

5.3 Lower Valley/Plain Region

East Antioch Creek, Oakley, and Lower Marsh Creek subbasins are located primarily in the lower valley/plain region.

5.3.1 East Antioch Creek

Physical Setting

This subbasin covers approximately 7,261 acres, representing approximately 4% of the inventory area. Figure 5-12a shows the location of wetland types found in the East Antioch Creek subbasin.

Geology

Much like West Antioch Creek, East Antioch Creek is largely underlain by Tertiary bedrock in its upland areas. Pleistocene alluvial fan deposits underlie the lower flatland areas. These deposits also extend upland along tributaries adjacent to channels. The Younger Holocene alluvial fan deposits can be found within stream channels in the lower plains region.

Soils

The East Antioch Creek subbasin is largely dominated by clay loam soils. Wetland habitat tends to occur in Rincon clay and clay loam complexes because these complexes have low permeability. Low-elevation areas are dominated by the Rincon clay and silty clay loam formation, while upland areas are dominated by clay soils. Patches of alkali clay and clay loam are found in the upper subbasin.

Climate

Average annual rainfall in the East Antioch Creek subbasin is approximately 13 to 14.5 inches. This subbasin receives less rainfall than West Antioch Creek, which receives approximately 15 to 18 inches of rainfall annually. The difference in rainfall is due to the rain shadow effect of the higher elevation of West Antioch Creek compared to the lower elevation of East Antioch Creek.

Hydrology and Land Use

The East Antioch Creek subbasin contains one major tributary originating in the foothills region of the subbasin. East Antioch Creek is ephemeral and flows from east to northwest, draining to the Delta during winter storm events. In addition to

storm flows collected in the grassland areas of the upper watershed, the creek receives diverted runoff from streets, houses, and parking lots from urbanized areas, the dominant land cover. Detention basins and levees have been built along the creek to promote infiltration and prevent the floodwaters from moving into adjacent subbasins (Contra Costa County 2003). Approximately 87% of the main East Antioch Creek channel lies above ground (Contra Costa County 2003). A 1-mile reach of the creek upstream of Highway 4 is underground.

Land use in the subbasin follows the typical pattern of dense urban development, with small patches of parkland scattered throughout the subbasin. Sixty percent of the watershed is impervious (Contra Costa County 2003). Restoration projects in the lower subbasin are underway just upstream of Alhambra Lake and in the tidal marsh areas close to the Delta, outside the inventory area.

WoUS Types

WoUS types in the East Antioch Creek subbasin include six of the general types described in Chapter 4.

- Riverine nontidal (intermittent and lower perennial).
- Riverine excavated artificial.
- Lacustrine impounded.
- Palustrine forest.
- PAB/UB (detention basins).
- PPEM (seasonal).

Figure 5-12b shows representative photos of WoUS types commonly found in this subbasin. Table 5-12 summarizes the functions of each WoUS type found in the East Antioch Creek subbasin.

Apart from the Alhambra Lake reservoir and the Contra Costa Canal, about 60% of the WoUS types in this subbasin are palustrine forest/scrub, while the remaining 40% are PPEM wetlands. Most of these WoUS are concentrated in an open space corridor north of Highway 4. South of Highway 4, only riverine nontidal intermittent WoUS are found in this subbasin.

Wetland Functions

Habitat

Riverine Nontidal (Intermittent and Lower Perennial)

Much of East Antioch Creek has been culverted or is surrounded by dense residential development. However, the reach of creek between Highway 4 and

