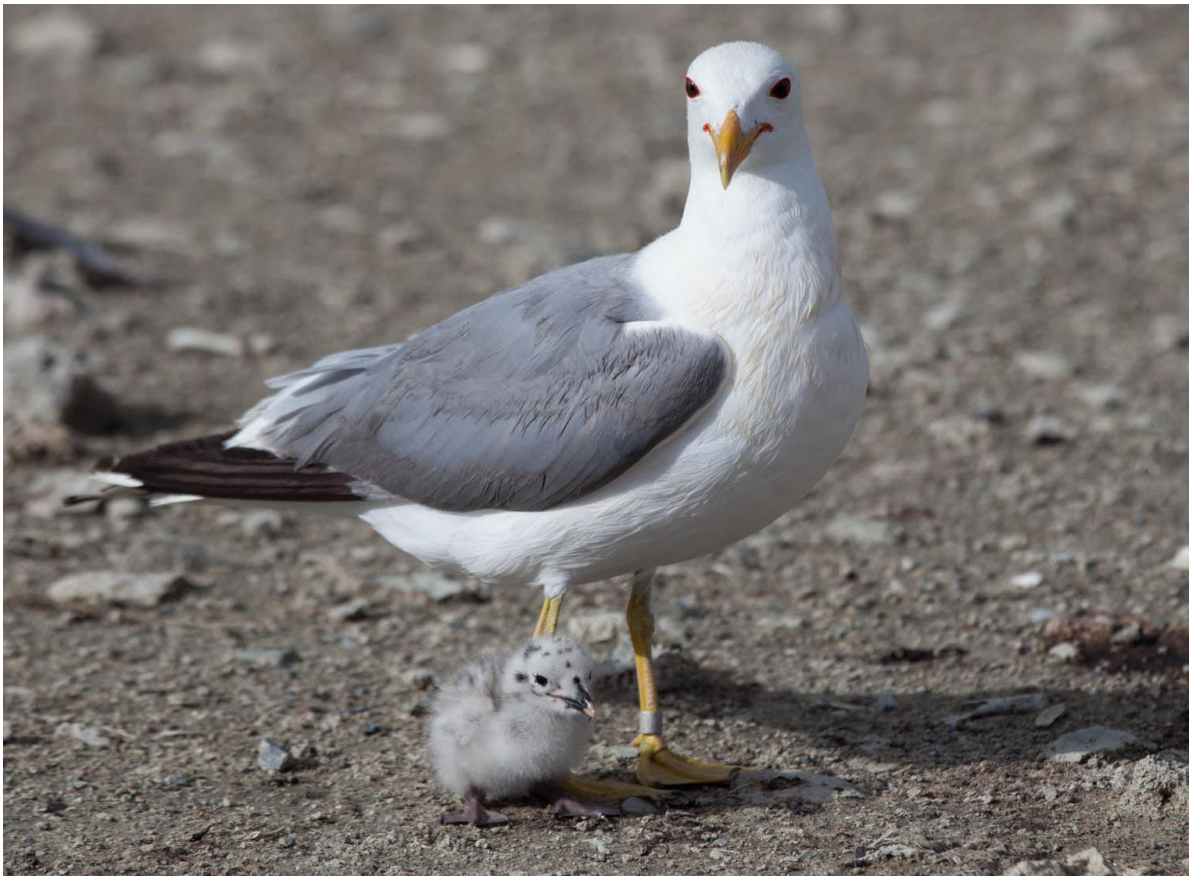
Point Blue Report

Population size and reproductive success of California Gulls at Mono Lake, California



Annual Report

December 2015

Kristie N. Nelson, Nora Livingston, and Teague Scott

Conservation science for a healthy planet

3820 Cypress Drive, #11 Petaluma, CA 94954
T 707.781.2555 | F 707.765.1685
pointblue.org

Population size and reproductive success of California Gulls at Mono Lake, California

December 2015

Kristie N. Nelson, Nora Livingston, and Teague Scott

Acknowledgements

We are grateful to the **Mono Lake Committee** for providing financial and logistical support for this project in 2015. We are extremely thankful to **Lighthawk**, and pilot Geoff Pope, for donating flight time to test aerial photography as an alternative method for counting gull nests on Mono Lake. We also wish to thank Dan Shaw, Dave Marquart and the Mono Lake Tufa State Natural Reserve.

We greatly appreciated the help of volunteers and others who assisted with field work – without dedicated people like you, the long-term effort would not have been possible. Volunteers & participants for the 2015 season were: Hillary Behr, Robert DiPaolo, Lizzie Feucht, Catherine Jones, Rick Kattelmann, Ashli Lewis, Matt Rice, Shanell Rodriguez, Ryan Spaulding, West Vane, and Tina Weedman.

Suggested Citation

Nelson, K.N.; N. Livingston, and T. Scott 2015. Population Size and Reproductive success of California Gulls at Mono Lake, California. Point Blue Conservation Science, Petaluma, CA.

This is Point Blue Contribution No. 2060.

