An Ornithological Update of Hoffman Marsh After the Restoration Project of 1984

Pica Lockwood

Introduction

In 1984 the California Department of Transportation (Caltrans, 1981) proposed a project to widen Highway 580 which would impact 1.3 acres of adjacent marsh land in south Richmond. As a result of negotiations with the Bay Conservation and Development Commision (BCDC), Caltrans agreed to mitigate this projected impact by restoration of the southern section of Hoffman Marsh which is located along the western end of Central Avenue in El Cerrito (Figure 1). The proposed restoration of Hoffman Marsh was to be accomplished by increasing tidal exchange through two new culverts in the levee separating the northern and southern sections of the marsh. After dredging one channel in the southern section, however, the project was terminated upon discovery of a sewage pipe in the levee, which could have been damaged if the new culverts had been constructed. Today the diked 7.5-acre southern section receives minimal tidal action through the existing culvert (Hay, 1985).

The purpose of this study is to determine whether the number and diversity of bird species has

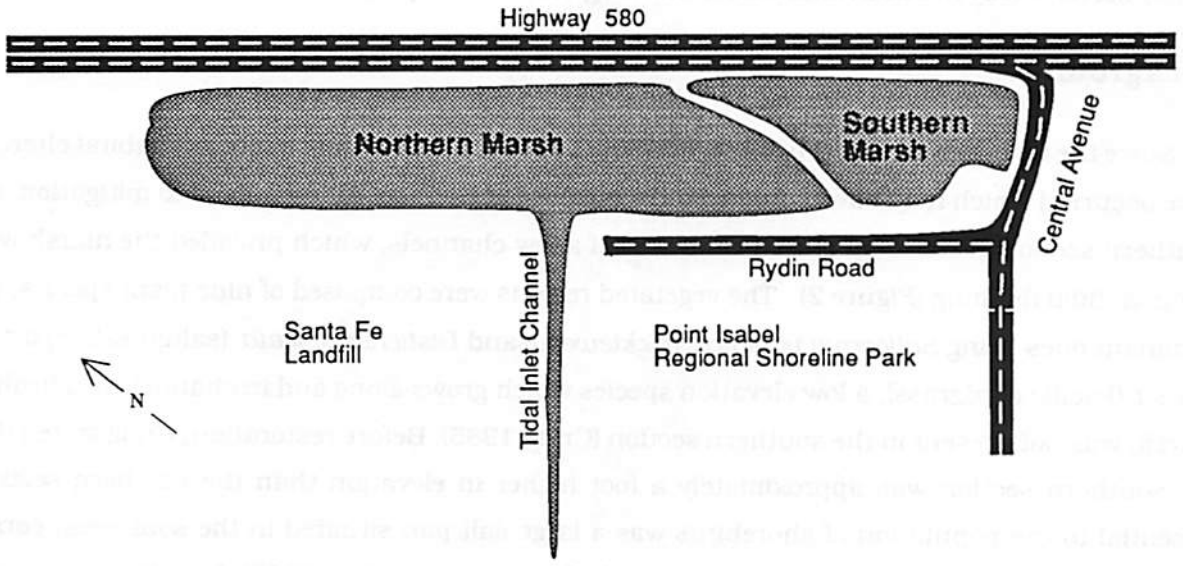

Figure 1. Map of Hoffman Marsh study area
Source: Modified after Hay (1985)

changed since the termination of the restoration project and the ornithological study by Hay in 1985. In my study I compare the number and diversity of birds in the southern marsh to the northern marsh and focus on the use patterns between these two sections. Since significant habitat changes occurred as a result of the mitigation process, I consider how these changes may have affected the birds' use of Hoffman Marsh. I hope that this study proves useful to BCDC or other organizations proposing future marsh mitigation projects at this site or elsewhere.

Past Studies

The East Bay wetlands have been the site of many bird studies designed to evaluate shorebird activity and the importance of marsh and mudflat habitats for birdlife. The earliest analysis which considered Hoffman Marsh was a study conducted by URS Research Company (1973), which addressed the environmental impact of widening Highways 80 and 580. Among other things, it noted that Hoffman Marsh and the Albany mudflat comprised the only large bird habitats for five miles along the East Bay shoreline.

