus drop off area to Highland Court to provide 3 bus loading/unloading spaces; and the construction of a pedestrian underpass to alleviate pedestrian/vehicle conflicts.

Like other proposed projects, construction activities at Yosemite Lodge would result in direct temporary and permanent losses of native vegetation and wetlands as well as the redevelopment of existing disturbed areas (see **table 9-44**). Impacts to vegetation would occur in lower montane coniferous forest, the dominant natural vegetation community in Segment 2, and to a much lesser extent in lower montane broadleaf forest. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-44, only a small percentage of these vegetation communities would be impacted. In addition, potentially affected vegetation is adjacent to already developed areas, and therefore experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

TABLE 9-44: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT YOSEMITE LODGE AND CAMP 4 – ALTERNATIVE 5

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Lower Montane Coniferous	15.47	0.2%
Lower Montane Broadleaf	1.73	<0.1%
Redevelopment[b]	3.69	N/A
Wetland (Palustrine Emergent)	0.01	<0.1%
Wetland (Riverine Intermittent)	0.03	<0.1%
Wetland (Riverine Perennial)	0.01	<0.1%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Like other development actions proposed under this alternative, vegetation that would be removed at Yosemite Lodge under Alternative 5 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Construction activities at Yosemite Lodge and Camp 4 would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands and along the Merced River and in intermittent channels flowing through the area. Approximately 0.05 acres of potentially jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 5. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

In summary, as shown in **table 9-45**, actions to manage visitor use and facilities would result in the loss of 36.89 acres of vegetation primarily located near previously developed areas, resulting in long-term, local, minor, adverse impacts to these communities. Actions to manage visitor use and facilities would result in the permanent loss of 2.67 acres of potentially jurisdictional wetlands.

TABLE 9-45: SUMMARY OF VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES IN SEGMENT 2 – ALTERNATIVE 5

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.31	<0.1%
Lower Montane Coniferous	34.04	0.5%
Lower Montane Broadleaf	2.54	<0.1%
Redevelopment[b]	19.84	N/A
Wetland	2.67	0.5%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Segment 2 Impact Summary: Actions to protect and enhance river values within Segment 2 under Alternative 5 would result in the restoration of 182 acres of vegetation and 40.37 acres of wetland, resulting in long-term, segmentwide, major, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in the loss of 36.89 acres of vegetation primarily located near previously developed areas, resulting in long-term, local, minor to moderate, adverse impacts to these communities. Actions to manage visitor use and facilities would result in the permanent loss of 2.67 acres of potentially jurisdictional wetlands.

Segments 3 and 4: Merced Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

Currently, vehicles park under the dripline of the 38 valley oak trees. This practice compacts soil under the trees, affecting root health, water uptake, and soil aeration. Additionally, existing development and trampling in the vicinity limits the area where oak seedlings can be recruited. Under Alternative 5, valley oaks in El Portal would be enhanced by creating an oak recruitment area of one acre in Old El Portal in the vicinity of the current bulk fuel storage area, including the adjacent parking lots. Parking and new building construction within the oak recruitment area would be prohibited. Nonnative fill would be removed and soils decompacted. Appropriate native understory plant species would be planted. The fuel storage area would be relocated outside of the river corridor. Overall, these actions would result in local, long-term, moderate, beneficial impacts on valley oaks in El Portal.

The types of habitat that would be affected by these restoration actions in Segment 4, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-46** and **9-47**. A total of 12 acres of vegetation would be enhanced or restored in Segment 4, including 0.05 acre of wetland (this includes restoration actions common to Alternatives 2-6).

TABLE 9-46: SEGMENT 4 VEGETATION RESTORATION UNDER ALTERNATIVE 5[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Valley oak woodland alliance	1	Foothill broadleaf woodland	1	Valley oak woodland	1
canyon live oak-(Ponderosa pine-incense cedar) forest superassociation	11	Lower montane broadleaf	11	Riparian & floodplain	11
Total	**12**		**12**		**12**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

TABLE 9-47: SEGMENT 4 WETLAND RESTORATION UNDER ALTERNATIVE 5

Wetland Type	Acres
Segment 4	
Palustrine Emergent	0.001
Palustrine Forested	0.05
Total amount of wetlands restored	**0.05**
SOURCE: NPS 2012c	

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Under Alternative 5, day parking would be expanded by 200 parking spaces at the Abbieville site; this area would be used primarily for visitor access to Yosemite Valley. NPS employee housing would be added to Abbieville, El Portal Village Center, and Rancheria Flat; a total of 292 employee parking spaces would be added at these locations. While all new units would be built outside of the 100-year floodplain, they would fall within the river corridor. This increase in capacity in El Portal is a function of the decrease in employee housing capacity in the Valley (Segment 2). The addition of employee housing and park facilities development would increase the total built environment within Segment 4.

Relocation of facilities to other locations within the corridor could have long-term, negligible to moderate, adverse effects on vegetation, depending on site-specific conditions and project design. Local, minor to moderate, short-term, adverse effects could occur from construction and demolition of facilities along the Merced River. Vegetation that is removed under Alternatives 2–6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities at El Portal, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor, adverse impacts on plant communities in El Portal.

Segments 3 and 4 Impact Summary: Actions to protect and enhance river values within Segments 3 and 4 would result in the restoration of 12 acres of vegetation and 0.05 acres of wetland, resulting in long-term, local, moderate, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in short-term, local, minor, adverse impacts to vegetation and wetlands.

Segments 5, 6, 7, and 8: South Fork Merced River

Impacts of Actions to Protect and Enhance River Values

The Wawona Golf Course would not be removed under Alternative 5, and therefore effects related to its continued operation would be the same as described for Alternative 1. Actions specifically targeted to protect culturally sensitive areas would also benefit vegetation and wetlands, including the relocation or removal of select campsites and stock campground sites that are within the 100-year floodplain or culturally sensitive areas. The removal of select campsites within the floodplain would result in a local, long-term, minor, beneficial impact on riparian vegetation.

The types of habitat that would be affected by these restoration actions in Segment 7, as well as the types of habitat that would be enhanced or restored, are summarized in **table 9-48.** A total of three acres of vegetation would be restored in Segment 7 (this includes restoration actions common to Alternatives 2-6).

