

Bolinas Lagoon Heron and Egret Nesting Summary 2015

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



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ACR Technical Report 67-1-9
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Introduction

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 adjacent subsite, 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. These dates are estimates only.

Results

PICHER CANYON

As in 2014, there were no heron or egret nest attempts in 2015 in Picher Canyon (Table 1). This is only the second year since monitoring began in 1967 that no herons or egrets nested in the canyon.

BOLINAS

The number of nests established at the Bolinas colony site in 2015 was similar to last year for both Great Blue Herons and Great Egrets. A peak of ten Great Blue Heron nests was established in the Bolinas colony site in 2015 (although there were 12 nest attempts). The first nests were initiated on 12 February. Average nest success was 42% ($n = 12$ nests), with successful nests fledging an average of 1.8 ± 0.37 (SE; $n = 5$ successful nests) chicks, which was very close to the average per capita productivity of successful nests in San Francisco Bay during recent years (1.9 ± 0.03 , 2009-2014; Kelly and Nur 2015).

Great Egrets initiated nesting on 19 March, with nest abundance peaking at 27 nests on 1 May. Nest success was low, with only 10% ($n = 29$ nests) of nests fledging chicks. Brood size, however, was close to the regional average in the northern San Francisco Bay area in recent years (2.1 ± 0.02 , 2009-2014; Kelly and Nur 2015), with 2.3 ± 0.33 ($n = 3$) chicks fledged per successful nest.

An adult Bald Eagle was seen harassing the colony on multiple occasion at the end of March through the beginning of April. On 30 March the eagle was seen consuming eggs from a Great Blue Heron nest. About half of the colony's nests failed after this, but the majority of those re-nested. Common Ravens were also seen attacking and killing Great Egret chicks at two nests on separate occasions; these nests were just beginning to be left unguarded by adults, which is period of the nesting cycle when chicks are the most vulnerable to predation (Kelly et al. 2005).

Although nest success in 2015 was lower than average for both species, brood sizes were equal to, or above, the regional average for both species. The normal level of productivity in successful nests suggests that food was not limiting for herons or egrets nesting on Bolinas Lagoon. The relatively low nest success was associated with disturbance by Bald Eagles and Common Ravens, suggesting that disturbance by potential nest predators was an important factor limiting nesting activity by herons and egrets on Bolinas Lagoon.

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.

- Kelly, J.P., K. L. Etienne and J. E. Roth. 2005. Factors influencing the nest predatory behaviors of Common Ravens in heronries. *The Condor* 107: 402–415.
- Kelly, J. P., and N. Nur. 2015. Processes—heron and egret brood size indicator. Technical summary and appendix, in *State of the San Francisco Estuary 2015: Status and Trends Update on 33 Indicators of Ecosystem Health*, San Francisco Estuary Partnership. [www.sfestuary.org/about-the-estuary/soter/]
- Millus, S. A., J. P. Kelly, 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 2011-2015. All error estimates are standard error (SE) and sample sizes are (n).

| Variable | 2011 | 2012 | 2013 | 2014 | 2015 |
|--|-----------------|-----------------|---------|----------|----------|
| a) Great Blue Heron | | | | | |
| Arrival date | — | — | May 2 | — | — |
| Peak nesting date | — | — | May 2 | — | — |
| First egg laid | — | — | May 6 | — | — |
| First chick hatched | — | — | June 11 | — | — |
| First chick fledged | — | — | — | — | — |
| Peak nests | 0 | 0 | 1 | 0 | 0 |
| Percent nest success (n) | — | — | 0% (1) | — | — |
| Chicks fledged per successful nest (n) | — | — | — | — | — |
| Final fledge date | — | — | — | — | — |
| b) Great Egret | | | | | |
| Arrival date | March 5 | March 12 | April 6 | — | — |
| Peak nesting date | May 6 | May 11 | May 2 | — | — |
| First egg laid | April 4 | April 16 | April 8 | — | — |
| First chick hatched | May 2 | May 18 | n/a | — | — |
| First chick fledged | July 1 | July 2 | n/a | — | — |
| Peak nests | 66 | 75 | 32 | 0 | 0 |
| Percent nest success (n) | 38% (60) | 17% (66) | 0% (35) | — | — |
| Chicks fledged per successful nest (n) | 3.1 ± 0.07 (15) | 2.8 ± 0.12 (20) | — | 0 | 0 |
| Final fledge date | August 15 | July 29 | — | — | — |

Table 2. Timing and reproductive performance of (a) Great Blue Heron and (b) Great Egret at the Bolinas mainland colony site 2011-2015. All error estimates are standard error (SE) and sample sizes are (n).

