



U.S. Fish & Wildlife Service

Wetlands and the National Wildlife Refuge System

Protecting and Restoring Wetlands

National Wildlife Refuges harbor wetlands and the exceptional collection of species that inhabit them. From their small beginning in 1903 to protect colonially nesting wetland birds from feather collectors, 540 refuges have been established for conservation, management, and where appropriate, restoration of the Nation's fish, wildlife, and plant resources. Additionally, some of the Nation's largest remaining wetlands are protected within refuges.

There are over 30.4 million acres of wetlands in the Refuge System, about one-third of the 95 million acre total.

Maintaining Wetland Quality with Partners

Purchasing property for a refuge or establishing an easement does not guarantee that a wetland will be completely protected. Outside factors affect wetlands within refuges. For example, sediment, pesticides or fertilizers from lawns or farms can wash into refuge wetlands. Nearby forestry or mining practices can adversely affect the quality of wetlands or their hydrology. Air pollution, traveling over long distances, can also damage wetland plant communities. Invasive species found outside a refuge can invade refuge wetlands, displacing native species.

Outside development can turn a refuge into a habitat "island" lacking areas with which to exchange plant and

animal species for maximum biological diversity. Development can also destroy upland habitats that wetland species may need during various life stages, such as territory needed for young to migrate, mature or breed.

Refuges are partnering with communities, watershed protection bodies, Tribes, municipalities, and States to incorporate refuge concerns into other watershed, water quality, and habitat protection initiatives.

a public awareness campaign to reduce indoor water use. By reducing fresh water effluent, the salinity of the saltmarsh is maintained.

Municipalities in Santa Clara County, California, have banded together to reduce urban runoff pollution which is contaminating Bay saltmarsh. The refuge participates in the County's public education initiative which aims to reduce fertilizer and pesticide use on lawns, increase planting of wildlife

habitat on private properties, improve vehicle maintenance to reduce leaking gasoline-based chemicals and air pollution, and eliminate all dumping into storm drains. Their motto is "Nothing but rain in the drain." Storm drains are stenciled with "Flows to Bay" and a picture of the Clapper Rail.

Wetlands Reestablishment

Many refuges have active programs to reestablish former wetlands within Refuge boundaries.

For example, at the 152,000 acre Alligator River National Wildlife Refuge in coastal North

Carolina near Manteo, half of the area was covered with pocosins, a type of heavily vegetated wetlands. Many Neotropical migratory birds, such as Prothonotary Warbler, Prairie Warbler, Swainson's Warbler, and Red-eyed Vireo nest in the refuge's thick vegetation.

These wetlands had been altered in the past by logging and farming



Pine barren bog protected in the Brigantine Division of the Edwin B. Forsythe National Wildlife Refuge, New Jersey

Service partners have raised funds to purchase Bair Island, for the Don Edwards San Francisco Bay National Wildlife Refuge, California, and develop a restoration plan to return 1,400 acres to tidal marsh. With San Francisco Bay's loss of tidal wetlands at 85%, this extensive restoration effort will benefit the endangered California Clapper Rail and saltmarsh harvest mouse. The refuge has also partnered with the city of San Jose, in

operations. A major refuge objective is to restore historical water levels and natural flooding regimes. The refuge is plugging man-made ditches and installing water control structures that allow seasonal changes to mimic natural conditions. Adding culverts under roads restored the natural sheet flow of water.



Planting Atlantic white cedar at Alligator River NWR, a globally threatened ecosystem

Wetlands Rehabilitation

Sometimes refuges need active rehabilitation, such as planting native species, re-contouring landscapes, reintroducing native wildlife, or reinstating a natural fire regime. At Horicon Refuge, Wisconsin, wetlands have been temporarily drained and cattails burned to rehabilitate habitat. This has allowed species pushed out by cattail invasion to return, increasing species diversity. In California, Sweetwater Refuge staff and school children are rehabilitating a saltmarsh by planting a mosaic of native species.



Digging out common reed to rehabilitate Imperial Refuge wetlands

At the Imperial Refuge in Arizona, a ninety-acre wetland/riparian area dominated by invasive common reed (phragmites) and salt cedar (tamarisk) has been rehabilitated. Exotic species were removed, uplands bordering the wetlands (riparian) were re-contoured, the wetland was deepened, water control structures were added, and native species were planted. This was a cooperative effort between the

Service, U.S. Bureau of Reclamation, Ducks Unlimited, and Wildlife Forever. Since the rehabilitation, the wetland has been used by waterfowl, shorebirds, and the endangered razorback sucker.

Removing Invasive or Harmful Species in Wetlands

Refuges have identified three hundred invasive species on their lands. We estimate that 6 million acres of Service lands are infested with invasive plants and that nearly \$120 million is needed each year to reduce their effects on fish and wildlife. Inventories and assessments are currently underway to determine the locations, extent and impacts of aquatic invasive plant and animal species.



Volunteers removing melaleuca

Volunteers have helped the Arthur R. Marshall Loxahatchee Refuge remove melaleuca, one of the many invasive wetland plants found in Florida. At the J.N. Ding Darling Refuge in Florida, staff and volunteers have cleared Brazilian pepper from the refuge and adjacent property. Many refuges nationwide have been using beetles as a biological control for purple loosestrife.



Nutria exclosure study area, showing nutria damage outside the fence.

On the Chesapeake Bay, Blackwater Refuge, has lost 6 square miles of marsh to nutria. The Service is developing techniques for controlling

this semiaquatic rodent native to South America that destroys the saltmarsh vital to coastal species.

Reducing Contaminants in Wetlands

Sometimes land transferred to the Service for a refuge has soil contamination affecting wetlands and wildlife. Crab Orchard Refuge in Illinois addressed residual industrial pollutants, including PCB's and heavy metals. With intensive efforts still ongoing, refuge actions have included soil studies to outline the problem; contaminant removal, incineration, and landfill; and disposal of unexploded ordnance.

The Kesterton Unit of the San Luis Refuge in California is addressing the problem of selenium leaching from the soil after irrigation of semiarid cropland. Contaminated agricultural drainwater was diverted from the refuge and contaminated soils in the wetlands were covered with clean dirt to prevent bird die-off.

Wetlands in many other refuges are threatened by agricultural runoff of pesticides and fertilizers. At Tule Lake Refuge in California, the refuge developed an integrated pest management plan to reduce the use of pesticides and herbicides on its lands that are leased for agricultural use. The refuge also maintains a buffer around the wetlands and works with farmers to pilot and encourage various low-chemical farming practices such as low input farming, organic farming, and flooding and leaving fields fallow for a year. At the same time, the refuge is addressing the lack of dissolved oxygen in the lake's water due to the overuse of fertilizer.

Other refuges are studying a wide range of threats to their wetlands. As more is known about issues affecting the wetlands, cooperative plans and partnerships for action can be developed to protect or rehabilitate these important habitats and the fish, wildlife and plant species that rely on them.

To learn more about wetlands in the National Refuge System, visit their website at <http://refuges.fws.gov>

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