TABLE 9-48: SEGMENT 7 VEGETATION RESTORATION UNDER ALTERNATIVE 5[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Ponderosa pine woodland alliance	1	Lower montane needleleaf	3	Riparian: cottonwood, willow, mix of upland deciduous & coniferous forest	3
Ponderosa pine-incense cedar forest alliance	2				
Total	**3**		**3**		**3**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 7 under Alternative 5 include the relocation of stock use campsites from sensitive resource areas to the Wawona maintenance yard. Overall, this action would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Under Alternative 5, the operations of the Wawona stables would be eliminated and two stock campsites would be relocated to this area from the current Wawona stock camp. Thirteen campsites in the Wawona Campground would be removed from within 100 feet of the Merced River or from cultural sites. The area would be restored. Soils would be decompacted and the area would be replanted with riparian vegetation. This would reduce visitor use in this area, resulting in a decrease of

vegetation trampling. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Wawona Campground. Facilities actions at the Wawona Campground would involve removal of 13 sites that are either within the 100-year floodplain or in culturally sensitive areas. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Segments 5, 6, 7 and 8 Impact Summary: Actions to protect and enhance river values within Segments 5, 6, 7 and 8 under Alternative 5 would result in the restoration of three acres of vegetation, resulting in long-term, segmentwide, minor, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in long-term, local, minor, beneficial impacts to vegetation and wetlands.

Summary of Impacts from Alternative 5: Enhanced Visitor Experiences and Essential Riverbank Restoration

Alternative 5 would restore approximately 197 acres of vegetation, including 40.52 acres of wetlands, as a result of actions common to Alternatives 2-6 in conjunction with actions specific to Alternative 5. Actions to manage visitor use and facilities would result in the loss of approximately 36.89 acres of vegetation and the permanent loss of 2.67 acres of potentially jurisdictional wetlands as a result of actions specific to Alternative 5.

Past development and human activity in the Merced River corridor have in some cases adversely affected vegetation communities and regional vegetation patterns. Actions associated with Alternative 5 are expected to have corridorwide, long-term, moderate, beneficial impacts on vegetation in the Merced River corridor. Restoration actions associated with Alternative 5 would restore meadow and riparian areas, improve and restore hydrologic function and restore ecological integrity throughout the corridor, remove and restore informal trails, and direct the public onto established trails and river access points. This is part of a comprehensive strategy to reduce existing adverse impacts on meadow, wetland, and riparian vegetation. Existing natural resource management actions, such as removal of nonnative invasive plants, would continue. Adverse effects from these actions would be local, short-term, and minor or negligible. There would be local, long-term, moderate, adverse impacts on native vegetation communities from construction of some facilities. Notable actions the park would implement under Alternative 5 include

- restricting recreational use of rivers and riverbanks to reduce riverbank erosion
- removing, restoring, relocating, or repurposing park facilities to efficiently utilize park facilities and reduce the built environment within the park; some facilities would be built to accommodate visitors or employees
- managing total visitors to the park and visitor demands for day parking space, lodging, and camping space
- removing facilities within 100 feet of the Merced River and restoring riverbanks, meadows, and riparian habitat

- enhancing meadow, riparian, and river hydrologic function, complexity, and connectivity
- improving the free flow, complexity, and water quality of the Merced River

Generally, Alternative 5 focuses on intensive restoration of meadow, riparian, and riverbank habitats in Yosemite Valley (Segment 2) by removing many flood-prone facilities that are located within 100 feet of the Merced River; repurposing park facilities to improve efficiency; maintaining existing use levels; and providing adequate lodging, camping, and parking space for visitors and employees. Adverse effects from these actions would be associated with active construction or ecological restoration, and would be local, short-term, and minor or negligible. However, there would be local, long-term, moderate, adverse impacts on vegetation communities from construction of some facilities. In addition, visitor use would remain consistent with current levels, and therefore vegetation would continue to be affected in some areas where use is intense (i.e., Curry Village, east Yosemite Valley). These effects would be most pronounced in areas of high human use, such as Yosemite Valley and Wawona (Segments 2 and 7).In total, the long-term effect of all of these measures would be a corridorwide, moderate, beneficial impact on vegetation communities as habitats are restored and habitat fragmentation is reduced.

Cumulative Impacts from Alternative 5: Enhanced Visitor Experiences and Essential Riverbank Restoration

The past, present, and reasonably foreseeable plans and projects that could have a cumulative impact on vegetation resources are the same as those listed under the No Action Alternative. Alternative 5 would result in segmentwide, long-term, minor to moderate, beneficial impacts on vegetation communities within the Merced River corridor. These actions focused on restoring and improving aquatic, meadow, and riparian habitat quality within the Merced River corridor. The past, present, and future actions in the region would have varying effects on vegetation and wetlands, with some projects restoring or enhancing vegetation and wetlands, and many others resulting in the loss or decline of vegetation and wetlands. For projects that would result in the loss of wetland features regulated under section 404 of the CWA, losses would be typically compensated at a ratio of 1:1 (no net loss). Compensation typically occurs through creation or enhancement of wetlands either on-site or at a designated mitigation bank. However, even with these protections in place, wetlands may be lost over time through unregulated activities or negatively impacted through nonpoint source pollution, nonnative species, and changes in surface and subsurface hydrology over time.

The actions under Alternative 5 would have long-term, beneficial effects on vegetation and wetlands, including vegetation-related ORVs, within the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region (e.g., introduction and spread of nonnative species, direct displacement of vegetation by structures), the actions under Alternative 5 would have a minimal beneficial effect. Overall, cumulative actions on vegetation and wetlands would result in long-term, minor adverse effects on regional vegetation patterns.

Environmental Consequences of Alternative 6: Diversified Visitor Experiences and Selective Riverbank Restoration

Segment 1: Merced River above Nevada Fall

Impacts of Actions to Protect and Enhance River Values

Under Alternative 6, grazing in Merced Lake East Meadow would be managed as described for Alternatives 3. Beneficial effects to vegetation would be the same as described for Alternative 3.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Several actions related to management of visitor use and facilities would have the potential to affect vegetation and wetlands in Segment 1 under Alternative 6. Visitation within Segment 1 would not be expected to change appreciably under Alternative 6; wilderness access quotas would remain as under Alternative 1 (No Action) and modifications to overnight accommodations would be nominal. Under Alternative 6, the Merced Lake High Sierra Camp would remain in operation and continue to host overnight guests and through-hikers during the summer months. The camp's 60 beds (22 units) would remain. The park would not reduce the total number of designated campsites within the Merced River corridor's wilderness.

Total daily use levels for Segment 1 under Alternative 6 are estimated at 380 overnight visitors and approximately 450 day visitors, the same as Alternative 1 (No Action). Collectively, actions to maintain similar kinds and levels of use as current levels would result in continued local, long-term, minor, adverse impacts on vegetation and wetlands within Segment 1.

Merced Lake High Sierra Camp. Actions in the Merced Lake High Sierra Camp area proposed under Alternative 6 involve retention of the Merced Lake High Sierra Camp and replacing the flush toilets with composting toilets. Actions to maintain current kinds and levels of use would continue local, long-term, minor, adverse impacts on vegetation and wetlands within Segment 1 through the effects of concentrated human use.

Segment 1 Impact Summary: Actions to manage visitor use and facilities within Segment 1 under Alternative 6 would have local, long-term, minor, adverse impacts on plant communities and wetlands in the river corridor.

