SOUTH BAY SALT POND RESTORATION PROJECT

Bird Workshop 1 Summary (March 11, 2005 from 10:00am to 5:00pm)

Organizers: Lynne Trulio, Nils Warnock, Steve Rottenborn; Facilitator: Mary Selkirk, CCP

INTRODUCTION

The purpose of the workshop was to discuss the state of our knowledge on migratory bird use of existing habitats in the South Bay and to examine the extent to which restoration is likely to affect bird species currently using salt ponds. Specific goals included:

- understanding the habitat needs of shorebirds and waterfowl using habitats in the South Bay.
- understanding how South Bay habitats can be managed and enhanced to increase the use of ponds by these migratory species while supporting tidal marsh species recovery.

Desired outcomes were as follows:

1. A list of habitat requirements of migratory shorebirds and waterfowl.
2. A suite of feasible management and enhancement methods likely to improve habitat for migratory birds and likely effects of these actions (for example, which species will benefit and how much; which species will not benefit).
3. A list of indicator species and parameters for monitoring bird response to management/enhancement actions for adaptive management.
4. Key questions and uncertainties for near-term and long-term studies/experiments.

MORNING PRESENTATIONS and OUTCOMES

Nils Warnock, PRBO, presented, "Overview of Migratory Bird Use/Habitat Needs in the South Bay Salt Ponds." He emphasized the importance of San Francisco Bay to shorebirds and other birds, citing that more than 50% of all shorebirds counted on the Pacific Coast are found in the Bay and that South Bay salt ponds support over 25% of the Bay's total waterfowl population. He summarized data gathered by the Point Reyes Bird Observatory and USGS between 1999 and 2001 covering 14 salt ponds and 24 tidal marshes. They found densities of water birds were higher in salt ponds and most foraging is done over the entire range of salinities peaking at about 140 ppt. The cumulative abundance of birds in 20 of the ponds surveyed showed 90% of small shorebirds were found in 25% of the salt ponds, and that 90% of large shorebirds were found in 50% of ponds. Other data showed that 90% of diving ducks were found in 43% of ponds and 90% of dabbling ducks were found in 30% of ponds. Questions include: How can we use and design tidal marsh to compensate for the loss of salt ponds? What is the carrying capacity of the salt ponds? How do we maintain high invertebrate productivity in restored habitat? What role will the existing Cargill ponds play for displaced birds? Will loss of tidal flats, methylmercury and/or non-native Spartina affect migratory birds that use the ponds? He emphasized the need to monitor the restoration to understand bird responses and adaptively change at rapid time scales.

Then, Valary Bloom, USFWS, presented "Background Context: USFWS Tidal Marsh Species Recovery Plan." Valary presented an overview of the recovery plan and stated that FWS wanted to get feedback from this group and others about it. Six listed species highlighted in the recovery plan include: the California Clapper Rail, Salt Marsh Harvest Mouse, Suisun Thistle, Salt Marsh Bird's Beak, Soft Bird's Beak, and California Sea-Blite. Special status species include the Salt Marsh Wandering Shrew, Suisun Shrew, San Pablo Vole, California Black Rail, the Suisun, Samuel's and Alameda Song Sparrows, Saltmarsh Common Yellowthroat, Old Man Tiger Beetle, Delta Tule Pea, and Pacific Cordgrass. Listed species indirectly associated with tidal marshes are the Western Snowy Plover, California Least Tern, Chinook Salmon, Steelhead, Shorebirds, and Waterfowl. She noted that some of these species already have their own recover plans and that FWS is striving to mesh the plans together within the recovery plan. The Tidal Marsh species recovery plan is being revised and, for Clapper Rails, there will be some combination of numerical target populations with acreage protected, restored, and managed. The criteria for the Salt Marsh Harvest Mouse will possibly be habitat based, and listed plants will consider the number of populations and population variability. Recovery strategies will occur at the ecosystem,

regional, and species levels, and incorporate adaptive habitat management, restoration and monitoring; habitat protection; special status surveys and monitoring; research; and public education and outreach.

With respect to **Outcome 1**, the group discussed these habitat requirements:

- Patch size and connectivity of marshes
- Prey quality and quantity
- Adequate invertebrates and plants
- Salinity, depth, landscape characteristics, proximity to the Bay, presence of islands and interior levees, size, disturbance
- Tidal flats, marshes, mudflats, salt pannes, ponds, large channels
- "Hotspots" of foraging areas in salt ponds

AFTERNOON PRESENTATIONS and OUTCOMES

David Herbst, Sierra Nevada Aquatic Research Lab, discussed "Management of Salt Pond Habitat to Support Invertebrate Production for Migratory Birds". He discussed a study of solar salt ponds in the Mohave Desert, which focused on how aquatic invertebrates respond and interact over salinity gradients. The ponds had a series of salinities and the research group created a simplified system for gradient. He found brine flies (*Ephydra gracilis*) were the preferred food resource of many wading birds and shorebirds and the data suggest that the most productive conditions are supported by moderate salinity levels—between low levels where brine flies are subject to competition from fast-growing grazers and losses to a variety of insect predators, and high salt concentration where physiological stress limits growth and reproduction. David pointed out that a simple food web existed within the ponds, including: a) Brine flies (*Ephydra gracilis*), benthic grazers, b) Brine shrimp (*Artemia franciscana*), filter feeders c) Water boatman (*Trichocorixa reticulata*), predators, and d) Phytoplankton and benthic algal mats.

