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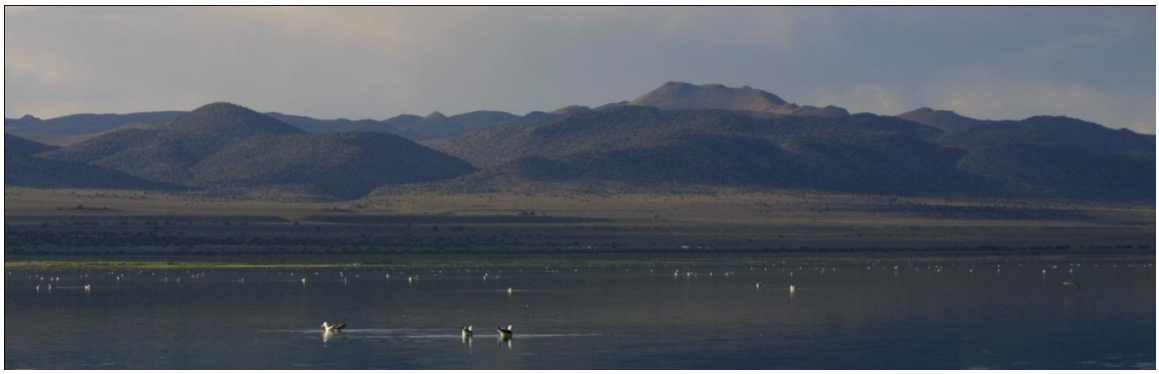
Population Size and Reproductive Success of California Gulls at Mono Lake, California in 2012



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Summary

An estimated 40,118 adult California Gulls (*Larus californicus*) nested at Mono Lake in 2012. This total is below the annual average of 46,775 ± 1472 for the period 1983–2011 (*n* =29 years) but well above the low population sizes recorded in 2010 and 2011. Eighty-three percent of Mono Lake's gulls nested on the Negit Islets, 9% on the Paoha Islets, and 8% on the Old Marina islets. For the second consecutive year, the gull population on the Paoha Islets experienced a large decline in population size and reproductive success relative to previous years. Lake-wide reproductive success of 0.72 ± 0.05 chicks fledged per nest was below the 1983-2011 average of 0.91 ± 0.07. An estimated 14,528 ± 729 chicks fledged from Mono Lake islets in 2012. For the 578 chicks banded and weighed in early July, weight at banding was significantly greater for those that survived to fledging than for those that did not. Post-banding mortality was 24%, which was above the long-term average. Two-hundred and ninety-four chicks were banded with coded red color bands, 229 received a green color band on the left leg and a federal USFWS band on the right leg, the remaining 65, all very young or unthrifty chicks, received no color band.

INTRODUCTION

We continued long-term monitoring of population size and reproductive success of California Gulls (*Larus californicus*) at Mono Lake, California, in 2012. Our objectives are to measure year-to-year variation in population size and reproductive success as they relate to changing lake levels and other environmental conditions. Through color banding, we aim to better understand gull movements, fall and winter distribution, and investigate whether individual gulls breed in different colonies in different years. This study provides an important long-term data set that is a useful measurement of Mono Lakes' ecological condition.

STUDY AREA AND CLIMATE CONDITIONS

The study area has previously been described in detail (see Wrege et al. 2006). Locations of the Mono Lake nesting islets are shown in Figures 1, 2 and 3.

Fig. 1. Location of gull nesting islets within Mono Lake.

Following the very wet winter of 2010-2011, the winter of 2011-12 was very dry in the Mono Basin. According to Greg Reis, Information Specialist at the Mono Lake Committee, who compiled a climate summary using data from several sources, local runoff during the 2012 water year (measured Oct. 1, 2011 – Sept. 30, 2012) was only 55% of average, and local snowpack this spring melted unusually quickly. During the 2012 water year, Lee Vining received a mere 14 cm (6.2 inches) of precipitation – only 45% of the average calculated since 1989. Only 1991 was drier in Lee Vining. According to Cain Ranch weather data which has a continuous weather record since 1933, snowfall in the 2012 water year was 47% of average, making it the fourth driest water year after 2007, 1960, and 1968. By October 01, 2012, Mono Lake dropped 0.4 m (1.3 ft) from the year before – only the second time since 1989 it has dropped over a foot in a year (G. Reis, Mono Lake Committee. See http://www.monolake.org/today/2012/10/12/happy-new-water-year-2/#more-9698). In May the lake level was approximately 1945.7 m (6383.7 ft.) (lake-level data available at http://www.monobasinresearch.org).

