CALIFORNIA GULL PREDATION ON WATERFOWL

BY CLYDE R. ODIN

THE California Gull (*Larus californicus*) has been protected in the State of Utah from 1848. Since then its nesting area, and possibly its population, are larger. The majority of publications portray the California Gull as a follower of the plow and a savior of crops. This investigation, however, was made to determine the extent of the predation of the California Gulls on nests and young of waterfowl. My study, lasting from March through August, 1950, was supplemented by less intensive work by John Wunder in 1949. The project was initiated and supervised by Dr. Jessop B. Low and partially financed through the Utah Cooperative Wildlife Research Unit, with the U. S. Fish and Wildlife Service, Utah Fish and Game Department, Utah State Agricultural College, and Wildlife Management Institute cooperating.

Utah's man-made marshes have provided not only an excellent waterfowl habitat but also breeding grounds for the California Gull.

Farmington Bay Bird Refuge with 3,800 acres of marsh and the New State Gun Club with 1,800 acres of marsh in Davis and Salt Lake counties were selected for the study because they are typical of Utah's man-made marshes and have populations of gulls in close proximity to nesting waterfowl. The nesting colony of California Gulls was restricted to 28 small islands of almost one acre in size located entirely within the Farmington Bay Bird Refuge (Table 1). The islands had sparse stands of peppergrass (*Lepidium* sp.), pigweed (*Chenopodium* sp.), and mustard (*Brassica* sp.).

The area of investigation was divided into three units or zones to study gull predation at varying distances from the gull nest sites: Zone One, a circular area with a radius of one mile, located in the lower two-thirds of the Farmington Bay Bird Refuge, included 17 of the 28 gull nesting islands within its boundary; Zone Two, lying mainly within the New State Gun Club, extended one mile from the southwest perimeter of Zone One to the northwest boundary of Zone Three and also extended a mile north from Zone One in the northern part of the refuge; Zone Three, lying entirely within the New State Gun Club, extended one mile from the southwest boundary of Zone Two, to 1,000 feet south of the New State Gun Club headquarters (Figure 1).

A study of California Gull predation on waterfowl was made by Wunder (1949) on the Farmington Bay Bird Refuge and New State Gun Club from June 22 to August 20, 1949. In this study California Gulls accounted for over 100 per cent more destruction on waterfowl

TABLE 1

CALIFORNIA GULL NESTS ON THE 28 ISLANDS AT FARMINGTON BAY BIRD REFUGE, UTAH, MAY 10, 1950

Island Number	*California Gull nests**	*Size of island in square feet*	*Average number of square feet per California Gull nest*
1	0	56,628	—
2	0	47,916	—
3	0	56,628	—
4	0	39,204	—
5	0	56,628	—
6	0	39,204	—
7	0	56,628	—
8	242	56,628	234
9	223	39,204	176
10	259	39,204	151
11	276	56,628	205
12	449	56,628	126
13	349	56,628	162
14	124	47,916	386
15	250	56,628	227
16	167	47,916	287
17	226	47,916	212
18	108	47,916	444
19	14	39,204	2800
20	142	39,204	276
21	240	47,916	200
22	380	56,628	149
23	396	47,916	121
24	415	56,628	137
25	362	56,628	156
26	351	47,916	137
27	203	47,916	236
28	256	47,916	187
Total	5,432	1,354,716	
Average Square Feet per occupied island			184

* Nest count made by William H. Behle, University of Utah.

eggs than all other mortality factors. Wunder also noted two instances of gull predation on young waterfowl.

Nelson (1947, 1948, 1949, 1950, 1951, 1952) conducted nesting studies at Ogden Bay Bird Refuge, Utah, during the period from 1947 through 1952. Gull predation on waterfowl nests was noted in these studies, and the California Gull was by far the most destructive predator on the Refuge.

Wingfield (1951) in a waterfowl productivity study on Knudson Marsh, Utah, in 1950, found that eight per cent of all waterfowl eggs were destroyed by California Gulls.

Williams and Marshall (1938) made intensive duck nesting studies on the Bear River Migratory Bird Refuge, Utah, in 1937, but avian predation was found to be negligible. The California Gull was

