



Santa Clara County Fish & Game Commission Grant Application

Project Summary

The San Francisco Bay Bird Observatory (SFBBO) is a nonprofit organization dedicated to the conservation of birds and their habitats through science and outreach. Founded in 1981, SFBBO is a local authority on the birds that rely on the San Francisco Bay and its surrounding environments. SFBBO conducts a wide range of science programs, including Western Snowy Plover and California Least Tern Recovery, Avian Disease Prevention, Tidal Marsh Restoration, Colonial Waterbirds Monitoring, and Passerine Banding at the Coyote Creek Field Station. Critical in all of these programs are the many citizen scientists who volunteer for SFBBO, who contribute thousands of hours to our programs.

Western Snowy Plovers (*Charadrius nivosus nivosus*; Snowy Plover) have declined due to loss of habitat, human disturbance, and increasing predator populations. Snowy Plovers were classified as federally threatened in 1993, with a Final Recovery Plan produced in 2007. As part of the Recovery Plan, the Snowy Plover breeding range was broken up into distinct Recovery Units, each with their own population goals. The San Francisco Bay is designated Recovery Unit 3 (RU3), and has a population goal of 500 breeding adult Snowy Plovers.

Snowy Plovers in RU3 nest almost exclusively in dry salt panne habitat in former salt evaporation ponds (Figure 1). The vast majority of Snowy Plover habitat is located within the South Bay, with 303 out of 304 nests monitored by SFBBO in 2023 found south of the San Mateo Bridge. Most of this habitat is part of the South Bay Salt Pond Restoration Project (SBSRP), which aims to restore up to 15,000 acres of managed ponds back to tidal marsh. This restoration will benefit many wildlife species and buffer bay habitats against the effects of climate change, but poses a challenge to Snowy Plover recovery as the project has already reduced the amount of Snowy Plover breeding habitat by 27 percent and will likely reduce it even further in the coming years.

Snowy Plover recovery in RU3 is also heavily impacted by several predator species whose populations have greatly expanded in recent years. These include common raven (*Corvus corax*), which was formerly considered rare in the Bay Area but is now one of the most commonly sighted predators; red fox (*Vulpes vulpes*), a non-native canid species which has expanded across the Pacific coast and caused the decline and extinction of numerous ground nesting birds and small mammals; and California gulls, which were formerly only winter visitors to the San Francisco Bay, but began breeding here in 1980 and now have an estimated population of 50,000. All of these species are generalists that thrive in the presence of humans and supplement their diets with the adults and young of sensitive species such as Snowy Plovers.

Despite the challenges faced by shrinking habitat and rapidly expanding predator populations, the RU3 Snowy Plover population has remained relatively stable, with an average of 256 breeding adults counted during the May Breeding Window Surveys from 2016-2023. However, it must be noted that during this time-frame, the SBSRP has supported 82% of all breeding Snowy Plovers in the San Francisco Bay. Much of SFBBO's research has focused on enhancing and monitoring the remaining Snowy Plover breeding habitat within the SBSRP footprint, but also on identifying suitable habitat not planned for

tidal marsh restoration.

Crittenden Marsh, which consists of Crittenden Marsh East (CME, owned by NASA-AMES) and Crittenden Marsh West (CMW, owned by Midpeninsula Regional Open Space District [Midpen]) is located in Mountain View next to Moffett Airfield. These two parcels can potentially provide long-term Snowy Plover breeding habitat (Figure 1) in Santa Clara County. Crittenden Marsh was first identified as a Snowy Plover breeding site in 2014, when SFBBO biologists found and monitored 14 nests over the course of the season. Minimal Snowy Plover breeding activity was observed on-site from 2015 to 2017 due to a combination of high spring precipitation and a malfunctioning water control structure in adjacent Don Edwards National Wildlife Refuge pond A2E. This resulted in water levels rising enough in Crittenden Marsh to preclude Snowy Plover nesting in most areas. In 2018, NASA began a remediation project at Crittenden Marsh to remove a peninsula on the pond, which required them to dewater the pond. As a result, SFBBO biologists found and monitored 6 nests in Crittenden Marsh, of which four hatched and two were depredated. In 2019, due to high water levels only one nest was located (Figure 2), although two additional broods observed on the pond indicate additional nesting occurred.