Fig. 2.View of individual islets within the Negit Islet complex.

Fig.3. View of Paoha Islet complex

METHODS

Nest Counts

Between May 27-30, 2012 field workers walked through colony islets in sweep-lines to count nests. Each sweep line consisted of 4 to 6 individuals depending on islet size and nest density. Every nest was counted with a tally meter and marked with a small dab of water-soluble paint to avoid duplicate counts. For some small islets, incubating adults were counted from a small motor boat.

Clutch Size, Banding, and Reproductive Success

We sampled 11 fenced plots on 4 islets to estimate clutch size and sampled 9 plots on 3 islets to estimate reproductive success. Six fenced plots measuring 10 x 20 m are located on the Negit Islets (four on Twain, two on Little Tahiti), another plot approximately 20 x 20 m is located on Little Tahiti, and four fenced plots of various but smaller sizes are located on the Paoha Islets (two on Coyote A, two on Piglet Islet). Average clutch size was estimated by counting the number of eggs per nest for all nests within the 11 plots during nest count in late May.

From 4-7 July 2012, we banded all chicks within the plots with a silver U.S. Fish and Wildlife Service band as well a color band – either a single green color band (applied to the left leg of small, less vigorous chicks) or a red coded band engraved with a field-readable numeric code unique to each banded individual. During banding, most chicks were weighed using hand-held Pesola scales. However, 150 chicks from the Little Tahiti East and West Plots were not weighed this year due to us not having cloth weighing bags with us that day, and 7 chicks from other plots were not weighed for other reasons.

From 4-6 September 2012, we searched the islets with plots to determine the number of banded chicks that died before fledging. We estimated the fledging rate for each plot in which data was collected, and, using the average fledging rate for the entire population, the total number of gulls successfully fledged from Mono Lake in 2012. We calculated the fledging rate for each plot **(f_{plot})** as:

$$f_{plot} = (C_b - C_d) / N_p$$

where $\mathbf{C_b}$ is the number of chicks banded in that plot in July, $\mathbf{C_d}$ is the number of chicks from that plot found dead in September, and $\mathbf{N_p}$ is the number of nests counted in that plot in May or June. We calculated the total number of gulls successfully fledged **(F)** from Mono Lake as:

$$F = (N/P) \sum_{i=1}^{P} f_i$$

where **N** is the total number of nests on Mono Lake, **P** is the number of plots, and **fi** is the number of young fledged per nest in each of the fenced plots.

In 2012, data from two small plots on Piglet Islet were excluded from reproductive success estimates due to extreme localized predation, apparently by Great-horned Owls (*Bubo virginianus*). This event caused complete nesting failure on Piglet Islet but was not noted on any other islets or plots. Due to the isolation of the event, the 2 Piglet Islet plots were not deemed representative for the overall population and thus removed from the sample.

We analyzed variables associated with chick mortality using a nonparametric test (Wilcoxon/Kruskal-Wallis) with Stata 10.0 (Stata Corp. 2003). Results are presented with plus or minus one standard error.

Tick Infestations

Because of the potential effect on gull reproductive success, we recorded the presence and abundance of the bird tick *Argas monolakensis* for all banded chicks. We also checked for the presence of "mites" (perhaps tick nymphs). Each bird received a tick score of 0-3 based on the approximate proportion of the fleshy part of the leg (tibia) covered by tick larvae: 0, no ticks; 1, up to one-third covered; 2, up to two-thirds covered; and 3, more than two-thirds covered. "Mites" were recorded as either present or absent based on examination of the tibia. For more information on the life cycle of this endemic tick, see Schwan et al. (1992) and Nelson et al. (2006). This year were unable to

assess the tick/mite status of the last 10 chicks banded in the Cornell plot, as it got too dark for us to see well enough.