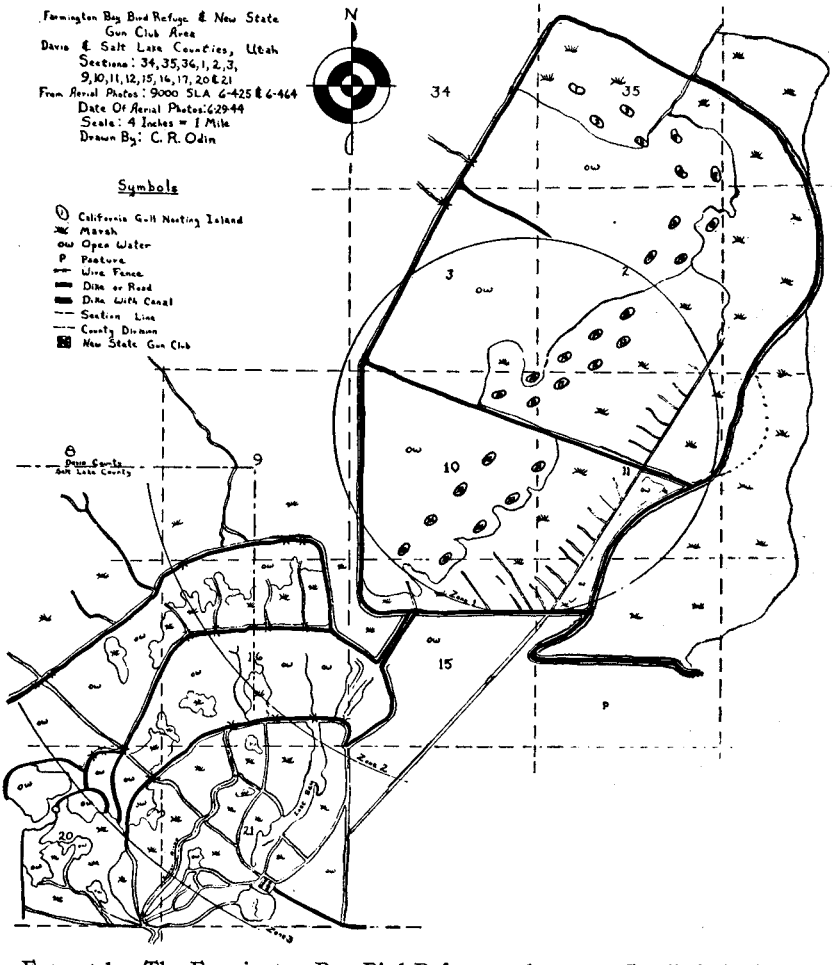

FIGURE 1. The Farmington Bay Bird Refuge study area. Small circles indicate islands used by nesting California Gulls. Scale after reduction: 1 inch = 1 mile.

listed as a predator observed on the area, but no record of nest destruction by gulls was given.

In July 1947, Twomey (1948) observed California Gulls bringing other birds' eggs to their nests on a small island of Deer Flat Refuge in southwestern Idaho. The eggs brought to the gull nesting island were mostly those of Cinnamon Teal (*Anas cyanoptera*), Ring-necked Pheasant (*Phasianus colchicus*), Coot (*Fulica americana*), Black-necked Stilt (*Himantopus mexicanus*), and Eared Grebe (*Colymbus caspicus*).

Sugden (1947) found Ring-necked Pheasant, Coot, Shoveller (*Spa-*

tula clypeata), and Cinnamon Teal eggs in California Gull nests on Rock Island in Utah Lake, on the Farmington Bay Bird Refuge, and on the Bear River Migratory Bird Refuge, Utah.

An intensive food habits study of 184 California Gull stomachs from the Bear River Migratory Bird Refuge and Antelope Island in Great Salt Lake, showed that 30 contained eggs of other species of birds and 7 contained ducklings (Greenhalgh, 1952).

Methods of Procedure.—To determine the fate of nests in relation to gull predation, a search for duck nests was made on the study area. A willow shoot about seven feet long and stripped of branches was placed four paces from the waterfowl nest, on either the east or west side, to facilitate relocation. A period of a week was usually allowed between visits to the nests. The position and identification of the nest was located on a field map. The number of gulls near the nest site at the time of location was recorded.

The different degrees of nest concealment, which played an important role with nest success, were rated as good, fair, and poor. Nests under good concealment were entirely hidden from view, and generally necessitated parting the cover to observe the nest proper. Under fair concealment the canopy over the nest was thinner and the contents of the nest would be partially viewed without parting the cover. A poorly concealed nest had little or no cover above the nest, and when the female was flushed, the eggs could be viewed from a distance.

Detection of the Predator.—Four methods were used by the gulls to destroy a duck egg: (1) pecking a hole in the egg at the nest, (2) dropping the egg over water and retrieving the contents, (3) carrying the egg intact to the gull nesting islands or to a favorite loafing site, and (4) swallowing the egg whole.

Since completion of the Farmington Bay Bird Refuge in 1940, the California Gull population has steadily increased. Possibly this increase was caused by a shift in the gull nesting from the islands (Hat, Egg, Gunnison, and White Rock islands) in Great Salt Lake. The two primary causes for this shift possibly were: (1) new nesting areas created by the construction of marshland for waterfowl, and (2) greater availability of food inland. According to Nelson (1945) in 1942, the nesting islands on Farmington Bay Bird Refuge supported a breeding population of 4,000 California Gulls. On May 10, 1950, Behle counted 5,432 California Gull nests on the 28 nesting islands (Table 1). Allowing two birds per nest, a total breeding population of 10,864 California Gulls was calculated for 1950. Thus, an increase of more than 150 per cent in the California Gull breeding population occurred between 1945 and 1950.

Twenty-one of the islands, numbers 8 through 28, contained California Gull nests and were entirely surrounded by water; little or no water surrounded islands 1 through 7, and gull nests were entirely lacking. Absence of water during the nesting season makes the islands easily accessible to predaceous mammals and man and probably accounted for the gulls not nesting on these islands. There was an average of 184 square feet of island per gull nest (Table 1).

