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Color-Banding California Gulls at Great Salt Lake, Utah

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COLOR-BANDING CALIFORNIA GULLS

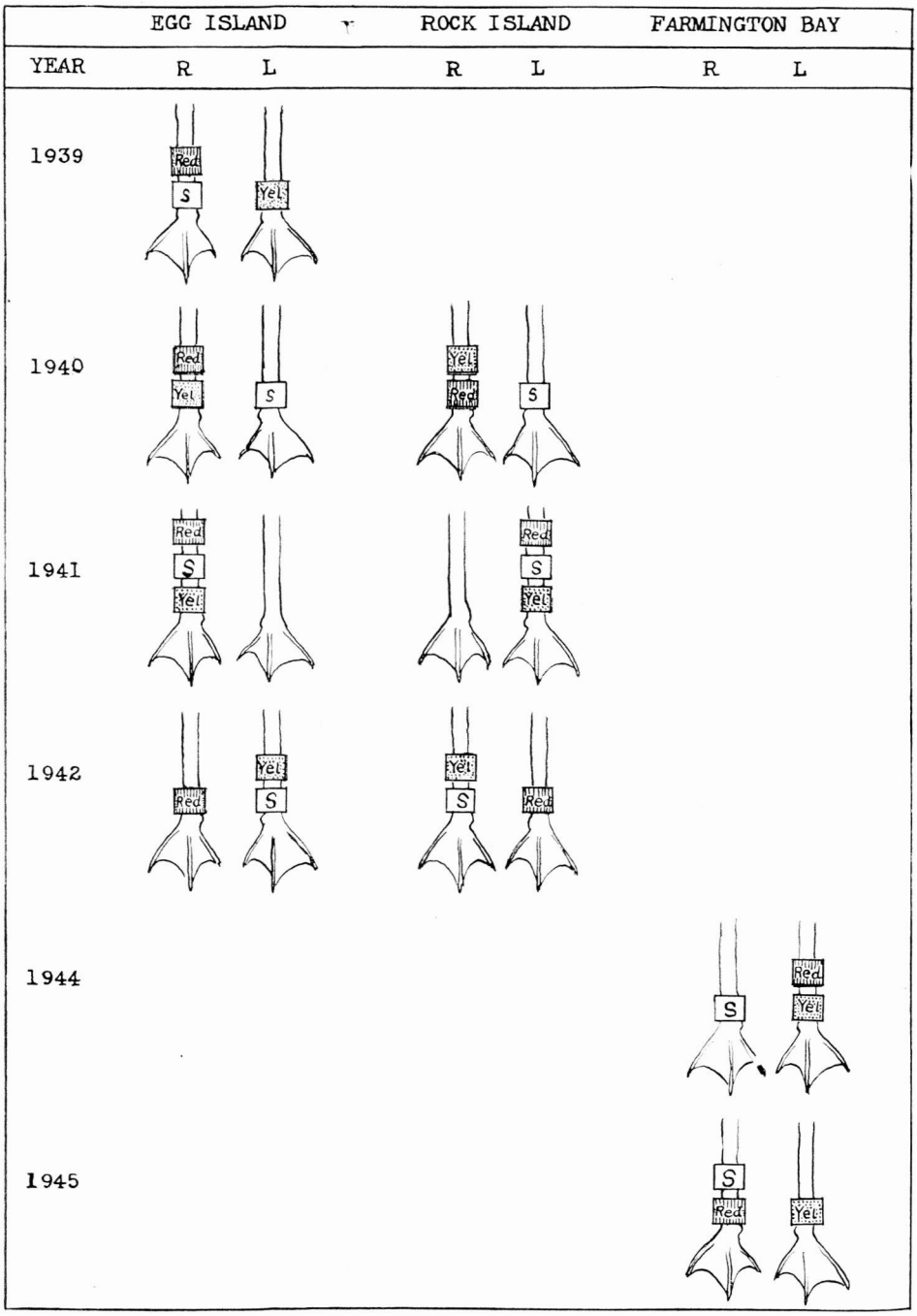

Fig. 1. Sketch showing color-banding combinations used in the Great Salt Lake Region.