Segment 2: Yosemite Valley

Impacts of Actions to Protect and Enhance River Values

Projects proposed in Segment 2 under Alternative 6 to protect and enhance river values in addition to those proposed under actions common to Alternatives 2-6 would construct a boardwalk for the Valley Loop Trail through sensitive wet meadow habitat in Slaughterhouse Meadow; and move 780 feet of the Valley Loop Trail out of Bridalveil Meadow.

Habitat restoration actions in Segment 2 under Alternative 6 are displayed in **figures 9-33** through **9-36**. The types of habitat that would be affected by these restoration actions in Segment 2, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-49** and **9-50**. A total of 156 acres of vegetation would be restored in Segment 2, including 37.32 acres of wetlands (this includes restoration actions common to Alternatives 2-6).

These restoration management actions would improve the hydrologic function and restore the ecological integrity of plant communities and wetlands in the Merced River corridor in Segment 2, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. Removing abandoned underground infrastructure, restoring informal trails, removing conifers from meadows, directing visitor use, removing riprap, and restoring free-flowing conditions along the river corridor would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

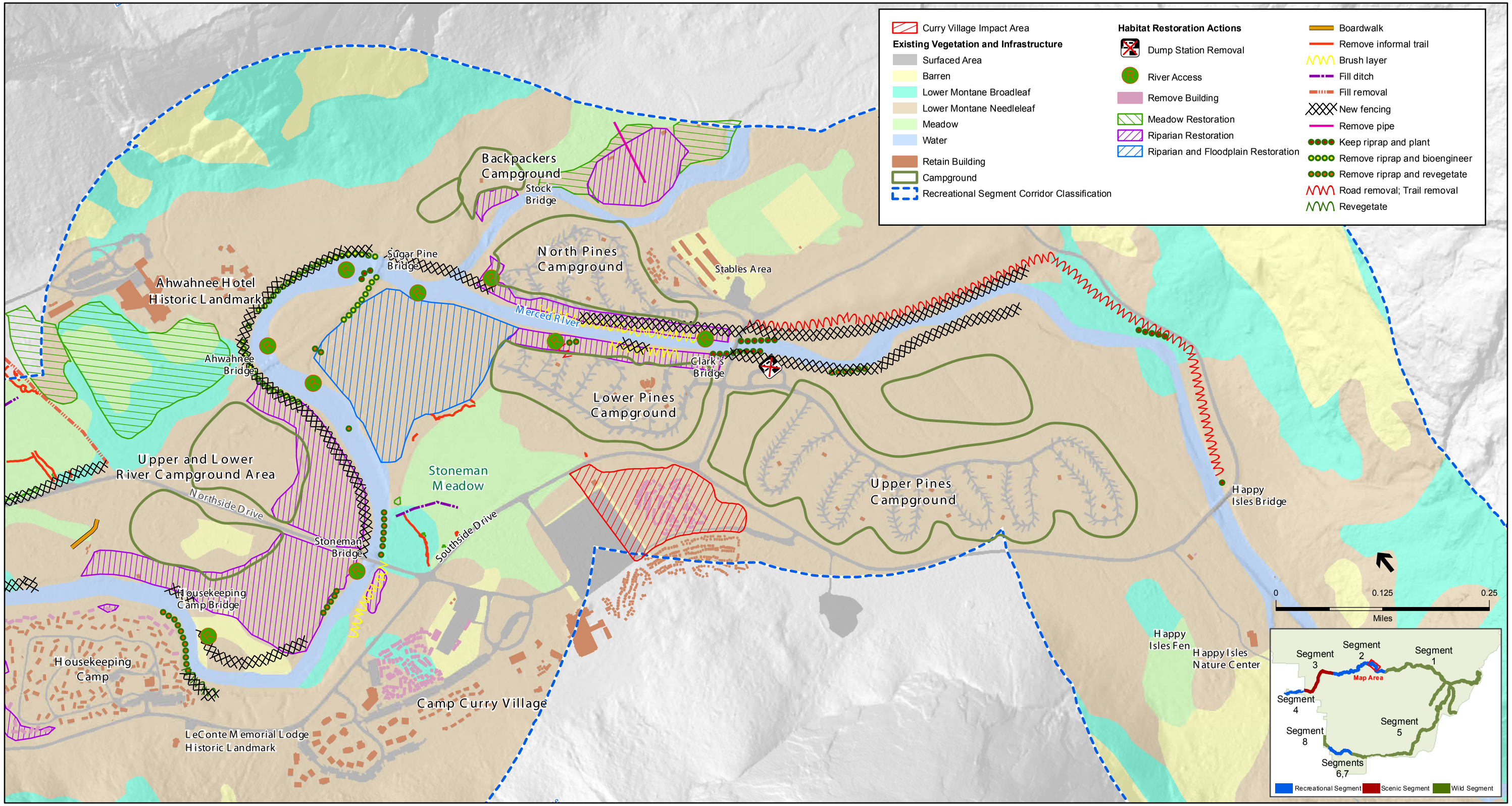
Biological Resource Actions.

***Yosemite Valley Campgrounds*:** Like Alternative 5, specific restoration actions under Alternative 6 to enhance the river's biological values in Segment 2 include removing all campsites within 100 feet of the bed and banks of the Merced River and restoring 6.5 acres of floodplain/riparian habitat, and designating river access at the North Pines Campground. Restoration of riparian habitat throughout Yosemite Valley would result in segmentwide, long-term, minor to moderate, beneficial impacts to vegetation and wetlands.

***El Capitan Meadow*:** Alternative 6 would install restoration fencing along the northern perimeter of El Capitan Meadow to designate appropriate meadow access points along boardwalks and viewing platforms. The NPS would remove all informal trails in sensitive and frequently inundated areas and in areas that trails incise meadow and promote habitat fragmentation. Additionally, Alternative 6 would selectively remove conifers that block the views of El Capitan from the roadside. Restoration of El Capitan Meadow and rerouting or removal of informal trails would result in local, long-term, minor to moderate, beneficial impacts on vegetation and wetlands from reduction of trampling from foot traffic that causes habitat fragmentation.

Ahwahnee Meadow: Similar to Alternatives 4 and 5, specific actions under Alternative 6 in Segment 2 to enhance the river's biological values at the Ahwahnee Meadow include: removing fill in sections of trails that passes through meadow and wetland habitats and replace the trails with boardwalk. Unlike Alternatives 2 and 3, Northside Drive and the bike path adjacent to Ahwahnee Meadow would remain under Alternative 6. Hydrological connectivity between both sides of Northside Drive would be enhanced by increasing the number of culverts. Trail improvement and meadow restoration would result in local, long-term, minor to moderate, beneficial impacts on vegetation and wetlands at the Ahwahnee Meadow as wetland fragmentation and vegetation trampling is reduced, and wetland connectivity to the river is enhanced.

