Key uncertainty: Will ponds reconfigured and managed to provide target water and salinity levels significantly increase the prey base for, and pond use by waterfowl, shorebirds and phalaropes/grebes compared to existing ponds not managed in this manner?

Ponds managed as small-scale salt pond systems may provide enhanced benefits for wide range of birds. But, the extent to which they can improve the prey base and increase foraging shorebird densities in the short and long-term is not known.

Background/Rationale

Eden Landing Ponds E12 and E13 would be reconfigured to create shallow-water foraging habitat for migratory shorebirds, with a range of salinities, and a limited number of islands for nesting bird habitat (Figure 1). The restoration action would help maintain populations of bird species breeding at the salt ponds (project objective 1B.1) through the creation of nesting island and berm habitat; maintain habitat for salt pond-specialized birds (project objective 1B.2) by creating cells with elevated salinities; and maintain population levels of foraging shorebirds (projective objective 1B.3) by managing water levels and salinities to maximize foraging potential. These reconfigured ponds would test the extent to which focused management of shallow water habitats can increase migratory shorebird densities, the importance of salinity on the density of foraging shorebirds and their prey as applied studies, and techniques for vegetation management, predator management, and water and salinity management. The specific studies described below will address the following hypotheses:

- To what the extent will focused management of shallow-water habitats increase the densities of foraging shorebirds?
- What is the importance of salinity to the density of foraging shorebirds and their prey?

Applied Study Design Concepts

Several shorebird species, particularly Wilson's and Red-necked Phalaropes, have long been known to occur in the South Bay primarily within higher-salinity ponds. These species generally forage in high-salinity ponds throughout the tidal cycle. In addition, studies by PRBO and others have demonstrated that some species that typically forage on intertidal habitats during low tide, such as Western Sandpipers and Dunlin, show an affinity for higher-salinity (vs. lower-salinity) ponds at high tide, and that many individuals of these species forage in higher-salinity ponds at high tide. However, very high densities of shorebirds have also been observed foraging in South Bay ponds that do not have high salinities, but do have optimal foraging depths for small shorebirds. The experiment at Ponds E12 and E13 would assess whether foraging shorebirds prefer low, moderate, or high salinity levels (and the associated prey types) in cells with similar shallow water depth habitat. The results of this experiment would determine the need for ponds with elevated salinity levels for foraging by migratory shorebirds in future phases of the project within the Adaptive Management Plan. Monitoring of the use of the constructed islands by nesting birds may provide some information regarding nesting bird use at the different salinity levels in the pond; however, this would not be the focus of the Ponds E12 and E13 applied study.

Study Methodology

Shorebird monitoring. Shorebirds in all cells would be monitored every other week from mid-July through April by observers walking or driving along the perimeter of the ponds (using spotting scopes). During each survey, the number of individuals of each species roosting and foraging in each cell during a two-hour period at high tide and a two-hour period at low tide (on the same day) would be recorded.

For an additional two hours during high tide, individual birds would be observed while foraging in an attempt to determine prey species. For a two-minute period, a single foraging individual would be watched. The foraging habitat, water depth, foraging method, and number of prey items taken by prey type (if determined) and foraging method would be recorded. If the bird spends time foraging in different habitat types (*e.g.*, mud vs. water) or using different methods, the proportion of the two-minute focal period spent using different habitats or methods would be recorded. After two minutes, a different bird would be observed, and so on, so that all the major species foraging in the ponds are represented by observations. Equal time observing foraging behavior would be spent in each of the three salinity treatments. The purpose of these observations would be to collect data that can be used to determine the optimal foraging conditions for birds within these ponds, and to attempt to relate foraging behavior and success to prey type and abundance (based on foraging habitat, water depth, foraging method, and in the case of larger prey items, observation of the prey items).

Prey monitoring. Invertebrates would be sampled at 10 locations within each salinity treatment during every other survey (*i.e.*, once/four weeks). Prey abundance would be estimated from these samples, including samples from both the water column and substrate, by prey type. Water depth, salinity, and temperature would be recorded at each sampling location.

Timeframe. The study would commence immediately following construction when water level management is underway. It is anticipated that a response to the reconfigured habitat will be discernable in the first season. However, meaningful results should be available after 5 years of monitoring.