Following the URS study, Caltrans outlined in a 1981 Environmental Impact Statement five alternatives to expanding Highway 580. In November, 1984, Caltrans began the restoration project on the southern section of Hoffman Marsh. Preceding and following mitigation by Caltrans, Hay (1985) conducted an ornithological census at the site. Her study addressed the change in number, use patterns and species diversity after the Caltrans mitigation, taking into account the influence of the tidal cycle and weather. She reported that the shorebirds in the southern section of Hoffman Marsh decreased by five individuals after the mitigation, while species diversity remained constant.

Background

Since the restoration project of 1984, and Hay's 1985 study, further significant habitat changes have occurred which may have influenced the bird use of Hoffman Marsh. Prior to mitigation, the southern section of Hoffman Marsh consisted of a few channels, which provided the marsh with minimal tidal flushing (Figure 2). The vegetated regions were composed of nine plant species, the dominant ones being *Salicornia virginica (pickleweed)* and *Distichlis spicata* (saltgrass). *Spartina foliosa* (Pacific cordgrass), a low elevation species which grows along and in channels of a healthy marsh, was not present in the southern section (Craig,1985). Before restoration, Craig stated that the southern section was approximately a foot higher in elevation than the northern section. Essential to the population of shorebirds was a large salt pan situated in the southwest corner (Figure 2). According to the ornithological data before mitigation (Hay,1985) the salt pan was used by willets, sandpipers, and dowitchers as a place to forage and occasionally roost.

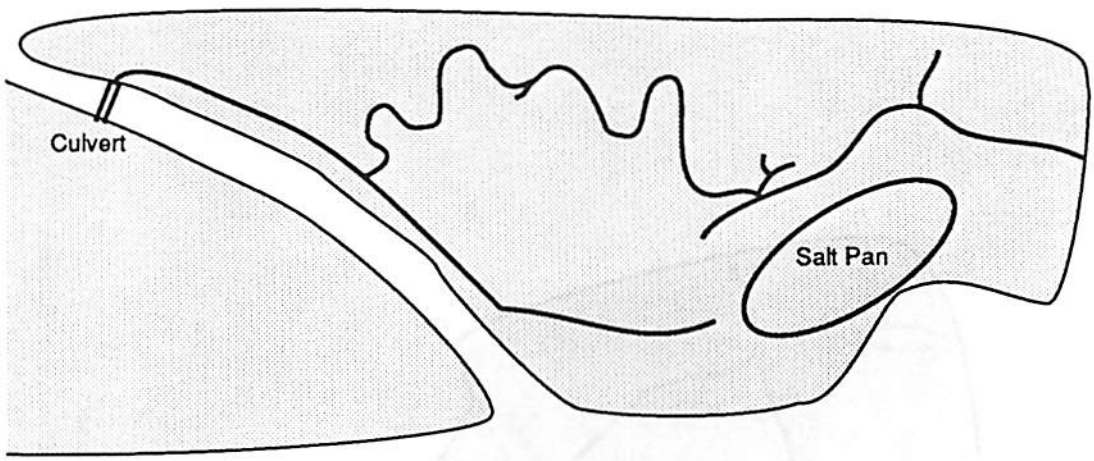

Figure 2. Southern end of Hoffman Marsh showing channels before mitigation.
Source: Adapted from Siegel (1985)

Although not extremely different structurally from its pre-mitigation state, Hoffman Marsh has undergone a series of changes. Today, the diked southern marsh is comprised of five smaller salt pans and a more complex channel system (Figure 3). The widening and the deepening of the channels increased tidal flow in the southern section of the marsh. However, the manner in which Caltrans elected to dispose of the dredge materials appears to have been detrimental to the health of the marsh. Caltrans disposed of the dredgings on the edges of the channels. These deposited spoils served to further increase the elevation of the marsh and consequently altered the plant species inhabiting the southern section. The newly colonizing plant species are not marsh plants.