In 2020, with the support of Santa Clara County Fish and Game Commission (the Commission) funding, SFBBO again monitored Crittenden Marsh for breeding Snowy Plovers. Due to lower water levels, there was much more available breeding habitat for Snowy Plovers, and SFBBO monitored a record for the site (at the time) of 15 nests (Figure 2), of which 10 hatched. In addition, SFBBO was able to color band 6 chicks and track an additional 5 in which the attending male was color banded, determining that 8 of these chicks fledged. This resulted in a chicks fledged per male ratio of 2.5, considerably higher than the estimate of 0.66 across all of RU3 in 2020. This indicates that Crittenden Marsh can provide high quality breeding habitat that will contribute significantly to RU3 recovery goals.

With support from the Commission, SFBBO was able to continue monitoring breeding Snowy Plovers at Crittenden Marsh from 2021 to 2023 (Figure 2). In 2021, drought conditions provided a large amount of suitable breeding habitat, and SFBBO located and monitored a record total of 23 nests, finding that eight hatched, fourteen were depredated, and one nest was abandoned. In 2022, water levels were higher, meaning there was less available habitat for nesting, and SFBBO only monitored eight nests that year. In 2023, similar to 2017, water levels in Crittenden Marsh stayed high enough to completely preclude Snowy Plover nesting for the entire season due to historic winter rains.

Due in part to SFBBO's work at Crittenden Marsh, Midpen became interested in managing CMW for Snowy Plovers and developed a phased plan for active management and habitat enhancement over the next 10 years. Following the 2022 breeding season, Midpen spread oyster shells on CMW as prescribed in Phase I of their management plan. Moving forward, Midpen agreed to fund SFBBO to continue monitoring CMW in order to track the impact of their habitat enhancement and ongoing management activities. SFBBO is requesting funds from the Commission to continue comprehensive nest monitoring and chick banding at CME in 2024.

Snowy Plover nest monitoring at Crittenden Marsh will be especially important this year because the 2024 season will be the first season since the breach of Don Edwards National Wildlife Refuge's pond R4 in Menlo Park, approximately seven miles northwest of Crittenden Marsh. Although this breach was planned and accounted for as part of the SBSRP, it is a major loss for Snowy Plovers and represents the conversion of eight percent of their remaining habitat to tidal marsh. Excluding the other four Ravenswood ponds, Crittenden Marsh is the next closest nesting site available to Snowy Plovers on the

Peninsula. It will be particularly important to track whether and how Snowy Plover usage of Crittenden Marsh changes in the aftermath of the R4 breach. This data will allow land managers to make decisions that will help make Crittenden Marsh as favorable as possible for Snowy Plovers moving forward.

Through nest monitoring at CME, SFBBO will further the research of federally listed wildlife species occurring in Santa Clara County (**Fish & Game Code 13103-i**), provide recommendations for predator control actions benefiting federally listed wildlife species in Santa Clara County (**Fish & Game Code 13103-h**), and provide habitat enhancement recommendations for federally listed wildlife species in Santa Clara County (**Fish & Game Code 13103-e**).

Detailed Project Description

Breeding Surveys and Nest Monitoring (Fish & Game Code 13103-i,e)

From March 1 to September 15 SFBBO will conduct a weekly count survey at CME. These surveys are conducted by driving slowly along pond levees or walking levees without vehicle access, stopping approximately every 0.3 miles to scan for Snowy Plovers with a spotting scope. During each survey, SFBBO will record the number and behavior of adult Snowy Plovers present, identify the sex of each individual using plumage characteristics, and mark the approximate location of sightings on a geo-referenced map. When appropriate, SFBBO will also record the number and location of nests or chicks found at CME and the color-band combinations of any banded birds sighted.

SFBBO will locate Snowy Plover nests by scanning for incubating females during weekly surveys. If an incubating female is found, the exact location of the nest will be determined by foot-search and recorded with a GPS-enabled device. SFBBO will monitor active nests weekly until the final nest fate can be determined. During each nest visit, SFBBO will record the number of eggs or chicks in the nest, and float all eggs that are not actively hatching to estimate egg age. Using the estimated egg age, SFBBO will calculate the nest initiation date and predicted hatch date based on the average egg-laying-to-hatching period of 30 days. When there are no longer eggs in the nest, SFBBO will assign each nest a fate (hatched, depredated, flooded, abandoned, unknown, or other) based on evidence seen at the nest (Mabee 1997). A nest is considered successful if it hatched at least one egg.