Table 5-12. East Antioch Creek Subbasin: Summary of Wetland Functions/Valuation

Functional Type	Hydrogeomorphic Class (HGM)	Biological Functions	Biological Quality	Hydrologic Functions	Hydrologic Quality	Overall Quality	Potential Quality*
Riverine nontidal intermittent	Foothill/Terrace Stream channels; Valley bottom stream channels	Adjacent development along most of creek degrades habitat quality. Adjacent protected forest and grasslands in creek reach northwest of Hwy 4 enhance habitat quality for species including CTS and CRF	Low	Vegetated reaches filter contaminants. Stream reaches in the transition zone may provide groundwater recharge.	Moderate	Low	Low
Riverine nontidal lower perennial	Valley bottom stream channels	Low habitat quality due to adjacent developed land and culverted reaches	Low	Sediment sink. Contaminants from urban runoff may be trapped in bottom sediments. Naturally lined channels provide groundwater recharge.	Low	Low	Low
Palustrine forest (riparian forest)	Foothill/Terrace Stream-Banks	Small patches of forest, some surrounded by development, provide habitat for limited number of species.	Moderate	Reduce flow velocity and filter sediment. Maintain cool water temperatures.	High	Moderate	Moderate
Palustrine persistent emergent (PPEM) (seasonally or temporarily flooded wetlands)	Valley Bottom depression wetlands, Stream Floodplains, Bottomlands or Pond Margins	Wetlands in the Lower Valley/Plain are adjacent to an open space corridor, and may provide habitat for CTS and CRF.	Moderate	Well-developed wetlands vegetation filters contaminants and provide flood storage.	Moderate	Moderate	Moderate

Functional Type	Hydrogeomorphic Class (HGM)	Biological Functions	Biological Quality	Hydrologic Functions	Hydrologic Quality	Overall Quality	Potential Quality*
Riverine excavated artificial	Aqueduct	Open water habitat for waterfowl, shorebirds and some amphibians	Low	Human drinking water conveyance	Low	Low	Low
Palustrine aquatic bed/unconsolidated bottom (PAB/UB) (ponds)	Recreational Ponds	Recreational ponds are surrounded by development and provide little habitat function.	Low	Highly disturbed ponds increase sediment mobility, thus degrading water quality. Some flood storage and groundwater recharge.	Low	Low	Low
Lacustrine impounded	Reservoir	Lake Alhambra is surrounded by development and provides little habitat function.	Low	Provides a sediment sink and flood storage.	Low	Low	Low

* "Potential" as related to management considerations or mitigation efforts as proposed here or in the HCP.

Functional Type	Est. Total in Inventory Area (acres)	Est. Impact (acres)	Mitigation Ratio		Wetland Preservation Needed (acres)	Wetland Available for Preservation ^a (acres)	Wetland Needed for Restoration (acres)
			Preservation	Restoration			
Riverine nontidal (intermittent and lower perennial)	7 miles						
Palustrine forest (riparian forest)	13						
Palustrine persistent emergent (PPEM) (seasonally or temporarily flooded wetlands)	10						
Riverine excavated artificial	0.3						
Palustrine aquatic bed/unconsolidated bottom (PAB/UB) (ponds)	1						
Lacustrine impounded	21						

^a Available within Land Acquisition Analysis Zones with moderate or high acquisition priority

Calaveras Circle is surrounded by grassland. In this area, some reaches of the channel contain marsh vegetation and others are lined with palustrine forest. This area provides habitat to a diverse group of wildlife species, including CRF, which has been documented in the neighboring subbasin (CNDDDB 2003).

Riverine Excavated Artificial

See discussion of the Contra Costa Canal in Section 4.5 of Chapter 4.

Lacustrine Impounded

Lake Alhambra is surrounded by dense development and therefore provides habitat only to species that use open water and tolerate high levels of human disturbance.

Palustrine Forest

Two areas of palustrine forest are present in this subbasin. One of these is located adjacent to the Bidwell School, southeast of Hillcrest Street and East 18th Street. This area is surrounded by dense development and thus provides habitat only for species that can tolerate high levels of human disturbance. The second area is located in an open space corridor between Highway 4 and Calaveras Circle. This area of palustrine forest is larger and is surrounded by grassland and PPEM wetland, providing habitat for a greater number of more sensitive species.

Palustrine Aquatic Bed/Unconsolidated Bottom (Detention Basins)

Only two small areas totaling 0.6 acres of PAB/UB WoUS are mapped in the subbasin. These areas are surrounded by dense residential development and therefore provide habitat for few species.

Palustrine Persistent Emergent (Seasonal and Perennial)

PPEM wetlands in the open space corridor between Highway 4 and Calaveras Circle contain well-developed wetlands vegetation surrounded by or adjacent to grassland, palustrine forest, and the creek channel. These wetlands may provide habitat for a diverse group of species, including CTS and CRF, which have been documented in this subbasin or in adjacent subbasins.