An additional change was the draining of the large salt pan. Caltrans drained the salt pan on the assumption that it was an undesirable feature in marsh habitats. However, the studies of both Siegel (1985) and Hay (1985) provide data suggesting the ecological importance of salt pans. Siegel noted higher dissolved oxygen levels in the salt pan than in any other of his test sites; high dissolved oxygen is an indicator of either low oxygen demand or high photosynthetic productivity. Hay's study found a high level of foraging by birds in the salt pan. Therefore it is probable that the salt pan was a region of high productivity and thus a valuable resource. Further vegetative and water quality changes are discussed in the studies by Alexander and Austin respectively (this report).

Methodology

In developing my methodology for this project, I attempted to identify the variables affecting bird populations in marsh habitats. To begin my census I familiarized myself with the birds cited by

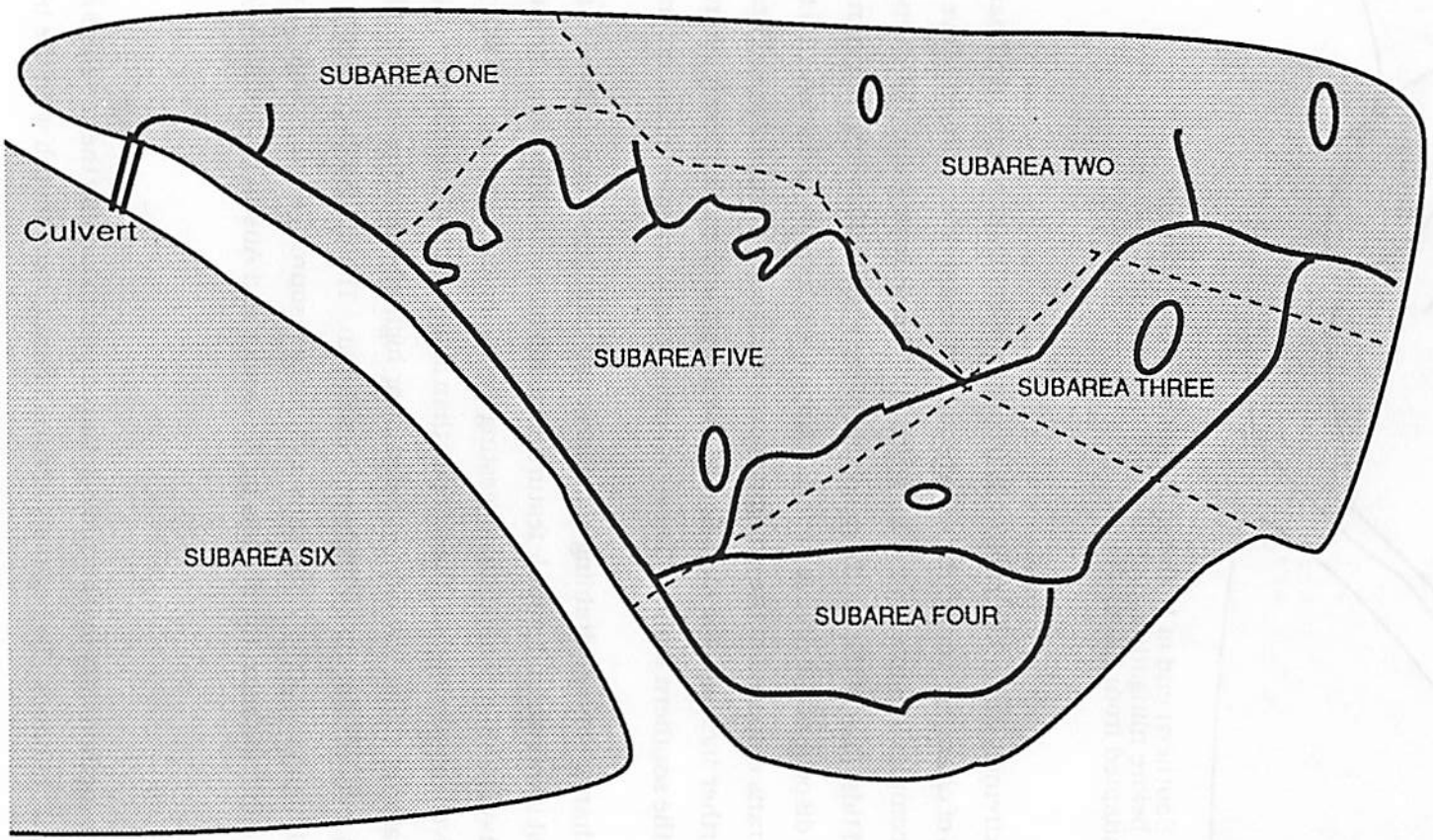

Figure 3. Study area showing observation subareas and existing channels.
Source: Adapted from URS (1973).

Hay (1985) by using the *Field Guide to the Birds of North America* (NGS, 1983). To compile my bird list I recorded bird species sighted in both the northern and southern sections of Hoffman Marsh. I monitored the birds during high and low tide to measure the difference in both number and species. Censusing was done on eight days during January and February. Observation consisted of a one-hour period which began a half-hour before the high or low tides, and persisted through the change of the tide with an additional half hour of observation after tidal change. Consideration of the tidal cycle was important to my study since the number of birds using the marsh is directly affected by the state of the tide. The effects of weather on bird populations was tested by conducting censuses during rain and in clear weather. During all observations, the location and activity of the birds were noted.

Originally I intended to make my observations from one point on the levee separating the two sections of the marsh. I planned to observe each section for a half-hour while noting use patterns and location. However, the marsh vegetation made it difficult to sight birds at that distance. My revised methodology provided more observation sites so that more of the marsh could be observed at a closer range. I divided the southern section into five subareas (Figure 3). At each of these subareas, I stood along the edge of the marsh, and observed the birds for no more than ten minutes. To monitor the birds I used a pair of 7x35 binoculars.