| Variable | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|--------------------|--------------------|--------------------|---------------------|--------------------------------------|
| a) Great Blue Heron | | | | | |
| Arrival date | February 28 | February 23 | March 8 | February 19 | February 12 |
| Peak nesting date | April 4 | March 19 | April 29 | March 19 | April 2 |
| First egg laid | March 11 | March 7 | March 25 | February 28 | March 3 |
| First chick hatched | April 11 | April 20 | April 17 | April 2 | May 11 |
| First chick fledged | July 5 | June 22 | June 17 | June 18 | July 20 |
| Peak nests | 6 | 8 | 9 | 9 | 10 |
| Percent nest success (n) | 50% (6) | 63% (8) | 60% (10) | 89% (9) | 42% (12) |
| Chicks fledged per successful nest attempt \pm SE (n) | 2.3 \pm 0.16 (8) | 1.8 \pm 0.20 (5) | 2.6 \pm 0.32 (8) | 2.8 \pm 0.31 (8) | 1.8 \pm 0.37 (5) |
| Final fledge date | >Aug. 1 | July 6 | July 19 | June 18 | July 20 |
| b) Great Egret | | | | | |
| Arrival date | June 3 | April 4 | March 25 | March 11 | March 19 |
| Peak nesting date | July 5 | June 15 | June 17 | May 29 | May 1 |
| First egg laid | June 3 | April 20 | April 1 | March 19 | March 19 |
| First chick hatched | July 5 | May 18 | April 29 | April 30 | May 5 |
| First chick fledged | n/a | > July 6 | June 28 | June 18 | July 20 |
| Peak nests | 4 | 3 | 15 | 34 | 27 |
| Percent nest success (n) | 0% (5) | 50% (2) | 40% (15) | 68% (31) | 10% (29) |
| 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) | 2.3 \pm 0.33 (3) |
| Final fledge date | n/a | > July 6 | > July 19 | July 10 | > July 27 |

Table 3. Timing and reproductive performance of (a) Great Blue Heron and (b) Great Egret on Kent Island 2011-2015. All error estimates are standard error (SE) and sample sizes are (n).

| Variable | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|--------------------|----------|------|----------|-------------|
| a) Great Blue Heron | | | | | |
| Arrival date | February 28 | March 19 | n/a | — | — |
| Peak nesting date | April 25 | March 19 | n/a | — | — |
| First egg laid | March 11 | March 19 | n/a | — | — |
| First chick hatched | April 18 | April 20 | n/a | — | — |
| First chick fledged | July 5 | n/a | n/a | — | — |
| Peak nests | 4 | 3 | 1 | 0 | 0 |
| Percent nest success (n) | 100% (3) | 0% (1) | n/a | — | — |
| Chicks fledged per successful nest attempt \pm SE (n) | 2.0 \pm 0.00 (3) | n/a | n/a | — | — |
| Final fledge date | 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 | 2 | 0 | 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 2011-2015. All error estimates are standard error (SE) and sample sizes are (n).

| Variable | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---------------------|---------------------|--------------------|---------------------|--------------------------------------|
| a) Great Blue Heron | | | | | |
| Arrival date | February 28 | February 23 | March 8 | February 19 | February 12 |
| Peak nesting date | April 25 | March 19 | April 29 | March 19 | April 2 |
| First egg laid | March 11 | March 7 | March 25 | February 28 | March 3 |
| First chick hatched | April 11 | April 20 | April 17 | April 2 | May 11 |
| First chick fledged | July 5 | June 22 | June 17 | June 18 | July 20 |
| Peak nests | 10 | 11 | 11 | 9 | 10 |
| Percent nest success (n) | 75% (9) | 31% (9) | 30% (11) | 89% (9) | 42% (12) |
| Chicks fledged per successful nest attempt \pm SE (n) | 2.2 \pm 0.18 (11) | 1.8 \pm 0.20 (5) | 2.6 \pm 0.32 (8) | 2.8 \pm 0.31 (8) | 1.8 \pm 0.37 (5) |
| Final fledge date | > August 1 | July 6 | July 19 | June 18 | July 20 |
| Number of active colony-sites | 2 | 2 | 3 | 1 | 1 |
| b) Great Egret | | | | | |
| Arrival date | March 5 | March 12 | March 25 | March 11 | March 19 |
| Peak nesting date | May 6 | May 14 | May 2 | May 29 | May 1 |
| First egg laid | April 4 | April 16 | April 1 | March 19 | March 19 |
| First chick hatched | May 2 | May 18 | April 29 | April 30 | May 5 |
| First chick fledged | July 1 | >July 6 | June 28 | June 18 | July 20 |
| Peak nests | 70 | 80 | 47 | 34 | 27 |
| Percent nest success (n) | 19% (65) | 22% (70) | 20% (50) | 68% (31) | 10% (29) |
| Chicks fledged per successful nest attempt \pm SE (n) | 3.1 \pm 0.07 (15) | 2.8 \pm 0.18 (21) | 2.4 \pm 0.24 (5) | 2.6 \pm 0.19 (17) | 2.3 \pm 0.33 (3) |
| Final fledge date | August 15 | July 29 | >July 19 | July 10 | > July 27 |
| Number of active colony-sites | 2 | 3 | 2 | 1 | 1 |