

Bolinas Lagoon Heron and Egret Nesting Summary 2014

With Results from Heronries at
Picher Canyon, Kent Island, and the Bolinas Mainland



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Introduction and data collection

Audubon Canyon Ranch (ACR) has been monitoring nesting Great Blue Herons (*Ardea herodias*), Great Egrets (*Ardea alba*) and Snowy Egrets (*Egretta thula*) in Picher Canyon since 1967. This colony is located at the Martin Griffin Preserve, on the northeast side of the Bolinas Lagoon, near Bolinas, CA (Figure 1). ACR has also been monitoring nesting herons and egrets at the Bolinas colony site, at the base of the Francisco Mesa adjacent to the Bolinas Channel since 1990. This colony's subsite, located on the south end of Kent Island at the mouth of Bolinas Lagoon, has also been monitored by ACR since it was founded in 2008.

ACR biologists collect data on: (1) the number of active nests, (2) reproductive success (nest survival rates and the number of chicks fledged from successful nests), (3) the nesting stage (a measure of seasonal timing), and (4) any observed disturbances or potential predators observed or inferred in the vicinity of the nesting site. The tables included in this report contain several variables extracted from the data that is collected each year. The following is an explanation of each of those variables:

Arrival date – The date a species is first observed at the colony site. These dates are estimates only. The dates for Picher Canyon are more accurate, due to staff presence in the canyon.

Peak nesting date – The date at which the greatest number of nests are active at one visit.

First egg laid – The date at which the first egg in the colony is detected, based either on direct observation of eggs or inferred from behavior of adults.

First chick hatched - The date at which the first chick hatched in the colony is detected, based either on direct observation of chicks or inferred from behavior of adults and estimated incubation time.

First chick fledged – The estimated date when the first chick in the colony reaches independence and the nest is no longer continually occupied by chicks.

Peak nests – The total number of active nests in the colony on the peak nesting date.

Percent nest success – The number of nests that fledge at least one chick out of the total number of focal nests in the colony. Focal nests meet the criteria: (1) observed as active before or during the first two weeks of incubation (after pair bond detected and before the end of the first two weeks of egg laying/ incubation); (2) must be followed to either fledging or failure; and (3) must be first observed as a focal nest prior to the peak nesting date.

Chicks fledged per successful nest attempt – The average number of chicks fledged per nest, only for those nests where all chicks in the brood were visible. Brood sizes can be calculated from non-focal nests. It is important to note that it is therefore possible to have zero nest success and have chicks fledge from a colony, because brood size and nest success are calculated from different sets of nests.

Final fledge date – The last date that a chick is observed in the colony.

Results

PICHER CANYON

There were no nest attempts by either herons or egrets in Picher Canyon in 2014 (Table 1). Two Great Blue Herons flew low over the colony site and vocalized on 29 January, but no other herons or egrets were seen in the canyon. This was the first year since monitoring began in 1967 that no herons or egrets have nested at this colony site. A Bald Eagle, the species considered to be the most likely cause of the significant decrease in colony size and reproductive success at Picher Canyon in 2013 (Millus et al. 2013), was seen flying over Picher Canyon on 19 March.

BOLINAS

The Bolinas colony site saw a dramatic increase in the number of nesting Great Egrets in 2014, with a peak of 34 nests, more than double the number of nests in the preceding year (Table 2). Great Egrets initiated nesting on 11 March, continuing the recent trend of increasingly earlier nest initiations at this relatively new colony site for Great Egret. Nest performance also increased compared to previous years, and $68 \pm 9\%$ (SE; $n = 31$ nests) Great Egret nests were successful and fledged an average of 2.6 ± 0.19 ($n = 17$ successful nests) chicks per successful nest.

Nine Great Blue Heron nests were also established at the Bolinas colony site. The first nests were initiated on 19 February. Of the nine nests, $89 \pm 11\%$ (SE; $n = 9$ nests) were successful, with an average of 2.8 ± 0.31 ($n = 8$ successful nests) chicks fledging per successful nest.

A juvenile Bald Eagle landed in the Bolinas colony site early in the season, after the Great Blue Herons had arrived, but before the Great Egrets arrived. Landing in the colony trees, it flushed all the herons, but it was not observed chasing or attacking them. Bald Eagles were also seen regularly on Bolinas Lagoon throughout the nesting season (Keith Hanson, personal communication).