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Fig. 2. Map showing dispersal of California Gulls from Egg Island, Great Salt Lake, Utah. Data from banding returns.

COLOR-BANDING CALIFORNIA GULLS AT GREAT SALT LAKE, UTAH.*

BY

ANGUS M. WOODBURY, WILLIAM H. BEHLE
AND JOHN W. SUGDEN

In 1938, under the Pacific Color-Banding Project initiated by the Western Bird-Banding Association to study gull migration and life history, Western Gulls and Glaucous-winged Gulls were banded along the coast and California Gulls at Mono Lake, California. The following year banding was undertaken in the California Gull colony on Egg Island, Great Salt Lake, by the writers and in 1940 at Rock Island in Utah Lake by Vasco M. Tanner and others. Banding continued on Egg Island from 1939 to 1942 inclusive and on Rock Island from 1940 to 1942. Wartime exigencies prevented banding in 1943. In 1944, however, operations were transferred to a newly established colony at Farmington Bay which is much more accessible than Egg Island.

It seems desirable to present now a review of our activities and summarize the results obtained from banding at Egg Island. The writers are indebted to Mrs. M. C. Sargent and Mr. Frederick C. Lincoln for their continuous help. In addition to the writers, birds were banded by Clifton M. Greenhalgh and Ralph Williams, both of whom have banding permits. We should like to thank, too, the many others who assisted us in the project from time to time.

Egg Island is a small islet of less than an acre in size that is located just off the north shore of Antelope Island, the latter being the largest island in the lake situated near the east shore. Egg Island is devoid of vegetation and consists of a great mass of rocks and boulders with a slight beach area around the central rocky mass. The island is noted for being the type locality of the Treganza Great Blue Heron and as being the only site at present in the lake proper where the double-crested cormorants nest.

The California Gulls are summer residents in the region which arrive in late February or early March and remain until the following autumn when most of them are replaced by the Ring-billed gulls that move in from the north for winter.

By this study we hoped to gain information concerning (1) migration routes and destinations, (2) instincts and habits and (3) molts and plumages. It had been noted that California Gulls wintered along the Pacific Coast and that immature gulls lacking the immaculate adult plumage not assumed until the third year were seldom observed in this interior region.

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The colors chosen for this colony were red and yellow together with the regular "Survey" band. The combinations used are shown below:

	EGG ISLAND IN GREAT SALT LAKE		ROCK ISLAND IN UTAH LAKE	
1939	Right leg Left leg	red above survey yellow		
1940	Right Left	red above yellow survey	Right Left	yellow above red survey
1941	Right Left	red above survey above yellow no bands	Left Left	no bands red above survey above yellow
1942	Right Left	red yellow above survey	Right Right	yellow above survey red

For results acquired at the Utah Lake colony, see Tanner, Great Basin Naturalist, 2(2):98, June, 1941, and Sargent, News from the Bird-Banders, 17(4):45, December, 1942.

Operations in 1939

A party of six at Egg Island on June 3, 1939, banded 335 California Gull fledglings, of which 321 were color-banded and 14 had survey bands only. It was soon found that best results were accomplished if the banders worked in teams of three, one to gather the young, one to hold the young and the third to apply the bands. The survey bands were numbered as follows: 651165 to 651500. The banders were Angus M. Woodbury, Clifton M. Greenhalgh and four assistants.

When the island was first reached a great many young gulls were found already dead, suggesting a high mortality rate among the young. Corroboration of this was the finding of many dead birds that Autumn that had been banded. A party of sea scouts operating on Great Salt Lake picked up bands from 11 dead young on Egg Island on September 10, 1939. Later that fall one of the banding party, Clifton Greenhalgh, picked up bands from an additional 13 birds. The following year during banding operations, bands from an additional bird were found. The mortality was thus nearly 7% and presumably not over 310 banded birds left the island.

It was noted in the early stages of the work that where young banded birds were simply released and ran off in any direction, adults would pounce on them and injure or kill them. When we became aware of this circumstance we were careful to return the young birds to their own nesting areas and did not choose the downy young for banding.

