July 25, 2008

SOUTH BAY SALT POND RESTORATION PROJECT
Summary: Technical Workshop on the Interaction of Public Access and Wildlife

Held on Tuesday, May 20, 2008 from 8:30 a.m. – 3:30 p.m.
Location: Don Edwards National Wildlife Refuge, 9500 Thornton Avenue, Newark, CA
Summary prepared by Lynne Trulio with input from workshop attendees

Purpose and Format of the Meeting
A panel of technical experts was assembled to bring forward and discuss the current scientific knowledge on public access and wildlife interactions, focusing on boating and trail use as well as potential impacts to key species in the South Bay Salt Pond Restoration Project. Such species include nesting and foraging shorebirds (in particular western snowy plovers), waterfowl and other waterbirds, and harbor seals. Based on this information, the experts discussed what studies need to be undertaken during the long-term restoration project and recommended parameters and designs for applied studies during Phase 1. In addition to the experts, a number of stakeholders attended to hear the discussion and provide comments. This information will be used to adaptively manage public access with respect to wildlife effects. Attendees are listed on page 7 and the Agenda for the Workshop is on page 8.

Morning Presentations and Discussions
Dr. Lynne Trulio, one of the science leads for the Project, provided background on the Project and the adaptive management approach for public access. Next, three experts gave presentations on their research areas; each talk was followed by discussion among the expert panelists.

1) Boats and Wildlife: Jules Evens, principal with Avocet Research Associates, began by presenting literature information and his research findings on boating effects on waterfowl. His research focused on the disturbance responses of waterfowl to non-motorized boating in the Berkeley/Emeryville area of the San Francisco Bay. Bird responses to boating included flushing, swimming, diving, and flying. The Bay is a major migratory waterfowl stopover and over-wintering site. Studies show an overall decrease in waterfowl numbers of approximately 25% since the 1950s. Migratory ducks are most common in the Bay from October through April. However, in general, boaters were more common in the spring and summer, months when there are few migratory waterfowl on the Bay. The greatest overlap between boaters and migratory ducks occurred during October and April. Ruddy ducks and surf scoters were the two most common species in his study area. Based on the disturbance responses he observed, Jules found that a buffer of approximately 250m is needed to prevent disturbance of scoters, scaups, and ruddy ducks. He believes that studies to measure the non-lethal costs of disturbance behavior are needed.

Dr. John Takekawa, research biologist with USGS, briefly describd the study his team from the USGS has conducted on the disturbance effects of high speed ferries on rafting waterfowl. They did ground and aerial surveys and surveys from the ferries, and compared weekday to weekend use. His preliminary finding is that a buffer of approximately 300m is needed to protect birds from ferry disturbance. A report on this study will be out at the end of the summer.

Kathy Fox, a master of science student at San Jose State University, researched the behavioral responses of harbor seals to boats at Corkscrew Slough in Bair Island, Redwood City. She found that boats were present only approximately 1% of the time she observed the study site.

Seals responded by flushing on few occasions; direct approach and loud boats (such as air boats) were most likely to cause flushing. Seals seemed to respond more to kayaks than motorboats, perhaps because kayakers were more likely to approach seals and were able to quietly "sneak up" on seals. Most boats moved at a relatively slow but constant pace and did not approach seals, and overall, seals responded little to boats.

2) Trails and Waterbirds: Lynne Trulio discussed her research on the effects of trail use on shorebirds in light of other relevant literature. She noted that there are many ways to measure disturbance--such as changes in behavior, species abundance, distribution, species composition, or population levels--and different studies use different measures. Extensive literature exists on nesting birds, which shows they are very sensitive to human presence. The literature also shows that hunting, research, and direct approaches are all significant disturbances to birds. However, there is little information on the effects of trail use on foraging shorebirds and waterfowl. She and her research team conducted a study of the effects of trail use foraging shorebirds at three locations around the Bay looking at shorebird numbers, distribution and foraging behavior. Compared to control sites, trail sites showed no negative effects of trail use overall or by season. At trail sites, bird number decreased with increasing trail use. Foraging shorebirds, overall, were relatively undisturbed by trail users at these sites

Heather White, master's student at San Jose State University, is studying the effects of trail use on waterfowl using managed ponds. Her data were collected at ponds in the Alviso complex where waterfowl are common but no trail use exists on internal levees. She conducted experimental trials in which she observed ducks before and after she and an assistant walked along a section of trail. Ruddy ducks, northern shovelers, and scaup were the three most common species. Early results indicate that birds were significantly less numerous after trail use compared to before at a distance of up to 120m from the levee on which the trail use occurred. Beyond 120m, bird numbers pre- and post-trail use differed little.