Stoneman Meadow: Like Alternative 5, specific actions in Alternative 6 to enhance the biological values of the Merced River include restoring Stoneman Meadow by redesigning the Orchard Parking Lot. Through engineering solutions, Alternative 6 would promote water flow by increasing drainage

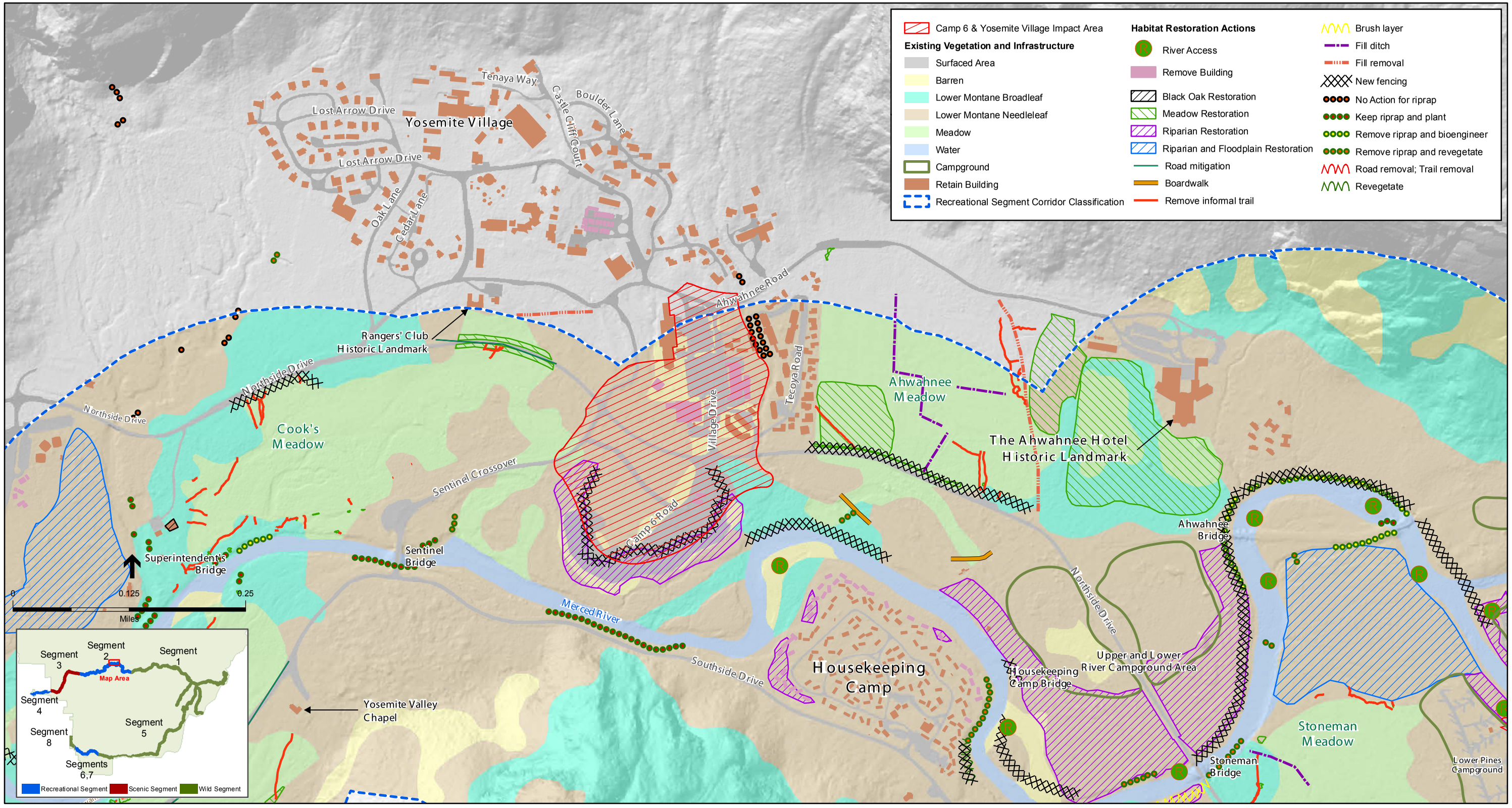


SOURCE: NPS, 1997, 2011, 2012

Merced River Comprehensive Management Plan and EIS . 210436

Figure 9-33

Curry Village Area: Alternative 6 Habitat Restoration Actions and Select Facilities Actions



SOURCE: NPS, 1997, 2011, 2012

Figure 9-34

Yosemite Village Area: Alternative 6 Habitat Restoration Actions and Select Facilities Actions

Yosemite Lodge & Camp 4 Impact Area

Existing Vegetation and Infrastructure

- Surfaced Area
- Barren
- Lower Montane Broadleaf
- Lower Montane Needleleaf
- Meadow
- Water
- Retain Building
- Campground
- Recreational Segment Corridor Classification

Habitat Restoration Actions

- River Access
- Remove Building
- Black Oak Restoration
- Meadow Restoration
- Riparian Restoration
- Riparian and Floodplain Restoration
- Road mitigation
- Boardwalk
- Remove informal trail
- New fencing
- No Action for riprap
- Keep riprap and plant
- Remove riprap and bioengineer
- Remove riprap and revegetate

Lower Yosemite Fall Picnic Area
Yosemite Creek Bridge
Cook's Meadow
Yosemite Lodge
Superintendent's Bridge
Sentinel Bridge
Yosemite Lodge Road
Camp 4 Historic Site
Northside Drive
Wahhoga
Sentinel Meadow
Yosemite Valley Chapel
Leidig Meadow
Swinging Bridge
Swinging Bridge Picnic Area
Southside Drive
Merced River
Sentinel Beach