GULL PREDATION ON NESTING WATERFOWL

All Waterfowl Species.—The present study is based on 317 nests of 8 waterfowl species: Canada Goose (*Branta canadensis*), Common Mallard (*Anas platyrhynchos*), Cinnamon Teal, Pintail (*Anas acuta*), Gadwall (*Anas strepera*), Shoveller, Redhead (*Aythya americana*), and the Coot.

In Zone One, 19.6 per cent of the 1,186 eggs were destroyed by California Gulls; Zone Two suffered slightly more, with 21.8 per cent of 684 eggs pilfered by California Gulls; and Zone Three, which was farther from the gull nesting islands, suffered the least from California Gull predation. In this zone, 14.7 per cent of the 1,127 eggs were destroyed by gulls.

In the three study zones, 18.3 per cent of the 2,997 eggs were destroyed by California Gulls; 4.7 per cent were destroyed by skunks, flooding, and unknown causes; 12.1 per cent were deserted or infertile; and 64.9 per cent of all eggs hatched successfully (Figure 2).

Almost three times as many eggs were destroyed by the California Gull as by all other causes, thus indicating the destructive potential of this avian predator.

Wunder (1949) found that 11.3 per cent of the 834 eggs were destroyed by gulls, 5.2 per cent were flooded or destroyed by skunks, and 57.9 per cent successfully hatched. In his study more eggs were destroyed by California Gulls than by all other causes. This study again revealed that the intensity of gull predation became less as the distance from the gull nesting island increased. Probably a greater percentage of the eggs would have been recorded as destroyed had his study begun early in the waterfowl nesting season.

In the present study, the Pintail had the highest loss from gull predation, with 25.6 per cent of all eggs destroyed in three study zones. However, in one zone the Gadwall had 57.2 per cent of its eggs destroyed.

Gulls were known to take Cinnamon Teal, Redhead, Pheasant, and Avocet (*Recurvirostra americana*) eggs to their nesting islands before eating them. The majority of the juvenile gulls were only

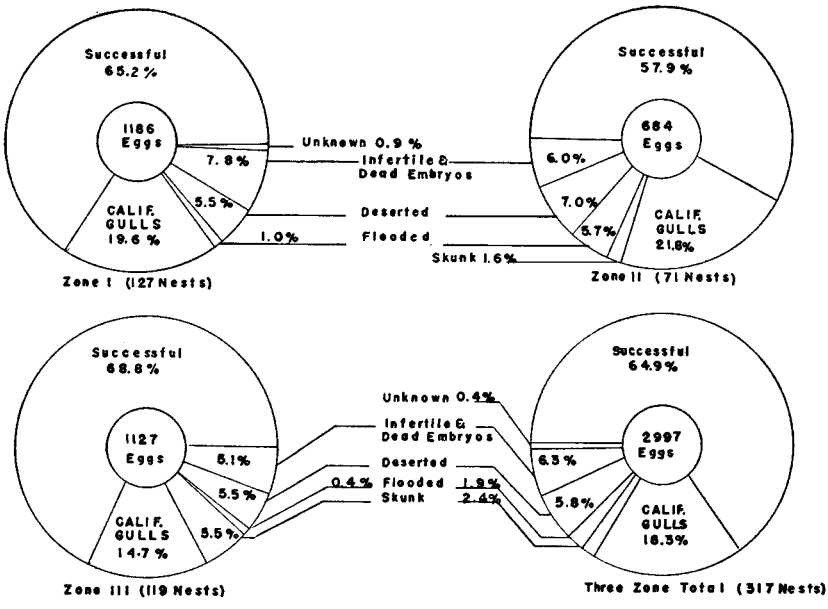

FIGURE 2. The fate of all eggs from 317 waterfowl nests, Farmington Bay Bird Refuge and New State Gun Club, Utah, April 8 through July 27, 1950.

six weeks old and still dependent on their parents for food at the time of greatest nest destruction.

Redhead eggs were found in Cinnamon Teal, Mallard, Pintail, and Shoveller nests. The maximum number of Redhead eggs found in any one of these nests was seven. Of the 50 nests parasitized by the Redhead, 47 were under good and fair concealment, and only three were poorly concealed. Of the parasitized nests that were poorly concealed, 66.7 per cent were taken by California Gulls, and only 10.6 per cent of the parasitized nests under good and fair concealment were destroyed by gulls. Of the 181 nests not parasitized by the Redhead, 19.9 per cent were destroyed by the California Gull.

Redhead parasitism on the nests of the Cinnamon Teal, Mallard, Pintail, and Shoveller did not increase gull predation because: (1) an average of only 2.7 Redhead eggs was laid in each parasitized nest, and (2) the Redhead chose mainly nests of good and fair concealment in which to lay its eggs.

Concealment played a major role in the survival of the waterfowl nests. Gull predation was practically negligible on well-concealed nests; nests of fair and poor concealment suffered the greatest destruction. Of the 139 nests under good concealment only 5.8 per

TABLE 2

PREDATION BY CALIFORNIA GULLS ON DUCK NESTS IN RELATION TO THE DEGREE OF NEST CONCEALMENT AT FARMINGTON BAY BIRD REFUGE AND NEW STATE GUN CLUB, UTAH, APRIL 8 TO JULY 27, 1950.