3) Snowy Plovers: Dr. Kevin Lafferty, marine ecologist with the Western Ecological Research Center, presented his findings of beach recreation effects on snowy plovers. At the UC Santa Barbara Coal Oil Point Reserve, there is a population of snowy plovers on the beach, but public access impacts have preventing successful breeding for the past 30 years. His research showed that 47% of the disturbance to plovers was due directly to people, 23% due to dogs, and 24% due to crows. Plovers congregated in specific areas of the beach, so in 2001, managers closed those areas to human access. They also implemented a year-round docent program to keep people and crows away from plovers and their nests. In 2001, birds began nesting for the first time in 30 years and by 2006, 43 nests had produced 48 chicks. Kevin found that, in winter, plovers were typically undisturbed when people were 30m or more away. During the breeding season, he recommends 75m. He found plovers habituate quickly but they need repeated, regular activity to habituate. If public use is infrequent, plovers will need bigger buffers to prevent flushing.

Caitlin Robinson, biologist with San Francisco Bay Bird Observatory, has been studying snowy plover reproduction on ponds in the Eden Landing complex. As part of this research, she collected data on the distances at which plovers flushed when approached by researchers. Based on 24 approaches, she found birds flushed at an average distance of 175m (SE=45m). These birds are not used to people and flush at very great distances when approached.

Comments from the Panel:

- Really regular use can result in habituation in which birds do not respond negatively to human use. Birds view any novelty in the environment as a threat and they will respond negatively to that.
- We need to study which birds habituate. First, managers need to understand how people are distributed across the landscape. To promote habituation, managers should aggregate public use, particularly to locations where there are species prone to habituation or less subject to disturbance. Light use = novelty = bird response.
- Public access in remote areas is perhaps the worst situation for birds. People's behaviors cannot be easily monitored/controlled and there probably won't be much use so birds will experience the "novelty" effect; without regular use birds won't have a chance to habituate.
- It's important to consider indirect effects of public access. For example, predators can be attracted to nests as a result of public access; at Pt. Reyes more plover nests are lost on weekends versus weekdays because ravens and crows follow people as they walk near nests.
- There is a potential cost to habituation if predators can take advantage of birds not responding quickly to disturbance.
- One aspect of habituation is consistency in the behavior of people. Trails and lookouts increase consistent spatial distribution of people and, as such, are likely to reduce buffer distances. However, longer buffer distances between people and nesting and some foraging birds may be needed at overlooks and trails that are not well used, versus places without these features.
- Buffer distances might be able to be reduced if there is habitat structure such as large shrubs, vegetation, or perhaps differences in elevation (if birds are above or below people).
- Birds often do not respond to boats moving by them at a constant rate but will react when approached. Thus, nature viewers, birdwatchers, and photographers often have the most negative impact on birds.
- Habituation plus visual barriers can allow birds to nest closer to trails, but dogs cannot be allowed off-leash under any circumstance.
- We need more data on the value of rafting and roosting areas used by birds. Birds tend to congregate in certain parts of the Bay and these areas may provide particular advantages to birds.

Afternoon Discussion

Lynne Trulio and Cheryl Strong, wildlife biologist for the USFWS, summarized expected Phase 1 applied studies. Public access and wildlife studies are planned in conjunction with actions at the A16/SF2 island construction (with public access trails/overlooks), the E12/13 mini-salt pond system (with trails/overlooks), the Eden Landing kayak launch, and the trail opening at A3W.

Feedback on E 12/13 Trails and Shorebirds Study

Study design considerations to effectively assess disturbance:

- Before the new kayak launch goes in, collect baseline data on existing kayak and bird use of the slough.
- Also need bird use data (species, spatial distances from levees) in ponds after ponds are reconfigured but before trail in opened to public. This would be the baseline data.
- Baseline data can also be gathered at pristine or unaltered ponds.
- Design studies to separate salinity gradient and trail use factors.

  - Collect data on rate of disturbance/hour versus flight initiation distance of birds with respect to disturbers to get a probability of disturbance curve. The disturbance probability curve will differ by species, activity, and type of disturbance.