RESULTS AND DISCUSSION

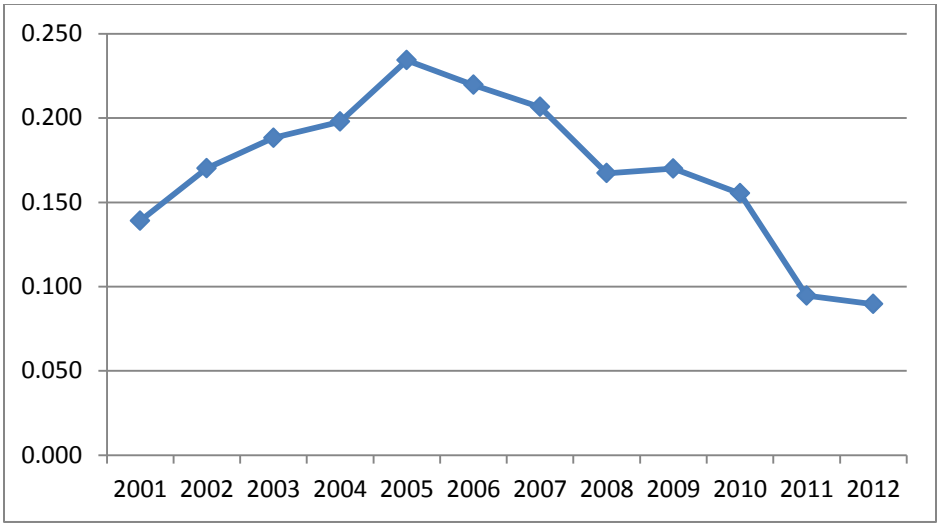
Number of Nests and Breeding Adults

In 2012, we counted a lake-wide total of 20,059 California Gull nests, yielding a population of 40,118 nesting adults. This is below the mean population size of 46,775 ± 1472 for the period 1983-2011 (n = 29 years), yet is up from the very low populations tallied in 2010 and 2011.

In 2012, 83 percent of the gulls nested on the Negit Islets, 9% nested on the Paoha Islets and 8% nested on Old Marina and Old Marina South islets (Figures 1, 2 and 3, Appendix 1). The 1797 nests on the Paoha Islets in 2012 (representing 9% of the total population) are congruent with 2011 and 1999 for containing the lowest proportions recorded. Over the tenure of this study, the proportion of Mono Lake's gulls nesting on the Paoha Islets has fluctuated between 9% and 35%, with the 1983-2011 average proportion being 19%. In recent years the number of nesting on the Paoha Islets has declined; in 2011 the 1578 nests counted there was the lowest ever recorded for the Paoha Islets (Fig. 4, and see Appendix 1 in Nelson and Greiner 2009). This could be due to predation or weather exposure, as the Paoha Islets are more prone to prevailing wind than the Negit Islets (Jehl 1983, KNN pers. obs), and the springs of 2010 and 2011 were especially windy and cold (Nelson and Greiner 2010 and 2011).

Of the individual islets, Twain was the most populous, holding 9,396, or 47%, of the lake-wide total number of nests. Little Tahiti and Pancake A islets contained 3,366 and 1,972 nests; representing 17% and 10% of the entire nesting population respectively (Appendix 1). Of note were the seven nests found on Negit Island. This is the first time any nests have been found there since 2007 (Appendix 1).

Fig. 4. Proportion of Mono Lake California Gulls nesting on the Paoha Islets: 2001-2012



Phenology

Ten nests containing small chicks were detected during the May 27-30 2012 nest count. This is similar to or somewhat above than the average we typically encounter. In July, most plots had some nests with either eggs or freshly hatched chicks that were too small to band (Table 1). Of the plots we were able to adequately tally the number of nests with eggs or small chicks in July, only one had zero, others contained up to 8 nests with adults incubating eggs. This suggests some pairs either initiated nesting relatively late, or re-nested as a result of losing their first clutch.

Clutch Size

In 2012, the lakewide average clutch size was similar to years past at 1.8 ± 0.05 eggs/nest (range = 1-3 eggs, *n* = 668 nests). Average clutch size for the Negit Islets was 1.7 eggs/nest; the Paoha Islets averaged 2.0 eggs/nest (Table 1). Overall, 33% of the nests contained one egg, 55% had two, and 11% had three. The average clutch size for Mono Lake since 2002 (*n* = 10 years) is 1.9 ± 0.05 eggs/nest.

Overall Reproductive Success

All sample plots produced fewer than average fledglings this year. The Negit Islet plots averaged 78.5 ± 10.7 nests and averaged 0.72 ± 0.06 fledged chicks per nest. The four plots on the Paoha Islets averaged 29.5 ± 3.5 nests and 0.36 ± .21 fledged chicks per nest.

