

Hayward Marsh

- Located in Hayward, California, and managed by Union Sanitary District
- First phase of the project was completed in 1980; second phase which includes use of secondary effluent was started in 1988
- Flow is diverted from East Bay Dischargers Authority outfall
- The entire marsh area is 172-acres and is divided into sections. Five basins exist and a preserve is set aside for the salt marsh harvest mouse (endangered species). The marsh is a mix of open water habitats with salt water, fresh water and brackish water areas.
- Basin 1 receives chlorinated, secondary effluent. Chlorine residual is allowed; BOD, TSS and fecal coliform limits are met. The Basin is 15 acres and ranges in depth from 5 to 8 ft deep. Basin 1 flows into an outer channel.
- Studies have been ongoing to also try to quantify beneficial metals reductions in secondary effluent
- Wastewater was viewed as a resource rather than a liability – this has been part of the success of the project. Three main project objectives were to:
 1. Create diversified marsh system using secondary effluent
 2. Maximize public benefits, including preserving wildlife habitat, preserving open space, creating educational opportunities
 3. Meeting NPDES permit requirements



Photo credit: RMC staff

Las Gallinas Marsh

- Located near San Rafael, California, and managed by Las Gallinas Valley Sanitary District
- Reclamation/wetlands system was constructed in 1984 together with wastewater treatment plant upgrades as part of the Clean Water Act
- Treatment consists of secondary treatment (with ammonia removal) chlorination and dechlorination. Effluent goes to the marsh, Miller Creek/San Pablo Bay (for discharge), or storage ponds (depending on the time of year). Some effluent is diverted for recycled water use and is filtered to meet Title 22 requirements
 - There is a 20-acre fresh water marsh/pond that was designed to accommodate a variety of wildlife habitat. During times of the year (end of summer is typical) – this area will receive wastewater effluent.



Photo credits: Las Gallinas Valley Sanitary District, www.lgvsd.org



Arcata Marsh

- Located in Arcata, California and managed by the City of Arcata
- System was constructed in 1986 – in response to the Clean Water Act (previously, primary effluent was discharged to the Humboldt Bay)
- Wetlands system is being used to meet wastewater treatment



Photo credits: Friends of the Arcata Marsh, <http://arcatamarshfriends.org/>

requirements but also to restore a degraded urban waterfront. Now there are 100 acres of freshwater and saltwater marshes, brackish ponds, tidal sloughs and estuaries. Because of the wildlife that now exists the area has been renamed to the Arcata Marsh and Wildlife Sanctuary

- There are two NPDES permits for system operation. The first one covers oxidation pond effluent being discharged to enhancement wetlands and one for discharge to the Bay. The limits for both are BOD = 30 mg/L and TSS = 30 mg/L, pH – 6.5-9.5 and fecal coliform of 200 MPN/100 mL.
- Disinfection and dechlorination prior to discharge to Arcata Bay is required due to public use in the area. Thus, effluent from the final enhancement marsh is pumped back to the treatment plant for disinfection.

Kelly Farm Wetland

- Located near Santa Rosa, California, and managed by the City of Santa Rosa
- Part of the 397 acre property that includes both active farming and wildlife habitat
- Demonstration wetland started in 1989 to study the benefits of tertiary-treated recycled water for wetland creation and restoration
- Wetland receives fully treated recycled water so the objectives of the project were to:
 - Identify design criteria to maximize benefits to fish and wildlife
 - Determine how the natural biological processes of a wetland affect the quality of recycled water
 - Evaluate the impact of the reclaimed water on the wetland
 - Provide wildlife and water quality data to key regulatory agencies, public groups and individuals
- Study results to date have shown a high degree of suitability of recycled water for habitat restoration and significant benefits to wildlife



Photo credits: City of Santa Rosa, <http://ci.santa-rosa.ca.us>



Rocky Mountain Arsenal National Wildlife Refuge

- Located near Denver, Colorado, and managed by the US Fish and Wildlife Service
- Beginning in late 2011, Denver Water will begin serving recycled water to the Rocky Mountain Arsenal National Wildlife Refuge
- Recycled water will be brought to three lakes and four wetlands at the Refuge and will be used to irrigate a short-prairie to establish a native grassland area
- Denver Water produces filtered and disinfected recycled water that is of equivalent quality to the California Title 22 standard designation of “disinfected tertiary recycled water”
- Recycled water will replace the use of raw water from a dirt lined canal



- Denver Water analyzes their recycled water for a variety of additional parameters that are of interest to recycled water customers. The typical range found in Denver Water’s recycled water for a few parameters include:
 - Ammonia as N, 0-0.4 mg/L
 - Nitrate as N, 5-20 mg/L
 - Phosphorus, Total as P – 0.04-0.4 mg/L
 - Specific Conductance – 360-1,250 uS/cm
 - Total Coliform - <1 MPN/100 mL

Photo credits: Rich Keen, www.fws.gov/rockymountainarsenal/index.htm