Data

During the period of my study I identified a total of 29 bird species at Hoffman Marsh. Of the species sighted, six had minimal interaction with the marsh habitat and are thus not presented in the data tables. The remaining 23 species consist of aquatic birds (13 species) and multi-habitat birds (ten species). Multi-habitat birds are those that do not depend on the tidal cycle of the marsh, but were observed either foraging or roosting within it. Tables 1 and 2 present the total number of each species sighted in the two sections of Hoffman Marsh. During the eight days that I observed Hoffman Marsh the majority of the birds were sighted in subareas two and three, with the predominant aquatic species being the common snipe. Common snipe were observed only in subareas two and three, and were primarily seen roosting along the edges of the salt pans or foraging in the pickleweed and salt grass. The density of this species did not vary in correlation with the tidal cycle. On average, however, I sighted a greater number of shorebirds in the southern section at high tide than at low tide. Willets, greater yellowlegs, godwits and dunlin were seen only during high tide. They utilized areas dense in pickleweed for both foraging and roosting. Throughout my study I observed three species (nine birds) in the northern section at low tide and 15 species at high tide.

DATE	1-20	1-21	1-28	1-29	2-4	2-11	2-12	2-18
WEATHER	Clear	Clear	Overcast	Clear	Clear	Overcast	Clear	Rain
TIME	9:47-11:15	10:20-11:38	10:00-11:33	11:00-12:13	9:19-10:54	9:35-11:04	10:41-11:57	9:35-10:41
TIDE	Hi. 9:49am	Hi. 10:31am	Lo. 10:00am	Lo. 11:05am	Hi. 9:20am	Lo. 9:29am	Lo. 10:41am	Hi. 9:40am
SPECIES								
Great Egret	1	1		1	1			
Killdeer						2		
Marbled Godwit	2							
Willet	97		1		119			21
Greater Yellowlegs		1			1			
Common Snipe	8	57	24	50	53	41	10	15
Dunlin					2			
Turkey Vulture		1	1	1			1	
Northern Harrier							1	
Red-tailed Hawk			2				2	1
Black Phoebe	1							
Loggerhead Shrike					1			
European Starling	210	15	84	50	100	200		100
Western Meadowlark	8				2		3	1
Red-winged Blackbird	100				25	4		