Point Blue Conservation Science – Point Blue's 140 staff and seasonal scientists conserve birds, other wildlife, and their ecosystems through scientific research and outreach. At the core of our work is ecosystem science, studying birds and other indicators of nature's health. Visit Point Blue on the web www.pointblue.org.

Cover photo: California Gull and chick on Coyote Islet, Mono Lake, photo by West Vane

TABLE OF CONTENTS

EXECUTIVE SUMMARY

We conducted our 33rd year of monitoring the California Gull breeding population on Mono Lake in 2015. An estimated 48,924 adult California Gulls (*Larus californicus*) nested at Mono Lake in 2015. This total is slightly above the long-term average of 46,316 ± 1364 for the period 1983–2014 (*n* =32 years). Ninety-one percent of Mono Lake's gulls nested on the Negit Islets and 9% nested on the Paoha Islets. Negit Island contained 16 nests, a negligible percentage of the total, and no nests were found at Old Marina, where former nesting islands have become connected to the mainland. Lake-wide reproductive success of 1.07 ± 0.06 chicks fledged per nest was above the 1983-2014 average of 0.90 ± 0.06. An estimated 26,272 ± 1594 chicks fledged from Mono Lake islets in 2015. For the 891 weighed in July, weight at banding was significantly greater for those that survived to fledging than for those that did not. Post-banding mortality was 15%, which is consistent with the 2005-2014 average. Eight hundred and ninety-four chicks were banded in July. Of these, 264 received coded, auxiliary marked red color bands, 597 received a blue cohort color band on the right leg opposite the federal band on the left leg, and 33 chicks received no color band. California's extreme drought has reduced the surface elevation of Mono Lake over 1.5 m (5') over the past 4 years. In 2015 the moat protecting nesting islets from the mainland (i.e. Twain and Pancake islets, Negit Island) was reduced to an estimated few hundred meters or less of primarily shallow water by the end of the 2015 nesting season.

INTRODUCTION

Mono Lake in eastern California is a large hypersaline lake of great ecological importance. Its large seasonal populations of endemic brine shrimp (*Artemia monica*) and alkali flies (*Ephydra hians)* provide important food resources for a large numbers of birds. Mono Lake supports one of the largest breeding colonies of California Gulls in the world (Winkler 1996).

In 1983, Point Blue Conservation Science (founded as Point Reyes Bird Observatory) began standardized monitoring of the population size and reproductive success of California Gulls at Mono Lake. The goal of the project is to use gulls as an indicator to help guide long-term management of the lake ecosystem. Specifically we aim to track the long-term reproductive success and population size of the gulls through changing lake conditions and identify the ecological factors influencing fluctuations in these metrics. This study represents one of the longest term ongoing studies of birds in North America. It is a powerful tool for assessing the conditions at Mono Lake and can be an invaluable tool in understanding how wildlife populations respond to ecological change that manifests over longer periods (e.g. climate change).

In 2015, we conducted the 33rd consecutive year monitoring the population size and reproductive success of California Gulls (*Larus californicus*) at Mono Lake. We continued to collect information on nest numbers, banded young gulls, and surveyed for mortality. In recent years we have also added additional objectives to better understand gull movements, including fall and winter distribution and breeding colony fidelity through a color banding program. In this report we provide a detailed summary of the 2015 results with reference to historical conditions. We also discuss the impacts of the historic drought and low lake levels on the gull population at the lake.

Study Area

Mono Lake, California, USA, is located at 38.0° N 119.0° W in the Great Basin of eastern California at an altitude of 1945 m. The lake has a surface area of approximately 160 km2, a mean depth of about 20 m, and a maximum depth of about 46 m. As a terminal lake with no outlet, it is high in dissolved chlorides, carbonates, and sulfates, and has a pH of approximately 10.

