

## HUMAN DISTURBANCE IN WESTERN GULL *LARUS OCCIDENTALIS LIVENS* COLONIES AND POSSIBLE AMPLIFICATION BY INTRASPECIFIC PREDATION

JUDITH LATTA HAND

*Biology Department, University of California, Los Angeles, California 90024, USA*

### ABSTRACT

*Indirect evidence is presented that human disturbances are having a profound effect on reproductive efforts of *Larus occidentalis livens* at several colonies in the Gulf of California. Breeding adults that lose their eggs or chicks apparently practise conspecific predation whether or not humans are present, thus increasing effects of human intrusions. These combined effects could lead to a severe decline in numbers or even pose a threat to the survival of this endemic population, if human disturbance is widespread. Attempts to assess breeding success throughout the Gulf seem warranted and, if necessary, some action to regulate human contact may be essential.*

### INTRODUCTION

The subspecies of yellow-footed western gull *Larus occidentalis livens* nesting in the Gulf of California, is endemic to that area; this endemism is perhaps more significant in the light of recent findings that its true affinities may lie with *L. dominicanus* (of the southern hemisphere) rather than *L. occidentalis* (reviewed by Hand, 1979). In view of recent developments in the Gulf of California (Anderson *et al.*, 1976; Anderson & Keith, 1980), the conservation of this unique gene pool is an issue of immediate concern.

### OBSERVATIONS

Between 1974 and 1978 I visited colonies of *L. o. livens* and gathered information on numbers of nests, eggs, and chicks present in sections of each colony studied. The data suggest that human activities in the area visited are having profound effects on gull reproduction.

Observations were disturbing in several respects. First, numbers of chicks counted during late visits in 1974 (on 15 and 17 June) were surprisingly few, given the colony sizes. 118 nests and 14 half-grown chicks were found at the south of the island Angel de la Guarda and 116 nests and 4 half-grown chicks at Isla Mejia (0.12 and 0.03 chicks/nest respectively). It is unlikely that other chicks had fledged and left the colonies. Counts of adults indicated that most pairs were still present and they frequently showed evidence of territoriality. Also, data collected in 1976, a year in which the colony visited was probably undisturbed (see below), indicate that the peak of laying in this area is probably mid-April. Pacific subspecies of *L. occidentalis* have mean incubation periods of 26 to 28 days (Schreiber, 1970; Coulter, 1973) and the estimated time to fledging is about 7 weeks depending on how fledging is defined. Using these figures to estimate time from end of laying to fledging and my 1976 observations to estimate peak of laying, the peak of hatching in Baja, at the earliest, could be around 10 May. Most young would begin to fly at approximately 21 June and would be ready to fledge by about 28 June. Thus, at the time of my 1974 visit in mid-June there probably should have been numerous large chicks still present.

A second disturbing observation (made from a hide) was that several chicks at South Angel de la Guarda were viciously attacked by adults which had neither eggs nor chicks, and the parents, being overwhelmed by the 'chickless' adults, were unable to defend their young effectively. Fights between adults were observed, but while the presumed parent fought one bird, others were seen pecking the chicks. Chicks had a battered appearance around the head and neck and it is doubtful whether they would have survived to fledging. Somewhat similar conditions were evident in 1978 on Isla Cardinosa, an island just south of Angel de la Guarda, and I saw (from a hide) a 4-6 day old chick killed by adults who also appeared to have lost their own eggs or chicks. Similar behaviour has been reported for *L. fuscus* (Davis & Dunn, 1976) with a reported chick mortality of more than 50%.

Isla Cardinosa was also visited in 1976. In that year patrolling of the Gulf of California by the Mexican Navy was stringent and adequate protection of nesting birds was at least partially afforded. Data collected on 14 April 1976 were of the kind expected very near the peak of egg laying (Table 1). In contrast, similar data collected one-half to one week later in 1975 at two other colonies indicated much higher rates of empty nests (Table 1). This suggests that unlike most larids (Coulter, 1973) the peak of laying can vary tremendously in this species from year to year or from island to island, or that there had probably been a major disturbance in the colonies visited in 1975 (Table 1).

