

Key uncertainty: Will ponds that are reconfigured to create large isolated islands for nesting and foraging significantly increase reproductive success for terns and other nesting birds and also increase the numbers and densities of foraging birds over the long term compared to existing ponds not managed in this manner?

Constructing islands within managed ponds is expected to increase the densities of nesting birds in those ponds, and certain island shapes or densities may result in higher use by nesting birds than others. However, the extent to which nesting bird densities can be increased and sustained by island construction, and the shapes and densities of islands that will optimize bird use, is not known.

Background/Rationale

The A16 and SF2 managed ponds would be reconfigured to create islands for nesting birds and would be managed to provide shallow-water habitat for foraging waterbirds, particularly shorebirds. The Phase 1 actions at Ponds A16 and SF2 would help maintain populations of bird species breeding at the salt ponds (project objective 1B.1) through the creation of nesting islands and population levels of foraging shorebirds (projective objective 1B.3) by managing water levels to maximize foraging potential. These reconfigured ponds would test bird use of different island configurations as an applied study, and would also test management techniques for vegetation management, predator management, and water quality management. The specific studies described below will address the following hypotheses:

- Will pond reconfiguration to include numerous islands, and water-level management, increase the density of nesting and foraging shorebirds within Ponds A16 and SF2?
- Does island shape and density affect nesting success?
- Does vegetation type and density affect nesting success on the islands?
- Does passive human activity on trails affect nesting success on nearby islands?

Applied Study Design Concepts

Various nesting bird species may respond differently to different island shapes. For example, highly colonial species such as terns may make more use of circular islands while shorebirds such as Black-necked Stilts, American Avocets, and Snowy Plovers may benefit from long, linear islands. In addition to contrasting shapes, it is important to understand the effect of island density on habitat value. For example, high-density islands may reduce foraging area between islands and increase aggressive interactions among family groups of American Avocets and Black-necked Stilts. Vegetation also plays an important role in nesting success, as different birds species have varying vegetation tolerances or requirements. Snowy Plovers typically avoid vegetated areas for nesting, and avocets usually nest in bare or sparsely vegetated areas. While some South Bay tern colonies are located in areas with little or no vegetation, other tern colonies, as well as many Black-necked Stilt nests, are located in areas having some vegetation, which may also provide shade and cover from predators for chicks. Nesting waterfowl are likely to nest almost exclusively in vegetated areas. Although human activity in the vicinity of Ponds A16 and SF2 is expected to be limited to non-motorized recreation (*i.e.*, walking or biking around the outer levee of the pond) and pond/island maintenance, it is unknown whether this level of activity will affect island use or nesting success by birds.

The experimental studies designed for Ponds A16 and SF2 will provide an important model for island design, provide an understanding of the vegetation requirements of various pond-breeding bird species, and determine an acceptable level of human activity for reproductive success of bird species using managed ponds. This understanding will help inform and guide the design of optimal pond configurations that would be used at other locations in the South Bay.

Study Methodology

Island spacing, shape and distance to adjacent islands. Varying densities of islands will be created within Ponds A16 and SF2 to study the effects of island density on nesting bird use. There will be two island shapes: circular and linear (much longer than wide) to determine whether various nesting bird species respond differently to contrasting island shapes.

Vegetation type, density, and distribution. Vegetation is expected to establish on some of the islands after one or more years. At that point, the vegetation can either be controlled or vegetation can be manipulated by planting or selective removal, to determine the effects of vegetation type, density, and spatial distribution on nesting use and reproductive success of bird populations. The species composition, type of vegetation, and vegetation distribution will be manipulated by planting or selective control/removal to conduct studies to determine the effects and distribution of vegetation on nesting success. The decision regarding which plant species will be used in actual experiments will be determined by monitoring which vegetation types invade (and thus can be expected to survive on the islands) during the first few years following island construction.

Human activity. To determine whether human activities affect nesting birds at Ponds A16 and SF2, a portion of the trail around each pond (*e.g.*, along the entire northeastern side of Pond A16) could be closed during the breeding season every other year. The number of nests, and nest success and fledging success, would be estimated for a sample of islands to determine whether the location, number, and breeding success of birds varies depending on whether or not portions of the levee trails are open to human activity.

Timeframe. The study would commence prior to project implementation so that preconstruction conditions are documented. It is anticipated that a numerical response to island construction will be discernible in the first season after construction is complete and water level management is underway. However, it may be a few decades before ultimate densities are achieved as future phases of tidal restoration for the SBSP Project continue to reduce the amount of existing salt pond and levees available as potential nesting habitat.

Management Response

The extent to which the construction of nesting islands results in increased densities of nesting birds will inform the degree to which nesting islands are constructed in other managed ponds in the SBSP Project area. Species' responses to the shape and density of nesting islands will also help determine the types of islands that are constructed for nesting birds, and whether islands of various shapes or densities must be provided to optimize use by various species. The responses of nesting birds to vegetation type, density, and distribution will inform how the substrate on nesting islands should be managed for different species. If nesting birds respond negatively to increased human activity around the ponds, public access to trails will be modified (either spatially or temporally) to minimize disturbance. If no negative effects of human activity are noted, public access to trails will be incrementally increased and monitoring continued.