Close watch was made for banded birds around Salt Lake City that Summer and Autumn but only one bird was seen, on November 11, 1939, over the University of Utah campus. Long before this, two birds, at least, had reached the Pacific Coast (Sea Side and Portland, Oregon, on August 3rd) and subsequent returns indicated widespread dispersal all along the Pacific Coast. Careful search for any of these banded birds was made the following year when a new lot was being banded on the island but none was discovered. In fact, only one gull of this lot that returned to its native island has ever come to our attention. It was seen there on June 6, 1942, three years later and was then in adult plumage. One other third-year return has been reported; one of the 1939 group was seen at LaJolla, California, on January 28, 1942.

Data that have accumulated for this first year of banding are summarized below.

RETURNS FROM 1939 BANDINGS

Year and State Reported	No. Birds	Location When Found	Date	Observer	Type of Record
Reported in 1939					
Utah	1	Salt Lake City	Nov. 11	Clifton Greenhalgh	Sight
Oregon	1	Portland	Aug. 3	?	Survey Band
	1	Sea Side	Aug. 3	T. H. Perry	Survey Band
California	3	Treasure Island, San Francisco Bay	Oct. 25 and 28	?	Sight
	1	Hampton Bay, Solano Co.	Nov. 3	Sidney Hust	Survey Band
	1	Monterey	Nov. 16	Laidlaw Williams	Sight
Reported in 1940					
California	1	San Francisco	Apr. 19	J. Goldberg	Survey Band
	1	Berkeley	May 13	Frank Watson	Sight
	2	Santa Monica	May 23 and 29	Palmer Stoddard	Sight
Reported in 1942					
California	1	La Jolla	Jan. 28	A. E. Hutchinson	Sight
Utah	1	Egg Island	June 6	A. M. Woodbury	Sight

For this first year there were 14 birds reported of which 10 were sight records and 4 bands recovered. On the basis of banded birds actually leaving the island, the recovery of birds is 4½%. The birds were reported from 8 localities other than Egg Island and the vicinity of Salt Lake City. All were along the Pacific coast from Portland, Oregon, south to La Jolla, California. Eight were reported the first year, 4 the second year and 2 the third year. Westward dispersal was indicated, in some instances, of very early date. The fact that no birds were found to have returned to the natal site the following two seasons is significant and suggests that they remained away until mature. The one bird that did return after three years was then an adult.

Operations in 1940

The second year the banding was carried on more intensively and a total of 1088 young gulls were banded on June 8 by eleven participants. Of the total banded, 1013 were color-banded and 75 with the survey band alone. The color combination was red above yellow on the right leg and the Survey band alone on the left. The Survey bands used were numbered as follows: No. 39—651,013; 651,015 to 651,100; 651,200; Nos. 40—679,001 to 680,000. In handling the young gulls, we were as careful as the nature of the work permitted to get the young birds back on their home territory. However, many of the young birds were large enough to leave their territory and take to the water; others would run hither and thither so it was not always possible to tell where they belonged.

After banding was completed, it was estimated that about 1 in 10 or 12 had been banded. To be conservative, perhaps 10,000 young birds were on the island. A large number of dead were noted but no attempt was made to count or estimate their numbers. The banders were Angus M. Woodbury, Clifton M. Greenhalgh, Ralph Williams and eight assistants.

The data concerning the recovery of birds banded in 1940 are summarized below.