Combined, the 9 plots used to estimate lakewide reproductive success averaged 0.72 ± .05 fledged chicks per nest (Table 1), which is below the long-term average of 0.91 ± 0.07 chicks fledged per nest.

Based on the total of 20,059 California Gull nests on Mono Lake and an average of 0.72 ± 0.05 chicks fledged per nest, an estimated 14,499 ± 725 chicks fledged at Mono Lake in 2012. This is below the 1983-2011 average of 21,354 ± 1453 (n = 29 years). The long term average is calculated for the Negit Islets only from 1983-2002, and Negit and Paoha Islets combined since 2002.

Table 1. Summary of Nest Counts, Chick Banding, and Mortality Counts from all plots in 2012.

Plot	Total nests in May	Avg. Clutch Sz.	Chicks/nest in July	# Chicks Banded (# found dead)	Total chicks successfully fledged/nest
Cornell	142	1.7	0.80	114 (24)	0.63
Little Tahiti East	52	1.9	0.75	39 (11)	0.54
Little Tahiti West	98	1.7	1.15	113 (20)	0.95
Twain North	60	1.9	1.03	62 (13)	0.82
Twain South	70	1.5	0.77	54 (17)	0.53
Twain West	77	1.8	1.04	80 (21)	0.77
Twain New	51	1.8	1.06	54 (12)	0.82
Negit Islet Totals/averages:	**550**	**1.7**	**0.94 ± .06**	**516 (118)**	**0.72 ± .06**
Coyote Cove	32	2.0	1.09	35 (8)	0.84
Coyote Hilltop	38	2.1	0.97	37 (14)	0.60
Piglet East	22	1.9	0	0	0
Piglet West	26	1.9	0	0	0
Paoha Islet Totals/averages:	**118**	**2.0**	**0.52 ± .30**	**72 (22)**	**.36 ± .21**
Lakewide Totals *** calculated w/o Piglet Islet plots**	**668**	**1.8**	**0.96 ± .05**	**588 (140)**	**0.72 ± .05 ***

Mass at Banding

The average mass of chicks in 2012 was below the 2002-2011 average. In July of 2012, the average mass of banded chicks was 485 ± 5g, which represents nearly a 5% reduction from the previous annual average of 501 ± 9g. Mass of chicks that survived to fledging (508 ± 6g; n = 326) was significantly greater than the average mass for chicks that did not

survive to fledging (413 ± 10g; n = 105) (X^2 = 69.0, df = 1, p = 0.0001). This pattern has been consistent all years in which chicks were weighed.

Tick Infestation

Ticks were found on only 22 chicks of the 578 examined, approximately 4% of the total, and those with ticks had very few. The presence of "mites", small orange ectoparasites we now believe to be larval ticks, were slightly more widespread. Fifty-seven chicks (10%) had "mites" present on the tibia. Though not experienced in 2012, plots with high levels of tick infestation have had low levels of fledging success (Hite et al. 2004).

Chick Predation on Piglet Islet

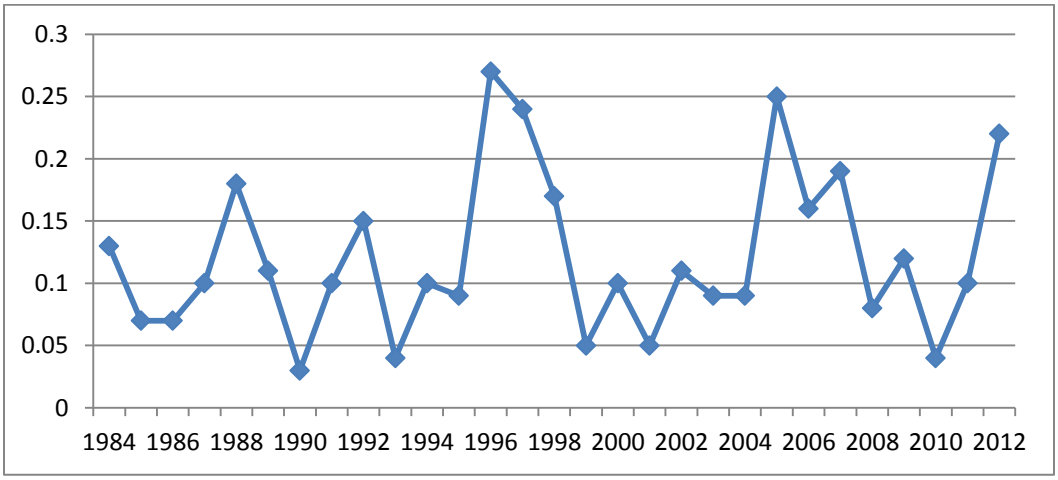
In 2012, Piglet Islet apparently suffered significant chick predation by Great-horned Owl(s). In late May, Piglet contained 344 nests, and the two plots had average clutch sizes and nest density. In early July we found no chicks in either Piglet Islet plot, and many partially eaten chick carcasses were scattered about the islet and the 2 plots. Only 4 live chicks were observed on the entire islet, suggesting near total loss due to predation. We searched for and found no sign of Coyotes (prints, scat) although Piglet Islet is only about 75 m from the shore of Paoha Island, where Coyotes are present (KNN pers. obs).