Study Zone	*Degree of duck nest concealment*	*Duck nests*		*Duck nests destroyed by California Gulls*	
		Number	*Per cent*	*Number*	*Per cent*
1	Good	40	31.5	3	7.5
	Fair	48	37.8	9	18.8
	Poor	39	30.7	13	33.3
	Total	127	100.0	25	19.7
2	Good	29	40.8	1	3.4
	Fair	26	36.6	6	23.1
	Poor	16	22.6	7	43.8
	Total	71	100.0	14	19.7
3	Good	65	54.6	4	6.2
	Fair	33	27.7	7	21.2
	Poor	21	17.7	6	28.6
	Total	119	100.0	17	14.3
TOTAL	Good	139	43.8	8	5.8
	Fair	101	31.9	22	21.8
	Poor	77	24.3	26	33.8
	Total	317	100.0	56	17.7

cent were destroyed by the California Gulls, 21.8 per cent of the 101 nests under fair concealment were lost to gulls, and 33.8 per cent of the 77 poorly concealed nests were pilfered by the gull (Table 2). Wunder (1949) found that 6.8 per cent of 44 nests under good concealment were lost to gulls, 12.5 per cent of 32 nests under fair concealment were destroyed by gulls, and 27.3 per cent of the 22 poorly concealed waterfowl nests were pilfered by gulls.

It was noted by Wingfield (1951) that 11.6 per cent of the 146 Mallard nests under good concealment were pilfered by California Gulls, nine per cent of the 90 Mallard nests under fair concealment were lost to gulls, and 15.5 per cent of the 185 poorly concealed Mallard nests were destroyed by gulls. Gull predation accounted for 13.1 per cent of the 114 Cinnamon Teal nests under good concealment, whereas 10 per cent of the 10 poorly concealed nests were destroyed by gulls. Gull predation was responsible for destruction of 6.7 per

cent of the 67 Redhead nests under good concealment; 9.4 per cent of the 32 Redhead nests under fair concealment were lost to this predator, and 17.4 per cent of the 23 poorly concealed Redhead nests were destroyed by California Gulls. Again the importance of concealment to nest survival is evident.

The largest number of waterfowl nests (67) was successfully terminated during the two week period from June 10 to June 25, 1950, which was also the period of greatest nest destruction by the gulls (Figure 3). Of the 56 waterfowl nests destroyed by California Gulls,

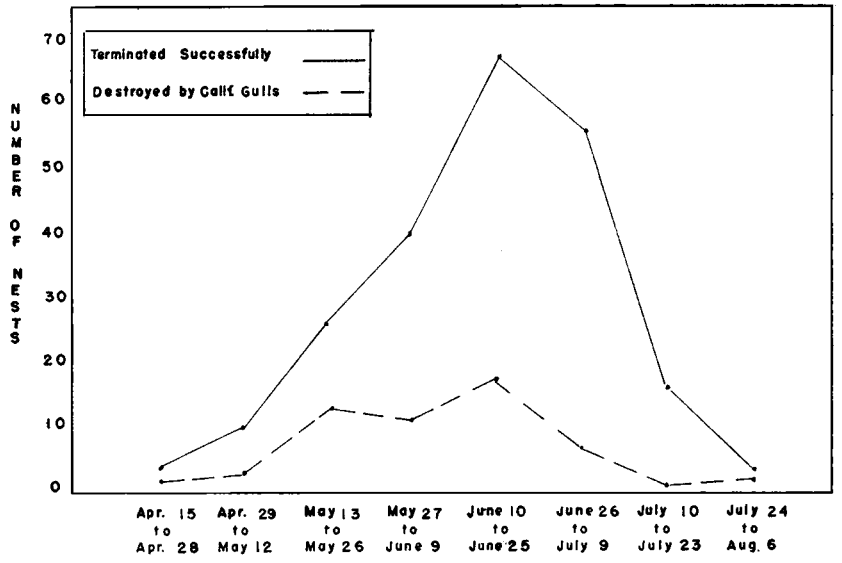

FIGURE 3. California Gull predation on duck nests during eight two-week periods in relation to successfully terminated duck nests, Farmington Bay Bird Refuge and New State Gun Club, Utah, April 15 through August 5, 1950.

82.1 per cent were lost by June 25, and the remaining 17.9 per cent were pilfered after that date. The greater gull predation occurred before June 25 because: (1) waterfowl nesting reached its peak before this date, and (2) the majority of the juvenile California Gulls were still dependent on their parents for food during this period.

California Gulls were observed nearby at the time of location or revisit to 124 nests out of 317 studied. Of these 124 nests 12.9 per cent were destroyed by gulls. In the remaining 193 nest histories no gulls were observed nearby at the time of location or revisit to the nest, yet 20.7 per cent of these latter nests were destroyed by gulls. Thus, it was concluded that the observer was of little or no aid to the California Gull in locating the waterfowl nest.

Canada Goose.—None of the goose eggs was destroyed by California Gulls, but it is known that the California Gull can peck open the eggs and will destroy a Canada Goose nest if given the opportunity. While the goose incubates the eggs, the gander keeps constant guard, and the nest is completely covered whenever the pair leaves.

Cinnamon Teal.—In all study zones 17.4 per cent of the eggs were destroyed by California Gulls, 7.6 per cent were destroyed by other means (skunk, flooding, and unknown), and 62.8 per cent hatched successfully.