For Great Blue Heron, both nest survivorship and the number of chicks fledged per nest was higher at the Bolinas colony in 2014 than the average for the northern San Francisco Bay region (Kelly et al. 2007). For Great Egret, brood size was higher than the regional average; nest success was slightly below the regional average, but higher than the historical average for Picher Canyon. The high number of young produced per successful nest suggests that food was not limiting for heron and egrets nesting on Bolinas Lagoon. The processes leading to the abandonment of Picher Canyon appear to be specific to that site and did not apparently impose any adverse effects on the nesting colony at Bolinas.

Kent ISLAND

There were no nest attempts by either herons or egrets on Kent Island (Table 3).

References

- Kelly, J. P., K. L. Etienne, C. Strong, M. McCaustland, and M. L. Parkes. 2007. Status, trends, and implications for the conservation of heron and egret nesting colonies in the San Francisco Bay area. *Waterbirds* 30: 455-478.
- Millus, S. A., Kelly, J. P. and T. E. Condeso. 2013. Management framework for protection of the heronry at Martin Griffin Preserve: An assessment and response to the 2013 decline in Great Egret nesting in Picher Canyon. ACR Technical Report 1967-1-3 © September 2013, Audubon Canyon Ranch Cypress Grove Research Center P.O. Box 808, Marshall, CA 94940



Figure 1. Approximate locations of Picher Canyon, Bolinas and Kent Island colony sites on Bolinas Lagoon.

Table 1. Timing and reproductive performance of (a) Great Blue Heron and (b) Great Egret at Picher Canyon 2010-2014. All error estimates are standard error (SE) and sample sizes are (n).

Variable	2010	2011	2012	2013	2014
a) Great Blue Heron					
Arrival date	March 17	—	—	May 2	—
Peak nesting date	April 23	—	—	May 2	—
First egg laid	March 17	—	—	May 6	—
First chick hatched	April 16	—	—	June 11	—
First chick fledged	August 13	—	—	—	—
Peak nests	2	0	0	1	0
Percent nest success (n)	0% (2)	—	—	0% (1)	—
Chicks fledged per successful nest (n)	2.0 ± 0.0 (1) ^a	—	—	—	—
Final fledge date	August 13	—	—	—	—
b) Great Egret					
Arrival date	March 9	March 5	March 12	April 6	—
Peak nesting date	May 24	May 6	May 11	May 2	—
First egg laid	March 17	April 4	April 16	April 8	—
First chick hatched	April 16	May 2	May 18	n/a	—
First chick fledged	June 7	July 1	July 2	n/a	—
Peak nests	86	66	75	32	0
Percent nest success (n)	64% (76)	38% (60)	17% (66)	0% (35)	—
Chicks fledged per successful nest (n)	2.8 ± 0.09 (49)	3.1 ± 0.07 (15)	2.8 ± 0.12 (20)	—	0
Final fledge date	August 6	August 15	July 29	—	—

^aThis was the only successful nest, but it was not a focal nest; rather, it was a re-nesting attempt at one of the failed focal nests, initiated after the colony had reached peak size for the year.

Table 2. Timing and reproductive performance of (a) Great Blue Heron and (b) Great Egret at the Bolinas mainland colony site 2010-2014. All error estimates are standard error (SE) and sample sizes are (n).

Variable	2010	2011	2012	2013	2014
a) Great Blue Heron					
Arrival date	March 6	February 28	February 23	March 8	February 19
Peak nesting date	May 4	April 4	March 19	April 29	March 19
First egg laid	April 13	March 11	March 7	March 25	February 28
First chick hatched	May 4	April 11	April 20	April 17	April 2
First chick fledged	June 17	July 5	June 22	June 17	June 18
Peak nests	5	6	8	9	9
Percent nest success (n)	33% (3)	50% (6)	63% (8)	60% (10)	89% (9)
Chicks fledged per successful nest attempt \pm SE (n)	2.2 \pm 0.31 (6)	2.3 \pm 0.16 (8)	1.8 \pm 0.20 (5)	2.6 \pm 0.32 (8)	2.8 \pm 0.31 (8)
Final fledge date	>July 5	>Aug. 1	July 6	July 19	June 18
b) Great Egret					
Arrival date	—	June 3	April 4	March 25	March 11
Peak nesting date	—	July 5	June 15	June 17	May 29
First egg laid	—	June 3	April 20	April 1	March 19
First chick hatched	—	July 5	May 18	April 29	April 30
First chick fledged	—	n/a	> July 6	June 28	June 18
Peak nests	0	4	3	15	34
Percent nest success (n)	—	0% (5)	50% (2)	40% (15)	68% (31)
Chicks fledged per successful nest attempt \pm SE (n)	—	0	2.0 \pm 0.00 (1)	2.4 \pm 0.24 (5)	2.6 \pm 0.19 (17)
Final fledge date	—	n/a	> July 6	> July 19	July 10