Water Quality

Riverine Nontidal (Intermittent and Lower Perennial)

Long reaches of East Antioch Creek exist as an open vegetated channel. A section of the channel southwest of Highway 4 is located in an underground culvert. However, the majority of the creek has been modified and relocated to accommodate residential housing and vehicle transportation. The vegetated channels slow flows during high precipitation events and filter sediment and contaminants from the water column.

Riverine Excavated Artificial

See discussion of the Contra Costa Canal in Section 4.5 of Chapter 4.

Lacustrine Impounded

Reservoirs, such as Lake Alhambra, improve water quality by settling sediment and associated contaminants from urban runoff. Sediment and contaminants are collected on the reservoir bottom and made unavailable to plants and wildlife through the decomposition process. Because Lake Alhambra is near the most downstream end of the watershed, it perhaps serves as the last filtration mechanism to improve water quality of East Antioch Creek.

Palustrine Aquatic Bed/Unconsolidated Bottom (Detention Basins)

Stormwater detention basins function to improve water quality through filtration of sediment and removal of urban contaminants adsorbed to sediment particles. After the stormwater is held for a period, gates are lifted and the filtered and settled water is allowed to pass along downstream channels or through the storm drain network. Detention basins are particularly important at the lower end of the watershed area because contaminants and sediment have a chance to be removed before flowing to downstream areas and the Delta.

Palustrine Persistent Emergent (Seasonal and Perennial)/Palustrine Forest

The riparian areas in the middle of the watershed north of Highway 4 function to improve water quality by filtering sediments associated with new residential construction and runoff from vehicle use on the highway. This large riparian area is one of the few places in the watershed where contaminants contained in surface waters have an opportunity to be removed.

Hydrologic Cycling and Flood Storage

Riverine Nontidal (Intermittent and Lower Perennial)

Flood storage in the channel has been reduced by urban development. The watershed has been modified to accommodate storm flows in storm drain networks leading to detention basins and reservoirs.

Riverine Excavated Artificial

See discussion of the Contra Costa Canal in Section 4.5 of Chapter 4.

Lacustrine Impounded

In addition to serving recreational functions, Lake Alhambra absorbs flood flows from storm events. Incoming storm flows are held in the lake then slowly released to the marsh area below the reservoir and to the Delta. Lake Alhambra protects the residences in this flat and downstream area of the watershed from flooding.

Palustrine Aquatic Bed/Unconsolidated Bottom (Detention Basins)

Water held in these basins prevents storm runoff from flooding developed areas. Detention basins are particularly important to protect developments at the bottom of the watershed area from flooding.

Palustrine Persistent Emergent (Seasonal and Perennial)/Palustrine Forest

The large open space area north of Highway 4 provides ample flood storage capacity for surface waters from upper areas of the watershed. There is little flood storage capacity in the upper subbasin because of residential developments and relocated stream channels in culverts. The flood plain area north of Highway 4 is large compared to other subbasins in the inventory area.

Management Considerations for WoUS Conservation and Enhancement

The East Antioch Creek subbasin is dominated by dense residential and commercial development. Wetland functioning can be maintained by preventing development along the channel downstream of Highway 4 to encourage riparian corridor development and improve wildlife habitat in the lower channel. This will also provide flood storage and improve water quality. Table 5-12 summarizes the overall quality of wetland types and opportunities for preservation and restoration.

In addition, storm drains need to be better maintained to prevent migration of garbage and other contaminants to the stream channel. Stencilling storm drains in this subbasin with signs indicating that they drain to the creek and the Delta may be helpful in reducing dumping of pollutants.

5.3.2 Oakley

Physical Setting

This subbasin covers approximately 3,892 acres, representing approximately 2% of the inventory area. Figure 5-13a shows the location of wetland types found in the Oakley subbasin.

Geology

Brentwood dune sands, deposited in the Pleistocene and Holocene, dominate the geology of the Oakley subbasin.