SFBBO will include the results of all Snowy Plover breeding activity and nest success at CME in its annual report, which summarizes and discusses the results of all the Snowy Plover surveys conducted in RU3 in 2023. This report includes management recommendations to improve the habitat of Snowy Plovers across RU3, including in Santa Clara County.

Avian Predator Surveys (Fish & Game Code 13103-h)

Concurrently with Snowy Plover breeding surveys, SFBBO surveys for avian predator species which have the potential to depredate Snowy Plover nests. Predator species include (but are not limited to): Common Raven (*Corvus corax*), American Crow (*C. brachyrhynchos*), Northern Harrier (*Circus hudsonius*), American Kestrel (*Falco sparverius*), Peregrine Falcon (*F. peregrinus*), Merlin (*F. columbarius*), Red-tailed Hawk (*Buteo jamaicensis*), Cooper's Hawk (*Accipiter cooperii*), White-tailed Kite (*Elanus leucurus*), Golden Eagle (*Aquila chrysaetos*), Great Blue Heron (*Ardea herodias*), Great Egret (*A. alba*), Snowy Egret (*Egretta thula*), Loggerhead Shrike (*Lanius ludovicianus*), Barn Owl (*Tyto alba*) and Burrowing Owl (*Athene cunicularia*). While SFBBO opportunistically records mammalian predator sign (e.g., visual sightings or tracks), the avian predator surveys are not designed to detect mammals, particularly since many mammalian predators are nocturnal.

Avian predator surveys are conducted concurrently during Snowy Plover surveys. Observers choose survey points throughout the survey that allow the observer to fully scan all required ponds for predators. At each survey point, the location, start time, and stop time are recorded. Observers record the number, species, behavior, and habitat type at the time of sighting any predators present. The approximate locations of the predators are marked on a map. In addition, observers document any predator nests in the area and their fates when possible.

SFBBO will relay information on particularly problematic predators to the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) to coordinate their removal if possible.

Amount Requested

Total = \$9,856

List of other funding sources

SFBBO has applied for funding from the California Wildlife Foundation to fund plover research in 2024 within the South Bay Salt Pond Restoration Project footprint, including in Santa Clara County at Don Edwards National Wildlife Refuge.

Midpen has agreed to fund SFBBO to conduct Snowy Plover research on CMW in 2024.

Fish and Game Commission Fund Purpose

This grant will primarily fund staff time from March 1 to September 15 to conduct plover breeding surveys and associated predator surveys at Crittenden Marsh in Mountain View. In addition, we will share nest and brood location data on a weekly basis with Midpen, NASA-ARC, and USFWS to ensure that breeding plovers are not impacted by any activities within or adjacent to Crittenden Marsh. Additional staff time will be spent conducting project management and administrative tasks from March 1 to December 31.

Benefit to fish and/or game in Santa Clara County or education benefits of project

This research will play a vital role in the recovery of federally threatened Snowy Plover populations in Santa Clara County, and allow SFBBO to continue providing data to the USFWS to meet the federal recovery goals. With high breeding productivity documented in multiple years, Crittenden Marsh is a valuable location to manage for Snowy Plovers in Santa Clara County as Snowy Plover habitat is lost to tidal marsh restoration projects and sea level rise.

Has the commission provided funds for this project/event or to the organization in the past? If so, when and how much?

Santa Clara County F&G Commission provided \$5,000 in 2019, \$8,000 in 2020, \$8,536 in 2021, \$8,850 in 2022, and \$9,356 in 2023 for similar activities. These funds allowed SFBBO to survey Crittenden Marsh for breeding plovers and predators, share the data with landowners and agencies to prevent disturbance to breeding plovers, conduct data analysis, and include this data in our annual reports which are shared with the Commission.

Project Schedule

- Plover Surveys; Timing – Weekly, March 1-September 15, 2024
 - Using spotting scope and/or binoculars, count, sex, and record behavior and color band combinations (when applicable) of all plovers observed in CME; record observation locations on georeferenced map

- Locate active nests, record location using a cellular phone
- Predator Surveys; Timing – Weekly, March 1-September 15, 2024
 - Using spotting scope and/or binoculars, count and record behavior of all potential predators of plover adults, chicks, and eggs observed within 100m of CME; record observation locations on georeferenced map
 - Inform U.S. Department of Agriculture Animal and Plant Health APHIS Wildlife Services of any problematic predators in area
- Nest Monitoring; Timing – Weekly, March 1-September 15, 2024
 - Determine stage of development using egg flotation method
 - Communicate nest and brood data to land owners and agencies
 - Once nest is no longer active, determine fate of nest i.e. hatched, depredated, flooded, unknown, etc.