RETURNS FROM 1940 BANDINGS

Year and State Reported	No. Birds	Location When Found	Date	Observer	Type of Record
Reported in 1940					
Utah	1	Salt Lake City	July 14	Mrs. A. E. Jensen	Survey band
	1	Salt Lake City	July 14	.....	Survey band
	1	Layton	July 30	Geo. F. Adams	Survey band
Idaho	1	Murtaugh	July 21	L. C. Merrill	Survey band
	1	Idaho Falls	Aug. 18	L. R. Bird	Survey band
	1	Craigmont	July 20	Mrs. W. C. Tautfest	Survey band
Oregon	1	Malheur Lake	Sept. 6	R. M. Tullar	Survey band
	1	Glenada	Nov. 27	M. E. Barrett	Survey band
	1	Cherryville	Aug. 1	Bennie Clark	Survey band
California	1	Oakland	Sept. 27	A. W. Crowton	Survey band
	1	San Francisco	Dec. 3	William F. Barr	Sight record
	1	Monterey	Oct. 23	Laidlaw Williams	Sight record
	1	Galt	Aug. 5	Carl Yocham	Survey Band
	1	Wilmington	Dec. 21	J. W. Curtis	Survey Band
	1	Ocean Park	Oct. 6	C. U. Butterfield	Survey Band
Reported in 1941					
California	1	San Francisco	Feb.	Enid Austin	Sight record
	1	Oakland	Nov. 16	Paul F. Covel	Sight record
	1	Solano County	Aug. 14	A. W. Ward	Survey band
	1	Lynwood	Mar. 4	Lt. Kerr	Survey band
	1	Los Angeles	May 17	Josiah Keely	Sight record
	1	San Diego	Feb. 14	A. E. Hutchinson	Sight record
	1	San Diego	Feb. 26	Mrs. M. C. Sargent	Sight record
	1	La Jolla	Jan. 24	A. E. Hutchinson	Sight record
Reported in 1942					
Oregon	1	Warren	Nov. 4	T. A. Platz	Survey band
California	1	San Francisco	Jan. 2	W. M. Lovelady	Survey band
Reported in 1943					
California	1	San Francisco	Mar. 28	C. W. Friedricks	Survey band
	1	Burlingame	Sept. 18	W. Wilson	Survey band
Reported in 1944					
California	1	Moss Landing	Aug. 16	Dorothy Twitt	Survey band
Reported in 1945					
Utah	6	Rock Island, Utah Lake	May 26	A. M. Woodbury and J. W. Sugden	Sight records

For the 1940 banding, there were 34 returns of which 14 were sight records, a return of approximately 3.1%. Of these, 15 were reported during the first year, 1940. The next year in 1941, 8 other records were acquired. In 1942 only 2 were reported and 2 again in 1943. One additional record was added in 1944, but 6 were seen together at one colony in Utah Lake in 1945.

Once again there was an early exodus from the home territory. The dispersal was generally westward but several birds drifted north to Idaho. Since none of

the birds was reported from the Salt Lake area after the summer they were banded, the inference is, as before, that they remain away until mature. The attraction to the home region is seemingly nil until mature.

Although a larger number of birds were banded than during the first year the percentage of returns was lower. Most of the returns this second year were based on birds found dead or dying or caught on fish hooks. The color bands may have attracted attention, however, to the banded birds.

Operations in 1941

Plans were made to band 1500 birds on the island this year. We were not able to get to the island until June 14, when the party of 12 was only able to band 1250 gulls. A second trip was made on June 22nd with a party of 7 and an additional 250 birds were banded, making a total of 1500. Survey bands used were numbered from 41-650,001 to 651,500. The banders were Angus M. Woodbury, William H. Behle and 15 assistants. The banding was carried on later than in previous seasons and the gulls were running free on the island. After finishing, we estimated that 9 out of 10 young on the island were banded. A very great reduction in the number of young, from 10000 to 1700, had taken place since the previous season of 1940.

In light of this it is significant that new colonies were established this year in Farmington Bay and that the Rock Island colony at Utah Lake showed a large increase. Dr. Vasco M. Tanner, banding there his second year on June 17, ringed 1000 gulls and wrote as follows (News from the Bird-Banders, 16(2):19, August, 1941): "We were able to band these birds in three hours and forty minutes. The colony is much larger than last year. After banding we estimated that one out of every 15 to 16 young gulls was banded. I believe there are at least ten to twelve thousand nests on the island this year and barring early death due to cold stormy weather, the infertility of the eggs and starvation, there will be at least fifteen to sixteen thousand young gulls reach flight maturity. We have made a rather careful study of the island since the gulls came this spring and we believe there are at least twenty-four to twenty-five thousand adult gulls in the colony."