Soils

Soils of the Oakley subbasin can be characterized as nearly level and are dominated by Delhi sands with patches of clay loam. The Delhi sands are ancient dune deposits. Aside from the sands, these clay loams have low

permeability and are highly alkaline. These soils will hold water for long periods unless intentionally drained.

Climate

Average annual rainfall in the Oakley subbasin ranges from 12 to 13 inches.

Hydrology and Land Use

This subbasin lacks a naturally defined channel network. Runoff from impervious surfaces are collected in underground storm drain networks and conveyed to stormwater detention and retention basins, or discharged northwards to the Delta. There are several industrial wastewater treatment ponds in this subbasin. These ponds do not discharge to the Delta or groundwater supplies. The tidal marshes in this subbasin are located outside the inventory area.

Land use in the Oakley subbasin is a mixture of intensive agriculture, residential, and industrial development. However, residential developments are quickly becoming the dominant land use in the subbasin. An active railroad line runs through this subbasin. Maintenance and operation of rail lines involve lubrication of the tracks and wheels with oils and greases. These contaminants can be transported to drainage channels and ultimately to the Delta, further degrading water quality.

WoUS Types

WoUS types in the Oakley subbasin include four of the general types described in Chapter 4.

- Riverine excavated artificial.
- Palustrine scrub/shrub.
- PPEM (perennial, seasonal).
- PAB/UB (stormwater and industrial wastewater treatment ponds).

Figure 5-13b shows representative photos of WoUS types commonly found in this subbasin. Table 5-13 summarizes the functions of each WoUS type found in the Oakley subbasin.

Ponds (PAB/UB) associated with industry and water treatment make up the majority of the WoUS types in this subbasin, followed by PPEM wetlands. PPEM wetlands are located in agricultural areas and adjacent to

Table 5-13. Oakley Subbasin: Summary of Wetland Functions/Valuation

Functional Type	Hydrogeomorphic Class (HGM)	Biological Functions	Biological Quality	Hydrologic Functions	Hydrologic Quality	Overall Quality	Potential Quality*
Palustrine scrub	Valley Stream Banks	May provides habitat for a variety of sensitive species, particularly in areas adjacent to tidal marshes.	Moderate	Scrub vegetation removes sediment and associated contaminants through filtration of surface waters. Vegetation at tidal fringes helps to stabilize banks from erosion.	High	High	High
Palustrine persistent emergent (PPEM) (seasonal and perennial)	Valley Bottom depressional wetlands, Stream Floodplains, Bottomlands or Pond Margins	Habitat quality varies with adjacent land use. Adjacent land is occupied by intensive agriculture, mostly grazing and row crops, or by development.	Low	Filtration capacity of vegetation improves water quality of surface runoff waters. Little flood storage functioning.	Moderate	Low	Low
Palustrine aquatic bed/unconsolidated bottom (PAB/UB) (ponds)	Industrial Ponds	Adjacent development limits habitat function.	Low	Lined ponds do not provide flood storage and groundwater recharge.	Low	Low	Low
Riverine excavated artificial	Aqueduct	Open water habitat for waterfowl, shorebirds and some amphibians.	Low	Human drinking water conveyance	Low	Low	Low

* "Potential" as related to management considerations or mitigation efforts as proposed here or in the HCP.

Functional Type	Est. Total in Inventory Area (acres)	Est. Impact (acres)	Mitigation Ratio		Wetland Preservation Needed (acres)	Wetland Available for Preservation ^a (acres)	Wetland Needed for Restoration (acres)
			Preservation	Restoration			
Palustrine scrub	7						
PPEM (seasonal and perennial)	30						
PAB/UB) (ponds)	3						
Riverine excavated artificial	0.07 miles						

^a Available within Land Acquisition Analysis Zones with moderate or high acquisition priority

the Suisun Bay salt marshes. Tidal wetlands with palustrine scrub/shrub vegetation are found adjacent to the Suisun Bay salt marshes.

Wetland Functions

Habitat

Riverine Excavated Artificial

See discussion of the Contra Costa Canal in Section 4.5 of Chapter 4. In some cases, drainage ditches in this subbasin contain freshwater marsh vegetation and may provide habitat for species that can use marsh vegetation surrounded by intensive agriculture.

