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Restoring Salt Marsh Habitat for the Recovery of California Clapper Rails

by Joy Albertson

California Clapper Rail/ Photo by Bill Purcell

In the early 1800s, California clapper rails (*Rallus longirostris obsoletus*) were abundant in the tidal marshes of San Francisco Bay and smaller populations were present in coastal marshes from Humboldt Bay to Morro Bay. Between 1850 and 1915, when rail hunting was made illegal, over-hunting by market and sport hunters decimated rail populations leading to the extinction of many local populations. Some local rail populations recovered following the hunting closure, however the California clapper rail never fully recovered. Destruction of tidal marsh habitat for urban use and salt production accelerated in the 1920s and proceeded at a rapid pace until federal and state laws were enacted in the mid-1960s. Since that time, large scale habitat loss has been limited, but the cumulative effects of many small habitat losses has resulted in significant wetland loss and degradation.

In the last 100 years, approximately 85% of the salt marsh habitat in San Francisco Bay has been destroyed by filling and diking. This dramatic loss and fragmentation of salt marsh habitat has been the primary factor leading to severe long-term declines in California clapper rail populations. Rail populations declined so significantly that the federal government listed the California clapper rail as endangered in 1970.

In 1972, the most crucial positive action toward rail recovery occurred when local environmental groups and Congressman Don Edwards offered strong support for the establishment of the 23,000-acre San Francisco Bay National Wildlife Refuge in the marshlands of south San Francisco Bay. The goals of the Refuge are to conserve wildlife, fish and plant species listed as endangered or threatened under the Endangered Species Act, to protect migratory birds, and to promote wildlife-dependent educational opportunities to foster public awareness and appreciation of local wildlife resources. The Refuge protects approximately 3,500 acres out of the 8,600 acres of salt marsh habitat in the South Bay from further development.

In 1984, the U.S. Fish and Wildlife Service drafted a California clapper rail recovery plan to provide a framework for implementing recovery strategies for this endangered species. The primary focus of the recovery plan involved restoration and enhancement of salt marsh habitat for the benefit of the rail. In 1988, again supported by Congressman Don Edwards and citizens groups, Congress approved expansion of the Refuge to 43,000 acres. This action will allow additional habitat to be protected and restored for the benefit of the rail.

Presently, California clapper rail populations are restricted to fragmented salt marshes in San Francisco Bay. Remaining marshes are geographically disjunct, and characterized by lack of a natural transition zone between the marsh and upland habitat, relatively small size, and close proximity to urban and industrial development. As habitats have become more fragmented, with easier access for terrestrial predators such as the non-native red fox and feral cats, predation pressures have increasingly threatened the survival of rails and other ground nesting species inhabiting these areas.

Currently, the Refuge is involved in an integrated predator management program to reduce effects of non-native predators on native wildlife species. Efforts include predator barriers removal, and habitat management to reduce suitability for these predators. Without control of non-native predators, benefits of other long-term recovery actions for the rail, such as habitat protection and marsh restoration, would be limited. Restoration of salt marsh habitat is the only long-term solution to recovery of the rail and protection of other species dependent on the marsh. In order to plan restoration projects which have a higher chance for supporting rail populations, biologists need to consider the physical characteristics of marshes which affect rail use. This allows us to create marshes supporting large, self-sustaining populations of rails.

Red Fox Predating on a Mallard Duck

Some of the physical characteristics of marshes which affect rail use are size of marsh, location relative to other marshes, buffer area between marsh and upland, elevation of the marsh, and hydrology. These factors all contribute to the "quality" of the habitat for rails. Elements of quality include food resources, cover from predators, nesting habitat, and habitat available during high tide. Rails in "high quality" marshes don't need as much area to fulfill their requirements because resources are more abundant. This means that the quality of restored habitat will help determine the number of rails that can live in the marsh.

Marsh size and habitat quality, considered together, determine the maximum number of rails which can be supported in a particular marsh. It is important to consider habitat quality prior to starting a restoration project, since parcels of low quality habitat may not be able to support a viable rail population. This is because rails call to each other to contact one another, to advertise breeding status, and to defend territories. If a rail cannot hear another rail because they are too far apart, it may not find a mate or breed. A population of many unmated rails will not sustain itself.

Location of marshes with respect to one another should also be taken into consideration when planning restoration. Marshes to be managed for breeding clapper rails should be in close proximity to each other to facilitate dispersal without risk of excessive predation. Minimally, marsh corridors (low-quality, narrow marsh habitats not used by rails for breeding), should be available between the primary breeding marshes to provide cover for migrating rails.

Size of buffer areas or transitional habitat (area between the marsh and uplands) is important because outside influences from the upland area may have devastating effects in the marsh. The larger the buffer, the less severe or direct the impacts will be. For instance, one of the reasons the non-native red fox is able to have a large impact on rail populations is because there is no buffer area between the uplands and the marsh. Most remaining marshes have levees on at least two sides and the foxes use the levees to reach the marsh.

The shape of marshes also determines ease of access for foxes. The narrower the marsh, the easier it is for foxes (and other terrestrial predators) to gain access to the entire marsh. Historically, marshes were very wide, with ample transition zones. Likely, terrestrial predators limited their activities to the edges of the marshes and wildlife in the interior of the marsh was safe from this type of predation.