Table 3. Timing and reproductive performance of (a) Great Blue Heron and (b) Great Egret on Kent Island 2010-2014. All error estimates are standard error (SE) and sample sizes are (n).

Variable	2010	2011	2012	2013	2014
a) Great Blue Heron					
Arrival date	March 6	February 28	March 19	n/a	—
Peak nesting date	April 3	April 25	March 19	n/a	—
First egg laid	March 13	March 11	March 19	n/a	—
First chick hatched	April 19	April 18	April 20	n/a	—
First chick fledged	June 25	July 5	n/a	n/a	—
Peak nests	4	4	3	1	0
Percent nest success (n)	100% (3)	100% (3)	0% (1)	n/a	—
Chicks fledged per successful nest attempt \pm SE (n)	2.3 \pm 0.25 (4)	2.0 \pm 0.00 (3)	n/a	n/a	—
Final fledge date	July 5	July 18	n/a	n/a	—
b) Great Egret					
Arrival date	—	—	May 18	—	—
Peak nesting date	—	—	May 18	—	—
First egg laid	—	—	May 18	—	—
First chick hatched	—	—	n/a	—	—
First chick fledged	—	—	n/a	—	—
Peak nests	0	0	2	0	0
Percent nest success (n)	—	—	0% (2)	—	—
Chicks fledged per successful nest attempt \pm SE	—	—	n/a	—	—
Final fledge date	—	—	n/a	—	—

Table 4. Timing and reproductive performance of (a) Great Blue Heron and (b) Great Egret for all Bolinas Lagoon colonies combined 2010-2014. All error estimates are standard error (SE) and sample sizes are (n).

Variable	2010	2011	2012	2013	2014
a) Great Blue Heron					
Arrival date	March 6	February 28	February 23	March 8	February 19
Peak nesting date	May 4	April 25	March 19	April 29	March 19
First egg laid	March 13	March 11	March 7	March 25	February 28
First chick hatched	April 16	April 11	April 20	April 17	April 2
First chick fledged	June 17	July 5	June 22	June 17	June 18
Peak nests	11	10	11	11	9
Percent nest success (n)	44% (8)	75% (9)	31% (9)	30% (11)	89% (9)
Chicks fledged per successful nest attempt \pm SE (n)	2.2 \pm 0.18 (11)	2.2 \pm 0.18 (11)	1.8 \pm 0.20 (5)	2.6 \pm 0.32 (8)	2.8 \pm 0.31 (8)
Final fledge date	August 13	> August 1	July 6	July 19	June 18
Number of active colony-sites	3	2	2	3	1
b) Great Egret					
Arrival date	March 9	March 5	March 12	March 25	March 11
Peak nesting date	May 24	May 6	May 14	May 2	May 29
First egg laid	March 17	April 4	April 16	April 1	March 19
First chick hatched	April 16	May 2	May 18	April 29	April 30
First chick fledged	June 7	July 1	>July 6	June 28	June 18
Peak nests	86	70	80	47	34
Percent nest success (n)	64% (76)	19% (65)	22% (70)	20% (50)	68% (31)
Chicks fledged per successful nest attempt \pm SE (n)	2.8 \pm 0.09 (49)	3.1 \pm 0.07 (15)	2.8 \pm 0.18 (21)	2.4 \pm 0.24 (5)	2.6 \pm 0.19 (17)
Final fledge date	August 6	August 15	July 29	>July 19	July 10
Number of active colony-sites	1	2	3	2	1