# Managing Shorebird Habitat at a Sacramento Valley Wetland

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In the near absence of historical natural wetlands and mudflats, shorebirds in the Sacramento Valley depend primarily on evaporation ponds, sewage ponds, flooded agricultural fields, and managed wetlands for foraging and roosting (Shuford, et al. 1998). In the first three habitats, appropriate shorebird habitat is usually a byproduct of water level management dictated by other concerns. In some years, excellent conditions may exist, whereas in other years the ponds may be dry or flooded to the extent that they are unsuitable for most shorebirds. There are few intentionally managed wetlands that provide reliable shorebird habitat year after year.

In 1997, the City of Davis, Yolo County, began managing the Davis Wetlands, four miles east of Davis. This 400-acre complex consists of 280 acres of wetlands divided into 9 ponds (avg=31 acres), 90 acres of native grasses, and 30 acres of riparian trees and shrubs. The water levels in each of the ponds are easily manipulated and controlled, allowing for the creation and maintenance of mudflats and shallow water. In 1999, shorebird surveys were conducted throughout the fall migration period to document patterns of shorebird occurrence, particularly with respect to water cover and extent of exposed mudflats. Here we report the patterns of species composition during initial drawdown and later maintenance or increase in water cover and document the water cover preferences of the most numerous species.

## METHODS

One 44-acre pond, called "Storm Pond," was managed to create mudflats and experiment with different water levels and amounts of exposed mudflats. The pond is constructed with fairly steep sides and a broad, nearly flat bottom. At a water coverage of 90%, a span of mudflats 5-10 feet wide ringed the pond; at 80%, small islands of mudflats appeared in the center of the pond; and at 60%, a rich mosaic of shallow water (mostly less than six inches deep), islands, and peninsulas covered the pond.

Drawdown of Storm Pond began in late July, after fall migration was in progress, and water cover reached its nadir on August 22 (Figure 1). From that point into October, water was trickled in slowly to maintain shallow water and mudflats.

There were two distinct phases in the management of the pond: the initial drawdown of water and the subsequent maintenance of mudflats and shallow water cover. During the initial drawdown period, as water cover decreased from 100% to as low as 30%, much of the remaining exposed pond bottom was wet fresh mud. In the maintenance period, as water was trickled into a pond to avoid

Table 1. Species observed on Storm Pond, 12 July to 4 October 1999 (high counts, median counts, and first and last dates recorded).

| SPECIES | HIGH COUNT (date) | MEDIAN COUNT | FIRST DATE | LAST DATE |
|---|---|---|---|---|
| Black-bellied Plover | 74 | 7 | 8/10 | 10/4 |
| *Pluvialis squatarola* | (8/12) | | | |
| Snowy Plover | 1 | 1 | 8/10 | 8/10 |
| *Charadrius alexandrinus* | (8/10) | | | |
| Semipalmated Plover | 11 | 2.5 | 8/10 | 10/4 |
| *Charadrius semipalmatus* | (8/21) | | | |
| Killdeer | 12 | 5 | 8/3 | 9/25 |
| *Charadrius vociferus* | (9/17) | | | |
| Black-necked Stilt | 138 | 14.5 | 7/25 | 9/17 |
| *Himantopus mexicanus* | (8/3) | | | |
| American Avocet | 222 | 21 | 7/25 | 10/4 |
| *Recurvirostra americana* | (8/3) | | | |
| Greater Yellowlegs | 3 | 1.5 | 8/3 | 10/4 |
| *Tringa melanoleuca* | (8/26) | | | |
| Lesser Yellowlegs | 1 | 1 | 8/16 | 9/25 |
| *Tringa flavipes* | (8/16, 9/12, 9/25) | | | |
| Willet | 1 | 1 | 7/25 | 7/25 |
| *Catoptrophorus semipalmatus* | (7/25) | | | |
| Whimbrel | 2 | 1 | 8/10 | 9/12 |
| *Numenius phaeopus* | (8/10) | | | |
| Long-billed Curlew | 1300 | 320 | 8/10 | 10/4 |
| *Numenius americanus* | (9/11) | | | |
| Marbled Godwit | 2 | 1 | 9/12 | 9/17 |
| *Limosa fedoa* | (9/12) | | | |
| Ruddy Turnstone | 1 | 1 | 8/28 | 8/28 |
| *Arenaria interpres* | (8/28) | | | |
| Western Sandpiper | 400 | 100 | 7/19 | 10/4 |
| *Calidris mauri* | (8/16) | | | |
| Least Sandpiper | 540 | 60 | 7/25 | 10/4 |
| *Calidris minutilla* | (10/4) | | | |
| Baird's Sandpiper | 3 | 1 | 9/6 | 9/30 |
| *Calidris bairdii* | (9/6) | | | |
| Pectoral Sandpiper | 1 | 1 | 9/25 | 9/25 |
| *Calidris melanotos* | (9/25) | | | |
| Dunlin | 3 | 1 | 9/30 | 10/4 |
| *Calidris alpina* | (9/30) | | | |
| Stilt Sandpiper | 1 | 1 | 10/4 | 10/4 |
| *Calidris himantopus* | (10/4) | | | |
| Short-billed Dowitcher | 3 | 1 | 7/25 | 8/28 |
| *Limnodromus griseus* | (8/28) | | | |
| Long-billed Dowitcher | 200 | 18.5 | 7/29 | 10/4 |
| *Limnodromus scolopaceus* | (8/18) | | | |
| Wilson's Phalarope | 16 | 4 | 7/25 | 8/28 |
| *Phalaropus tricolor* | (8/16) | | | |
| Red-necked Phalarope | 15 | 4 | 7/25 | 9/12 |
| *Phalaropus lobatus* | (8/15) | | | |