Jehl (1983, 1987) found Great-horned Owls to be significant predators of California Gull adults and chicks on the Paoha Islets. In predating chicks, he found owls consistently hunted in a localized area until resources were depleted, tending to move islet by islet, and in some cases wiping out populations on small islets completely. Loss by owls may be direct (adult or chick is eaten) or indirect (eggs and chicks die of exposure during nocturnal abandonment, or adults abandon nests on islets heavily hunted by owls) (Jehl 1987). Thus, our findings of nearly complete localized predation are consistent with previously documented owl predation patterns at this location. Although we typically encounter some predated chick and adult carcasses particularly on the Paoha Islets (KNN, AG pers. obs), only this year and last year have zero live chicks been found in Paoha plots in early July, suggesting a rise in predation or other mortality levels.

Post-banding, Pre-fledging Mortality Rate

During our mortality count in early September, 140 dead, banded chicks were recovered from the islets on which they were banded. This post-banding, pre-fledging mortality rate represents 24% of the total number banded, which is well above the long term (1984 – 2011) average of .12 ± .01. Heat stress, particularly consecutive days of above average high temperatures, appear to cause increased mortality of gull chicks and juveniles at Mono Lake (Shuford et al. 1985, Chappel et al. 1984, Winkler 1983, Jehl and Jehl 1982). The summer of 2012 was warm. The highest maximum temperatures recorded in July 2012 in Lee Vining were exceeded only in 2002 and 2007 (from records dating back to 1988). Ten days during the summer months (June – August) temperatures exceeded 32 Deg. C (90 Deg. F); in 2011 there was only one (G. Reis, pers. comm.), providing further evidence of the seasonally warm temperatures.

Fig. 5. Post-banding mortality rates of California Gulls at Mono Lake, 1984-2012



Three fledged, banded juveniles were found dead at Mono Lake in late summer or early fall: 2 at South Tufa State Reserve on the south shore, and another found on the Paoha Islets had been banded on Twain. Five more juveniles banded as chicks in 2012 were found dead in locations away from Mono Lake and reported to the Bird Banding Lab by December 1st (Table 2). This total is well above previous numbers of dead banded juveniles reported, and may suggest a higher number of weak juveniles produced this year. Previous studies at Mono Lake have suggested a relationship between pre- and post-fledging mortality rates: when pre-fledging mortality is high, post-fledging mortality was

also high (Shuford 1985). It is also possible that gulls with color bands have a greater detection and reporting rate by people who find them.

Bassia Encroachment on the Negit Islets

*Bassia hyssopifolia**, native to the Old World, has likely been present on Mono Lake's islands and islets for many years. Until last year, we took little notice of it. It is a bushy annual that can grow a meter or more tall, and live vegetation as well as woody stems from previous year(s) seem to be increasingly abundant in some areas of the Negit Islets and plots to a degree that seems to us likely to be displacing nesting gulls. The Twain West plot has been especially "clogged" in recent years by old and new vegetation. We are increasingly concerned about the negative impact that encroachment of this non-native could have on nesting gulls. It appears to favor the relatively flat, open terrain where gulls nest in the greatest densities.

During the mortality count in early September we were surprised to encounter relatively vast amounts of lush *Bassia* growing on the northeast part of Tahiti Islet, including the Cornell Plot. The Mono Basin had experienced a series of rainstorms in late summer, which may have led to this rapid fall growth. We searched for and found little woody debris of last years' growth, suggesting to us, along with our memory of this area, that this *Bassia* growth was new. We manually pulled all large and most small plants from the Cornell Plot; the plants were in early seed production (Fig. 6). We will continue to monitor *Bassia* and report changes to local land managers.