0 0.125 0.25
Miles

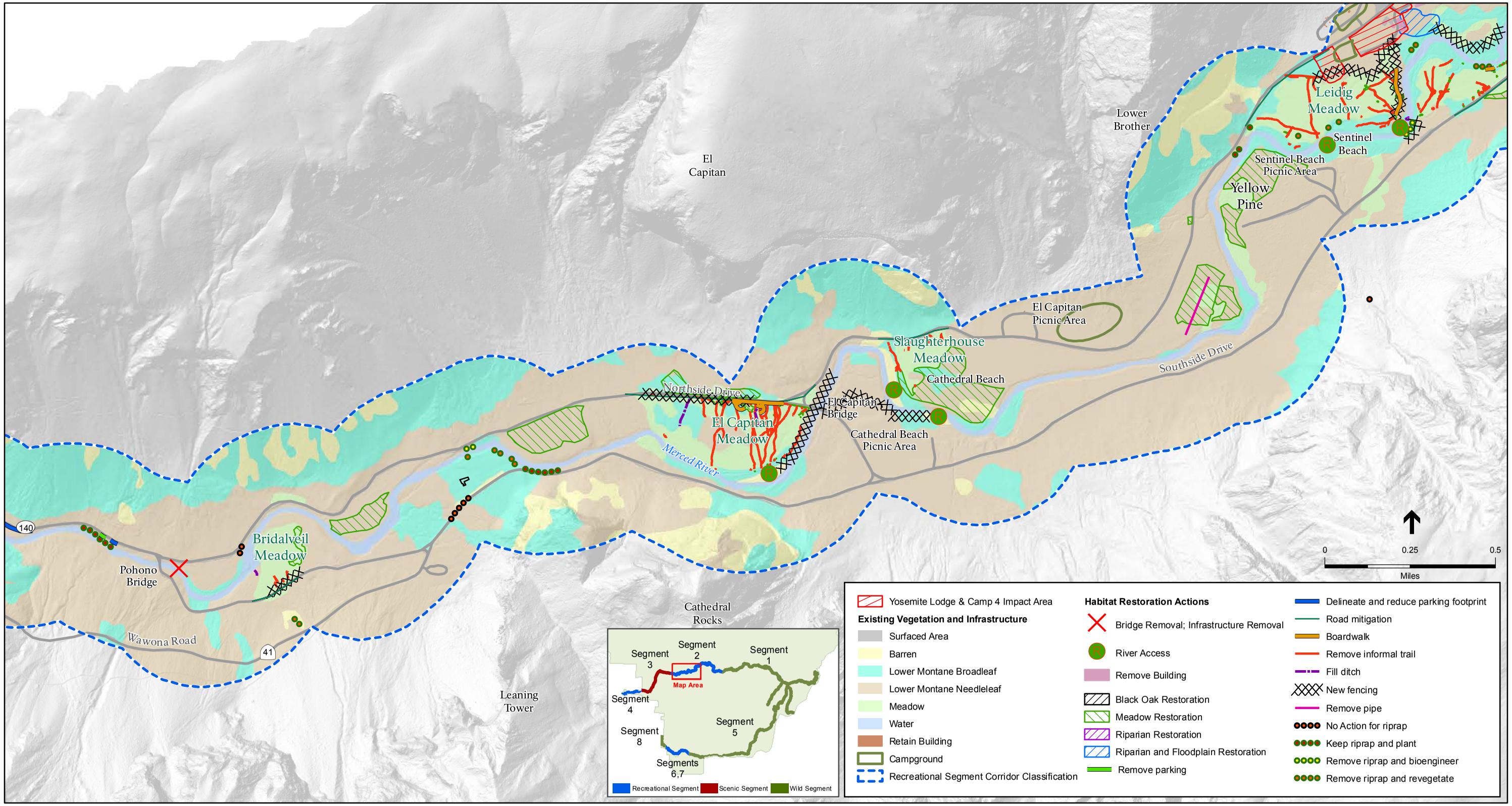
Segment 1
Segment 2
Segment 3
Segment 4
Segment 5
Segments 6,7
Segment 8
Map Area

Recreational Segment
Scenic Segment
Wild Segment

SOURCE: NPS, 1997, 2011, 2012

Figure 9-35

Yosemite Lodge Area: Alternative 6 Habitat Restoration Actions and Select Facilities Actions



SOURCE: NPS, 1997, 2011, 2012

Figure 9-36

West Yosemite Valley: Alternatives 6 Habitat Restoration Actions and Select Facilities Actions

TABLE 9-49: SEGMENT 2 VEGETATION RESTORATION UNDER ALTERNATIVE 6[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Intermittently to seasonally flooded meadow	12	Meadow	16	Meadow	18
Semi-permanently to permanently flooded meadow	3				
Sparsely vegetated undifferentiated	2	Sparsely vegetated	2		
Black cottonwood temporarily flooded forest alliance	1	Lower montane broadleaf	15	Lower montane broadleaf	15
California black oak forest alliance	6				
California black oak /(bracken fern) forest mapping unit	8				
Douglas-fir-(White fir-incense cedar-Pondera pine) forest mapping unit	1	Lower montane needleleaf	58	A mosaic of meadow, black oak, and open canopy coniferous forest	58
Ponderosa pine-incense cedar forest alliance	18				
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	39				
Black cottonwood temporarily flooded forest alliance	1	Lower montane broadleaf	1	Riparian & floodplain: cottonwood, willow, mix of upland deciduous & coniferous forest	29
Ponderosa pine-incense cedar forest alliance	11	Lower montane needleleaf	28		
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	17				
Urban/Developed	4	Barren	4	Riparian: cottonwood, willow, mix of upland deciduous & coniferous forest	36
Ponderosa pine-incense cedar forest alliance	20	Lower montane needleleaf	32		
Ponderosa pine-incense cedar-(California black oak-canyon live oak) forest superassociation	12				
Total	**156**		**156**		**156**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

TABLE 9-50: SEGMENT 2 WETLAND RESTORATION UNDER ALTERNATIVE 6

Wetland Type	Acres
Segment 2	
Palustrine Emergent	17.13
Palustrine Forested	19.46
Palustrine Scrub Shrub	0.73
Total amount of wetlands restored	**37.32**
SOURCE: NPS 2012c	

from the cliff walls of the parking lot to Stoneman Meadows, thus improving meadow heath. Improving hydrological connectivity between the Orchard Parking Lot cliff walls and Stoneman Meadow would result in local, long-term, minor, beneficial impacts on vegetation and wetlands.

***Former Upper and Lower Rivers Campgrounds*:** Like Alternative 5, specific actions to enhance biological values of the Merced River at the Former Upper and Lower Rivers Campgrounds under Alternative 6 include restoring the topography of 16.5 acres of the floodplain within 150 feet of the ordinary high-water mark of the Merced River. While this area is largely undeveloped, Alternative 6 would remove remaining asphalt; decompact soils in former roadbeds and campsites; re-establish former river cut-off channels and remove imported fill; and place large box culverts under the road to allow water flow. To protect the riverbank from trampling associate with the addition of walk-in campgrounds, the riparian zone at the former Upper River Campground site would be fenced and closed. Restoration of the riverside area at Former Upper and Lower Rivers Campgrounds would result in local, long-term, minor, beneficial impacts on vegetation and wetlands.

These restoration management actions would improve hydrologic function and restore ecological integrity of the Merced River corridor in Segment 2 and associated plant communities and wetlands, address ongoing and future impacts on park resources and infrastructure, and manage visitor use and development along the river corridor. These actions would be part of a comprehensive strategy to reduce existing adverse impacts on meadow and riparian vegetation. Overall, these actions would result in a segmentwide, long-term, moderate, beneficial impact on plant communities and wetlands in Segment 2.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternative 6 include relocating unimproved Camp 6 parking and placing large wood and constructed logjams along the bases of Stoneman, Sugar Pine, and Ahwahnee Bridges. These actions would result in enhanced channel free flow, increased channel complexity, increased streambank stability, and restored riparian habitat segmentwide. Overall these measures would improve the free-flowing condition of the river and restore the ecological integrity of Yosemite Valley riparian habitats, resulting in segmentwide, long-term, moderate beneficial impacts on plant communities and wetlands in Segment 2.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Actions to manage visitor use and facilities under Alternative 6, specifically those concerning vehicle access and overnight accommodations, would result in a 4% increase in daily Yosemite Valley visitation, from approximately 20,900 under Alternative 1 to 21,800. Day use would decrease by 7%. However, due largely to increases in lodging and campground facilities, overnight visitation would increase by about 33%. Under Alternative 6, there would be a net increase in Yosemite Valley lodging units. This would largely result from the substantial increase in units at Yosemite Lodge and Curry Village, along with a slight reduction in Housekeeping Camp units. The park would increase the total number of campsites within the Valley.