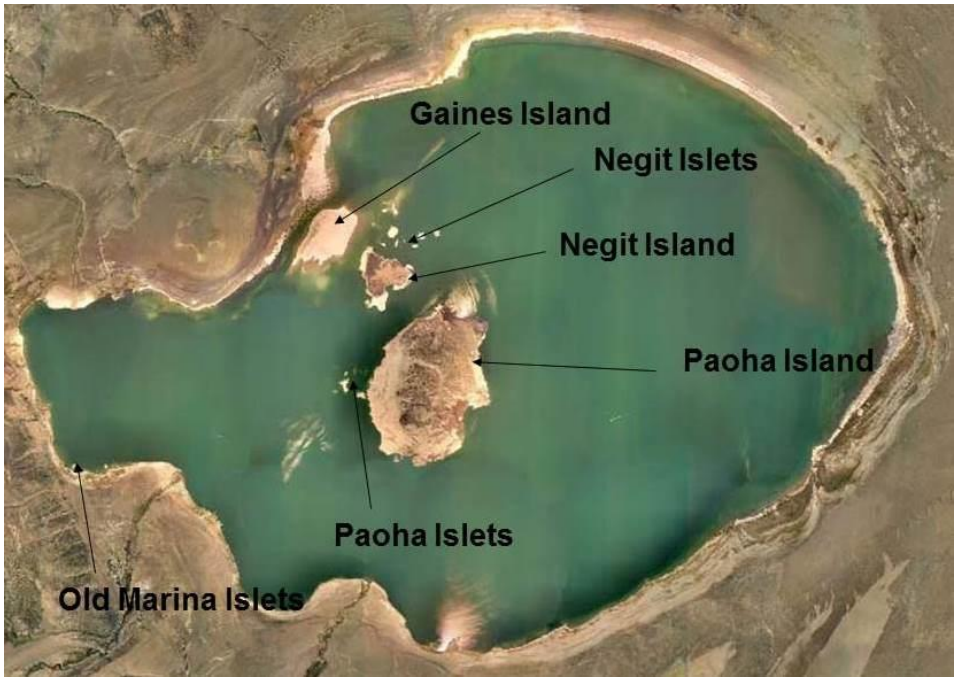


Fig. 1. Locations of islands and islets within Mono Lake. Note when this photograph was taken the surface elevation of Mono Lake was >1 m above that measured during the 2015 gull breeding season.

Gulls nest on a series of islands located within an approximately 14-km² area in the north-central portion of the lake. At various times the gulls have nested on Negit (103 ha) and Paoha (810 ha) islands, and on two groups of smaller islets referred to as the Negit and Paoha islets, which range in size from 0.3–5.3 ha (Wrege et al. 2006).

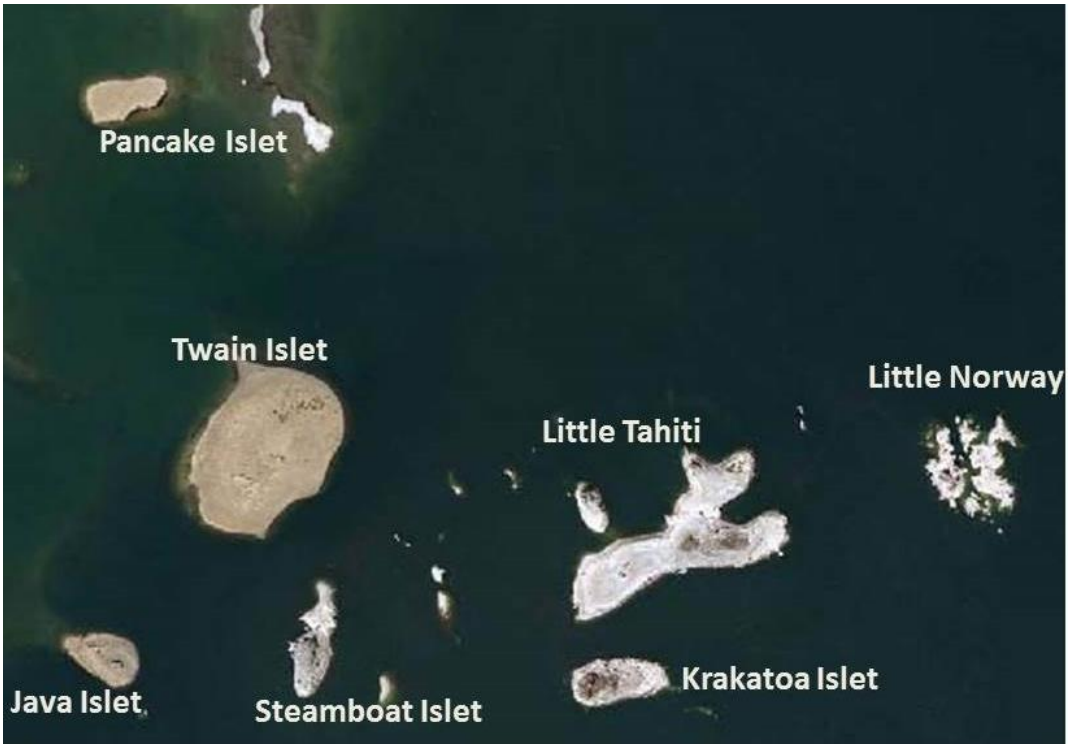


Fig. 2. View of the nesting islets within the Negit Islet complex. Note when this photograph was taken the surface elevation of Mono Lake was > 1 m above that measured during the 2015 gull breeding season.

METHODS

Nest Counts

In 2015, we continued using our standardized methods for counting gull nests. From May 23 – 26 2015, we walked through the nesting islets in sweep-lines to count nests. Each sweep line consisted of 3 to 6 personnel depending on islet size and nest density. Every nest (defined by containing at least 1 egg) was counted with a tally meter and marked with a small dab of water-soluble paint to avoid duplicate counts. For some small islets with low densities, incubating adults were counted from a small motor boat. Former nesting areas near Old Marina were scanned with binoculars from the nearby shoreline.

