

HERON AND EGRET MONITORING RESULTS AT WEST MARIN ISLAND: 2001 NESTING SEASON

A Report to the San Pablo Bay National Wildlife Refuge

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INTRODUCTION

Audubon Canyon Ranch (ACR) has been monitoring the number of nesting herons and egrets on West Marin Island since 1979. In addition, ACR has been monitoring annual reproductive success of Great Egrets and Great Blue Herons since 1993 (Kelly *et al.* 1994-2000). Monitoring is conducted annually from viewing positions on East Marin Island and by boat. This work is part of a regional study of heron and egret colonies in the northern San Francisco Bay area (Kelly *et al.* 1993).

METHODS

Methods for estimating reproductive success are described in detail in Kelly *et al.* (1996). In 2001, we mapped the locations of 54 focal Great Egret nests and 8 Great Blue Heron nests on panoramic photographs of the nesting colony and numbered them for individual identification. We used telescopes to monitor the nest survivorship, seasonal timing, and pre fledging brood size of the numbered nests during four visits to East Marin Island (6 April, 25 April, 10 May, and 5 June). A subset of 17 focal Great Egret nests was monitored more frequently, on 38 observation days from the mainland.

On 5 June, we counted nests of all bird species nesting on all sides of West Marin Island. As in other years, the census was conducted primarily from an 18-foot Boston Whaler. We counted nests on the west side of the Island first, by drifting slowly with the motor off, then counted the south and northeast sides from anchored positions. After the initial census, we cruised slowly along the northeast side to check for nests that were not seen from our anchored position, and adjusted the total counts accordingly. We then landed on East Marin Island and rechecked the initial estimates for number of Great Blue Herons. Viewing conditions were very good, with clear skies and calm water. We also conducted an earlier census of active Great Egret nests on 10 May, from viewing positions on the wharf at East Marin Island and by boat.

RESULTS AND DISCUSSION

Great Egret

On 5 June 2001, we counted 94 active Great Egret nests, suggesting a decrease in colony size from 135 active nests on 9 June 2000 (Table 1). However, an earlier census revealed 161 active nests on 10 May, suggesting a greater number of nesting pairs in 2001, and a substantial rate of nest failure (42%) in late May and early June. Focal nest survivorship (percent fledging at least one young) in 2001 was 69% ($n = 54$ focal nests), which was a lower rate than recorded in 2000 (81%, $n=59$), 1999 (80%, $n=45$), and 1998 (77%, $n=82$). However, this estimate of 69% focal nest survivorship was higher than suggested by the estimated 58% decline in overall colony size from 10 May to 5 June. In other years, focal nest survivorship has ranged from 66% in 1997 ($n = 41$) to 89% in 1995 ($n=73$). Observations of resident ravens suggested that the higher rates of Great Egret nest failure in 2001 might have been associated with increased raven activity in the colony (Kelly and Roth 2001).

Mean pre fledging brood size was 1.89 young per successful nest ($SE = 0.10$, $n = 27$). Overall productivity was 1.31 ($SE=0.16$) young per nesting attempt, which was similar to estimates in recent years (Figure 1). These annual estimates were obtained by adjusting