Relocation of facilities to other locations within the corridor could have long-term, negligible to moderate, adverse effects on vegetation, depending on site-specific conditions and project design. Local, minor to moderate, short-term, adverse effects could occur from construction and demolition

of facilities along the Merced River. Vegetation that is removed under Alternatives 2–6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor to moderate, adverse impacts on plant communities in Yosemite Valley.

Former Upper and Lower River Campground Area. Construction of new walk-in campgrounds and picnic area in undeveloped areas at the former Upper and Lower Campgrounds would preclude the ecological restoration of the former riparian/wetland/California black oak complex in the area. Fencing along the riverbank would mitigate potential additional trampling damage to riparian areas. Construction activities at Upper and Lower River Campground would result in direct, temporary and permanent losses of native vegetation as well as the redevelopment of existing developed areas. Outside of previously developed areas, impacts to vegetation would occur in lower montane coniferous forest. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). Losses of vegetation communities, while long-term, would be local, adverse and moderate.

Curry Village & Campgrounds. Actions under Alternative 6 in Segment 2 related to managing visitor use and facilities at Curry Village include the reorganization of Curry Village including the construction of 98 hard-sided units. The units would be constructed within previously developed areas as well as within vegetation communities adjacent to the existing Curry Village site.

Construction activities at Curry Village would result in direct, temporary and permanent losses of native vegetation and wetlands (see **table 9-51**) as well as the redevelopment of existing developed areas. Outside of previously developed areas, impacts to vegetation would occur in lower montane coniferous forest and, to a lesser extent, meadow. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-51 below, only a small percentage of these vegetation communities would be affected by the facility actions in Curry Village. Impacts to meadow habitat would occur in a small meadow area currently disconnected from the larger Stoneman Meadow to the north by Happy Isle Loop Road. In addition, vegetation communities at Curry Village are adjacent to already developed areas, and therefore currently experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

Direct impacts to vegetation, including trampling or removal of rooted vegetation, would cause a reduction of total numbers of plants and/or a reduction or loss of total area, diversity, vigor, structure, or function of vegetative habitat. Direct impacts could also include decrease plant vigor or health from reduced water availability or dust accumulation on photosynthetic surfaces.

TABLE 9-51: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT CURRY VILLAGE & CAMPGROUNDS – ALTERNATIVE 6

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.03	<0.1%
Lower Montane Coniferous	6.35	<0.1%
Redevelopment[b]	1.97	N/A
Wetland (Palustrine Emergent)	0.04	<0.1%
Wetland (Riverine Intermittent)	0.02	<0.1%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Vegetation that would be removed at Curry Village under Alternative 6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Construction activities at Curry Village would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands associated with Stoneman Meadow and intermittent channels flowing through the area. Approximately 0.06 acres of potentially jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 6. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

Camp 6 and Yosemite Village. Near-term specific project-level actions under Alternative 6 in Segment 2 related to managing visitor use and facilities at Camp 6 and Yosemite Village include measures to formalize and relocate parking facilities 150 feet away from the river in order to facilitate riparian restoration goals. The Camp 6/Village Center Parking Area would be formalized to include 850 designated parking spaces by redeveloping part of the current administrative footprint. In addition, 100 parking spaces would be added at Yosemite Village. A pedestrian underpass and two roundabouts

(one at the Village Drive/Northside Drive intersection and one at the Sentinel Drive/Northside Drive intersection) would be constructed to address traffic congestion and pedestrian/vehicle conflicts. A three-way intersection would be added at Sentinel Drive and the entrance to the parking area to improve traffic flow and alleviate congestion. Expanded parking area and new road construction activities at Yosemite Village would result in direct temporary and permanent losses of native vegetation and wetlands as well as redevelopment of existing disturbed areas (see **table 9-52**).

TABLE 9-52: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT CAMP 6 AND YOSEMITE VILLAGE – ALTERNATIVE 6

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.28	<0.1%
Lower Montane Coniferous	12.22	0.2%
Lower Montane Broadleaf	0.81	<0.1%
Redevelopment[b]	14.18	N/A
Wetland (Palustrine Emergent)	1.21	0.4%
Wetland (Palustrine Forested)	0.96	0.8%
Wetland (Riverine Intermittent)	0.39	0.3%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

As noted in table 9-52, over half of the area affected by the above actions would occur at sites that are already developed. Outside of previously developed areas, impacts to vegetation would occur almost entirely in lower montane broadleaf forest and lower montane coniferous forest; these types are among the most dominant native vegetation communities in Segment 2. Impacts to meadow habitat would occur in an area currently impacted by its proximity to Sentinel Drive. Losses to these communities would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-52, only a small percentage of these vegetation communities would be impacted by the actions at Camp 6 and Yosemite Village. In addition, potentially affected vegetation communities are adjacent to already developed areas, and therefore experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

Vegetation that would be removed at Camp 6 and Yosemite Village under Alternative 6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

Parking areas and new road construction activities at Camp 6 and Yosemite Village would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands located adjacent to the Northside Drive and Sentinel Crossover intersection, palustrine forested wetlands associated with the Merced River, and intermittent channels flowing through the area. Approximately 2.56 acres of potential jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 6. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, moderate and adverse.

Yosemite Lodge and Camp 4. Actions under Alternative 6 in Segment 2 related to managing visitor use and facilities at Yosemite Lodge and Camp 4 include: the removal of old and temporary housing at Highland Court and the Thousands Cabins; the construction of two new concessioner housing areas and the construction of 78 employee parking spaces; redevelopment west of Yosemite Lodge to provide an additional 300 day use parking spaces and area for 15 tour buses; relocation of existing tour bus drop off area to Highland Court to provide 3 bus loading/unloading spaces; and the construction of a pedestrian underpass to alleviate pedestrian/vehicle conflicts.

Like other proposed facility projects, construction activities at Yosemite Lodge would result in direct temporary and permanent losses of native vegetation and wetlands as well as the redevelopment of existing disturbed areas (see **table 9-53**). Impacts to vegetation would occur in lower montane coniferous forest, the dominant natural vegetation community in Segment 2, and to a much lesser extent in lower montane broadleaf forest. Losses would occur through vegetation clearing, grading, site development or other surface disturbance (e.g., driving over vegetation). As shown in table 9-53, only a small percentage of these vegetation communities would be impacted. In addition, potentially affected vegetation communities are adjacent to already developed areas, and therefore experience high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. Therefore, losses of vegetation communities, while long-term, would be local, adverse and minor.