Clutch Size, Banding, and Reproductive Success

We sampled 9 fenced plots on 3 islets to estimate clutch size and sampled 7 plots on 3 islets to estimate reproductive success in 2015. 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 two smaller rounded fenced plots approximately 100 -120 m^2 are located on Coyote Islet of the Paoha Islet complex (see Fig. 1 & 3). Average clutch size was estimated by counting the number of eggs per nest for all nests within the 9 plots during nest count in late May.

Reproductive success data from two plots were excluded from our sample in 2015. Coyote Cove plot was not used due to a large hole under the fencing caused by ground erosion which allowed chicks to move in or out of the plot. Though chicks in this plot were banded, multiple individuals (~6-7) escaped from the hole, and we decided to drop data from this plot for reproductive success measures due to the likelihood that the number of chicks banded may not accurately reflect the total number of chicks originally present in the plot at banding time. After banding, we removed an entire side of the plot fence to enable escaped chicks to return to their territories. Little Tahiti East plot was removed from the sample due to a localized infestation of the endemic bird tick *Argus monolakensis.* High rates of chick mortality has been associated with tick infestation (Hite et al. 2004, Shuford 1985). Forty-one percent (26 of 63 total) of the chicks banded in the Little Tahiti East plot had ticks, whereas less than 1% of chicks on all other plots had ticks. Due to the high rate of tick infestation not observed in other plots, Little Tahiti East plot was not deemed representative of the overall population for reproductive success. Little Tahiti East plot has been excluded in previous years due to isolated tick infestations (Nelson et al. 2008) which appeared to have affected reproductive success.

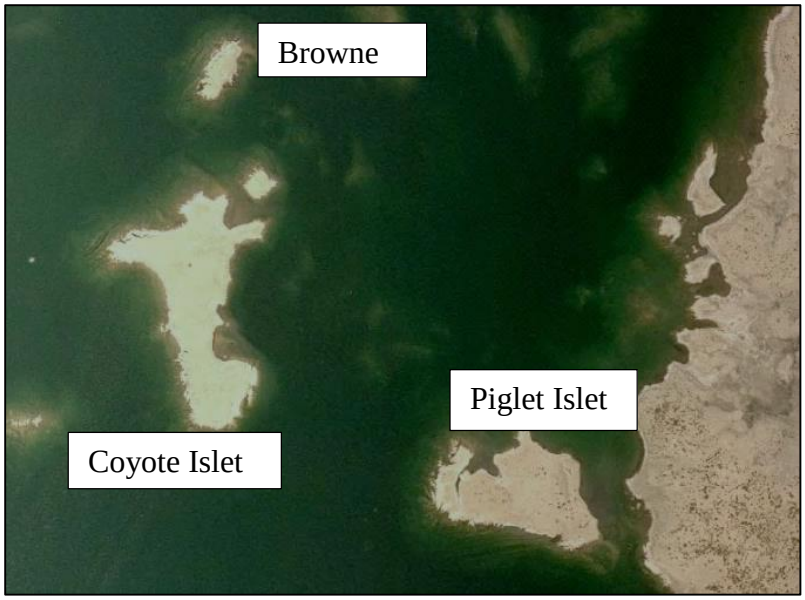


Fig. 3. The Paoha Islet complex. Note when this photograph was taken the surface elevation of Mono Lake was > 1 m above that measured during the 2015 gull breeding season.

Fig. 4. Piglet "Islet" (now connected to Paoha Island) in May 2015. This nesting islet was abandoned in 2015 following Coyote depredation of nests there in 2013 and 2014.

From 6 - 9 July 2015, 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 blue cohort-style color band (applied to the right leg) or a red coded band engraved with a field-readable numeric code unique to each banded individual (applied to larger, more robust chicks). During banding, chicks were weighed using hand-held Pesola scales. From 5 - 7 September 2015, we searched the islets in which chicks were banded to determine the number of banded chicks that died before fledging.

We estimated the fledging rate for each plot, and, using the average fledging rate for the entire population, the total number of gulls successfully fledged from Mono Lake in 2015. We calculated the fledging rate for each plot **(fplot)** as:

$$fplot = (Cb - Cd) / Np$$

where **Cb** is the number of chicks banded in that plot in July, **Cd** is the number of chicks from that plot found dead in September, and **Np** is the number of nests counted in that plot in May. 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. Overall chick production is estimated by multiplying the average reproductive success by the total number of nests. 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. 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. For more information on the life cycle of this endemic tick, see Schwan et al. (1992).

Diet Samples

Diet samples were taken from chicks that spontaneously regurgitated during banding. For each bolus of regurgitation, the percent volume of each prey item was estimated.

RESULTS

Number of Nests and Breeding Adults

In 2015, we counted a lake-wide total of 24,462 California Gull nests, yielding a population of 48,924 nesting adults. This is slightly above the long-term mean population size of 46,316 ± 1364 for the period 1983-2014 (n = 32 years), and well above the mean population over the past 10 years, which is 40,983 ± 696.