desiccating the pond and to maintain shallow water conditions, water cover would rebound from 30% back up to 70% or more, and continue to oscillate as it dried up and more water was trickled in (Figure 1). During this period, much of the exposed pond bottom was already dry and hard, while wet, muddy exposed earth was limited to areas immediately adjacent to the water. These changes in water cover enabled us to observe changes in shorebird use during different phases of water level management.

From 12 July to 4 October 1999, experienced birders from the Yolo Audubon Society surveyed shorebirds on 22 different days at this pond. On average, a census was conducted every 3.5 days. The censuses were not necessarily concentrated on weekends. Regardless, the Davis Wetlands was closed to the public at this time and human activity was minimal throughout the period. Each census would take approximately one hour. On each visit, the surveyors recorded the time, date, and weather conditions, the number of each species of shorebird observed, and the water cover of the pond. Water cover was estimated visually as a percentage of the surface of the pond covered by water (no matter how shallow) relative to the amount of mud or dry surface that was exposed. Steve Hampton provided guidelines for estimating the percentage of water cover and reviewed the estimates for consistency among surveyors.

## RESULTS

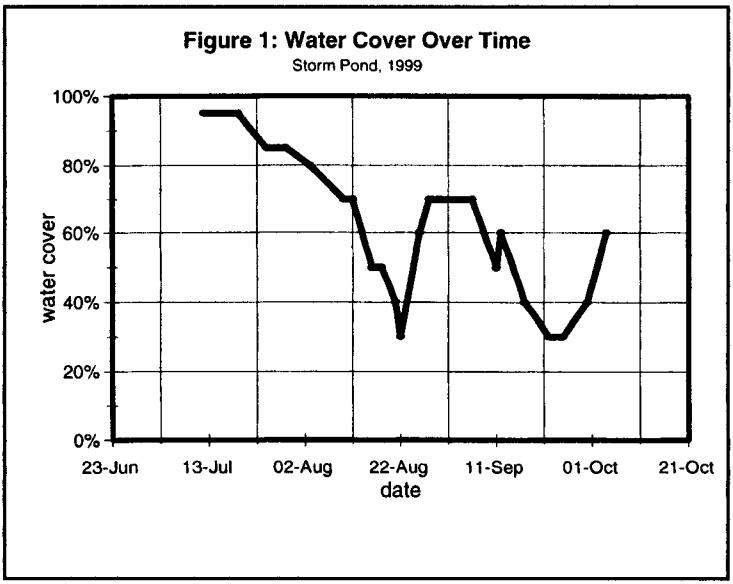
The pond proved to be a major attractant for shorebirds, usually containing between 400 and 1000 shorebirds on any given day. The variety of shorebirds matched the numbers, as 23 species of shorebirds were observed on Storm Pond during the survey period (Table 1).