Like other development actions proposed under this alternative, vegetation that is removed at Yosemite Lodge and Camp 4 under Alternative 6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Yosemite Valley, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce impacts to local, long-term, minor and adverse.

TABLE 9-53: VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES AT YOSEMITE LODGE AND CAMP 4 – ALTERNATIVE 6

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Lower Montane Coniferous	15.47	0.2%
Lower Montane Broadleaf	1.73	<0.1%
Redevelopment[b]	3.69	N/A
Wetland (Palustrine Emergent)	0.01	<0.1%
Wetland (Riverine Intermittent)	0.03	<0.1%
Wetland (Riverine Perennial)	0.01	<0.1%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Construction activities at Yosemite Lodge and Camp 4 would result in direct, permanent losses of federally protected wetlands. Impacts to wetlands would occur in palustrine emergent wetlands and along the Merced River and in intermittent channels flowing through the area. Approximately 0.05 acres of potentially jurisdictional wetland features would be directly and permanently impacted by the proposed actions under Alternative 6. Losses to these wetlands would occur through site clearing, filling, grading, and subsequent development. Construction activities may also generate indirect impacts to wetlands including potential modifications to flow, circulation, hydroperiod, or other aspects of the hydrologic regime, and increases in sedimentation due to ground disturbance associated with construction. However, post-construction, temporarily impacted areas would be restored. Wetlands that cannot be avoided and would be permanently filled must be compensated to result in "no net loss" of wetlands. Adherence to proposed mitigation measures MM-HYD-1, MM-VEG-1, and MM-VEG-4 through MM-VEG-7, as applicable (see Appendix C), and avoidance of wetlands during construction where possible, would reduce impacts to wetlands to local, long-term, minor and adverse.

In summary, as shown in **table 9-54**, actions to manage visitor use and facilities would result in the loss of 36.89 acres of vegetation primarily located near previously developed areas, resulting in long-term, local, minor, adverse impacts to these communities. Actions to manage visitor use and facilities would result in the loss of 2.67 acres of potentially jurisdictional wetlands.

Segment 2 Impact Summary: Actions to protect and enhance river values within Segment 2 under Alternative 6 would result in the restoration of 156 acres of vegetation and 37.32 acres of wetland, resulting in long-term, segmentwide, major, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in the loss of 36.89 acres of vegetation primarily located near previously developed areas, resulting in long-term, local, minor to moderate, adverse impacts to these communities. Actions to manage visitor use and facilities would result in the loss of 2.67 acres of potentially jurisdictional wetlands.

TABLE 9-54: SUMMARY OF VEGETATION AND WETLAND IMPACTS FROM ACTIONS TO MANAGE VISITOR USE AND FACILITIES – ALTERNATIVE 6

Vegetation/Wetland Type	Acres	Percent of Vegetation/Wetland Type Affected in Segment[a]
Segment 2		
Meadow	0.31	<0.1%
Lower Montane Coniferous	34.04	0.5%
Lower Montane Broadleaf	2.54	<0.1%
Redevelopment[b]	19.84	N/A
Wetland	2.67	0.5%

[a] This is a comparison of the acres of vegetation/wetland impacted to the total acres of that vegetation/wetland type in the segment.
[b] Redevelopment refers to existing developed areas that will be rebuilt.

SOURCE: NPS 2012c

Segments 3 and 4: Merced Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

Currently, vehicles park under the dripline of the 38 valley oak trees. This practice compacts soil under the trees, affecting root health, water uptake, and soil aeration. Additionally, existing development and trampling in the vicinity limits the area where oak seedlings can be recruited. Under Alternative 6, valley oaks in El Portal would be enhanced by creating an oak recruitment area of one acre in Old El Portal in the vicinity of the current bulk fuel storage area, including the adjacent parking lots. Parking and new building construction within the oak recruitment area would be prohibited. Nonnative fill would be removed and soils decompacted. Appropriate native understory plant species would be planted. The fuel storage area would be relocated outside of the river corridor. Overall, these actions would result in local, long-term, moderate, beneficial impacts on valley oaks in El Portal.

The types of habitat that would be affected by restoration actions in Segment 4, as well as the types of habitat that would be enhanced or restored, are summarized in **tables 9-55** and **9-56**. A total of 12 acres of vegetation would be restored in Segment 4, including 0.05 acre of wetland (this includes restoration actions common to Alternatives 2-6).

TABLE 9-55: SEGMENT 4 VEGETATION RESTORATION UNDER ALTERNATIVE 6[a]

Current Vegetation	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Valley oak woodland alliance	1	Foothill broadleaf	1	Valley oak woodland	1
canyon live oak-(Ponderosa pine-incense cedar) forest superassociation	11	Lower montane broadleaf	11	Lower montane broadleaf	11
Total	**12**		**12**		**12**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

TABLE 9-56: SEGMENT 4 WETLAND RESTORATION UNDER ALTERNATIVE 6

Wetland Type	Acres
Segment 4	
Palustrine Emergent	0.001
Palustrine Forested	0.05
Total amount of wetlands restored	**0.05**
SOURCE: NPS 2012c	

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Under Alternative 6, day parking would be expanded by 200 parking spaces at the Abbieville site; this area would primarily be used for visitor access to Yosemite Valley. NPS employee housing would be added to Abbieville, El Portal Village Center, and Rancheria Flat. While all new units would be built outside of the 100-year floodplain, they would fall within the river corridor. This increase in capacity in El Portal is a function of the decrease in employee housing capacity in the Valley (Segment 2). The addition of employee housing and park facilities development would increase the total built environment within Segment 4.

Relocation of facilities to other locations within the corridor could have long-term, negligible to moderate, adverse effects on vegetation depending on site-specific conditions and project design. Local, minor to moderate, short-term, adverse effects could occur from construction and demolition of facilities along the Merced River. Vegetation that is removed under Alternatives 2–6 would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities at El Portal, as new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Wetlands would be avoided during construction activities. Adherence to proposed mitigation measures MM-GEO-1, MM-HYD-1, and MM-VEG-1 through MM-VEG-7, as applicable (see Appendix C), and avoidance of the removal of vegetation where possible, would reduce short-term impacts to minor and adverse. Overall, these actions would result in local, short-term, minor, adverse impacts on plant communities in El Portal.

Segments 3 and 4 Impact Summary: Actions to protect and enhance river values within Segments 3 and 4 would result in the restoration of 12 acres of vegetation and 0.05 acres of wetland, resulting in long-term, local, moderate, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in short-term, local, minor, adverse impacts to vegetation and wetlands.