Of 67 nests under good concealment only 7.5 per cent were destroyed by California Gulls, whereas, 26.7 per cent out of 45 nests under fair concealment were lost to gulls. Only 5 nests were poorly concealed, but 40 per cent of these were destroyed by gulls.

Common Mallard.—In all three study zones, 21.4 per cent of the eggs were lost to California Gulls, 7 per cent to flooding and skunk predation, and 54 per cent successfully hatched.

Of the 34 Mallard nests under good concealment only 5.9 per cent were destroyed by California Gulls, but 25 per cent of the nests under fair concealment were lost to this predator. The 10 poorly concealed nests suffered the most, with 60 per cent being taken by California Gulls.

Pintail.—In all three study zones the California Gull destroyed 25.6 per cent of the Pintail eggs, 4.7 per cent were taken by skunks, and 60.9 per cent hatched successfully.

Only 7.7 per cent of the nests under good concealment were pilfered by California Gulls, 26.7 per cent of the nests under fair concealment were destroyed by gulls, and 46.2 per cent of the poorly concealed nests were lost to this predator.

On May 10, a Pintail nest was located on gull nesting island number 12. This was the only waterfowl nest observed on the 28 islands in the Refuge, and the nest was completely surrounded by nesting California Gulls. Only one egg was taken by gulls and the remaining six hatched successfully.

Gadwall.—In Zone One, 26.7 per cent of the Gadwall eggs were taken by California Gulls, 57.2 per cent were destroyed by gulls in Zone Two, and no eggs were taken by gulls in Zone Three. In all three zones 18.6 per cent of the eggs were destroyed by gulls, 9.7 per cent were deserted, infertile, or contained dead embryos, and 71.7 per cent hatched successfully.

None of the 13 nests under good concealment was disturbed by gulls, 16.7 per cent of the 12 nests under fair concealment were pilfered by gulls, and 60 per cent of the poorly concealed nests were destroyed by California Gulls.

Shoveller.—In Zone One, 16 per cent of the Shoveller eggs were destroyed by California Gulls, none was lost in Zone Two, and only 6.1 per cent were taken in Zone Three. In all three zones 13.1 per cent of the eggs were taken by gulls, 12 per cent were infertile or contained dead embryos, and 74.9 per cent hatched successfully.

None of the 5 nests under good concealment was disturbed by gulls, 11.1 per cent of the 9 nests under fair concealment were destroyed by gulls, and 33.1 per cent of the 3 nests under poor concealment were pilfered by the California Gull.

Redhead.—In Zone One, 11.8 per cent of the Redhead eggs were destroyed by California Gulls, none was lost to gulls in Zone Two, and 15.9 per cent were destroyed by gulls in Zone Three. In all three zones 11.8 per cent of the eggs were taken by gulls, 12.8 per cent were infertile or contained dead embryos, and 75.4 per cent hatched successfully.

Nests under good and fair concealment were not disturbed by gulls, but 28.6 per cent of the poorly concealed nests were destroyed by California Gulls.

American Coot.—In Zone One, 22.9 per cent of the Coot eggs were destroyed by California Gulls. No Coot nests were studied in Zone Two, and none of the nests studied in Zone Three suffered from gull predation. In the two zones studied, 18.1 per cent of the eggs were destroyed by gulls, 6.8 per cent were infertile or contained dead embryos, and 75.1 per cent successfully hatched.

The 23 Coot nests in Zone One were located in the immediate vicinity of gull nesting islands 12, 13, 14, and 15 and were exceedingly vulnerable to California Gull attack. Hundreds of gulls flew continuously over the nests at all hours of the day. In this zone, 95.7 per cent of the nests were poorly concealed and 4.3 per cent were under fair concealment.

The survival of 69.7 per cent of the Coot eggs in Zone One, with the nests so open to attack by gulls, may be partially explained by: incubation's being shared by both parents (Jones, 1940), and the Coot's being very pugnacious and fighting tenaciously when aroused.

Dummy Duck Nests in Relation to Gull Predation.—To study further the relationship of waterfowl nest concealment to predation, 60 dummy duck nests were made. These dummy nests were constructed to resemble the natural waterfowl nest as closely as possible. In order to determine the range of the predator, 20 dummy nests were placed in each of the three study zones (Table 3). Five nests were constructed with good, 5 with fair and 10 with poor nest concealment in each of the three zones.