Palustrine Scrub/Shrub

Two patches of palustrine scrub/shrub in the subbasin are located adjacent to tidal marshes on Suisun Bay. Although commercial and industrial development is present nearby, these wetlands may provide habitat for a diverse group of sensitive species. Antioch Dunes evening primrose (*Oenothera deltoides* ssp. *howellii*) has been documented in the subbasin and may be present on remnant river bluffs in the area. A third area of palustrine scrub/shrub is located adjacent to intensive agriculture and industrial development. This area provides habitat for species able to tolerate frequent human disturbance.

Palustrine Persistent Emergent (Perennial, Seasonal)

A few PPEM wetlands in the subbasin are located adjacent to the Suisun Bay tidal marshes and provide habitat for a diverse group of species. Antioch Dunes evening primrose has been documented in the subbasin and may be present on remnant river bluffs in the area.

Most of the PPEM wetlands in the subbasin are surrounded by intensive agriculture or residential development. These wetlands provide habitat for species able to tolerate frequent human disturbance.

Palustrine Aquatic Bed/Unconsolidated Bottom (Stormwater and Industrial Wastewater Treatment Ponds)

PAB/UB features in the subbasin are surrounded by industrial development and provide little habitat value.

Water Quality

Riverine Excavated Artificial

See discussion of the Contra Costa Canal in Section 4.5 of Chapter 4.

Palustrine Aquatic Bed/Unconsolidated Bottom (Stormwater and Industrial Wastewater Treatment Ponds)

Wastewater treatment ponds capture industrial discharge and urban stormwater runoff function to improve water quality through filtration and settling of

sediment, thus removing urban contaminants adsorbed to sediment particles. Water from these ponds is not released to nearby stream channels or the Delta; thus, water quality of the surrounding environment is not affected unless the treatment pond is not maintained and contaminants leach to the surrounding area and underlying groundwater.

Palustrine Persistent Emergent (Perennial, Seasonal)

There is a group of perennial and seasonal wetlands on the northeast boarder of the Oakley subbasin. These wetlands function to filter out sediment and associated nutrients and urban runoff contaminants contained in surface runoff flows from the surrounding area. The wetlands serve as the last surface water filtering mechanism for that area before the water reaches the Delta.

Hydrologic Cycling and Flood Storage

Riverine excavated artificial

See discussion of the Contra Costa Canal in Section 4.5 of Chapter 4.

Palustrine Aquatic Bed/Unconsolidated Bottom (Industrial Wastewater and Stormwater Treatment Ponds) and Palustrine Persistent Emergent (Perennial and Seasonal)

Industrial wastewater ponds and seasonal wetlands provide little flood storage capacity. Stormwater treatment ponds function to capture and retain runoff waters from surrounding impervious surfaces. The perennial and seasonal wetlands near the Delta help stabilize the shoreline from wave erosion during high winds.

Management Considerations for WoUS Conservation and Enhancement

The following measures are advisable to maintain and enhance WoUS functioning in this subbasin.

- Protect perennial and seasonal wetlands adjacent to Suisun Bay tidal marshes on the northeast portion of the subbasin.
- Maintain industrial wastewater treatment ponds to prevent contamination of the Delta.
- Limit the increase in impervious surfaces within the subbasin to prevent impacts on adjacent tidal wetlands.

Table 5-13 summarizes the overall quality of wetland types.

5.3.3 Lower Marsh Creek

Physical Setting

This subbasin covers approximately 10,454 acres, representing approximately 6% of the inventory area. Figure 5-14a shows the location of wetland types found in the Lower Marsh Creek subbasin.

Geology

Lower Marsh Creek is underlain by a variety of Quaternary deposits that have been recently mapped in detail by Helley & Graymer (1977). Downstream of the confluence with Briones Creek, the Lower Marsh subbasin consists of Holocene levee-overbank deposits (Qhl), which are generally porous and permeable; alluvial fan deposits (Qhaf), which are generally more gravelly; and finer Holocene basin deposits (Qhb) comprising silty clay and clays. To the north toward the San Joaquin river channel are found Quaternary dune sands (Qds) that originate from the lower sea levels of the Last Glacial Maximum (LGM) and provide very well-draining soils.