Some of the artificial islands in the newly created Farmington Bay Project, about 20 miles east of Egg Island, attracted gulls and colonies were started there in 1941. It may be that the new colonies drew from the Egg Island population. For the second time we failed to find on Egg Island any birds banded in the previous seasons of 1939 and 1940.

The data concerning the recovery of birds banded in 1941 are summarized below.

RETURNS FROM 1941 BANDINGS

Year and State Reported	No. Birds	Location When Found	Date	Observer	Type of Record
Reported in 1941					
Washington	1	Vancouver	July	Jim Padden	Survey band
Oregon	1	Cape Kiwanda	July 30	Baird Williams and Reed Ferris	Sight record
	1	Curry County	July 31	Fred Smith	Survey band
	1	Brookings	Aug. 15	H. T. Twidwell	Survey band
	1	Portland	Aug.	John Hayek	Survey
	1	Sea Side	July	.....	Survey ba

RETURNS FROM 1941 BANDINGS—Continued

Year and State Reported	No. Birds	Location When Found	Date	Observer	Type of Record
California	1	Seaside	Nov. 24	A. E. Fry	Survey band
	1	Pt. Reyes	Aug. 1	M. M. Gomez	Survey band
	1	San Leandro	Oct. 20	C. Estenson	Survey band
	1	Oakland	Nov. 6	Dixon Woodbury	Sight record
	1	Oakland	Dec. 5	Dixon Woodbury	Sight record
	1	Oakland	Dec. 4	J. H. Gay	Survey band
	1	San Francisco	Dec. 15	B. L. Brask	Survey band
	1	San Francisco	Dec. 19	Harry Davis	Sight record
	1	West Los Angeles	Dec. 12	Chas. P. Webster	Sight record
Reported in 1942					
California	1	Monterey Bay	July 9	G. W. Kirby	Survey band
	1	La Jolla	Jan. 3	A. E. Hutchinson	Sight record
Reported in 1943					
Utah	1	Lakeside	June 21	Mrs. Ruby Gale	Survey band
California	1	Mount Eden	Jan. 28	Alfred Marsicano	Survey band
	1	San Diego	May 16	John O. Harvey	Survey band
	1	Coronado	June	Dr. S. M. Dingwall	Survey band
Reported in 1944					
California	1	Santa Monica	May 2	Geo. T. Hastings	Sight record
Reported in 1945					
Oregon	1	Portland	Jan. 4	Mrs. W. J. Backa	Survey band

Returns for this third year of banding totaled 23 of which only 7 were sight records. This represents a 1.5% recovery. As usual, the first year gave best results with 15 records turning up. In 1942 only 2 were reported, 4 in 1943, 1 in 1944, and 1 in 1945. One of the second-year records is significant, the one from Lakeside, Utah, on the west side of the Great Salt Lake. Here is a case of a gull returning to the general region after two years while not yet fully mature.

Operations in 1942

During this, the fourth and last year of banding at the Egg Island colony, another 1500 gulls were color-banded. This was done on June 6 by a party composed of Angus M. Woodbury, John W. Sugden and 13 assistants. Survey bands used were as follows: 41-651,501 to 652,000 and Nos. 42-610,001 to 611,000.

After banding, it was estimated that about 40% of the young gulls were banded indicating a total crop of 3750 young birds. Thus the colony showed an increase in numbers of young over the previous year. For the first time a banded gull of other years was seen on the island, one banded in 1939, having returned after three years. It appeared to be in normal adult plumage.

The data concerning the recovery of gulls banded in 1942 are summarized below.