TABLE 3

PREDATORS TRAPPED ON DUMMY DUCK NESTS IN RELATION TO NEST CONCEALMENT AT FARMINGTON BAY BIRD REFUGE AND THE NEW STATE GUN CLUB, UTAH, JUNE 3 TO AUGUST 3, 1950

Degree of nest concealment	*Zone*	*Number of dummy nests*	*Number and kind of eggs used*		*Duck Down (nests)*		*Trapping success*			
			Species	*Number*	*Amount*	*Number*	*Predators Species Caught*	*Number*	*Other Species Caught*	*Number*
Good	1	5	Cinnamon Teal	17	Abundant	1	None		None	
			Redhead	8	Fair	2				
			Gadwall	4	Little	2				
Fair	1	5	Cinnamon Teal	11	Abundant	1	California Gull	1	None	
			Redhead	21	Fair	3	Long-tailed Weasel	1		
					Little	1				
Poor	1	10	Cinnamon Teal	43	Abundant	1	California Gull	9	None	
			Redhead	32	Fair	5				
			Gadwall	9	Little	4				
Good	2	5	Cinnamon Teal	5	Abundant	0	California Gull	2	None	
			Redhead	12	Fair	2				
			Gadwall	5	Little	3				
			Mallard	3						
Fair	2	5	Cinnamon Teal	14	Abundant	0	None		Muskrat	1
			Redhead	15	Fair	3				
			Shoveller	10	Little	2				
Poor	2	10	Cinnamon Teal	56	Abundant	5	California Gull	9	None	
			Redhead	22	Fair	4				
			Canada Goose	5	Little	1				
Good	3	5	Redhead	9	Abundant	2	None		None	
			Mallard	8	Fair	2				
			Pintail	4	Little	1				
Fair	3	5	Redhead	19	Abundant	3	California Gull	1	Gadwall	1
			Mallard	11	Fair	1			Yellow-headed-Blackbird	1
					Little	1				
Poor	3	10	Cinnamon Teal	43	Abundant	5	California Gull	6	None	
			Redhead	11	Fair	3				
			Gadwall	25	Little	2	Striped Skunk	1		

Four or five number one steel traps were set in a ring around the nest site. The traps were fastened down and the man-made duck nest placed in the center. The jaws of the traps were covered with vegetation, and shoots from different hard-stemmed forbs placed between the traps. The eggs used in the dummy nests were obtained from deserted waterfowl nests, flooded nests, nests containing infertile eggs or dead embryos, and eggs from partially destroyed nests.

Nests of poor concealment were checked daily while those in good and fair concealment were checked every four or five days.

The California Gull was the only avian predator caught pilfering eggs from the dummy duck nests. Mammals caught included one striped skunk (*Mephitis mephitis*), one long-tailed weasel (*Mustela longicauda*), and one muskrat (*Ondatra zibethica*). The weasel is believed to have been caught accidentally when it was looking for the female duck rather than the eggs.

The importance of the concealment factor in survival of the waterfowl nest was again noted in the dummy nest experiment.

California Gulls were caught at 46.7 per cent of the dummy nests, and only 3.3 per cent yielded mammalian predators. Of the 28 California Gulls caught, 37.5 per cent were caught in Zone One, 39.3 per cent in Zone Two, and 25 per cent in Zone Three. At the 30 nests in poor concealment 24 gulls were caught, at the 15 nests in fair concealment 2 gulls were caught, and at the 15 nests in good concealment 2 gulls were caught.

GULL PREDATION ON WATERFOWL BROODS

The methods used to detect predation on ducklings were, weekly waterfowl brood counts to determine the rate of decrease in brood size from one week of age until the young were three-quarters grown and continuous observations on California Gull activities noting all instances of gull predation of young waterfowl.

The waterfowl broods were classified according to their age in weeks up to five weeks of age. Age classifications over five weeks were listed as one-half grown and three-quarters grown. According to my observations, when the young waterfowl had reached three-quarters of their growth they were generally considered safe from gull predation.

No actual instances of gull predation on the Canada Goose young were noted on the study area. A constant brood average of the goslings would indicate that the effect of gull predation on this species was quite negligible (Table 4).

In April 1947, Nelson (1947) observed three California Gulls make

an attack on a newly hatched brood of goslings at the Ogden Bay Bird Refuge, Utah.

A similar instance was noted in April 1948 on the Bear River Migratory Bird Refuge by Smith and Jensen (Flyway Biologists at Bear River Migratory Bird Refuge). A California Gull made an attack on four goslings less than one week old. The gull succeeded in picking up one of the goslings several times, but would drop it back in the water when observers threw clods of mud at the gull to drive it away. In both the above instances the parents were in attendance, but failed to protect the young from the attacking gulls.

Duck species showed a definite decrease in average brood size on the study area. The per cent of decrease on the average duck brood by the time the young were three-quarters grown was: Cinnamon Teal 42.2 per cent, Mallard 34.3 per cent, Pintail 23.3 per cent, Shoveller 42.5 per cent, Redhead 41.4 per cent, and Gadwall 23.5 per cent. The total decrease on the average brood size of all waterfowl species studied was 40 per cent (Table 4). I cannot definitely say just what part of this decrease in average waterfowl brood size may be attributed to gull predation but some loss was observed.

Two instances of California Gulls seizing and killing young ducks were observed during the study. A single week-old young of a female Pintail, apparently her last, was taken by two gulls. A Redhead about 10 days old in a brood of seven was taken by a California Gull.

Apparently only a small percentage of California Gulls acquire the habit of taking young waterfowl.

FOOD HABITS OF THE CALIFORNIA GULL IN RELATION TO PREDATION ON WATERFOWL

The California Gull is a greedy bird and a scavenger, as well as omnivorous in its food habits. If an over-abundance of food is located, the gull will gorge itself until it has difficulty in taking to the air.