Soils

Soil in and adjacent to the Marsh Creek channel from the Marsh Creek Reservoir to just downstream of the confluence with Sand Creek is Sorrento silty clay loam. The creek cuts through a band of Rincon clay loam, and then through alternating patches of Delhi sand, Sorrento silty clay loam with a sandy substrate, and Sycamore silty clay loam.

Climate

Annual average rainfall in the entire Marsh Creek watershed is 17 inches.

Hydrology and Land Use

Marsh Creek becomes perennial at its confluence with Dry Creek. From its confluence with Sand Creek to its mouth in the Delta, the creek is confined to a trapezoidal channel that functions to quickly convey floodwater downstream. Vegetation in the Lower Marsh Creek channel is not chemically managed. Riparian vegetation growing along the channel banks, including areas of freshwater marsh, is dominated by cattails and hardstem bulrush (*Scirpus acutus*) and areas of seasonal wetland dominated by rabbit's root grass (*Polypogon monspeliensis*) and dotted smartweed (*Polygonum punctatum*). However, marsh and riparian vegetation is cleared regularly, and the channel is periodically

dredged (Robins and Cain 2002). The southernmost portion of the subbasin is located at the transition between the foothills/upper valley and lower valley/plain regions. A portion of this area west of the Marsh Creek channel consists of rangeland containing several stock ponds and seasonal wetlands. The reach from the Marsh Creek Reservoir to the confluence with Dry Creek runs through a corridor of palustrine forest surrounded by agricultural fields. The reach from Dry Creek to the confluence with Sand Creek is surrounded by residential housing and is therefore restricted from meandering or floodplain inundation.

Land use in this portion of Marsh Creek is largely residential and industrial with patches of agricultural farmland. The southernmost portion of the subbasin, between Concord Avenue and the reservoir, is located within John Marsh State Historic Park. Creekside Park, a small municipal park, surrounds a short reach of Marsh Creek between Arlington Way and Balfour Road. There are two active railroad lines that run through this subbasin. Maintenance and operation of rail lines involve lubrication of the tracks and wheels with oils and greases. These contaminants can be transported to drainage channels and ultimately to the Delta, further degrading water quality.

WoUS Types

WoUS types in the Lower Marsh Creek subbasin include six of the general types described in Chapter 4.

- Riverine nontidal (intermittent and lower perennial).
- Riverine tidal (lower perennial).
- Riverine excavated artificial.
- Palustrine forest.
- PAB/UB (stock ponds, wastewater treatment ponds).
- PPEM (seasonal).

Figure 5-14b shows representative photos of WoUS types commonly found in this subbasin. Table 5-14 summarizes the functions of each WoUS type found in the Lower Marsh Creek subbasin.

Apart from the aqueduct and wastewater treatment plant, riverine lower perennial areas make up most of the WoUS acreage in this subbasin, with significant areas of PPEM as well. Outside of the creek channel itself, nearly all of the WoUS in the subbasin are located south of the confluence with Dry Creek and consist of palustrine forest along the channel and stock ponds and seasonal wetlands in rangeland.