- The disturbance probability approach can be used as soon as ponds are reconfigured, unlike measures of species richness which will change as the ponds age.
- We may need to collect data for more than one year before trail is opened.
- Habituation can be assessed using the disturbance probability curve; before habituation and after the curve will be different.
- There will need to be adequate predator control, trash removal, and other management issues needed to keep the site beneficial to the target species.
- Any applied study on use of education could dove-tail with the bird studies at this site.
- We should develop a consistent survey/questionnaire and docent intervention to get to public response to access features.

Feedback on Kayak Study at E12/13

- A BACI-type (Before-After-Control-Impact) study would work well here to assess kayak impacts.
- Will need to study baseline conditions at the slough for several years before the kayak launch is opened. Measure existing kayak use, bird use, predator numbers and species.
- Tidal cycle and hunting in the area must be considered in the design of this study.
- Metric for study could be the probability that birds are disturbed. Local abundance and species richness are also potential metrics.
- To help managers, the study should determine where, specifically, impacts are occurring and to which species.

Feedback on SF2/A16 Trails and Shorebirds Study

- Measure parameters repeatedly over time either over the entire site or at randomly-chosen locations that become fixed sites for study.
- Metrics at these sites should include demographic parameters such as number of nests and reproductive success. This is a great opportunity to assess the link between public access impacts and demographic outcomes.
- Design trails and features to promote regular human use which will eliminate the novelty factor and encourage habituation.
- Close and open the same segments of trail, repeatedly, to test for trail effects on nesting and foraging birds.
- Use docent-lead trips as experimental users to avoid outcry of closed trails.

Feedback on A3W Waterfowl and Trails

- Hunting could be a confounding factor on this pond; it is certainly a much greater impact than trail use would be.
- The effect of the interaction between trail use and hunting could be interesting. Might trail use scare ducks away from the pond so they are not hunted? Might ducks become habituated to trail use and easier hunting targets?
- Study is planned for fall but should continue in winter and spring.

Questions/Comments from the Observers (morning and afternoon combined)

- A big question from the audience is: How bad is bad?? In other words, what metrics should you use to measure bird response and how do you know when you have a *significant* bird response? How much disturbance to rafting birds is OK, and how do you get at an answer to this question?
  - What is the relationship between flushing and population change? I.e., if flushing does not result in population change, is it a significant impact on birds?
  - What management triggers should be used to determine when to take action to protect wildlife?
  - Managers need metrics to measure the linkage between management actions to protect species and impact levels to species. They have trouble seeing behavioral changes, such as flight, as really important impacts. Are there other measures that can be used? Some thoughts from the group were that measuring the rate of disturbance or percent of time disturbed can be compelling. There seems to be public interest in impacts to individual birds they can see versus population statistics. Also, there are some studies of bird energetics that estimate the percent of energy devoted to roosting, preening, discretionary movement. This information could be linked to data on amount of time birds need to forage versus the amount of time they are disturbed.
- What are the effects of slough/pond morphology on disturbance of different species? In many cases kayaks can't reach species because of Bay morphology. (Please explain)
- What are the cumulative effects of trails, islands, and gulls on waterbirds? When conducting studies, we need to look at whether the public access disturbance coincided with other potential disturbances such as sirens, hunters' gun shots, helicopters, etc.
- How does the timing of public access affect species?
- What kind of education has been tried and what kinds are effective? Studies should address the effectiveness of different educational approaches. Should target different age classes with different types of educational methods.
- While education is important, Kevin's work showed that having docents on-site to protect species from humans and other disturbances might be necessary in some cases.
- Are there any species that don't habituate? This needs study including responses of migratory versus resident species.
- Baseline information for studies should include the distribution of birds in space with respect to trail locations before the trails are opened to the public.
- Studies need to have an adequate length of time between implementing a management action, such as creating nesting islands, and beginning a study of baseline (per-public access) conditions.
- We need to determine preferences of public before and after public access features are provided.
- We need to assess the effects of trails that completely encircle ponds.
- Is there any research on the effectiveness of so-called predator resistant barriers on trail bridges or other access points? Such a barrier is proposed at Bair Island. No one provided any citations.
- Decline in diving ducks argues for real caution with this population.

Other Suggested Studies

1. Habituation response by different species
2. Link energetic costs to behavioral responses

Summary Thoughts

1. The suggestions for Phase 1 study designs should be incorporated in the RFPs for research, as appropriate.

2. The panelists agreed that behavioral responses, such as the flight or flushing, are good metrics to use, even soon after a pond has been altered. Developing probability of disturbance curves for specific habitats, species, and/or public access uses can be used to monitor change, including habituation, over time. Species composition measures are useful when restored/altered habitats have reached equilibrium and conditions are no longer effected by construction impacts.

