



SAN FRANCISCO BAY
BIRD OBSERVATORY

Western Snowy Plover Recovery and Habitat Restoration at Eden Landing Ecological Reserve



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METHODS

Study Area

SFBBO conducted Snowy Plover and predator surveys, chick banding, and habitat restoration at Eden Landing Ecological Reserve, which includes approximately 6,400 acres of former salt ponds, marsh, and tidal habitat located in Alameda County. Eden Landing is operated by the California Department of Fish and Wildlife.

Snowy Plover Surveys

Snowy Plovers in the San Francisco Bay nest predominantly on dry ponds, berms, and levees. To document areas used by Snowy Plovers and to estimate the number of Snowy Plovers in the South Bay, we identified ponds with potential nesting habitat and surveyed those ponds weekly.

From March 21 to September 28, 2017, SFBBO biologists, interns, and volunteers surveyed the ponds by driving slowly on the levees or walking levees without vehicle access. We stopped approximately every 0.3 miles to scan for Snowy Plovers with spotting scopes. We recorded the number and behavior of all Snowy Plovers present, identified the sex and age class of each individual using plumage characteristics (Page et al. 1991), and marked the approximate location of sightings on a geo-referenced map. We also recorded the color-band status, and combination if appropriate, of any banded plover sighted.

Nest Monitoring

We located Snowy Plover nests by scanning for incubating females during weekly surveys. We then searched for nests on foot and recorded nest locations with a GPS unit (Garmin® GPS 60 or Garmin® eTrex Venture HC) and/or hand-held tablet (Apple® iPad 2 or Apple® iPad Mini 2).

We monitored nests weekly until we determined the fate of the nest. On each visit, we recorded whether the nest was still active (eggs present and adults incubating) and the number of eggs or chicks in the nest. We floated the eggs (Hays and LeCroy 1971) to estimate egg age. Since Snowy Plover nests are active for an average of 33 days (Warriner et al. 1986), we could use the known egg age to calculate the nest initiation date (the date the first egg was laid) and predicted hatch date for all nests monitored. When we observed an empty nest, we assigned each nest a fate (hatched, depredated, flooded, abandoned, failed to hatch, unknown, or other) based on evidence seen at the nest (Mabee 1997).

Chick Color Banding

To band chicks, biologists checked nests daily, starting four days before the estimated hatch date. Due to the precocial nature of chicks, we timed our arrivals to a short window between the complete hatching of chicks and their movement away from the nest. We banded each chick with a unique four-color combination by placing two bands on each leg below the tibiotarsal joint. Each combination consisted of three color bands and one silver U.S. Geological Survey band covered with tape.

We defined a fledged chick as one that survived to 28 days of age, at which point it is considered to be capable of flight (Warriner et al. 1986). We calculated apparent fledging success as the percentage of fledged, banded chicks out of the total chicks banded.

Avian Predator Surveys

SFBBO biologists and interns conducted predator surveys on the same ponds surveyed weekly for Snowy Plovers. Observers chose points throughout the survey that would allow the observer to fully scan all required ponds for predators. At each survey point, the location, start time, and stop time were recorded. Observers recorded the number, species, behavior, and habitat type at the time of sighting of any predators present. The approximate locations of the predators were marked on a map.

We defined avian predators as any species that could potentially prey on a Snowy Plover nest, chick, or adult. While mammalian predators and their signs (e.g., tracks) were also recorded opportunistically, these surveys were not designed to detect mammals, particularly since many are nocturnal. Among all avian predators, we considered raptors, gulls, and corvids to be the most critical potential predators to Snowy Plover adults, eggs, and chicks due to our previous observations.

Habitat Restoration

After the Snowy Plover breeding season was complete, SFBBO biologists identified two ponds, E6B and E8, in need of restoration and enhancement to provide higher quality Snowy Plover breeding habitat. In the north section of E8, vegetation has overgrown much of the Snowy Plover habitat, including previously deployed oyster shell plots that provide increased camouflage for Snowy Plover adults, chicks, and eggs. Beginning in November, SFBBO biologists and volunteers began work to remove large amounts of vegetation from this area, while leaving small amounts of vegetation dispersed throughout the pond in place to provide hiding places for chicks.