Segments 5, 6, 7, and 8: South Fork Merced River

Impacts of Actions to Protect and Enhance River Values

The Wawona Golf Course would not be removed under Alternative 6, and therefore effects related to its continued operation would be the same as described for Alternative 1. Actions specifically targeted to protect culturally sensitive areas would benefit vegetation and wetlands as well, including the

relocation or removal of select campsites and stock campground sites that are within 100 feet of the river or in culturally sensitive areas. The removal of select camp sites within the floodplain would result in local, long-term, minor, beneficial impact on vegetation and wetlands.

The types of habitat that would be affected by these restoration actions in Segment 7, as well as the types of habitat that would be enhanced or restored, are summarized in **table 9-57**. A total of three acres of vegetation would be restored in Segment 7 (this includes restoration actions common to Alternatives 2-6).

TABLE 9-57: SEGMENT 7 VEGETATION RESTORATION UNDER ALTERNATIVE 6[a]

Current Vegetation and Acreage	Acres	Current Habitat Type	Acres	Proposed Future Habitat Type	Acres Restored or Enhanced
Ponderosa pine woodland alliance	1	Lower montane needleleaf	3	Riparian: cottonwood, willow, mix of upland deciduous & coniferous forest	3
Ponderosa pine-incense cedar forest alliance	2				
Total	**3**		**3**		**3**

[a] Left four columns are the existing vegetation and general vegetation type and corresponding acres of each. Right two columns are the habitat type and acreage that the proposed restoration would restore or enhance.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 7 under Alternative 6 include the relocation of stock use campsites from sensitive resource areas to Wawona Stables. Overall, this action would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Impacts of Actions to Manage User Capacities, Land Use, and Facilities

Under Alternative 6, the operations of the Wawona stables would be eliminated and two stock campsites would be relocated to this area from the current Wawona stock camp. Thirteen campsites in the Wawona Campground would be removed from within 100 feet of the river or from cultural sites. The area would be restored. Soils would be decompacted and the area would be replanted with riparian vegetation. This would reduce visitor use in this area, resulting in a decrease of vegetation trampling. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Wawona Campground. Facilities actions at the Wawona Campground would involve removal of 13 sites that are either within the 100-year floodplain or in culturally sensitive areas. Overall, these actions would result in a local, long-term, minor, beneficial impact on plant communities and wetlands in Wawona.

Segments 5, 6, 7 and 8 Impact Summary: Actions to protect and enhance river values within Segments 5, 6, 7 and 8 under Alternative 6 would result in the restoration of three acres of vegetation, resulting in long-term, segmentwide, minor, beneficial impacts on vegetation and wetlands. Actions to manage visitor use and facilities would result in long-term, local, minor, beneficial impacts to vegetation and wetlands.

Summary of Impacts from Alternative 6: Diversified Visitor Experiences and Selective Riverbank Restoration

Alternative 6 would restore approximately 170 acres of vegetation, including 37.37 acres of wetlands, as a result of actions common to Alternatives 2-6 and those specific to Alternative 6. Actions to manage visitor use and facilities would result in the loss of approximately 36.89 acres of vegetation and the permanent loss of 2.67 acres of potentially jurisdictional wetlands as a result of actions specific to Alternative 6.Past development and human activity in the Merced River corridor have in some cases adversely affected vegetation communities and regional vegetation patterns. Actions associated with Alternative 6 are expected to have corridorwide, long-term, moderate, beneficial impacts on vegetation in the Merced River corridor. As described above, many of the actions in Alternative 6 would address existing adverse impacts on vegetation communities. This includes actions that are targeted to improve wetland, riparian, and meadow communities where these habitats are near or adjacent to existing developments and areas subject to high visitor use. Additionally, the park would implement measures to increase channel free flow, improve water quality, and reduce erosion and scouring. Notable actions the park would implement under Alternative 6 include

- restricting recreational use of rivers and riverbanks to reduce riverbank erosion
- removing, restoring, relocating, or repurposing park facilities to efficiently utilize park facilities and reduce the built environment within the park; some facilities would be built to accommodate visitors or employees
- managing for an increase (4%) in total daily visitors to the park and visitor demands for day parking space, lodging, and camping space
- removing selected facilities within 100 feet of the Merced River and restoring riverbanks, meadows, and riparian habitat
- enhancing meadow, riparian, and river hydrologic function, complexity, and connectivity
- improving the free flow, complexity, and water quality of the Merced River

Generally, Alternative 6 is focused on restoration of meadow, riparian, and riverbank habitats in Yosemite Valley (Segment 2); retaining most park facilities but removing selected facilities that are located within 100 feet of the Merced River and are jeopardized by flood; repurposing park facilities to improve efficiency of use; and providing adequate lodging, camping, and parking space for visitors and employees. Additionally, the park would continue to provide river access to visitors in designated areas, and continue to protect the river and riverbanks by requiring permits or limiting use of put-in areas. Alternative 6 would allow for a significant increase in total daily visitations to the park and park infrastructure (lodging, camping space, and parking lots) would be retained or expanded in selected locations to accommodate increased demand. Adverse effects from these actions would be associated with the active construction or restoration phase, and would be local, short-term, and negligible to moderate, depending on the type of project and location. Although some habitat would be restored and fragmentation would be reduced in selected areas, increase in visitors to the park accompanied by continued operation of most park facilities and construction of new facilities would result in adverse impacts on vegetation communities over the long-term where visitor use is concentrated. These effects would be most prominent in areas of high human use, such as Yosemite Valley and Wawona

(Segments 2 and 7).When combined, the long term effect of Alternative 6 would be a corridorwide, moderate beneficial impact on vegetation.

Cumulative Impacts from Alternative 6: Diversified Visitor Experiences and Selective Riverbank Restoration

The past, present, and reasonably foreseeable plans and projects that could have a cumulative impact on vegetation resources are the same as those listed under the No Action Alternative. Alternative 6 would result in segmentwide, long-term, minor, beneficial impacts on vegetation communities within the Merced River corridor. These actions are focused on restoring and improving aquatic, meadow, and riparian habitat quality within the Merced River corridor. The past, present, and future actions in the region would have varying effects on vegetation and wetlands, with some projects restoring or enhancing vegetation and wetlands, and many others resulting in the loss or decline of vegetation and wetlands. For projects that would result in the loss of wetland features regulated under section 404 of the CWA, losses would be typically compensated at a ratio of 1:1 (no net loss). Compensation typically occurs through creation or enhancement of wetlands either on-site or at a designated mitigation bank. However, even with these protections in place, wetlands may be lost over time through unregulated activities or negatively impacted through nonpoint source pollution, nonnative species, and changes in surface and subsurface hydrology over time.

The actions under Alternative 6 would have long-term, beneficial effects on vegetation and wetlands, including vegetation-related ORVs, within the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region (e.g., introduction and spread of nonnative species, direct displacement of vegetation by structures), the actions under Alternative 6 would have a minimal beneficial effect. Overall, cumulative actions on vegetation and wetlands would result in long-term, minor, adverse effects on regional vegetation patterns.