Ninety-one percent of the gulls nested on the Negit Islets, and 9% nested on the Paoha Islets (Figures 1, 2 and 3, Appendix 1). Sixteen nests were counted on Negit Island. Of the individual islets, Twain was the most populous, holding 12,263, or 50%, of the lake-wide total number of nests. Little Tahiti and Pancake islets were the next most populous islets, containing 4,258 and 3159 nests; representing 18% and 13% of the nesting population respectively (Appendix 1).

Changes in nest numbers relative to recent years were noted in several areas (Appendix 1). The Negit islets, particularly Twain, Tahiti, and Pancake, experienced a jump in nest numbers relative to past years, while the Paoha islets and Negit Island experienced a decline. The Old Marina islets and Piglet Islet were completely abandoned in 2015 following depredation by Coyotes (*Canis latrans*) in recent years.

Clutch Size

In 2015, the lake-wide average clutch size was 2.0 ± 0.02 eggs/nest (range = 1-3 eggs, *n* = 722 nests). Overall, 18% of the nests contained one egg, 62% had two, and 21% had three. The average clutch size for Mono Lake since 2002 (*n* = 13 years) is 1.9 ± 0.04 eggs/nest.

Reproductive Success

The Negit Islet plots averaged 90.4 ± 12.5 nests per plot, with an average nesting density of 0.40 ± 0.04 nests/m^2. The Negit islet plots (excluding Little Tahiti East) averaged 1.11 ± 0.06 fledged chicks per nest. On the Paoha Islets, the two plots on Coyote Islet averaged 44.5 ± 4.5 nests per plot and Coyote Hilltop (the only Paoha Islet plot used for reproductive success measurements in 2015) fledged 0.88 chicks per nest. Combined, the 7 plots used to estimate lake-wide reproductive success averaged 1.07 ± .06 fledged chicks per nest (Table 1), which is above the long-term average of 0.90 ± 0.06 chicks fledged per nest.

Based on the total of 24,462 California Gull nests counted in late May, and an average of 1.074 ± 0.06 chicks fledged per nest, an estimated 26,272 ± 1594 chicks fledged at Mono Lake in 2015. This is slightly above the 1983-2014 average of 21,803 ± 1885 (*n* = 32 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 2015. Italicized metrics were excluded from lakewide estimates.

Plot	# of nests in May	Avg. chicks/nest in July	Avg. mass of chicks in July (grams)	# chicks banded (# found dead)	Total chicks successfully fledged/nest
Cornell	152	1.39	516 gr	211 (27)	1.21
Little Tahiti East	69	*0.91*	524 gr.	*63 (14)*	*0.71*
Little Tahiti West	115	1.34	520 gr.	154 (22)	1.15
Twain North	55	1.20	551 gr.	66 (6)	1.09
Twain South	82	0.99	529 gr.	81 (14)	0.82
Twain West	89	1.42	551 gr.	126 (20)	1.19
Twain New	71	1.49	537 gr.	106 (22)	1.18
Negit Islet totals/averages: * = metrics excluding L. T. East plot	**633**	**1.30* ± .07**	**530 ± 3 gr**	**807 (125) ***	**1.11 ± .06***
Coyote Cove	40	*0.95*	554 gr.	*38 (8)*	*0.75*
Coyote Hilltop	49	1.04	585 gr.	51 (8)	0.88
Paoha Islet Totals: * = C. Hilltop plot only	**89**	**1.04***	**570 ± 10 gr.**	**51 (8)***	**0.88***
Lakewide totals/averages * = excluding LT East & C. Cove	**722**	**1.27* ± .07**	**534 ± 3 gr.**	**795 (119)***	**1.07 ± .06***

Mass at Banding

The average mass of the 891 chicks banded and weighed in July was 534 ± 3g, which is well above the long-term average (calculated since 2002) of 502 ± 7g. Mass of chicks that survived to fledging (550 ± 3g; $n = 751$) was significantly greater than the average mass for chicks that did not survive to fledging (446 ± 7g; $n = 87$) ($X^2 = 132.1$, $df = 1$, $p = 0.0001$). This pattern has been consistent all years in which chicks were weighed.

Chick Diet

Seventy-five diet samples were examined from chicks that spontaneously regurgitated during banding. Brine shrimp accounted for 63% of the observed diet, alkali flies accounted for 19%, and 12% was garbage. Lesser diet items included fish (2%) and insects (1%).

Tick Infestation

Tick infestation of gull chicks was relatively low and localized in 2015. Only 32 chicks of the 894 chicks examined had ticks (3.5%), and over 80% of those with ticks were from the Little Tahiti East plot. Less than 1% of chicks from plots other than Little Tahiti East (6 out of 831) had ticks. On Little Tahiti East plot, however, over 40% of the chicks had ticks. Of those, twenty-two had a tick score of 1, and 4 had a tick score of 2. Many of the chicks from Little Tahiti East appeared weak, and several cases of "wing droop" (a condition associated with an endemic bird virus transmitted by the ticks) were noted. As stated above, data from Little Tahiti East plot were not used in lakewide reproductive success estimates.

