POPULATION SIZE AND REPRODUCTIVE SUCCESS OF CALIFORNIA GULLS AT MONO LAKE, CALIFORNIA, IN 1995, WITH EMPHASIS ON THE NEGIT ISLETS

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ABSTRACT

In 1995, California Gulls began nesting at Mono Lake about 3-5 days later than in most years, and the egg laying period was much more protracted than usual. Nest counts estimated about 49,854 adult California Gulls were nesting in late May. The late initiation of nesting, protracted egg laying, and lower estimate of the number of breeding adults than in other recent years were probably a result of the severe winter weather in March and April. The Negit Islets supported 71% of Mono Lake's breeding gulls, versus 29% on the Paoha Islets. Twain Islet remained the most important nesting island by holding 44% of Mono Lake's entire breeding gull population. An estimated 26,452 young fledged from the lake's nesting islands in 1995. Although the lake level rose to cover the landbridge, isolating some former nesting islands, gulls did not recolonize Negit Island, and only four pairs bred on Java. Future research will be necessary to document the length of time needed for the gulls to recolonize these abandoned islands.

INTRODUCTION

In 1995 Point Reyes Bird Observatory (PRBO) completed the thirteenth year of a study of the California Gull *(Larus californicus)* at Mono Lake, California. The objectives of our ongoing study are to measure year-to-year variation in population size and reproductive success and to determine their relationship to changing lake levels. This report focuses on the Negit Islets, which currently support most of the lake's nesting gulls, and on Negit Island, which supported the majority until the gulls abandoned it in 1979. Negit Island was recolonized in 1985 and was abandoned again in 1991.

The effects of recent changes in the Mono Lake ecosystem are of special interest to biologists (Patten et al. 1987, Botkin et al. 1988) and to public agencies vested with protecting the lake's valuable natural and scenic resources (Jones and Stokes 1993). Despite a recent decision that protects the Mono Lake ecosystem by allowing the lake level eventually to rise to 6392 feet (SCWRCB 1994), there is a continuing need to monitor the lake's resources, including nesting gulls, to document their response to the changing conditions.

Since 1941, the lake has dropped almost 45 vertical feet and nearly doubled in salinity because of water diversions of its inflowing streams. Wet winters in the early and mid-1980s caused a temporary reversal of the downward trend. The winters of 1986-87 through 1993-94 averaged very dry, and lake level had fallen to 6374.5 feet by May 1992, climbing to 6375.5 feet by May 1994 (J. Perrault in litt.). Precipitation in the Mono Basin

watershed in the winter of 1994-95 was at record levels with runoff roughly 175% of normal (P. Vorster pers. comm.). Consequently, lake level began to rise rapidly, attaining 6376.1 feet by early May and 6377.6 feet by early August 1995 (J. Perrault in litt.). The landbridge on the north shore began to be covered, reisolating Negit Island and Java and Pancake islets, all of which had been abandoned by nesting gulls in recent years.

STUDY AREA AND METHODS

The study area at Mono Lake has previously been described in Shuford (1985) and Shuford et al. (1984, 1985).

Nest Counts

Because of early indications of a late start to the 1995 nesting season on the Paoha Islets (J. Jehl pers. comm.), we counted nests on the Negit Islets from 25 to 28 May, about five days later than in most years. Field workers walked through all the colonies tallying each nest and its contents and marking nests with a dab of spray paint to avoid duplicate counts. For some small, steep-sided islets brooding adults were counted from a small motorboat to estimate the number of nests present; none of these islets had more than 10 apparent nests. Nest totals for the Negit Islets were added to those for the Paoha Islets provided by Joseph R. Jehl, Jr., and the number of adult gulls breeding at Mono Lake was estimated as twice the total number of nests at the lake.

Separate subtotals were compiled for nests within eight 10 X 20 m fenced plots on four islands (Twain, Little Tahiti, Little

Norway, and Spot islets) which were monitored to determine chick production.

Chick Counts

On 7 and 8 July, Al Demartini and co-workers counted chicks within the eight fenced plots on the Negit Islets. The numbers of chicks produced in these plots were used to estimate total chick numbers on all the Negit Islets combined and on all of Mono Lake's nesting islands (see below).

Reproductive Success

Because we scaled back our monitoring efforts in 1995 we used only one method, of the three used previously (see Shuford 1985), to estimate reproductive success:

Combined Fenced Plot Method. In this method the number of fledged chicks on the Negit Islets **(F)** is calculated as: $(N/8)\sum_{i=1}^{8} f_i$1 where **N** is the total number of nests on the Negit Islets and $\mathbf{f_i}$ is the number of young fledged per nest in the eight Negit Islet fenced plots. Because we did not band chicks in 1995, the number of young fledged per nest was calculated by multiplying the average number of young produced in the fenced plots as of the July chick counts by the average survivorship from the time of chick counts (former time of banding) until fledging for the period 1983 to 1994, a rate of 0.91 (SE = 0.12, n = 12). As in prior years, all newly hatched chicks in July were assumed not to have fledged.

Estimates of the number of young fledged on the Paoha Islets, based also on fenced plots (J. R. Jehl, Jr. in litt.), were added to the Negit Islet totals to provide an estimate of the total number of young produced at Mono Lake in 1995.

RESULTS AND DISCUSSION

Phenology

In 1995 we found the first gull chicks on 26 May, indicating that egg laying and chick hatching began about 3-5 days later than in most years. Observations on 7 and 8 July of 46 eggs and 13 newly hatched chicks in our fenced plots indicated that egg laying was very protracted in 1995 compared with other years of our study.