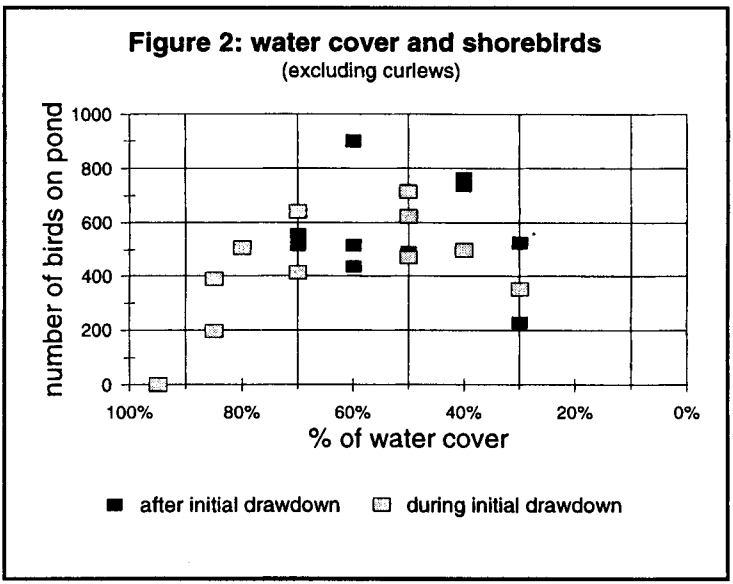
As the water cover in Storm Pond decreased and exposed mudflats, shorebird numbers initially increased correspondingly. Shorebird numbers rose dramatically as water cover fell from 100% to 85%, reached a peak between 70% and 40%, and declined when it fell further (Figure 2). Long-billed Curlews were excluded from the analysis, as they used the site sporadically for roosting, but not for feeding. During these periods, most of the water was less than six inches deep and birds were often observed standing in submerged areas. Taking the natural log of shorebird numbers, which reduces variation when numbers are high, produces an even more pronounced pattern (Figure 3).

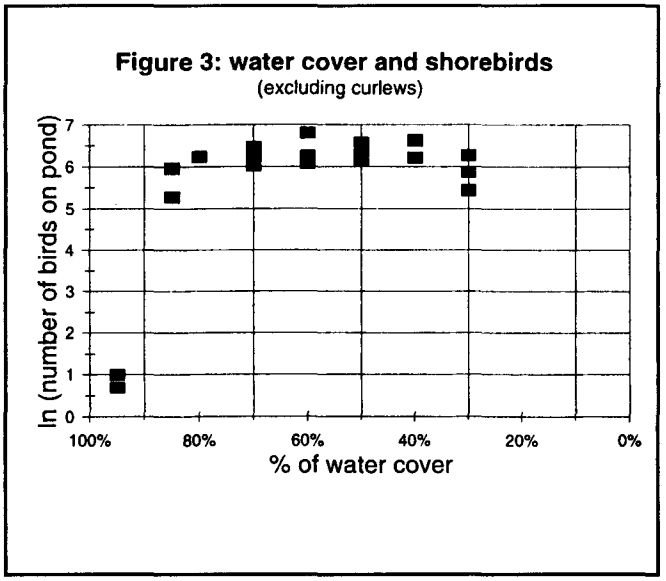
Whereas the overall numbers of shorebirds varied in a predictable manner with water cover, species composition varied in response to water level as reflected in species' body size and leg length (Figure 4). During the initial drawdown, when mudflats first appeared and water cover was in the 80-85% range, avocets and stilts predominated. Peeps (Western and Least Sandpipers) predominated as the water evaporated further. While dowitchers were most often observed when water cover was in the 40-80% range, their presence was not as well correlated with water levels.