Ninety California Gulls were collected—thirty gulls from each study zone. Gravel appeared in 86.7 per cent of the 90 stomachs examined; 77.8 per cent of the stomachs contained material which was considered to be accidentally picked up with other food and was termed debris. The debris included vegetative parts of plants, twine, glass, hair, cinders, and paper.

Insects were found in 35.6 per cent of the stomachs and were readily identified as belonging to the following families: *Cicadidae, Pentatomidae, Notonectidae, Locustidae, Muscidae* (*Calliphoridae*), *Stratio-*

TABLE 4

WATERFOWL BROOD DATA AT FARMINGTON BAY BIRD REFUGE AND NEW STATE GUN CLUB, UTAH, APRIL 25 TO AUGUST 22, 1950

	Age classes													
	1 Week		*2 Weeks*		*3 Weeks*		*4 Weeks*		*5 Weeks*		*½ grown*		*¾ grown*	
Species	*Number of broods*	*Average number per brood*	*Number of broods*	*Average number per brood*	*Number of broods*	*Average number per brood*	*Number of broods*	*Average number per brood*	*Number of broods*	*Average number per brood*	*Number of broods*	*Average number per brood*	*Number of broods*	*Average number per brood*
Canada Goose	14	4.9	15	4.9	20	4.7	17	4.5	23	4.6	23	4.5	19	4.5
Cinnamon Teal	36	8.3	9	7.9	5	6.6	11	5.0	15	7.5	6	5.5	20	4.8
Mallard	14	7.0	1	7.0	1	5.0	3	5.7	2	7.0	10	5.1	24	4.6
Pintail	6	6.0	1	5.0	1	6.0	1	9.0	2	5.5	7	4.7	7	4.6
Gadwall	5	9.8	4	7.0	0	0.0	1	6.0	1	9.0	1	7.0	4	7.5
Shoveller	3	8.7	2	7.5	2	7.0	1	6.0	2	4.5	3	3.3	4	5.0
Redhead	35	9.1	14	7.3	7	6.9	5	5.5	1	6.0	5	5.5	7	5.3
Unidentified species	3	9.3	7	8.3	4	5.8	5	7.0	0	0.0	1	7.0	0	0.0
Total	116	8.0	53	6.8	40	5.6	44	5.2	46	5.8	56	4.8	85	4.8

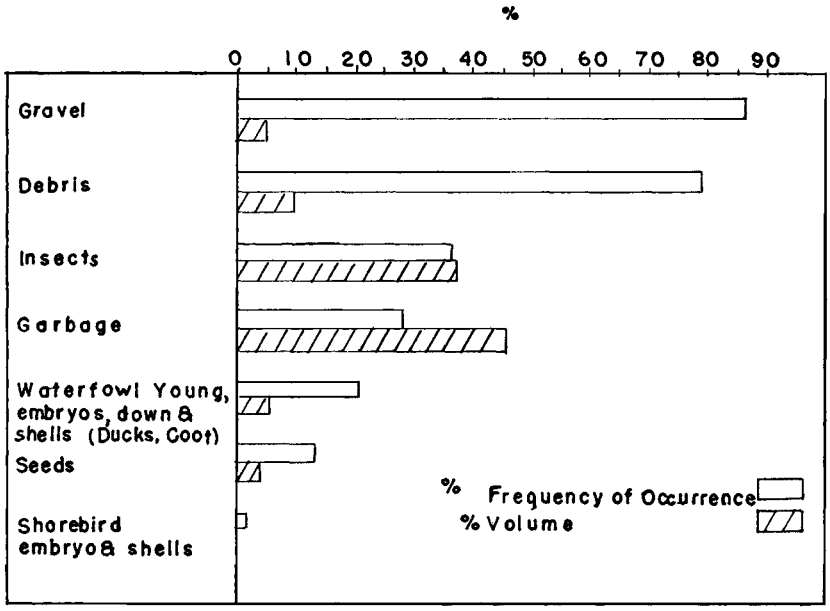

FIGURE 4. Stomach analysis on ninety California Gulls taken from Farmington Bay Bird Refuge and the New State Gun Club, Utah, June 2 to July 14, 1950.

myidae, Carabidae, Dytiscidae, Curculionidae, Tenebrionidae, and *Aeschnidae.*

Garbage was found in 27.8 per cent of the gull stomachs, and included mainly meat (pork and beef), with some bread, salmon, cheese, pork skin, and bone. This would indicate frequent visits to picnic grounds, school yards, camp grounds, and meat packing plants.

Seeds of muskmelon, watermelon, smartweed, cherry, pigweed, and wheat and rye were found in 12.2 per cent of the stomachs examined.

The stomach of one gull contained a Long-billed Curlew (*Numenius americanus*) embryo and egg shells. A young Avocet (*Recurvirostra americana*) about seven days old was taken from another stomach.

The stomachs from 18 of the 90 California Gulls contained waterfowl or parts of waterfowl; one stomach contained a young Coot and egg shells; seven contained wild duck egg shells; five contained wild duck down; one contained four Pintail embryos and egg shells; four contained wild duck egg shells and down. (Figure 4.)