RETURNS FROM 1942 BANDINGS

Year and State Reported	No. Birds	Location When Found	Date	Observer	Type of Record
Reported in 1942					
Washington	1	Tacoma	Sept. 6	J. E. Beaudoin	Survey band
Oregon	1	Coquilla	Nov. 25	Rex Pierce	Survey band
	1	Yaquina	July 14	Donald C. Lunstedt	Survey band
California	1	Near Petaluma	Aug. 12	Frank Vannucci	Survey band
New Mexico	1	Carlsbad	Nov. 28	J. E. Middleton	Survey band
Reported in 1943					
British Columbia (Canada)	1	Vancouver	Aug. 14	June Mitchell	Survey band
Oregon	1	Port Orford	July 26	D. M. Donnelly	Survey band
California	1	Alvarado	Oct. 30	Mrs. A. B. Hill	Survey band
	1	Arcata	Sept. 25	C. A. Christiansen	Survey band
	1	Santa Monica	July	Claire C. Lansing	Survey band
	1	Pacific Palisades	May 27	M. C. Johnston	Survey band
	1	Huntington Beach	Apr. 20	J. C. Patterson	Survey band
	1	Imperial Beach	July 31	Albert Coener	Survey band
Lower California (Mexico)	1	La Pamilla	Dec.	Jose Luis Verdugo	Survey band
	1	Magdalena Bay	Apr. 13	E. R. Gonzales	Survey band
Reported in 1944					
British Columbia (Canada)	1	Cordova Bay	Aug. 28	C. Charlton	Survey band
California	1	Oakland	Apr. 28	H. Ferguson	Survey band
	1	San Francisco	Apr. 17	A. Von Hoeston	Survey band
Reported in 1945					
California	1	Fort Cronkhite	Jan. 2	V. R. Shellaborger	Survey band
	1	Santa Barbara	Feb. 9	F. W. Reed	Survey band
Utah	1	Farmington Bay	May 14	W. H. Behle	Sight record

For 1942, when 1500 gulls were banded, there are as yet only 21 returns, a 1.4 percentage. All but one of these were on the basis of dead or injured birds picked up. This is the lowest percentage of any of the four years. This may be correlated with the war activity and lack of observers, or to the fact that the Pacific Coast banding project had terminated and there was less interest and publicity than in previous years. Some returns of course may still come in. Results for the first year were off the most, only 5 returns having come to light. In 1943, there were 10 reports and 3 for 1944 and 3 for 1945. Results for the 1942 banding effort are notable in three respects. They increased the known north-south dispersal-spread considerably, owing to two records from British Columbia and two from Lower California. The second feature is that a first year bird was found at the Avalon Reservoir at Carlsbad, New Mexico, on November 28, 1942, thus indicating that some stragglers go south and east just as others, indicated by the previous Idaho records, go northward. (A Utah Lake banded bird was found in Wyoming, indicating a northeast spread.)

The third item of note was the observation of one of these gulls nesting at a Farmington Bay colony on May 14, 1945. It was in adult plumage incubating eggs. At the same time another adult bearing the combination of bands used on Utah Lake birds in the banding operations of 1942 was observed to be nesting at one of the Farmington Bay colonies. Here, then, are two gulls that returned to their home region to breed three years after hatching. They did not, however, return to their natal colonies.

SUMMARY OF BANDING RETURNS

Summary of the results of 4 years of color-banding of California gulls at Egg Island, Great Salt Lake follows.

Year	Color Combination		Number Banded	Date Banded	Number of Recoveries	Percent Return
	Right leg	Left leg				
1939	Red	Yellow	321 color-banded	June 3, 1939	14	4.5%
	Survey		33 survey only			
			354 total			
1940	Red	Survey	1013 color-banded	June 8, 1940	34	3.1%
	Yellow		75 survey only			
			1088 total			
1941	Red		1250 on	June 14, 1941	23	1.5%
	Survey		250 on	June 22, 1941		
	Yellow					
			1500 total			
1942	Red	Yellow Survey	1500	June 6, 1942	21	1.4%

Total gulls banded=4,423. Total returns=92. Percent returns=2.0%

GENERAL DISCUSSION

MIGRATION OF YOUNG.—These four years of banding have produced significant results that show the dispersal of young during their first year. It is clearly demonstrated that the birds-of-the-year fan out over a surprising area, mostly toward the west coast. They spread out from extreme southern British Columbia to the southern part of Lower California. Some birds, however, took a northward direction into Idaho and presumably went down the Snake-Columbia rivers drainage while one at least went southeastward to New Mexico.