I visited Isla Cardinosa again in May 1978, during a period expected to be near or just after peak of hatching. Again, there was evidence of disturbance and associated poor productivity as in previous years except 1976 (Table 1). For example, only one of 34 nests examined had a clutch of 3 (e.g. 2 chicks and 1 egg, or the usual 3 eggs or 3 chicks). Many had combinations of two items (41.2%), and a surprisingly large percent (26.5%) relative to most other larids had only one.

TABLE 1  
CENSUSES OF YELLOW-FOOTED WESTERN GULL NESTS IN THE GULF OF CALIFORNIA FROM 1975 TO 1978

Eggs/chicks	Area and date of census							
	1975 19 April Isla Mejia (n = 88) <sup>a</sup>		1975 23 April SEAG <sup>b</sup> (n = 42)		1976 14 April Isla Cardinosa (n = 95) <sup>c</sup>		1978 15 May Isla Cardinosa (n = 34)	
	No.	%	No.	%	No.	%	No.	%
3 eggs	4	(4.5%)	7	(16.7%)	52	(54.7%)		
2 eggs	21	(23.9%)	3	(7.1%)	24	(25.3%)	6	(17.7%)
1 egg	21	(23.9%)	3	(7.1%)	11	(11.6%)	6	(17.7%)
empty	42	(47.7%)	29	(69.1%)	8	(8.4%)	10	(29.4%)
1 chick							3	(8.8%)
1 egg, 1 chick							2	(5.9%)
2 eggs (1 or both pipped)							3	(8.8%)
2 chicks							3	(8.8%)
2 chicks, 1 egg							1	(2.9%)

<sup>a</sup> n = numbers of nests checked

<sup>b</sup> SEAG = south end of Angel de la Guarda

<sup>c</sup> 3 additional nests, not included in this total, contained more than 3 eggs: 1 had 8 eggs and 2 had 4 eggs each.

On one occasion two men came ashore with a box to collect eggs, a common practice in the area. The sections I censused were strips of beaches holding many nests. Such areas would be the likely targets of egg-harvesters since the greatest numbers of nests could be visited with the least effort. Eggs or chicks in nests along these strips are also subject to malicious or inadvertent destruction by any parties that camp on or occupy beaches. Our own activities probably led to failure of the nests nearest our campsites. Adults (at one or two territories) were unwilling to sit on nests whenever we were active, and might be off for an hour or more. This undoubtedly interfered fatally with their ability to regulate egg temperatures, especially when the interference occurred at midday. A natural history tour group of some 75 persons spent roughly 3 hours during mid-afternoon on one beach. When individuals walked along the beach little harm seemed to occur provided they soon moved away, allowing the gulls to return to their nests. However, when the first person was followed by others at irregular intervals—the usual practice—gulls were kept off nests sometimes for long periods. Also, two people, apparently quite unaware of its presence, chose to rest some 7 m from one nest, keeping the gulls off the nest for at least 20 minutes.

#### DISCUSSION

Shaded air temperatures during breeding in this region regularly reach 24–25 °C and may remain in the low 30s for several hours on hot days. Displacements would

probably be lethal if they occur during hot midday hours and involve eggs or chicks at stages particularly susceptible to heat stress (e.g. recently hatched chicks, Howell *et al.*, 1974) or egg exposure to full sun for moderate periods of time (in excess of perhaps 20 minutes, Bakken *et al.*, 1978).

Since some *L. o. livens* pairs nest solitarily in small coves, one could reason that although human disturbance would certainly lead to some decline in population it might not necessarily pose a serious threat to the species since solitary pairs at less accessible parts of the islands might be unaffected. However, D. W. Anderson (pers. comm.) reports that many tourists frequently visit smaller coves as well.

Observation of attack and killing of chicks by adults that appear to have lost their own eggs or chicks is also disturbing. Whether pairs somewhat isolated from other gulls would escape this phenomenon is not known. Furthermore, we do not know what percent of the population is represented by 'solitary' breeders. It might be too small to offset major disturbances elsewhere. Combined with chronic destruction or removal of eggs in large sections of the colonies by humans, conspecific predation could seriously accelerate population decline since killing apparently continues long after human intruders have left.