Post-banding Mortality Rate

During our mortality count in early September, 119 dead, banded chicks (those from Coyote Cove and Little Tahiti East plots excluded) were recovered from the islets on which they were banded. The mean post-banding mortality rate average from the plots was 15% ± 1%. This is similar to the average mortality rate recorded the past 10 years, which is 15% ± 2%.

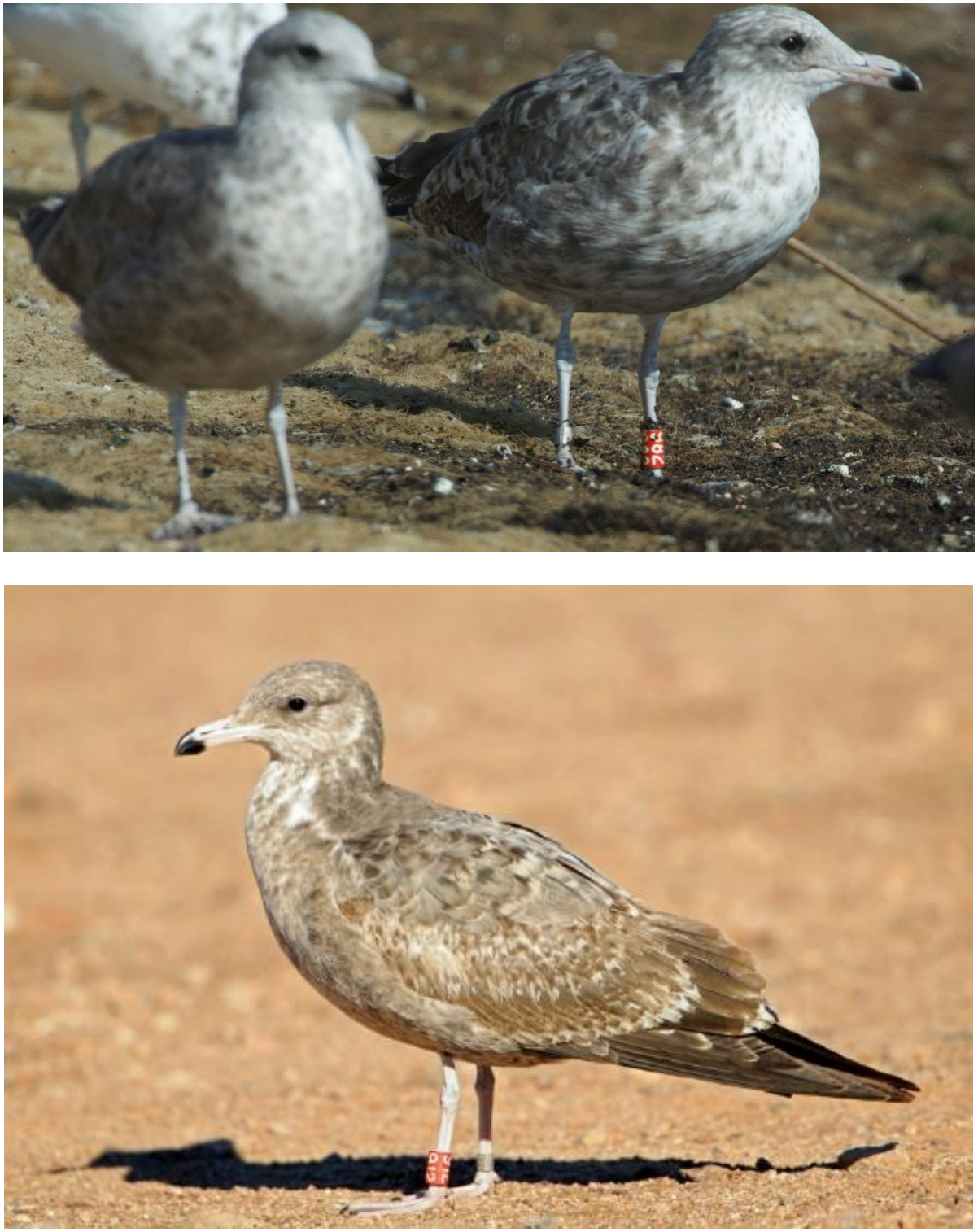


Fig. 5. Second cycle color-banded Mono Lake gulls detected in 2015: Alameda, CA 21 August (ph. Mark Rauzon, top); Lake Mead, NV January 7 (ph. Rick Fridell, bottom).

Detections and Recoveries of Banded Mono Lake California Gulls

There were over 40 detections or recoveries of banded Mono Lake gulls in 2015. The majority of these were of live gulls observed in the field wearing color bands (Fig. 5), and locations ranged from La Paz, Baja California South, Mexico, north to near Waldport, Oregon, and east to Reno and Lake Mead, Nevada. During field work in the Mono Lake colony, five color-banded adults wearing red, coded bands were observed, apparently breeding. Two of these five were also observed in 2014 on the same territories. A sixth individual was observed on Steamboat islet May 23 which had a dark blue cohort-style color band on the right leg.