In studying how birds forage, he found prey capture rate and consumption are highest at low salinity, but the effort expended returns less of the preferred *Ephydra* because of loss to *Trichocorixa* predation. The equivalent capture rates at high salinity ponds yielded much less return due to the small-sized prey, and the return of food per unit effort was the greatest at the moderate salinity pond. He concluded that ideal habitat conditions of pond management for invertebrate production include a moderate salinity range for flies and shrimp of about 100-150 g/L, that shallow water and rocky substrate provide for growth of benthic algae and attachment sites for brine fly larvae and pupae, and maintaining some low salinity ponds are beneficial for diversity of refuge and fish habitat.

The final talk of the day was from Scott Terrill, H. T. Harvey who spoke on, "Optimization of Pond Systems in the South Bay Salt Ponds Restoration Project." He described lessons learned from 15 years of work at ponds developed in the San Joaquin Valley to optimize migratory bird use. H.T. Harvey experimented with Island designs for roosting and nesting and provided more shallow water using a water gravity fed system, along with moderate and deep water, in varying locations. The experiments were highly successful resulting in foraging bird densities averaging 6-10 birds per acre. The most favorable island design in the ponds was 20-33% surface area to 66-80% foraging habitat or water. The islands were generally 300-500 feet long by 50-75 feet wide with smaller islands scattered in between, sparse or no vegetation, and at least 300 feet from the edge of the ponds. Salinity and water level management was essential.

The group developed this suite of feasible management and enhancement methods (**Outcome 2**):

- Changing to gentler slopes, shallower depths, contour dikes, islands and curved levees (for predator control).
- Draw down salt ponds in winter to remove vegetation.
- Create pond islands at least 300 feet from perimeter, using a 20-33% surface area to 66-80% foraging habitat or water, etc.
- Build water control structures to cycle water between ponds to create differing water levels and salinities.
- Don't let bird populations get too dense, creates a "bird farm."
- Enhance prey abundance by introducing rocky substrate and alfalfa bales, creating moderately saline ponds (100-150 g/L) and potholes.

- Provide electric fences for predator control.
- Build contingencies into the permitting process.
- Maintain infrastructure of managed ponds in groups, rather than isolated.

The discussion on **Outcome 3**, indicator species and parameters, lead to this list:

- Rare species, especially the Western Snowy Plover, California Clapper Rail, California Black Rail, Saltmarsh Common Yellowthroat, Song Sparrow and California Least Tern
- Duck guilds: Diving ducks, dabbling ducks
- Common nesting species, especially black-necked stilts and avocets
- Small and large shorebirds
- Key invertebrates especially brine flies, brine shrimp and water boatmen
- Coverage of key vegetation, especially Pacific cordgrass
- Specific algae and phytoplankton
- Vertebrate prey species, especially fish such as Tidewater Gobies
- Rare fish: Chinook Salmon/steelhead
- Rare tidal marsh vertebrates, Salt Marsh Harvest Mouse and Salt Marsh Wandering Shrew
- Physical parameters, such as salinity, depth, pH, DO

Some key data needs (**Outcome 4**) included the following:

- More data are needed on the quality and quantity of food resources for birds and how to enhance productivity of invertebrates and other food resources.
- More data are needed to determine how flexible birds are in foraging and if they will use other types of habitat and to what degree when the salt ponds are reduced.
- Additional data collection and monitoring within the ISP on the salt ponds are needed to determine a better baseline for early and Phase I actions of the Project's impact on birds.
- Additional predictive modeling of migratory bird response to habitat change is needed.
- More data is needed to determine how much tidal marsh and tidal flat to create and ponds to manage to balance bird species diversity and population.
- Data are needed on seasonal and other bottlenecks for migratory birds.

There was a long list of questions and uncertainties that fell into a number of other categories.

NEXT STEPS: We will hold Bird and Habitat Workshop 2, focused on modeling, on held May 23, 2005.

Invited Experts to Bird Workshop 1:

Doug Barnum, Shorebird expert, Salton Sea Science Office	Andy Gordus, Shorebird expert, CDFG
Valary Bloom, Endangered species expert, USFWS	David Herbst, Invertebrate expert, Sierra Nevada
Josh Collins, Landscape change, SFEI	Aquatic Research Lab
Scott Terrill, Birds habitat expert, H.T. Harvey	Keith Miles, Invertebrate expert, USGS
	Nils Warnock, Shorebird expert, PRBO

Workshop Attendees:

Al Jaramillo, SFBBO	Catrina Martin, USFWS	Eric Mruz, USFWS
Amy Hutzel, SBSP Project, SSC	Cheryl Millett, SFBBO	Gary Page, PRBO
Andree Breaux, RWQCB	Chris Alderete, NASA Ames	Mark Herzog, PRBO
Arthur Feinstein,	Diana Stralberg, PRBO	Harry McQuillen, USFWS
Bill DeJager, ACOE	Nadav Nur, PRBO	Carl Wilcox, CDFG
Caitlin Sweeny, BCDC	Eric Dunlavey, City of San Jose	Steve Ritchie, SBSP Project
Josh Collins, SFEI	Steve Rottenborn, H.T. Harvey	John Bradley, USFWS
Janet Hanson, SFBBO	Joelle Buffa, USFWS	Bruce Herbold, EPA
Ron Duke, H.T. Harvey	Deborah Clark, CCP	Letitia Grenier, SFEI
Mike Josselyn, WRA	Anne Hanson, SFBBO	Clyde Morris, USFWS
Nicole Athern, USGS	Brenda Buxton, SCC	John Krause, CDFG
John Takekawa, USGS	Stuart Weiss, SBW	