Figures



Figure 1. Former salt production and stormwater retention ponds in Santa Clara County, including Crittenden Marsh in Mountain View.

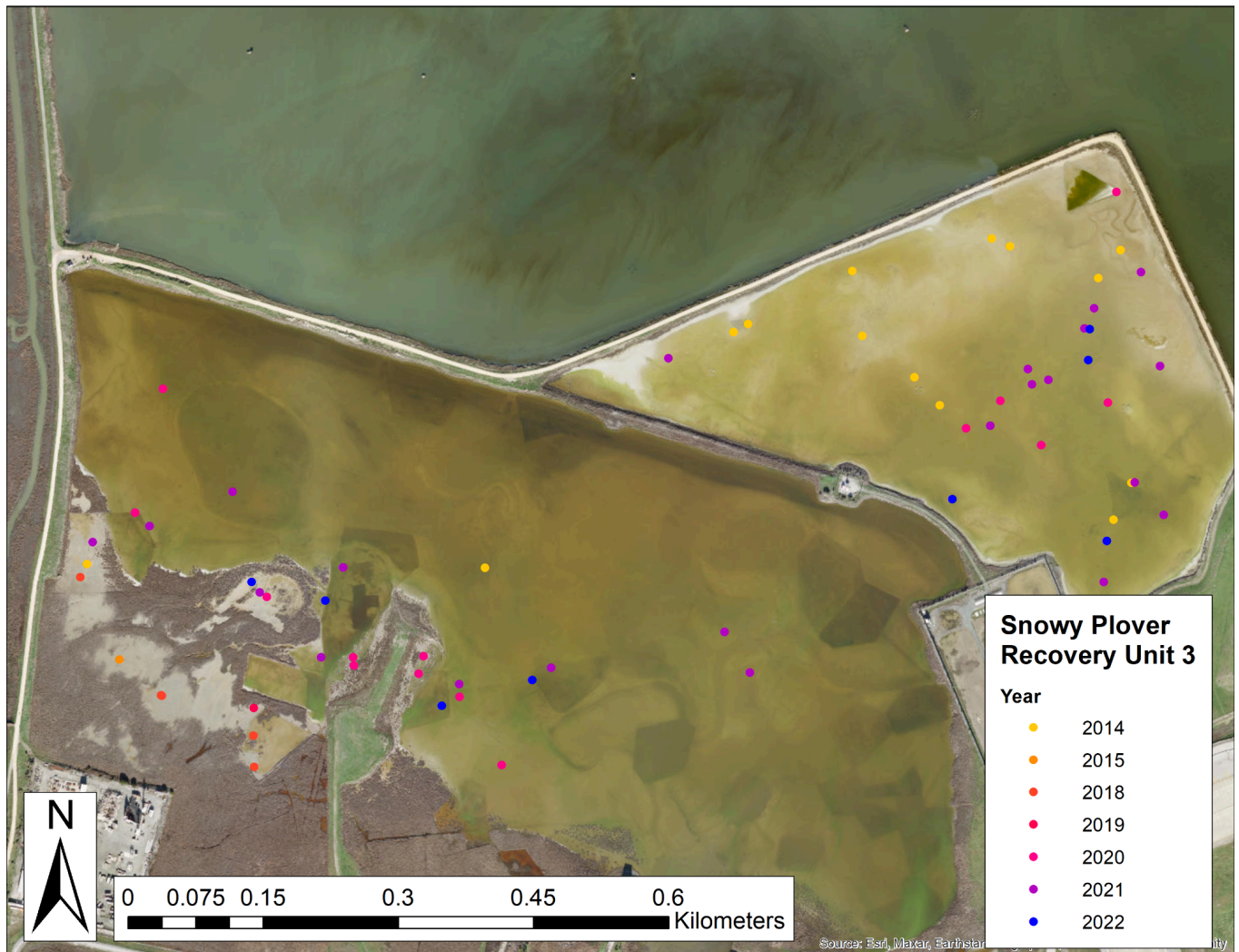


Figure 2. Snowy Plover nests at Crittenden Marsh, Mountain View, CA 2014-2022



Figure 3. Two color banded Snowy Plover chicks and an egg in Crittenden Marsh, Mountain View, 2021.

Submitted by

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