Table 5-14. Lower Marsh Creek Subbasin: Summary of Wetland Functions/Valuation

Functional Type	Hydrogeomorphic Class (HGM)	Biological Functions	Biological Quality	Hydrologic Functions	Hydrologic Quality	Overall Quality	Potential Quality*
Palustrine persistent emergent (PPEM) (seasonal)	Valley Bottom depressionals wetlands, Stream Floodplains, Bottomlands or Pond Margins	Habitat quality varies with adjacent land use. Adjacent land is occupied by intensive agriculture, mostly grazing and row crops. CTS and fairy shrimp have been documented.	Moderate	Filtration capacity of vegetation improves water quality of surface runoff waters. Little flood storage functioning.	Moderate	Moderate	Moderate
Palustrine forest (riparian forest)	Foothill/Terrace Stream-Banks	Forest areas, found surrounding the Marsh Creek Reservoir and upstream, provide habitat for a variety of species.	Moderate	Reduce flow velocity and encourages sediment removal from the water column. Maintains cool water temperatures.	High	Moderate	Moderate
Riverine tidal and nontidal (lower perennial)	Coastal Plain Stream Channels	Limited habitat in tidal reaches due to modification of channel banks for flood conveyance. Frequent disturbance and surrounding development and intensive agriculture limits habitat value.	Low	Riverine channels function to capture and convey agricultural waters. The filtration capacity of vegetated channels is important to improve degraded water quality of agricultural return waters.	Moderate	Moderate	Moderate
Riverine nontidal (intermittent)	Foothill/Terrace and Valley Stream Channels	Adjacent land use consists of palustrine forest and grasslands or residential and agricultural use. Forests and grasslands found in the upper subbasin provides a better variety of habitat than land use of the lower subbasin.	Moderate	Primary use of the stream channel is to convey floodwaters away from developed areas. Water quality is degraded by residential, industrial, and agricultural use.	Low	Moderate	Moderate

Functional Type	Hydrogeomorphic Class (HGM)	Biological Functions	Biological Quality	Hydrologic Functions	Hydrologic Quality	Overall Quality	Potential Quality*
Palustrine aquatic bed/unconsolidated bottom (PAB/UB) (ponds)	Agricultural Ponds	Stock ponds provide habitat for CTS.	Moderate	Stock ponds provide a low level of flood storage and groundwater recharge. Frequently disturbed ponds increase sediment delivery to downstream habitats.	Low	Low	Moderate
Riverine excavated artificial	Aqueduct	Open water habitat for waterfowl, shorebirds and some amphibians.	Low	Human drinking water conveyance	Low	Low	Low

* “Potential” as related to management considerations or mitigation efforts as proposed here or in the HCP.

Functional Type	Est. Total in Inventory Area (acres)	Est. Impact (acres)	Mitigation Ratio		Wetland Preservation Needed (acres)	Wetland Available for Preservation ^a (acres)	Wetland Needed for Restoration (acres)
			Preservation	Restoration			
PPEM (seasonal or perennial)	18						
Palustrine forest	47						
Riverine tidal and nontidal (lower perennial)	6 miles						
Riverine nontidal (intermittent and lower perennial)	4 miles						
Palustrine aquatic bed/unconsolidated bottom (PAB/UB) (ponds)	1						
Riverine excavated artificial	10						

^a Available within Land Acquisition Analysis Zones with moderate or high acquisition priority

Wetland Functions

Habitat

Riverine Nontidal (Intermittent and Lower Perennial)/Palustrine Forest

South of Creekside Park, most of the creek channel is surrounded by palustrine forest or grasslands. This reach of the creek is likely to be somewhat sediment starved because of its location just downstream of Marsh Creek Reservoir. However, the reach provides habitat for a variety of wildlife.

Downstream of Creekside Park, the channel is frequently disturbed and is surrounded by development or intensive agriculture, limiting its habitat value.

Riverine Tidal (Lower Perennial)

These features are formed near the mouth of Marsh Creek. The portion of the creek closest to the mouth provides important riverine mudflat and tidal marsh habitat for many species, but it is outside the inventory area. The portion in the inventory area is surrounded by intensive agriculture and consists of a trapezoidal flood control channel, providing limited habitat value.

Riverine Excavated Artificial

See discussion of the Contra Costa Canal in Section 4.5 of Chapter 4.

Palustrine Aquatic Bed/Unconsolidated Bottom (Stock Ponds)

Seasonal stock ponds in the southern portion of the subbasin may provide habitat for amphibians such as CTS, which has been documented in this area of the subbasin (CNDDDB 2003).

Palustrine Persistent Emergent (Seasonal)

Seasonal PPEM wetlands in the Lower Marsh Creek subbasin are located principally in the grazing land in the southern portion of the subbasin. These wetlands, while largely unvegetated, still provide potential habitat for amphibians such as CTS and invertebrates such as fairy shrimp (*Branchinecta lynchi*) and molestan blister beetles (*Lytta molesta*), all of which have been documented in this area of the subbasin (CNDDDB 2003).