Table 1. Observation Data: Southern Section of Hoffman Marsh

DATE	1-20	1-21	1-28	1-29	2-4	2-11	2-12	2-18
WEATHER	Clear	Clear	Overcast	Clear	Clear	Overcast	Clear	Rain
TIME	9:47-11:15	10:20-11:38	10:00-11:33	11:00-12:13	9:19-10:54	9:35-11:04	10:41-11:57	9:35-10:41
TIDE	Hi. 9:49am	Hi. 10:31am	Lo. 10:00am	Lo. 11:05am	Hi. 9:20am	Lo. 9:29am	Lo. 10:41am	Hi. 9:40am
SPECIES								
Snowy Egret								1
Great Egret				2			1	
Mallard	9	17						3
Canvasback	5	2			2			
Greater Scaup								6
Surf Scoter					4			
Common Goldeneye					1			1
Bufflehead		1			4			
Killdeer						2	3	
Willet						1		15
Greater Yellowlegs		1						
Turkey Vulture					1			
Black-Shouldered Kite					1			
Black Phoebe	1							
European Starling								100

Table 2. Observation Data: Northern Section of Hoffman Marsh.

The European starling, a multi-habitat species, consistently grouped in large numbers and were found either perched on the telephone wires above Central Avenue, or foraging in the pickleweed throughout both sections of the marsh. Like that of the common snipe, the European starling density was not influenced by the tidal cycle. Other multi-habitat birds, such as the house finch, Anna's hummingbird, mourning dove, and several species of sparrows occupy the surrounding upland vegetation and have not been included in my study. I did, however, observe mourning doves foraging in the pickleweed close to the edges of the marsh in subarea four. On January 28th two red-tailed hawks were sighted; the first was seen perched in a eucalyptus tree along the edge of subarea four and the second was seen flying over the marsh. During my study I had three more sightings of red-tailed hawks, all of which were seen circling above the marsh. I also saw a northern harrier, a black shouldered kite and several turkey vultures.

The two sections of the marsh differed greatly in the number of species present. In the northern section of the marsh I observed far fewer shorebird species than in the southern section, and further differences were caused by the tidal cycle. During low tide I sighted five killdeer and one willet in the northern section. In comparison, during high tide the northern section was a refuge for six species of duck (54 birds). The ducks observed in the northern section are listed in phylogenetic order in Table 2.

I had one day of observation in the rain, during which I sighted 21 willets (15 of which flew from the northern marsh to the southern marsh, and were therefore included in both data tables). Similarly I observed 100 European starlings foraging in both sections of the marsh; they too have been included in both data tables. Lastly, I saw 15 common snipe, one western meadowlark, and one red-tailed hawk.

Discussion

The diversity of bird species has changed since the ornithological study by Hay in 1985. I observed significantly different species and numbers in both sections of the marsh than she did. Hay sighted after mitigation 13 species of aquatic and multi-habitat birds in the southern marsh; this study found 15 species. The removal of the large salt pan altered the habitat such that plovers, dowitchers, and sandpipers were absent during the duration of my study. The number of willets sighted by Hay in the southern section were far fewer than I observed. Several factors may contribute to these differences. After the disruption caused by mitigation, Hay sighted no willets in the southern section. She attributed the decline of the willet population to the removal of the salt pan and to the destruction of the pickleweed as a result of bulldozing. I found that the willets did not utilize the existing salt pans and that instead they depended upon the large open areas of

pickleweed to forage and roost. The increased numbers of willets seen during this study may thus be a result of the restored covering of pickleweed over the southern section.

Consistent with Hay's work, I observed the northern section to define the bird use patterns of a healthy marsh. At a typical high tide the northern section becomes inundated such that the pickleweed is covered and the marsh resembles a lake. During such tides, the birds present were easy to observe. Observation at low tide is less accurate since the pickleweed and cordgrass in the northern section obstruct visibility. The two sections provide different habitat types during high tide; the northern section attracts ducks, while the southern section provides refuge for shorebirds from other East Bay wetlands which are inundated.