At both E6B and E8, high depredation rates of Snowy Plover nests may have been due to a lack of habitat complexity, making incubating adults, and thus nests, easier to detect by predators. To provide increased habitat complexity, SFBBO is planning a large volunteer mud stomp event for early March 2018. During this event, participants will walk repeatedly over a pre-defined portion of the ponds to increase the amount of texture on the pond bottom. In addition, some participants will be spreading oyster shells over these areas by hand, providing additional complexity to the pond bottom.

RESULTS

Snowy Plover Surveys

We observed a mean of 168 birds per week from March 21 through September 28 (compared with a mean of 143 birds per week during the same time period in 2016). Pond E14 supported the largest numbers of Snowy Plovers during the breeding season, averaging 87 birds per week.

Predator Surveys

The most abundant potential avian predators at Eden Landing were California Gulls (226/week) and unidentified gulls (337/week). Peregrine Falcons were the most frequently observed raptor at Eden landing (2.1/week), and they were especially numerous at ponds several critical plover nesting ponds, including E14, E6A, E6B, E8, and E16B, where they used old wooden structures, hunting blinds and power towers as hunting perches and nesting sites. Common Ravens (1.3/week) were observed most frequently in ponds E6C, E8, E14, and E15B, often foraging along the pond bottom. At pond E14, camera traps recorded Common Ravens depredating 30 Snowy Plover nests throughout the course of the season. Northern Harriers were observed hunting in ponds E14 and E6a.

Early and Late Season Trends.

In March, we observed large flocks at ponds E12 and E14, averaging 30 and 96 Snowy Plovers per week during this period, respectively. In August, we observed large flocks at E14, averaging 98 Snowy Plovers per week for the month. In both cases, many of these birds may have been staging (for migration), arriving for the breeding season (in March) or early arrival wintering birds (in August).

Nest Abundance and Success

We determined the fate of 199 Snowy Plover nests at Eden Landing. 100 hatched (50%), 82 were depredated (41%), six were abandoned (3%), five were flooded (3%), and six were unknown (2%). Pond E14 had the most nests (85), followed by pond E16B and E8 (30 nests each) and pond E13 (22 nests).

Chick Fledging Success.

We banded 48 Snowy Plover chicks in 2017 and determined that at least 24 chicks fledged (44%). While most fledgling sightings were recorded during the breeding season, several came during post breeding season band resighting surveys and through the use of camera traps strategically placed in areas where plover flocks are known to congregate. Due to the difficulties of resighting fledged chicks within the South San Francisco Bay Ponds, it is possible that additional chicks fledged as well.

Habitat Restoration

Thus far, SFBBO biologists and volunteers have removed vegetation from approximately 0.75 hectares of important breeding habitat in E8. During this project, we plan to remove vegetation from an additional 2.0 hectares. This work will continue until considered complete, or until March 1, 2018, when the Snowy Plover breeding season officially begins.

Remaining Funding

We were able to leverage grant funding provided by Alameda F&G Commission to obtain additional funding support from US Fish and Wildlife. This resulted in a surplus of funds from the Alameda F&G Commission. As of December 14, 2017, there is still \$4162 remaining from the grant provided by Alameda County F&G commission. The rest of these funds will be spent on Snowy Plover recovery and restoration at Eden Landing in the following ways:

- Equipment acquisition for Snowy Plover surveys
- Winter Snowy Plover surveys
- Habitat restoration: vegetation removal project at Pond E8
- Mud stomp event
 - Approximately 100-125 volunteers
 - Two porta-potty rentals
 - Pizza lunch after event

Photos

All photos were taken by SFBBO biologists, and should be credited to SFBBO when used for outreach or publication.



Figure 1. Vegetation removal at Eden Landing to improve plover nesting habitat quality



Figure 2. Chick banding at Eden Landing



Figure 3. Male Snowy Plover with one of his three chicks hiding in the pickleweed nearby



Figure 4. On the left, a chick banded in June with the combination kk:oy, not seen as a chick again. On the right, kk:oy, confirmed as a fledgling in late August on camera.