Water quality

Riverine Nontidal (intermittent and lower perennial)

Lower Marsh Creek downstream of Marsh Creek Reservoir captures contaminants contained in urban runoff from surrounding residential housing and agricultural fields. Contaminants such as oils and grease, carbon particulates, and nutrients from fertilizers are washed to the channel and conveyed downstream. These contaminants are adsorbed to fine sediments and transported into the channel. Although reaches of the channel within residential neighborhoods have been planted with grass, shrubs, and trees to provide

filtering of runoff waters, the primary function of the channel in this area is to convey floodwaters; thus, the majority of these sediments are transported downstream where water quality is further degraded. Sediments within Lower Marsh Creek also contain high concentrations of mercury washed from mines and soils higher in the watershed.

The lower perennial reach of Marsh Creek has been modified to support agriculture and urban development. This reach carries agriculture return and runoff flows from the surrounding developed land. Maintenance and operation activities for active railroads can deposit oils and grease to nearby channels. Contaminants carried from these sources, in addition to contaminants from upland sources, degrade water quality.

Riverine Tidal (Lower Perennial)

Tidal reaches of Lower Marsh Creek mix and dilute with surface waters carried from the upper watershed with brackish Delta water. Stable vegetation grows in the channel in this reach. The vegetation helps to filter and remove excessive nutrients and metals from surface and Delta waters.

Riverine Excavated Artificial

See discussion of the Contra Costa Canal in Section 4.5 of Chapter 4.

Palustrine Aquatic Bed/Unconsolidated Bottom (Stock Ponds, Wastewater Treatment Ponds)

Wastewater treatment ponds found in the Lower Marsh Creek subbasin are part of the treatment process for the City of Brentwood Sunset Wastewater Treatment Plant. Wastewater treatment ponds function to improve water quality through filtration and settling of sediment, thus removing urban contaminants adsorbed to sediment particles. Water from these ponds is not commonly released to nearby stream channels, so water quality of the surrounding environment is not degraded. Similarly, stock ponds remove sediment from the water column. However, use of these ponds by cattle degrades water quality through high concentrations of nutrients and high turbidity from trampling of the soils.

Palustrine Persistent Emergent (Seasonal)

Seasonal wetlands found on grazed lands function to filter out sediment and associated nutrients and urban runoff contaminants contained in surface runoff flows from the surrounding area. These wetlands can serve as the last surface water filtering mechanism before the water reaches the Delta.

Hydrologic Cycling and Flood Storage

Riverine Nontidal (Intermittent and Lower Perennial)

Because of residential developments in the flatland areas low in the watershed, creek channels have been modified to convey floodwaters quickly to the Delta. Floodwaters from this subbasin are carried to the Delta through these engineered channels, as well as culverts and storm drain networks.

Riverine Tidal (Lower Perennial)

Vegetation growing in tidally influenced reaches of Lower Marsh Creek provides structure against bank erosion due to wave action. This is particularly important during storm events when waves become large and more forceful.

Riverine Excavated Artificial

See discussion of the Contra Costa Canal in Section 4.5 of Chapter 4.

Palustrine Aquatic Bed/Unconsolidated Bottom (Stock Ponds, Wastewater Treatment Ponds) and Palustrine Persistent Emergent (Seasonal)

Ponds and seasonal wetlands provide little flood storage capacity.

Management Considerations for WoUS Conservation and Enhancement

There are many opportunities for restoration in the Lower Marsh Creek subbasin to improve habitat and water quality. Table 5-14 summarizes the overall quality of wetland types and opportunities for preservation and restoration. Listed below are a few potential opportunities for this subbasin.

- Restore vegetative and wildlife habitat to upper reaches of the channel. Restore channel sinuosity and create step pool habitat (also works for flood control).
- Ensure wastewater treatment ponds are being properly maintained so contaminants are not leaching to surface or groundwater supplies.
- Maintain grates to stormwater drains in residential neighborhoods to reduce recruitment of garbage and debris to the channel.
- Post notices to prevent local residents from depositing oil, grease, paint, and other chemicals down storm drains, which ultimately transport to Lower Marsh Creek.
- Enforce prevention of illegal dumping of garbage and chemicals to the stream channels and drainage ditches.