The channels in the northern section are significantly deeper than the southern section. This decreased the accuracy of the census. For instance, the great egret sighted in the northern marsh on February 12 would have been overlooked if it had not flown from a channel, exposing itself to my view. Considering the previously mentioned difficulties of observation in marshes, it is necessary to question whether the data I collected is an accurate representation of the bird use at Hoffman Marsh. Perhaps I overlooked birds that were not visible from my observation sites.

Hay noted in her paper that the presence of large numbers of multi-habitat birds was an indication of poor tidal exchange. I observed far fewer killdeer, a multi-habitat bird, than she did. The decline of this population may signify an increased tidal exchange as a result of mitigation. In the study by Hay, common snipe were not sighted in either section of the marsh. This study found in the southern section, common snipe on each day of observation. Two factors may have contributed to this difference. I found that the common snipe was quite secretive and that it crouched low in the pickleweed to avoid predators. For this reason, Hay may have overlooked this species. Secondly, in this study, only one common snipe was observed to forage in a salt pan (site 3); they clearly prefer the pickleweed. Hay's study was conducted while the pickleweed was in a state of disruption and therefore the common snipe may not have been present at that time.

The impact of weather on the number of shorebirds is inconclusive. I censused the birds at Hoffman Marsh five times in clear weather, twice in overcast and once in rain. The difference in numbers observed on the overcast days and the one day of rain may have been a result of poor visibility rather than the influence of weather.

Conclusion

This study has observed an increase of bird numbers and species at Hoffman Marsh since the restoration project by Caltrans and the ornithological census by Hay. Species types have

significantly changed due to the removal of the large salt pan. The southern section of Hoffman Marsh no longer supports the same mudflat-feeding shorebirds as it once did. Instead, the southern section offers a sanctuary for feeding and roosting during high tide while other East Bay wetlands are inundated. Although my data seem to suggest that the bird population is greater in the southern, altered section than in the natural marsh, any such conclusion is unwarranted and may be apparent merely because of the difficulties of observation in the natural marsh environment.

Despite the increase of observed bird species, Hoffman Marsh has not been completely restored. The purpose of the mitigation was to increase tidal flow and restore the southern section to a state similar to the northern marsh, but with the absence of Pacific cordgrass, and the presence of upland plant species, the southern section of Hoffman Marsh remains several steps from complete rehabilitation. To restore full tidal flow in the southern section would require further mitigation. The existing culvert would have to be cleaned on a regular basis and additional culverts constructed. If low elevation marsh plant species are desired, the southern section should be regraded to allow for their colonization.

Nevertheless, Hoffman Marsh is still providing a habitat for birds and complete restoration of the water circulation in the southern section would alter the present diversity of habitat type. With the continued decline of East Bay wetlands, marsh habitats have been isolated in fragments along the Bay shoreline. Because of this isolation, the natural transitional vegetation and habitat which once bordered these marshes is no longer present. The southern section of Hoffman Marsh provides a transitional habitat from marsh to upland vegetation, where birds can roost and forage while other wetlands are inundated during high tide. Therefore the southern section, in its present state, offers a habitat now rare in the East Bay, and I believe it should be maintained.

References

California Department of Transportation (Caltrans), 1981. *Final Environmental Impact Statement, Hoffman Corridor*, Volume I; San Francisco, California, 204 pp.

Craig, Darrin. 1985. Vegetation of the Hoffman Marsh before the restoration project of 1984. In *Open Space and Development in the Bay Area;* Doris Sloan, ed.; Berkeley, University of California, pp. 15-22.

Hay, Ellen. 1985. An ornithological study of Hoffman Marsh. In *Open Space and Development in the Bay Area;* Doris Sloan, ed.; Berkeley, University of California, pp. 25-32

National Geographic Society, 1983. *Field Guide to the Birds of North America;* Washington, D.C., National Geographic Society, 465 pp.

Siegel, Stuart. 1985. The rising of the tide - A study of marsh restoration. In *Open Space and Development in the Bay Area*; Doris Sloan, ed.; Berkeley, University of California, pp. 1-14.

URS Reseach Co., 1973. *Marine Environmental Impact Analysis, Widening Highways 17 and 80 Along Shoreline of Richmond, California.* California Department of Transportation, 139 pp.