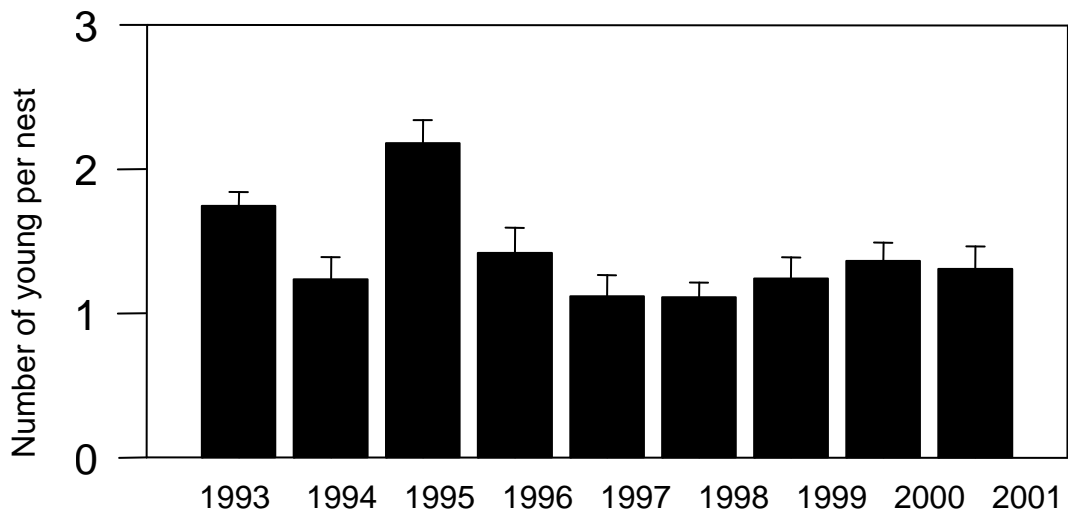


Figure 1. Mean number of young produced per Great Egret nest at West Marin Island, 1993-2001, based on pre fledging brood size of successful nests adjusted for overall nest survivorship. Error bars = standard errors.

Table 1. Number of active heron and egret nests on West Marin Island, based on counts conducted by boat and from East Marin Island.

Year	Great Egret	Snowy Egret	Black-crowned Night-Heron	Great Blue Heron
1979	58	262	98	0
1981	75	325	109	0
1982	187	500	80	0
1983	190	345	89	0
1984	139	347	54	0
1985	84	161	79	0
1986	160	126	40	0
1987	89	239	41	0
1988	77	212	35	0
1989	79	245	61	0
1990	119	300	37	1
1991	90	277	45	2
1992	189	220	30	1
1993	120	98	41	0
1994	163	8	32	2
1995	172	16	18 ^a	2
1996	148	36	22	3
1997	167	119	24	5
1998	155	117	53	7
1999	101	84	47	8 ^b
2000	134	156	50	9
2001	94 ^c	217	26	7 ^d

^a 115 Black-crowned Night-Herons were present on adjacent mudflats on 17 April 1995.

^b Number includes one nest on East Marin Island.

^c Number of active nests during the standard early-June census window, on 5 June 2001. A count on 10 May indicated an earlier peak number of 161 active Great Egret nests.

^d Number of nesting pairs in 2001 was 8.

the productivity of successful focal nests (prefledging brood size) to reflect all nest fates, based on focal nest survivorship. We emphasize that these productivity estimates should be interpreted with caution because they were adjusted using a single focal estimate of nest survivorship each year (69% in 2001) and therefore include some unmeasured sampling variation. For example, the apparent changes in colony size during 2001 suggest that overall nest survivorship might have been as low as 58%, which would result in a productivity estimate of only 1.09 young per nest (SE=0.15).

Snowy Egret

We counted 217 Snowy Egret nests on West Marin Island, indicating a continuing increase in the size of the Snowy Egret colony over recent years (Table 1). As in other years, Snowies concentrated their nests in the area of low shrubs on the northeast side of the Island (Table 2). Observations of foraging and feeding Common Ravens, and prey remains below the raven nest site on East Marin Island indicated that ravens ate at least seven adult Snowy Egrets in 2001 (at least four in 2000), but we did not directly observe predation on adult Snowies.

Only one other Snowy Egret colony (Napa State Hospital) increased in size over numbers estimated in 2000 (Table 3), and Snowies did not nest at nearby Red Rock or Brooks Island this year. This suggests interannual movements among colony sites and a continuing return of breeding Snowies to West Marin Island. The resulting colony size of 217 active nests was similar to that observed prior to the near-abandonment in 1993-1994 (Table 1), which was apparently the result of harassment by a Red-tailed Hawk. Greater numbers of Snowy Egrets over all sites suggests a slight increase in regional recruitment (Table 3). However, we emphasize that our results reflect only the number of active nests on observation days and do not directly indicate the number of breeding pairs. Apparent changes in colony size could be influenced by differences in the rates or timing of nest failure among sites and years. We were unable to monitor nest failure rate on West Marin Island because Snowy Egrets generally conceal their nests.