Observations were made about the same time on certain of these young gulls at widely separated points indicating great variance between individuals as to their time of departure. While some were still loitering in the home area, others had reached the Pacific Coast. Indeed, some individuals were found in coastal areas less than 2 months after banding as fledglings.

Many inland records seem to have been obtained from gulls found along lakes and waterways and Sargent *(op. cit.)* suggests that gulls tend to follow waterways in their movements toward the coast.

Most records for each batch of birds banded were acquired the first year although they continue to accumulate for birds three and four years old. Most of the records for years subsequent to the first are for coastal areas. A few, however, are from inland points. This might indicate that not all the California Gulls go to the Pacific Coast or that some gulls start moving inland when still not fully mature.

By comparison, the dispersal of young gulls from the Rock Island, Utah Lake colony shows much the same pattern as the Egg Island population. There is a general spread westward, and young gulls have been reported from Savary Island, British Columbia, to Colima, Mexico. The easternmost record was from Riverton, Wyoming. Similar results have been obtained for the gulls of the Mono Lake colony, Nevada. These gulls have been observed from Vancouver, B. C. south to Monterrey, Nueva Leon, Mexico. From this comparison it would appear that each colony has a very wide dispersal range and therefore the winter range of each colony overlaps throughout the range of the species.

Among these gulls which were all banded in different years between June 3 and 22, one that was banded on June 6 reached the Pacific Coast by July 14. A total of 5 were reported in July, 8 in August and 3 in September. If these are representative samples, then large numbers of the banded birds would have reached the coast during the months of July and August following the bandings. The lack of any great concentration of young gulls in late summer around Great Salt Lake indicates that they have moved by that time of year.

There is probably little or no significant difference in temperature or day length at this time of year, as Woodbury (Auk, 1941:472), indicated, that could be considered as a stimulus to longitudinal migration. Rather, it tends to support the idea that the migration stimulus is inherent in the young gull at a given stage of development but it throws no light on the mechanism of guidance that directs them toward the Pacific Coast.

In all probability the winter range of the adults is the same as that of the young although there is little data bearing on this problem as yet.

HOMING INSTINCT.—Data throwing light on the problems of whether and when California Gulls return to their natal region and if they return to the same colony are less numerous, although a few significant items have been revealed. It appears that, as a general rule, these gulls do return to their home area but not until they are fully mature. The seeming absence of gulls in immature plumage in the region had been noted by the writers long before these banding studies began and intensified observation since has strengthened the conviction that as a rule the gulls do not return until fully mature and in adult plumage. Occasionally one will see a second year bird among the adults but they are relatively rare. The only such bird of all color-banded that we know to have returned to its natal region was one found dead on June 21, 1943, at Lakeside, Utah. This location is on the west side of Great Salt Lake. The bird was banded in mid-June, 1941, at Egg Island. One previous record of similar nature pertains to a California Gull banded on Egg Island on June 16, 1933, which was found dead on June 26, 1934, at Salt Lake City.

Of the 4423 young gulls that we have banded, only 8 have been seen by us as adults on local breeding grounds of the species. The first of these was when an adult gull in immaculate plumage was seen at Egg Island on June 6, 1942, which had been banded there on June 3, 1939. The next instance pertained to finding an adult gull at Farmington Bay on May 14, 1945, which was banded there on June 6, 1942. This bird was definitely ascertained to be incubating eggs. At the same time and place another nesting adult was found that had been banded at Utah Lake in 1942. The third instance was revealed on a visit to the Rock Island colony at Utah Lake on May 26, 1945. Several banded adult gulls were seen as follows: one banded on Rock Island, Utah Lake on June 15, 1940; six banded at Egg Island, Great Salt Lake in mid-June, 1940; six banded at Rock Island, Utah Lake on June 17, 1941.

In the cases of the Farmington Bay birds and the Rock Island inhabitants banded at Egg Island we have instances where adults were found in their home region and in some cases definitely breeding. However, they were not on their natal grounds, which would seem to indicate that some of them return to the region but not necessarily to the particular colony where they hatched. Some of these birds showed up as adults after three years. Others were birds of 4 and 5 years old. They may have been elsewhere to breed in the third or fourth years.