DISCUSSION

Population Size

This year marked the first time in over 10 years that the population size of California Gulls breeding at Mono Lake was significantly above the long-term average. Reasons for this increase are uncertain. Wrege et al. (2006) found 4 variables that explained over 80% of the variability in the Mono Lake gull population, particularly brine shrimp densities around the time of egg-laying, springtime temperatures, and recruitment. However, the relationship between the population size and some of these variables may be changing. For example, brine shrimp have been trending significantly towards an earlier peak in abundance (closer to the gull egg-laying period) since approximately 2004 (Jellison and Rose 2012, LADWP 2015), yet the gull population has been in decline relative to the long-term mean since that time. Additionally, we would expect recruitment (measured by average reproductive success at Mono Lake 4 previously) to be low in 2015, as reproductive success in 2011 was only 0.31 chicks fledged/nest, the third lowest ever recorded at Mono Lake (Nelson and Greiner 2011), yet the population

swelled. Immigration from outside breeding sites hampered by drought may have contributed to an increase in the Mono Lake population. Lack of predator-free nesting islands resulting from reduced water levels and drought is known to negatively affect smaller California Gull breeding sites in northeastern California and other locations (Shuford and Ryan 2000, Winkler 1996).

Reproductive Success

The above average reproductive success experienced by Mono Lake gulls in 2015 can likely be attributed in part to favorable environmental conditions including a warm spring and lack of meromictic stratification in the lake (Nelson et al. 2014). The relatively large breeding population and high reproductive success combined to boost annual chick production to the highest recorded since 2004, and 9th highest recorded since 1983.

Post-banding Mortality Rate

In late summer, primarily during August, many dead juvenile gulls were reported around the shoreline of Mono Lake. Roughly 100 in total, predominantly from southshore areas, were estimated based on anecdotal reports. Specific counts included about 12 in the South Tufa area Aug. 3. However, because no systematic shoreline surveys of dead gulls were conducted, estimating the post-fledging mortality rate or comparing it to recent years is not possible.

The above average chick production of 2015 could account for higher numbers of dead juvenile gulls seen along the shoreline, even if post-fledging mortality was near average. Disease, starvation, and/or environmental stress could increase post-fledging mortality. Two incapacitated juvenile gulls were found in September with signs of fungal growths and respiratory distress, possibly as a result of *Aspergillosis* (KNN & C. Kamler, pers. comm.). Whether these two cases were associated with an infectious

disease outbreak such as *Aspergillosis* is unknown. A third incapacitated juvenile gull found near Mono Lake was suffering from mild emaciation without signs of disease; it was successfully rehabilitated and released (C. Kamler, pers. comm.).

From 1981 through 1984 post-fledging mortality of juvenile California Gulls was measured at Mono Lake through systematic shoreline walks. In 1981, post-fledging mortality was estimated at 70%, compared with much lower values (~2% - 7%) in subsequent years (Shuford et al. 1985). Reasons for the high post-fledging mortality rate in 1981 are imprecisely known, but were suspected to involve high levels of heat stress.

Lake Level and Colony Stability

The historic drought gripping California has had significant impacts on Mono Lake. From May 2012 to the end of the breeding season in 2015, the surface elevation of the lake declined over 1.5 m (>5'), and has continued to decline through the fall of 2015. Old Marina and Piglet islets were abandoned by gulls this year following Coyote depredation; these islets contained nearly 10% of the total population in 2012 (Appendix 1). Lake level decline has reduced the protective moat of some Negit islets to dangerously shallow levels that could potentially be accessed by Coyotes, particularly Pancake and Twain. In the late summer of 1996 when the lake level was approximately 1944.6 m (6380.0'), Coyote(s) accessed both Negit and Twain islets (Shuford et al. 1996). This occurred when the lake was 0.4 m (1.2') *higher* than the lake level as of August 1, 2015. Although the 1996 Coyote(s) likely involved individual(s) that had learned to access the nesting islets when the lake was considerably lower (i.e. the same individual(s) that accessed Twain in August 1994 when the lake was 1943.2 m [6375.3']), this event underscores the vulnerability the majority of the nesting gull population could face in the future if the lake continues to decline.

Literature Cited

Hite, J. M., M. A. Berrios, and T. Wilson. 2004. Population size and reproductive success of California Gulls at Mono Lake, California, in 2003. Contribution No. 1016, PRBO Conservation Science, 4990 Shoreline Hwy 1, Stinson Beach, CA 94970.

Jellison, R., and K. Rose. 2012. 2011 Annual Report. Mixing and plankton dynamics in Mono Lake, California. Marine Science Institute. University of California, Santa Barbara. Santa Barbara, CA 93106.

Los Angeles Department of Water and Power Watershed Resources staff (LADWP). 2015. Mono Lake limnology monitoring, 2014 annual report. *In* Compliance reporting in response to the State Water Resources Control Board order nos. 98-05 and 98-07. Section 5: Mono Basin waterfowl habitat and population monitoring RY 2012-2013.