The evidence presented suggests that severe disturbance occurred in 3 of 4 years (1974, 1975, 1978) at three colonies in this region of the Gulf. D. W. Anderson (pers. comm.) reports evidence of disturbance also at other colonies. From the early 1950s through the early 1960s commercial egg-harvesting occurred in colonies of Heermann's gulls *L. heermanni* and elegant terns *Sterna elegans* on Isla Rasa, which lies just south of Cardinosa (Barreto, 1975). Rasa became a National Reserve and Refuge of Migratory Birds in 1964 (Anderson *et al.*, 1976) and although some collecting is occasionally reported, it is probable that people not able to use Rasa systematically have turned to colonies of *L. o. livens* on the surrounding islands. Thus the phenomenon of egg-collecting may be a local one. Whether disturbance to western gulls of the magnitude suggested by my observations occurs elsewhere is not known. The islands can be easily reached by boats and western gull nests, being on the beaches, are particularly vulnerable, whilst the numbers of boats and people in the Gulf is increasing yearly (Anderson & Keith, 1980).

The Mexican government has initiated action to safeguard island wildlife by establishing 47 of the Gulf islands as refuges (President Lopez Portillo, Diario Oficial, 2 August 1978:7-8). Legal protection has therefore been extended to this endemic and biologically unique population. Recommendations for managing and maintaining colonial bird populations, including the key element of enforcement, are discussed by Anderson & Keith (1980). However, unlike many of the other seabirds that nest in concentrated groups (e.g. pelicans *Pelicanus occidentalis*, Heermann's gulls, elegant terns), *L. o. livens* nests are scattered along beaches that may be particularly subject to frequent human contact. Attempts to assess breeding success of *L. o. livens* throughout the Gulf seem warranted and, if necessary, some action to restrict human activities on critical beach areas during the breeding season may be required.

## ACKNOWLEDGEMENTS

I would like to thank the Frank M. Chapman Fund of the American Museum of Natural History and my husband, Harold M. Hand, for their shared financial support of this project. I am also grateful to Daniel Anderson, Antero Diaz, Albert Fulton, Thomas Howell, George Hunt, Bernard Keach, James Miller and Jerome White, and especially to my field companions, Harold Hand and Liga Auzins..

## REFERENCES

- ANDERSON, D. W., MENDOZA, J. E. & KEITH, J. O. (1976). Seabirds in the Gulf of California: A vulnerable, international resource. *Natur. Resour. J.*, **16**, 483-505.
- ANDERSON, D. W. & KEITH, J. O. (1980). The human influence on seabird nesting success: Conservation implications. *Biol. Conserv.*, **18**, 1, 65-81.
- BAKKEN, G. S., VANDERBILT, B. C., BUTTEMER, W. A. & DAWSON, W. R. (1978). Avian eggs: thermoregulatory value of very high near-infrared reflectance. *Science, N. Y.*, **200**, 321-3.
- BARRETO, R. (1975). Isla Rasa, B. C., Refugio de Gaviotas y Gallitos del Mar, *Bosques y Fauna*, **10**, 3-8.
- COULTER, M. C. (1973). *Breeding biology of the western gull*, *Larus occidentalis*. M.Sc. thesis, University of Oxford.
- DAVIS, J. W. F. & DUNN, E. K. (1976). Intraspecific predation and colonial breeding in lesser black-backed gulls. *Ibis*, **118**, 65-77.
- HAND, J. L. (1979). *Vocal repertoire of the western gull*, *Larus occidentalis*. Ph.D. dissertation, University of California, Los Angeles, California.
- HOWELL, T. R., ARAYA, B. & MILLIE, W. R. (1974). Breeding biology of the gray gull, *Larus modestus*. *Univ. Calif. Pubs Zool.*, **104**.
- SCHREIBER, R. W. (1970). Breeding biology of western gulls (*Larus occidentalis*) on San Nicolas Island, California, 1968. *Condor*, **72**, 133-40.