In Zone One, the 30 stomachs were collected from June 23 through July 6, and 23.3 per cent of these stomachs contained waterfowl young, egg shells, and down. In Zone Two, only 6.7 per cent of the stomachs

collected July 12 through 14, when duck nesting was nearly complete, contained wild duck egg shells. In Zone Three, 30 per cent of the stomachs collected June 2 through 9 contained waterfowl embryos, down, and egg shells. The waterfowl nesting on the study area was at its peak during this period.

During the months of May and June, gulls were noted hunting the marsh area for young birds and eggs. These gulls would fly low, six to eight feet above the ground, over the marsh area, always on the alert for a young bird or a clutch of eggs. On several occasions California Gulls were observed killing and eating young blackbirds and shorebirds.

The California Gulls also feed on Utah's cherry crop, Cottam (1935) and Greenhalgh (1952).

Knowlton (1941) states that: "The California Gull undoubtedly is the most appreciated and least molested bird occurring in Utah." This may well be the case, but few people realize that this bird of prey may be eating injurious insects one minute and young ducks or pheasants the next. The California Gull population on Utah's man-made marshes has increased to such an extent that they have become a serious threat to waterfowl production. A rational control program is recommended for the Farmington Bay Bird Refuge and surrounding waterfowl breeding areas that support increasing numbers of California Gulls.

SUMMARY

The adult breeding population of California Gulls increased on the Farmington Bay Bird Refuge and the New State Gun Club, Utah, from about 4,000 to 10,800 during the period 1942–1950. Twenty-eight small islands in the Farmington Bay Bird Refuge were utilized almost entirely by the California Gulls for nesting purposes and little used by other birds.

18.3 per cent of the 2,997 waterfowl eggs in 317 nests were destroyed by California Gulls.

The Pintail had 25.6 per cent of its eggs destroyed, and 57.2 per cent of the Gadwall eggs were destroyed in one of the study zones.

Of the 139 nests under good concealment, only 5.8 per cent were destroyed by California Gulls, 21.8 per cent of the 101 nests under fair concealment and 33.8 per cent of the 77 poorly concealed nests were destroyed by the gull.

To further determine the importance of duck nest concealment, 60 dummy duck nests were constructed. California Gulls were

caught most readily on nests with poor and fair concealment; nests with good concealment were least molested.

It was known that California Gulls preyed on young waterfowl, but the amount of this destruction could not be determined. A forty per cent decrease on the average duck brood was noted by the time the young were three-quarters grown.

The stomachs from 18 of 90 California Gulls contained young waterfowl, embryos, down, and egg shells.

The greatest predation by California Gulls on waterfowl young and eggs occurred from about June 1 to June 25, 1950. At the peak of the waterfowl nesting season (about June 18), it is believed that California Gulls were responsible for destruction of about 30 per cent of the waterfowl eggs and young produced on the study area. By July 14, predation by California Gulls on waterfowl eggs and young was negligible.

A rational control program is recommended for the Farmington Bay Bird Refuge and surrounding waterfowl breeding areas that support increasing numbers of California Gulls.

LITERATURE CITED

COTTAM, C. 1935. Unusual food habits of the California Gull. Condor, **37**: 170–171.

GREENHALGH, C. M. 1952. Food habits of the California Gull in Utah. Condor, **54**: 302–308.

JONES, J. C. 1940. Food habits of the American Coot with notes on distribution. U. S. Department of the Interior, Wildl. Res. Bull. 2: 2.

KNOWLTON, G. F. 1941. California Gull and insect control in Utah. Journ. Econ. Ent., **34**: 584–585.

NELSON, M. 1945. Farmington Bay Waterfowl Project provides convenient duck hunting. Utah Fish and Game Bull., **2** (8): 1–5.

NELSON, N. F. 1947. Nesting Study. Utah Federal Aid Project 29-R-1. Quarterly Progress Report. July, unpublished.

NELSON, N. F. 1948. Nesting Study. Utah Federal Aid Project 29-R-2. Quarterly Progress Report. July, unpublished.

NELSON, N. F. 1949. State of Utah Flyway Report. Pacific Waterfowl Flyway Report. No. 7, August.

NELSON, N. F. 1950. State of Utah Flyway Report. Pacific Waterfowl Flyway Report. No. 11, August.

NELSON, N. F. 1951. State of Utah Flyway Report. Pacific Waterfowl Flyway Report. No. 16, August.

NELSON, N. F. 1952. State of Utah Flyway Report. Pacific Waterfowl Flyway Report. No. 20, August.

SUGDEN, J. W. 1947. Exotic eggs in nests of California Gulls. Condor, **49**: 93–96.

TWOMEY, A. C. 1948. California Gulls and exotic eggs. Condor, **50**: 97–100.

WILLIAMS, C. S., and W. H. MARSHALL. 1938. Duck nesting studies, Bear River Migratory Bird Refuge, Utah, 1937. Journ. Wildl. Mgt., **2**: 43.

WINGFIELD, B. H. 1951. A waterfowl productivity study in relation to plant cover types on a typical western marsh. Utah State Agricultural College. Unpublished Master of Science thesis.

WUNDER, J. 1949. The pressure of California Gull predation on waterfowl production on Utah marshes. Utah Coop. Wildlife Res. Unit Quarterly, April, May, and June, 34–36.

Utah Cooperative Wildlife Research Unit, Utah State Agricultural College, Logan, Utah, February 10, 1955.