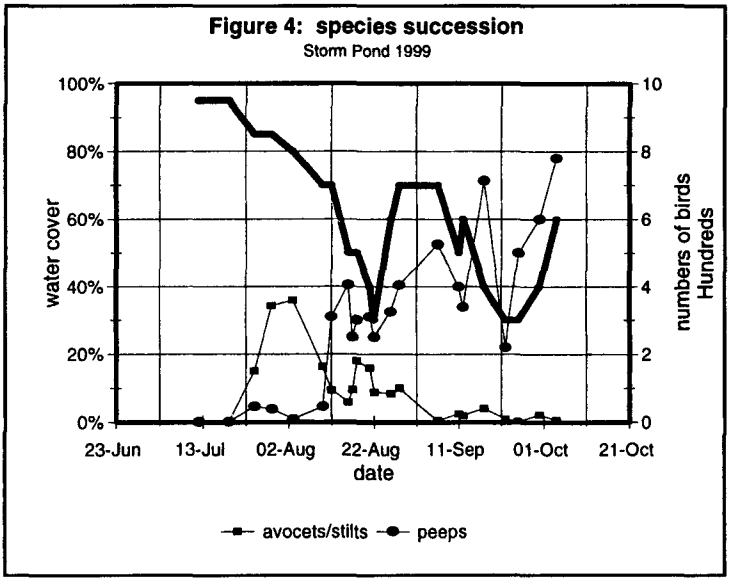
In addition to Long-billed Curlew, other species began using the mudflats as a roosting site. The surveyors noted that, at various times, 600 American

White Pelicans (*Pelecanus erythrorhynchos*), 100 Snowy Egrets(*Egretta thula*), 500 White-faced Ibis (*Plegadis chihi*), 200 Green-winged Teal (*Anas crecca*), 100 Ring-billed Gulls (*Larus delawarensis*), 400 California Gulls (*Larus californicus*), and 30 Caspian Terns (*Sterna caspia*) appeared to arrive at sunset to roost.






## DISCUSSION

This was probably the largest concentration of shorebirds in Yolo County at this time. This included all of the expected species and many of the more unusual migrants that typically occur in the Sacramento Valley (such as Stilt Sandpiper, Ruddy Turnstone, Snowy Plover). In October, just after the end of

the survey period, Storm Pond hosted an American Golden-Plover (*Pluvialis dominica*), two Pacific Golden-Plovers (*Pluvialis fulva*), and a Ruff (*Philomachus pugnax*). These results demonstrate that shorebirds do indeed respond to managed habitat changes.

The need for shorebird habitat in the Central Valley in migration has been demonstrated, as over 100,000 individuals may be present on any day in migration (Shuford, et al. 1998). Anecdotal evidence suggests that when mudflats appear, shorebirds use them. For example, in the spring of 1996, late rains created extensive mudflats at the "Trestle Ponds" in Yolo County, six miles north of the City of Davis Wetlands in the Yolo Bypass (pers. obs.). It was estimated that over 10,000 shorebirds/day used the area in spring migration. Likewise, the experience of successfully attracting shorebirds to the Davis Wetlands in the fall of 1999 suggests that foraging habitat for migration stopover points is in short supply during fall migration. While the results here may seem intuitive to birders, they provide documentation as to how wetlands may be managed for shorebirds and even for specific species over time.

Given that most wetlands managers are more accustomed to waterfowl management, a few comments regarding water level management issues are in order. During the experiment at the Davis Wetlands, the pond was monitored for botulism, salinity, and emergent vegetation growth. However, none of these problems surfaced to any degree. Should any of these become a problem over time, the pond could be filled while another pond is drawn down to create mudflats. Thus, the ability to manage multiple ponds allows for greater flexibility to deal with problems that may arise in creating mudflats. A potential conflict may exist between management for shorebirds and waterfowl. However, because shorebird habitat is most critical during the migration months of April, May, August, and September, conflict between shorebird and waterfowl management may be minimized. Also, most waterfowl use shallow water, and hundreds of ducks were observed foraging and roosting on Storm Pond during the survey period. With the active management of mudflats, a more complete wetlands ecosystem is maintained, with the carefully managed seasonal mudflats complimenting the permanent ponds.

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