Number of Breeding Adults in 1995

Late May nest counts enabled us to estimate that 35,192 adult gulls nested on the Negit Islets (Table 1). An additional 14,662 nested on the Paoha Islets (J. R. Jehl, Jr. in litt.). The lakewide estimate of 49,854 nesting adults in 1995 is much lower than the 61,000 to 65,000 recorded in most years since 1990. J. R. Jehl, Jr. (in litt.) estimated that the Paoha Islet nest counts in 1995 were 5% to 10% too low because egg laying was still in progress at the time of the nest counts. Our data also indicated protracted egg laying, but we had no defensible way to estimate the number of nests initiated other than by the late May nest counts. In 1991, about 44,000 gulls were nesting in late

May in a breeding season that also started late following severe March weather.

In 1995, the Negit Islets supported 71% of Mono Lake's breeding gulls versus 29% on the Paoha Islets. Twain remained the most important colony by holding 44% of the entire Mono Lake breeding population. Numbers of nesting gulls decreased from 1994 to 1995 on virtually all of the Negit Islets (Table 1). The decrease in nesting numbers was the most dramatic on Java, where the number of nesting adults dropped from 398 in 1994 to 8 in 1995. This was the culmination of a downward spiral in numbers after coyotes reached the island in 1992. Birds failed to recolonize Java despite a seemingly protective barrier formed as the lake rose to about 6376 feet by late April, when egg laying is usually initiated.

Table 1. Nest counts on the Negit Islets from 1983 to 1995. Data for the Paoha Islets from Jehl (in litt. and previous reports).

NEGIT ISLETS	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Twain	3808	7372	9309	11985	12422	11057	10573	15045	10883	15896	15431	15792	11035
L. Tahiti	5260	7051	6572	5763	4261	3692	2983	4218	3205	3810	3616	4505	4021
L. Norway	2218	1956	1407	810	360	254	269	432	355	473	428	533	493
Steamboat	997	1016	721	722	467	359	314	704	671	862	958	1217	981
Java	143	396	195	400	439	458	543	789	586	1040	399	199	4
Spot	505	358	296	311	248	247	231	309	311	335	356	449	422
Tie	511	231	196	150	84	87	95	167	160	220	210	320	264
Krakatoa	319	272	178	173	185	197	174	283	181	209	146	175	116
Hat	146	109	73	56	14	18	10	19	10	21	21	14	19
La Paz	105	58	43	30	22	21	23	46	49	70	77	57	55
Geographic	140	0	0	0	0	0	2	4	10	68	84	69	51
Muir	170	0	0	0	0	1	10	61	84	139	131	116	87
Saddle	175	46	41	29	14	13	10	18	8	14	10	11	21
Midget	5	3	3	4	4	2	3	3	2	2	3	2	2
Siren	51	0	1	0	0	0	1	7	7	19	20	14	16
Comma	2	1	1	1	0	0	0	0	1	1	1	0	0
Castle Rocks	2	3	4	3	4	6	5	4	5	5	3	3	3
Pancake	0	0	0	7	570	1216	1395	651	0	0	0	0	0
Java Rocks	0	0	0	0	4	3	0	4	2	13	15	9	5
No name	0	0	0	0	0	0	0	1	0	3	3	3	1
Negit Islet Totals:	14557	18872	19040	20444	19098	17631	16641	22765	16530	23200	21912	23488	17596
Paoha Islet Totals:	8001	3546	3151	3596	3208	2833	2682	5145	4442	9283	8498	8182	7331
Negit Island:	--	--	92	636	1502	2037	2765	2827	788	4	12	0	0
Paoha Island:	--	--	2	102	0	0	0	0	0	1	0	0	0
Mono Lake Totals:	22558	22418	22285	24778	23808	22501	22088	30737	21760	32488	30422	31670	24927
Nesting Adults:	45116	44836	44570	49556	47616	45002	44176	61474	43520	64976	60844	63340	49854

Fledging Rate in the Fenced Plots

The eight fenced plots held an average of 65.0 nests

(SE=7.30) and fledged an average of 0.97 chicks (SE = 0.09) per nest (Table 2). The fledging rate in 1995 was slightly lower than the average of 1.03 chicks per nest for the Negit Islets for the last 12 years, 1983 to 1994.

Table 2. Reproductive success of gulls in eight fenced plots in 1995.

PLOTS	NESTS PER PER PLOT	CHICKS PER NEST 7-8 JULY	CHICKS FLEDGED PER NEST
Little Norway	28	1.07	0.97
Spot	54	0.80	0.73
Little Tahiti West	88	1.27	1.16
Little Tahiti East	56	0.86	0.78
Twain North	84	0.61	0.56
Twain South	59	1.41	1.28
Twain Northeast	87	1.33	1.21
Twain West	64	1.14	1.04
$\bar{x}$2 =	65.00	1.06	0.97
SD =	20.64	0.28	0.26
SE =	7.30	0.10	0.09

Reproductive Success

Based on the average number of young fledged per nest in eight fenced plots on the Negit Islets (Table 2) and the total number of nests there (Table 1), an estimated 17,068 young fledged from the Negit Islets in 1995. Combining this total with the approximately 9384 young estimated to have fledged from the Paoha Islets (J. R. Jehl, Jr. in litt.) gives an estimate of about 26,452 young fledged from Mono Lake in 1995.

Conclusions

Severe weather in March and April seemed to be the cause of a late initiation of nesting, a protracted period of egg laying, and, perhaps, lower reproductive success than in most recent years. Despite a rising lake level, breeding gulls did not recolonize some recently isolated nesting islands, presumably because the gulls have a memory of prior invasions of these islands by coyotes. Research in future years during the anticipate rise in lake level should document the period of time needed for the gulls to fully recolonize these abandoned islands.

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