3. Collecting good baseline information both at the site being studied and at other reference sites is critical to assessing species responses. Studies should measure disturbance rates, distribution, abundance, and species richness, before and after construction, as appropriate.

4. Studies of public demand, enjoyment, and how people use access features should accompany studies of species-public access interactions.

5. Deploying a crew of well-trained docents to protect the resource and educate the public can be effective in reducing public impacts to wildlife.

6. Determining what amount of disturbance is "too much" for species is difficult. Translating disturbance effects into demographic parameters, such as rates of reproduction or population change, gives the clearest guide to unacceptable impacts; but, these parameters cannot often be assesses directly, especially if impacts are to feeding or resting animals. Potentially, a study could link levels of disturbance to existing information on energetic costs of movement or the amount of time birds need to forage to try to quantify energy used as a result of public access disturbance. More study of energetic costs of different behaviors is needed.

In the meantime, managers can manage disturbance impacts in these ways:

1) Use appropriate metrics of disturbance such as probability of disturbance, flush distance, presence/absence, abundance of species, species richness, reproductive success (when possible) to assess impacts.
2) Compare disturbance rates or other metrics at public access sites to controls to see if there is a difference and, if so, how much.
3) With the help of managers and experts, identify threshold levels and management responses if thresholds are reached.
4) Identify small/manageable changes that will result in relatively large reductions in impacts that managers can implement.
5) Take extra precautions with rare or declining species.

Workshop Attendees

Panel Members			
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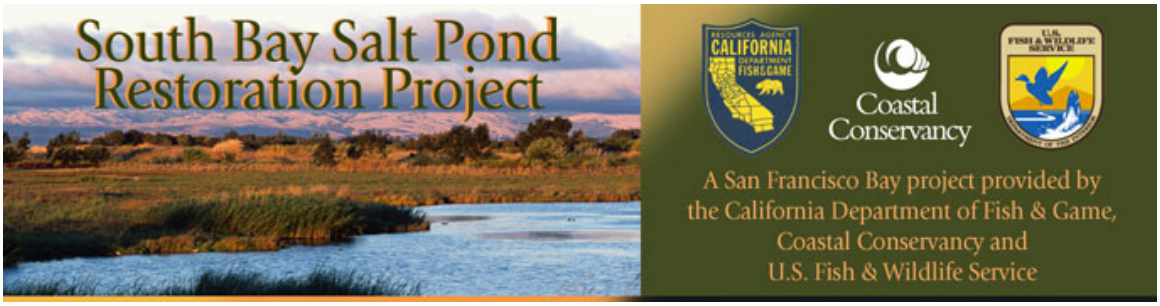

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Tuesday, May 20, 2008
8:30 a.m. – 3:30 p.m.
Conference Room
Don Edwards National Wildlife Refuge
9500 Thornton Avenue, Newark, CA

Desired Outcomes
1. Discuss the key issues and current state of knowledge about the interactions of public access and wildlife in the South Bay.
2. Identify what studies need to be undertaken during the long-term restoration project.
3. Discuss and recommend parameters and design for applied studies for Phase 1.

8:30-9	Coffee
9-9:30	Welcome, introductions, background on the South Bay Salt Pond Restoration Project—*Dr. Lynne Trulio, SBSP Project Science Program Lead*
9:30-11:30	Panel Discussion: Summary of Key Research and Key Uncertainties Boats and Waterfowl—*Lead Discussant: Dr. Jules Evens, Principal, Avocet Research Associates* Trails and Shorebirds—*Lead Discussant: Lynne Trulio* Trails and Snowy Plovers--*Lead Discussant: Dr. Kevin Lafferty, Marine Ecologist, USGS Channel Islands Field Station*
11:30-12	Summary of expected Phase 1 Applied Studies—*Lynne Trulio and Cheryl Strong, Wildlife Biologist, USFWS*
12-12:15	Comments from observers
12:15-1:00 p.m.	**LUNCH: <u>Bring Your Own Lunch & Drinks</u>**
1-3 p.m.	Discussion: What are the key issues, relative to the SBSP Project Objectives, that need study? * What studies should be undertaken? * How should the studies in Phase 1 be designed to address key issues? * What are the thoughts from the stakeholder observers?—*Lynne Trulio and Cheryl Strong with Mary Selkirk, Center for Collaborative Policy, facilitator*
3-3:30 p.m.	Summary and wrap up—*Lynne Trulio*