Management Response

The extent to which salinity differences are found to affect shorebird species composition and density, foraging behavior of these birds, or the density and availability of important prey species will inform the future management of ponds within the SBSP Project area. If salinity differences significantly influence the use of managed ponds by waterbirds, future pond management in other areas may include salinity management to optimize densities of foraging birds. The results of this experiment, with respect to certain water salinities or depths corresponding to high densities of particular bird species, will also be used to optimize pond management for specific species or groups of species.

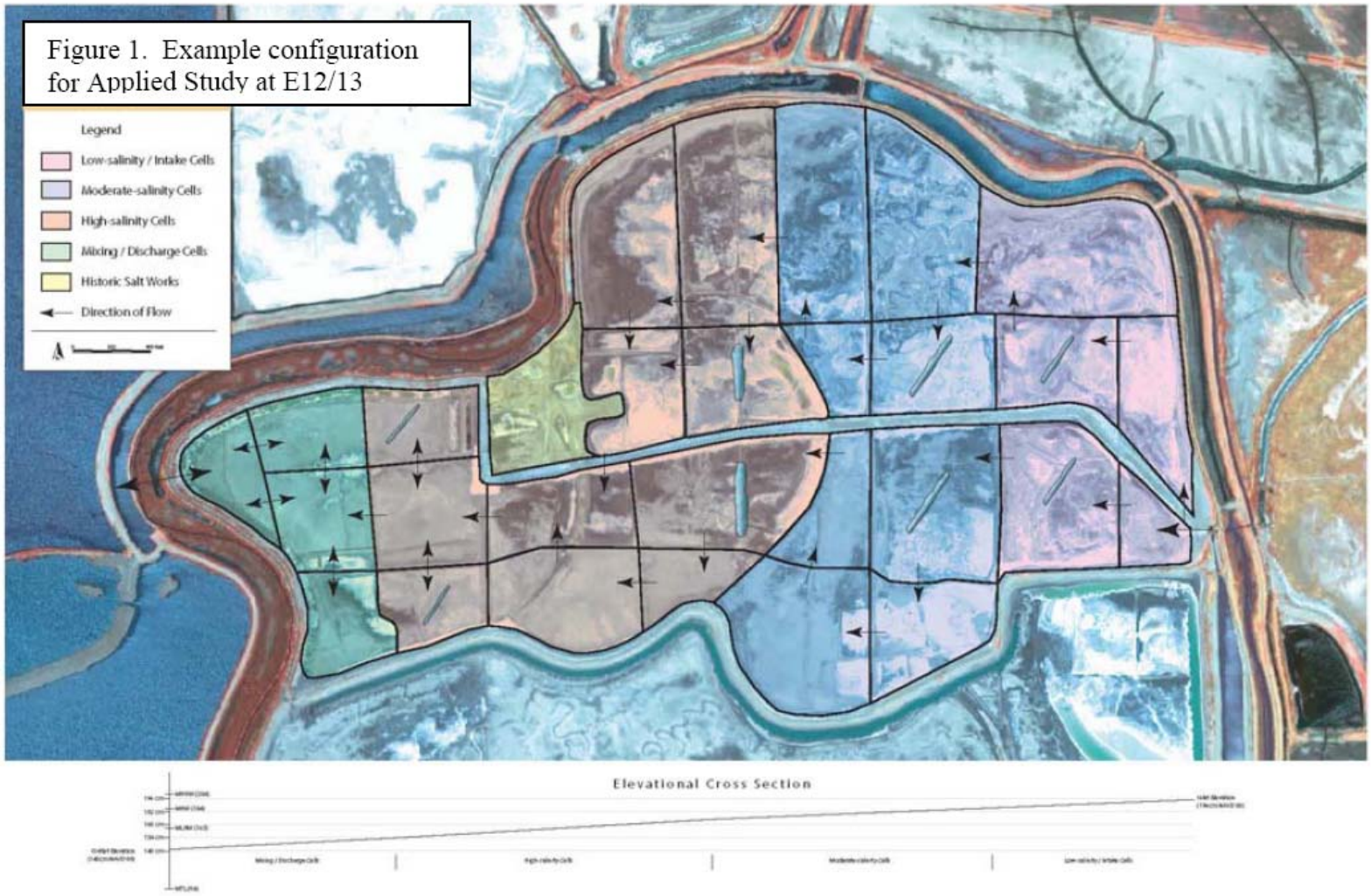
Figure 1. Example configuration for Applied Study at E12/13
Legend
Low-salinity / Intake Cells
Moderate-salinity Cells
High-salinity Cells
Mixing / Discharge Cells
Historic Salt Works
Direction of Flow
Elevational Cross Section