Nelson, K. N., A. Greiner and T. Wilson. 2008. Population size and reproductive success of California Gulls at Mono Lake, California, in 2008. Contribution No. 1655, PRBO Conservation Science, 3820 Cypress Dr. #11, Petaluma, CA 94954.

Nelson, K. N., and A. Greiner. 2011. Population size and reproductive success of California Gulls at Mono Lake, California, in 2011. Contribution No. 1843, PRBO Conservation Science, 3820 Cypress Dr. #11, Petaluma, CA 94954.

Nelson, K. N., L. J. Roberts, W. D. Shuford, and R. D. Burnett. 2014. Environmental influences on reproductive success of California gulls at Mono Lake, California, U.S.A. Contribution No. 1981, Point Blue Conservation Science, 3820 Cypress Dr. #11, Petaluma, CA 94954.

Schwan, T. G., M. D. Corwin, and S. J. Brown. 1992. *Argas monolakensis*, New Species (Acari: Ixodoidea: Argasidae), a parasite of California Gulls on islands in Mono Lake, California: Description, biology, and life cycle. J. Med. Entomol. 29:78-97.

Shuford, W. D., P. Super, and S. Johnson. 1985. Population size and breeding success of Califoornia Gulls at Mono Lake, California, in 1984. Point Reyes Bird Observatory. Contribution No. 294. 4990 Shoreline Hwy. Stinson Beach, CA 94970.

Shuford, W. D. 1985. Reproductive success and ecology of California Gulls at Mono Lake, California, in 1985, with special reference to the Negit Islets: an overview of three years of research. Contribution No. 318, Point Reyes Bird Observatory. 4990 Shoreline Hwy. Stinson Beach, CA 94970.

Shuford, W.D., D. M. Calleri, and T. Wilson. 1996. Population size and reproductive success of California Gulls at Mono Lake, California, in 1996, with emphasis on the Negit islets. Contribution No. 721. Point Reyes Bird Observatory, 4990 Shoreline Hwy., Stinson beach, CA 94970.

Shuford, W. D., and T. P. Ryan. 2000. Nesting populations of California and Ring-billed gulls in California: Recent surveys and historical status. Western Birds 31:133-164.

Winkler, D. W. 1996. California Gull (*Larus californicus*). *In* The Birds of North America, No. 259 (A. Poole and F. Gill, eds.) The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Wrege, P. W., W. D. Shuford, D. W. Winkler, and R. Jellison. 2006. Annual variation in numbers of breeding California Gulls at Mono Lake, California: The importance of natal philopatry and local and regional conditions. Condor: 108:82-96.

Appendix 1. Nest number by islet, 2006 - 2015

Negit Islets	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Twain	9900	10138	8891	11449	8219	8704	9396	9567	9144	12263
L. Tahiti	2700	3102	2477	2770	2429	2049	3366	3995	3899	4258
L Norway	165	172	137	119	114	171	390	493	384	505
Steamboat	583	631	590	580	509	579	871	1175	1076	1010
Java	710	648	482	433	367	432	325	234	216	439
Spot	75	9	49	87	122	151	39	95	162	184
Tie	33	0	9	37	55	58	30	56	65	181
Krakatoa	131	119	24	5	2	0	12	9	12	84
Hat	5	10	3	3	0	7	24	30	29	25
La Paz	0	0	0	0	0	0	0	0	4	7
Saddle	1	1	0	1	0	0	0	0	0	0
Midget	0	0	0	0	0	0	0	0	0	0
L.Tahiti Minor	[a]	[a]	[a]	152	151	162	253	282	255	202
Pancake	2059	1602	1623	2293	1894	1741	1972	2450	1903	3159
Negit Islets Total	**16362**	**16432**	**14285**	**17929**	**13862**	**14054**	**16678**	**18386**	**17149**	**22317**
Paoha Islets										
Coyote	3221	3094	1989	2591	1711	929	1393	2093	2618	2042
Browne	225	118	99	135	116	50	60	75	110	87
Piglet	1218	1269	1001	1314	997	599	344	148	38 [b]	0
Paoha Islets Total:	**4664**	**4481**	**3089**	**4040**	**2824**	**1578**	**1797**	**2316**	**2766**	**2129**
Negit Island:	120	63	0	0	0	0	7	8	28	16
Old Marina	94	723	1089	1775	1496	1133	1541	1665	9 [b]	0
O.M. So.	0	0	9	22	4	9	36	380	70 [b]	0
Lakewide Total	**21240**	**21699**	**18472**	**23766**	**18186**	**16774**	**20059**	**22755**	**20022**	**24462**
Nesting Adults	**42480**	**43398**	**36944**	**47532**	**36372**	**33548**	**40118**	**45510**	**40044**	**48924**

a. Nest numbers for Little Tahiti Minor were previously included within the Little Tahiti Total
b. Number of nests known to be depredated or abandoned on Old Marina South; likely an underestimate.