The presence of intricate networks of tidal channels in marshes is one of the most important characteristics of high quality rail habitat. Rails feed on invertebrates in the mud of the channels during lower tides. The channels are rich in food resources because constant supplies of nutrients enter the marsh with each tide cycle. Generally, marshes with more tidal channels can support more rails because food resources are more abundant. Rails in the tidal channels are also fairly safe from most predators because most channels are too narrow to allow predators to hunt effectively. If pursued in a channel, rails will evade predators by running quickly down a channel system and taking cover in the overhanging vegetation of the channel, becoming nearly impossible to capture. Most predation of clapper rails takes place during higher tides, when the tidal channels are filled with water and most marsh vegetation is flooded. This happens mostly during the winter season, when very high tides are common.

The elevation of the marsh greatly affects which type of vegetation will grow, determining how rails can use the marsh. Low marsh areas with sparse vegetation and tidal sloughs are used by rails for foraging. Higher marsh areas with dense vegetation are used for nesting. A marsh needs to have both high and low marsh in order to supply

all the needs of the rail. Marsh elevation has been a problem in many past (and present) restoration projects because of limitations in the methods used to construct the marsh.

Since most of the restorable parcels in the San Francisco Bay area have subsided due to drying of the soil after being diked off from the bay, elevations in many parcels are currently too low to support marsh vegetation. The two main methods of raising the level of restoration sites are introduction of dredge spoils (bay muds) on top of the existing soil surface and opening the area up to tidal action and allowing natural sedimentation to raise the ground level. Both methods are still experimental and may be subject to problems.

When using dredge spoils, it is difficult to predict how much material should be imported to increase the elevation. Since materials are brought in as wet mud, they will eventually dry and settle. Unfortunately, the amount of settling is sometimes unpredictable. If the mud settles too much, the restored area will be too low for marsh vegetation and may require additional materials. However, if the mud doesn't settle as much as predicted, the area will be too high and dry for growth of healthy marsh vegetation and formation of tidal channels. Another major issue associated with dredge spoils is that they may contain high levels of certain contaminants, which would make them unsuitable for use in wetlands restoration projects.

Opening restoration areas to tidal action allows sedimentation and formation of marshes to occur, although at a slower rate than with dredge spoils. Since the sediment load in San Francisco Bay is quite high, enough sediment is present in the water column to allow the elevation of restoration areas to increase quite rapidly up to a level that will support marsh vegetation. The advantage of this method is that it allows tidal channels to form naturally, which will result in the formation of a relatively healthy, self-sustaining marsh with sufficient tidal action to support vegetation. Depending on sedimentation rates and initial elevation of the restoration area, sedimentation may take approximately 5-15 years before marsh vegetation begins to grow.

If rail habitat requirements are taken into account when planning habitat restoration, more successful rail recovery may be possible. However, the process of marsh restoration is still in the experimental stage and we have not yet discovered how to recreate marshes as good as those created naturally. Therefore, monitoring the success of restoration projects is critically important, because it is our only chance to learn how to improve our methods.

There are many current marsh restoration projects in the San Francisco Bay area. The San Francisco Bay National Wildlife Refuge Complex is involved in several, including restoration of a 1,500 acre parcel of former farmland, called the Napa Marsh Unit (formerly known as Cullinan Ranch), in the Napa River area of the north bay. This area is planned to be restored to full tidal action for the benefit of clapper rails and other species, with levee breaching and natural sedimentation.

The Refuge has contracted with the National Biological Service to plan restoration of the Knapp Property, a 452-acre former salt pond in the Alviso area, on the edge of the bay, between Alviso and Guadalupe Sloughs. The levee may be breached in several locations, allowing full tidal action to the area. Wetland vegetation is expected to become established and grow within five to ten years in this area.

The East Bay Regional Park District is involved in a cooperative project with the Refuge and other organizations to enhance a 325-acre area of diked salt marsh and adjacent uplands known as Oro Loma Marsh, located along the shore of Hayward. The area will be restored to tidal marsh and seasonal wetland habitat.

The Refuge has also been working closely with the Regional Water Quality Control Board, the California Department of Fish and Game, and the City of San Jose to plan mitigation for conversion of salt marsh to brackish marsh which occurred in the Coyote Creek area due to excessive freshwater outflow from the San Jose Water Pollution Control Plant. This effort has resulted in a purchase by the Wildlife Conservation Board of 835 acres of inactive salt evaporators in Hayward, known as the Baumberg Tract, from Cargill Salt Co., to be restored to tidal marsh and seasonal wetlands. In addition, in order to complete the remainder of their mitigation requirements, the City of San Jose has also recently purchased the Moseley Tract (located just north of the west approach to the Dumbarton Bridge) from the Port of Oakland for restoration to tidal action.

The largest potential addition to the Refuge is Bair Island, a 1,673-acre diked wetland in Redwood City, owned by a private Japanese construction firm. The U.S. Fish and Wildlife Service, California Department of Fish and Game and environmental groups continue to pursue purchase of this land for restoration to tidal salt marsh. This parcel could be especially important to the recovery of rail populations due to its large size and location adjacent to a fairly large existing population of rails on Greco Island.

Current habitat configuration and present predation pressures will not allow rail densities to be increased without additional efforts. Therefore, short-term predator management will be required to maintain viable populations, but it is not the solution to increasing future populations. Only restoration of high quality salt marsh habitat will ensure future survival and recovery of the California clapper rail.

With continued support from citizens and environmental groups to purchase large tracts of restorable land, and close cooperation with agencies to plan high quality restoration and mitigation projects, it will be possible to restore large areas of salt marsh in San Francisco Bay for the benefit of the clapper rail and other marsh species.

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