One further observation suggests weakness of the instinct which might attract gulls to their natal region. Another banded gull was seen at Rock Island bearing a blue band over survey on right leg thus indicating that it came from a different region. Evidently it had lost its third band. The color combination used at Mono Lake, California, in 1939, was survey above blue on the right leg and blue alone on the left leg. At Klamath Falls in 1940 the color combination was black, survey and blue all on the right leg. Thus this bird could have been banded at either locality. In any event we have an instance of a gull reared in one region that was found associated several years later with a breeding colony of gulls of the same species in another region, where it was associated with a nest.

It is disappointing that more returns have not been obtained of banded birds on their home grounds. It should be pointed out in this connection that there are many breeding colonies of California Gulls in the Great Salt Lake region, most of them not readily accessible, especially during the war years. The total population of California Gulls in the region is probably in excess of 100,000.

Behavior Patterns.—Our experience with this banding of California Gulls leads us to believe that there are inherent behavior patterns transmitted by heredity from generation to generation which unfold one after another as development of the individual (ontogeny) proceeds.

At the time of hatching, this behavior pattern holds the young to the nest despite the approach of bird banders. Within a few days, this pattern is modified so that the young birds leave the nest when disturbed even though without disturbance, they would still be bound to the nest.

A little later, they leave the nest of their own accord and begin to wander, sometimes venturing into other nest territories. Presumably, adult behavior is correlated with that of the young and they resent intrusion of the nest territory during the early stage but tend to lose the defense reaction in the wandering stage of the young.

A third behavior pattern is exhibited when the young take to the water to swim, often in social groups. Presumably the territorial division of the nesting ground becomes more or less impaired among both adults and young and the colonial impulse becomes paramount.

A fourth behavior pattern manifests itself when the young are fledged—that of flight. While the young birds are learning, the flights are more or less local, but with increasing experience and efficiency, they get bolder and take longer flights.

A fifth behavior pattern starts them on migration. Apparently they are not content to remain with the parental ties and break them and start off for themselves. How they determine the direction to fly is not revealed by available evidence but the fact of migration toward the Pacific Coast seems to be established for the large majority of the returns.

A sixth behavior pattern, that of erratic movement along the coast seems to be implied by the banding returns but data are too incomplete for satisfactory conclusions.

A seventh behavior pattern is also implied but not satisfactorily substantiated in the return migration to the breeding grounds. This pattern does not seem to appear until gonadal development approaches the reproductive stage at 2 or 3 years of age. Thereafter it may be seasonal in occurrence but this needs further investigation.

An eighth behavior pattern is obviously a reproductive pattern.

SUMMARY.—Color-banding of young California Gulls on Egg Island off the north tip of Antelope Island in Great Salt Lake was conducted for four seasons as a part of the Pacific Color-banding project of the Western Bird-Banding Association. Of the total of 4423 young gulls banded, 354 were ringed on June 3, 1939, 1088 on June 8, 1940, 1500 on June 14 and 22, 1941, and 1500 on June 6, 1942. These had various combinations of red, yellow and aluminum bands.

Up to date, 92 or 2.0% returns records are available. Of these, 71 came from the Pacific Coast states, 2 from British Columbia, 2 from Lower California, 13 from Utah, 3 from Idaho and one from New Mexico. Of the Pacific Coast records, 13 were reported to have reached the coast during the months of July and August following the bandings. The lack of any great concentration of young gulls around Great Salt Lake during those months supports the idea that most of them migrate longitudinally toward the coast in late summer.

The available data seem to indicate: that the young gulls begin to move about almost as soon as they are mature enough to leave the parents; that most of them reach the coast in late summer; that they spread along the coast from British Columbia to Lower California; that in general they do not return inland to their birthplace until after 3 years when they are mature and stimulated by the necessity of reproduction; that when they do return to breed they do not necessarily return to the natal colony; and that the stimulus to migration is inherent in the young gull at a given stage of development. *Department of Biology, University of Utah. Salt Lake City, Utah, October 15, 1945.*