* This plant appears to be *Bassia,* but may also be *Kochia americana*. We will take more samples next year to confirm.

Other Species Nesting on Mono Lake Islets

In addition to the California Gull, other species found nesting on the Mono Lake islets in 2012 were the Black-crowned Night-Heron (*Nycticorax nycticorax*), Osprey *(Pandion haliaetus*), Caspian Tern (*Sterna caspia*) and Violet-green Swallow (*Tachycineta thalassina*). Black-crowned Night-heron nests were not thoroughly counted on the Mono Lake islets this year but were present on Twain and Little Tahiti Islets only. A pair of

Fig. 6. Early September *Bassia* growth in the Cornell Plot, before and after plant removal

Ospreys nested on the Negit islet Midget, although they did not successfully fledge young this year. Nine Caspian Terns were observed on Coyote Islet on May 29. These consisted of 4 pairs; at least one was observed incubating a nest, and another pair was observed copulating. Violet-green swallows are abundant breeders in rock crevices on Negit Island and some of the Negit Islets.

Detections and Recoveries of Banded Mono Lake California Gulls in 2011/2012

There were 25 detections or recoveries of banded Mono Lake gulls reported in late 2011 and 2012. All were from California; 13 were found on Mono Lake, and 10 involved sightings of live, banded or color-banded gulls. Color-banding was initiated on Mono Lake in 2009, and this spring and summer, color-banded gulls from all years were observed on Mono Lake (Table 2). One of these was a 3-year old gull observed within the colony during nest count that appeared to be nesting. Most California Gulls do not breed until their 4th year, but some males will breed in their third year (Winkler 1996). Additionally, color-banded gulls from the 2010 and 2011 cohorts were observed in late summer at Mono Lake, suggesting non-breeding sub-adults may migrate to Mono Lake in late summer as food resources become more abundant. Only one Mono Lake gull was detected on Southeast Farallon Island, located 48 km (30 mi.) off San Francisco in 2012 (fig. 7), where numbers of fall migrant California Gulls were unusually low for a third straight fall (PRBO unpubl. data). In 2009, up to 16 (2% of total) color-banded juveniles from Mono Lake were observed there during a 2 week period (Nelson and Greiner 2009).

Fig. 7. Fledged, color banded juveniles from the 2012 cohort observed on Southeast Farallon Island 29 Aug. (left, ph. J. Tietz) and the eastshore of Mono Lake 02 Aug. (right, ph. KNN)

Table 2. Band recoveries and sightings of Mono Lake gulls since the 2011 annual report. BBL represents reports sent to the National Bird Banding Lab in Laurel, MD.

No.	Date found	Location	Year Banded	Reporter	Live or dead?	Remarks
1	25 Sept. 2011	Cabrillo Beach, LA Co.	1989	BBL	Live	Band read w/ spotting scope
2	13 Nov. 2011	W. shore Mono L.	2009	BBL	Dead	Old skeleton
3	30 Nov. 2011	Oceano, SLO Co.	1988	BBL	Live	Band read w/ spotting scope
4	28 Dec. 2011	Hayward, Alameda Co.	2011	BBL	Dead	
5	Jan. 2012	Huntington Beach, Orange Co.	1990	BBL	Dead	
6	07 May 2012	Lemore, Kings Co.	2008	BBL	Dead	
7	27 May 2012	Tahiti Islet, Mono Lake	2009	K. Nelson	Live	nesting?
8	28 May 2012	Twain Islet, Mono Lake	1994	S. Krystek	Dead	probable owl predation
9	29 June 2012	near Davis, Yolo Co	2011?	S. Hampton	Live	Red band, 2nd-cycle plumage
10	09 July 2012	E. shore Mono Lake	2011	C. McCreedy	Live	Red 183
11	29 July 2012	E. shore Mono Lake	2010	K. Nelson	Live	Red 063
12	01 Aug. 2012	W. shore Mono Lake	2012	K. Nelson	Live	Red 435
13	01 Aug. 2012	W. shore Mono Lake	2012	K. Nelson	Live	Green band
14	02 Aug. 2012	E. shore Mono Lake	2012	K. Nelson	Live	Red 405
15	04 Aug. 2012	Santa Cruz, CA	2012	BBL	Dead	
16	14 Aug. 2012	Paoha Is. Mono L.	2012	K. Nelson	Live	Red 358
17	21 Aug. 2012	So. Tufa, Mono L.	2012	So. Tufa staff	Dead	green band, dead about 1 week
18	24 Aug. 2012	L. Almanor, Plumas Co.	2012	BBL	Dead	
19	25 Aug. 2012	So. Tufa, Mono L.	2012	S. Krystek	Dead	Red 529, dead 1-2 days
20	27 Aug. 2012	Santa Barbara	2012	BBL	Dead	
21	29 Aug 2012	SE Farallon I., SF Co.	2012	J. Tietz	Live	Green band
22	06 Sep 2012	Coyote Islet, Mono L	2012	M. Henkels	Dead	Banded on Twain, dead >2 weeks.
23	07 Sept. 2012	SW Paoha Island, owl roost @ McPhereson Ranch	2012	A. Greiner	Dead	Band from L. Tahiti East plot found in owl pellet.
24	07 Sep. 2012	6 mi. S. Ft. Bragg, Mendocino Co.	2012	BBL	Dead	
25	19 Oct. 2012	Discovery Bay, Contra Costa Co.	2012	BBL	Dead	

