

San Francisco Bay Area Network

Climate Change Resource Brief

Pacific West Region
Inventory & Monitoring
National Park Service
U.S. Department of the Interior



Monitoring Freshwater Quantity and Quality

Freshwater systems within the national parks of the San Francisco Bay Area Network (SFAN) support a variety of federally protected species such as California freshwater shrimp (*Syncharis pacifica*), coho salmon (*Oncorhynchus kisutch*), steelhead trout (*Oncorhynchus mykiss*), and the California red-legged frog (*Rana aurora draytonii*). Changes in quantity or quality of water can significantly alter the habitat for these rare species. Continuous monitoring of physical characteristics and stream discharge occurs in surface waters of all network parks.

Freshwater Community Monitoring

Spawning stocks of coho salmon along the west coast of the United States are at about 1% of historical levels. Habitat loss from urbanization, dam construction, logging, water withdrawals, stream channel alterations, climactic changes, and poor ocean productivity have all contributed to the species' decline. Year-round sampling at GOGA and PORE provides abundance data on spawning coho, number of juveniles produced in the stream, and number of smolt to estimate juvenile survival in park streams. At PINN, red-legged frogs that inhabit the perennial streams will also be tracked.

Vegetation and Wetland Community Monitoring

San Francisco Network parks include a variety of rare and unique vegetation types that exist within a landscape of expanding urban areas, pollution and road construction. The network has implemented a monitoring program to detect new invasive plant species leading to rapid response by park management. In addition, the network is developing monitoring programs to track changes in vegetation communities (e.g. species diversity, density, percent cover) and extent and condition of wetlands.

Avian Community Monitoring

Landbird monitoring investigates long-term changes in species diversity and relative abundance of songbird assemblages in riparian habitats. In addition, species-specific approaches focus on abundance and reproductive success of the endangered spotted owl (*Strix occidentalis*) and prairie falcon (*Falco mexicanus*). Both are sensitive to environmental factors such as precipitation, habitat changes, or human disturbance.

Monitoring Marine Indicators

The San Francisco Bay Area network monitors a variety of marine indicators that are highly susceptible to changes in water temperature or loss of habitat due to sea-level rise. They include invertebrate diversity and abundance of the rocky intertidal zone, abundance and productivity of harbor seals that haul out and breed at GOGA and PORE, and abundance and productivity of western snowy plovers that migrate, overwinter, and breed on park beaches.

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Collecting water quality samples in Lobos Creek of the Presidio (PRES).



Prairie falcon fledgling during a banner year at Pinnacles National Monument (PINN).



Invertebrate sampling in the rocky intertidal zone of Golden Gate National Recreation Area (GOGA).