Great Blue Heron

Nesting numbers of Great Blue Herons on West Marin Island have been increasing gradually since 1990 (Table 1). The peak number of active Great Blue Heron nests in

Table 2. Number of active nests observed on West Marin Island on 5 June 2001.

	Number of occupied nests			Total Nests
	West Side	South Side	Northeast Side	
Great Egret	0	10	84	94 ^a
Snowy Egret	0	0	217	217
Black-crowned Night-Heron	0	0	26	26
Great Blue Heron	0	0	7	7
Western Gull	10	24	5	39
Black Oystercatcher	0	1	0	1 ^b

^a161 active Great Egret nests were counted on 10 May.

^bTwo adults observed; nesting not confirmed.

Table 3. Number of active Snowy Egret nests in the northern San Francisco Bay area from 1991 to 2001.

Colony Site	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Brooks Island	7	5	26	95	89	0	0	0	0	8	0
Napa State Hospital	0	6	15	114	92	40	100 ^a	160	85	117	129
Picher Canyon, ACR	5	3	11	10	4	4	10	6	5	4	9
Penngrove	2	7	13	2	0	0	2	7	2	1	4
Santa Rosa Creek	0	1	9	8	37	18	27	24	7	48	43
Gold Hill, Suisun Marsh	0	0	0	2	0	0	0	0	0	0	0
Red Rock	0	5	20	65	80	30	10	23	17	2	0
West Marin Island	277	220	98	8	16	36	119	117	84	156	217
Alcatraz Island	0	0	0	0	0	0	3	11	8	17	2
Bodega Harbor	0	0	0	0	0	0	0	0	0	9	3
Petaluma Wastwtr Trtmt	0	0	0	0	0	0	0	0	0	12	7
Total	291	247	192	302	318	128	271^a	348	208	374	414

^aEstimate only; nests were not individually counted at the Napa State Hospital colony site in 1997.

2001 was seven, which was slightly lower than the count of nine active nests in 2000 (Table 1). However, there were eight Great Blue Heron nesting attempts this year, suggesting eight rather than seven pairs in the colony. Great Blue Herons did not nest on East Marin Island. The mean pre fledging brood size among successful nesting attempts was 2.17 young per nest (SE = 0.31, n = 6). The mean productivity of all nesting attempts, accounting for the failure of two nests, was 1.62 (SE = 0.42, n = 8).

Black-crowned Night-Heron

The number of Black-crowned Night-Heron nests seems to have declined slightly, based on annual estimates, from approximately 50 nests in 1998, 1999, and 2000, to 26 in 2001 (Table 1). However, annual estimates have shown considerable variation over the course of this study (Table 1). Because night-herons often conceal their nests in the vegetation, our counts conducted by boat provide only a rough index of trends in colony size. The number of night-heron nests on nearby Red Rock increased from 40 nests in 2000 to 63 nest in 2001. In addition, a new night-heron colony was established this year in cattails in an abandoned sewage treatment pond at Skaggs Island in the Napa Marsh. Numbers of night-herons nesting on West Marin Island has been relatively stable since the mid-1980s (Table 1).

Common Raven

As in 1999 and 2000, we conducted weekly all-day observations of raven activity from East Marin Island and by boat. Ravens frequently spent time in the heron and egret colony, defended the colony against other ravens, and rarely if ever left the vicinity of Marin Islands. On several occasions, ravens were observed carrying eggs or other prey from the heron and egret colony to their nest site on East Marin. Preliminary analysis of three years of raven activity in the heron and egret colony suggest an annual increase in raven predation of egret eggs and young. The raven work is part of a continuing study of status and nest predatory behavior of ravens at waterbird colonies in the San Francisco Bay area, and is reported separately (Kelly and Roth 2001).

Other Species

We counted 39 Western Gull nests on West Marin Island, which was similar to

abundances in recent years (49, 48, 37, 43 nests, respectively, 1997-2000). On 5 June, we observed one pair of Black Oystercatcher on the Island but found no nest or young.

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