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We greatly appreciated the help of the individuals who volunteered their time to assist with field work – without dedicated volunteers like these, this long-term effort would not have been possible. Volunteers and assistants for the 2012 season were Ondi Crino, Stephanie Driswol, Ken Etzel, Max Henkels, Erin Johnson, Steven Krystek, Morgan Lindsay, Nora Livingston, Sara Pence, Jessica Malisch Estelle Robichaux, Teague Scott, and Erica Tucker. Ken Etzel provided valuable edits and manuscript review. Thanks to Ryan Burnett, L. Jay Roberts, and Dave Shuford of PRBO Conservation Science for their input and support of the project. We are grateful to Jim Tietz and the fall crew of Southeast Farallon Island for adopting gull color-band searches to island protocol. This is PRBO Contribution Number 1911.

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Appendix 1. Nest number by islet, 2003-2012

Negit Islets	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Twain	9288	11480	9582	9900	10138	8891	11449	8219	8704	9396
L. Tahiti	2632	3303	2511	2700	3102	2477	2770	2429	2049	3366
L. Norway	249	213	126	165	172	137	119	114	171	390
Steamboat	575	635	621	583	631	590	580	509	579	871
Java	718	915	779	710	648	482	433	367	432	325
Spot	70	98	127	75	9	49	87	122	151	39
Tie	38	49	50	33	0	9	37	55	58	30
Krakatoa	113	181	184	131	119	24	5	2	0	12
Hat	7	9	3	5	10	3	3	0	7	24
La Paz	0	1	2	0	0	0	0	0	0	0
Saddle	0	0	0	1	1	0	1	0	0	0
Midget	0	1	1	0	0	0	0	0	0	0
L. Tahiti Minor	[a]	[a]	[a]	[a]	[a]	[a]	152	151	162	253
Pancake	1847	2837	2530	2059	1602	1623	2293	1894	1741	1972
Negit Islets Total:	**15537**	**19722**	**16516**	**16362**	**16432**	**14285**	**17929**	**13862**	**14054**	**16678**
Paoha Islets										
Coyote A	2480	3244	3174	3181	3094	1989	2591	1711	929	1393
Coyote B	34	55	63	40	0	0	0	0	0	0
Browne	224	283	253	225	118	99	135	116	50	60
Piglet	1010	1552	1649	1218	1269	1001	1314	997	599	344
Paoha Islets Total:	**3748**	**5134**	**5139**	**4664**	**4481**	**3089**	**4040**	**2824**	**1578**	**1797**
Negit Island:	452	587	285	120	63	0	0	0	0	7
Old Marina	178[b]	511	1	94	723	1089	1775	1496	1133	1541
Old Marina So.	0	0	0	0	0	9	22	4	9	36
Lakewide Total	**19915**	**25954**	**21941**	**21240**	**21699**	**18472**	**23766**	**18186**	**16774**	**20059**
Nesting Adults	**39830**	**51908**	**43882**	**42480**	**43398**	**36944**	**47532**	**36372**	**33548**	**40118**

a. Nest numbers for Little Tahiti Minor were previously included within the Little Tahiti Total

b Nests were not counted with water soluble paint on Old Marina Island this year. The paint serves as a counting aid, and counters judged that the 178 nests they recorded was an underestimate.