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PEOPLE AND "PAN-HANDLING" PELICANS

JEFFREY L. LINCER, DANIEL KRIVIT
AND
JON E. SHAW

As the populations of humans and certain wildlife increase and decrease, respectively, one can not help but wonder about relationships between the two groups. Literature on the effects of human behavior on the behavior of the Brown Pelican (*Pelecanus occidentalis*) is limited. Besides the work done on organochlorines and eggshell-thinning in this endangered species (Gress 1971, Anderson and Hickey 1972, Anderson et al. 1975, Blus et al. 1974, 1975, Schreiber and Risebrough 1972), little research has dealt with direct human/pelican interrelationships. Rapid urbanization and other changes in landuse have increased the contact between Man and pelican, yet only casual mention has been made of the potential impact of these interactions. Some of the resulting perturbations include entanglement of pelicans in monofilament fishing lines, disturbance at the rookery and other habitats and pollution effects on the pelican's food chain (Williams and Martin 1970, Mote Marine Laboratory 1976).

Herbert and Schreiber (1975) characterized the diurnal changes in the Brown Pelican population at one marina on Boca Ciega Bay (Pinellas Co., Florida). Their data indicated a mid-day increase in the number of pelicans. One obvious human activity that may affect pelican behavior is the common practice of fishermen feeding scraps of game fish to the pelicans while cleaning their catch. We studied the Brown Pelican's diurnal pattern near Sarasota in an effort to compare it with that described by Herbert and Schreiber (1975) and to characterize the relationship between fishermen and pelican behavior.

METHODS

A total of 880 counts were made, approximately twice daily, 5 days a week for a period of 18 months (February 1975 to July 1976), at a quarter mile long, 60-90 m wide dock/marina located on a dead-end lagoon called "Blind Pass" (south end of Siesta Key, Sarasota, Florida; NOAA chart #11425, formerly 857-SC). The surroundings include a public beach and boat ramp, with docks and pilings lining both sides of the waterway for motel/apartment access. Three age groups of pelicans were distinguished: adults, sub-adults/immatures and hatching year birds

(Schreiber, pers. comm.). Weather conditions and any observed feeding by fishermen were also recorded. An observed "feeding" was defined as fishermen cleaning or about to clean their catch at any of the three fish cleaning tables along Blind Pass.

In tabulating the population data by hour, observations for all months were combined to determine the mean number of pelicans (Fig. 1). That is, mean number of pelicans (for any hour) = total number of pelicans (for that hour) ÷ total number of observations (for that hour over the course of the study). Each hour represents all observations within a 60-minute time period on a 24-hour clock (example: 0900 = 0831 through 0930). To determine frequency or the "percent occurrence of feeding by fishermen," the total number of feedings during each hour period was divided by the total number of observations for the same hour × 100 (Fig. 2). To characterize the correlation between mean number of pelicans and percent occurrence of feeding by fishermen within the same hour, correlation coefficients were calculated for nine meaningful intervals (Table 1). Monthly pelican popnlation and fishermen feeding data were calculated by combining all hours within each month (Fig. 3).

Results and Discussion

The total number of pelicans observed at the marina complex peaks in the early afternoon (1300 - 1500 hours; see Fig. 1). However, this peak is not significantly different ($p > 05$) from adjacent points on the graph (i.e. at 1200, 1400 or 1600 hours). The population then sharply decreases with a slight rise at 1800 hours. This general trend for the total number of pelicans is followed closely by the pattern of adult birds but not by the pattern of the younger birds.

Similar work done approximately 64 km to the north, at another marina (Herbert and Schreiber 1975), shows a comparable diurnal pattern over a six-month period from October 1973 through March 1974. Despite the distance and difference in physical structures (i.e. pelicans utilize large, metal roof structures for resting, as well as waterway pilings), similar results strengthen our ability to characterize what is probably a widespread and distinct diurnal pattern.

"Feeding" was observed on 122 of 880 observations (13.9%). Figure 2 and Table 1 indicate different aspects of the relationship between fishermen feeding the pelicans and the number of pelicans at Blind Pass. The resulting two patterns in Figure 2 are strikingly parallel. The high correlation throughout the day, except for the 1600 to 1900 interval, suggests that the pelicans alter their daily routines in an effort to receive these "handouts" (see Table 1). An analysis of the same two diurnal patterns (i.e. mean number of pelicans and percent occurrence of feeding by fishermen) when compared on a monthly basis does not result in as high a correlation (see Fig. 3). The low correlation for the entire 18-month study period ($r = .25$; $p < 0.3$) suggests that the seasonal pelican population pattern is less affected by fishermen activity than is the daily pattern of pelicans. The exception to the rule is the similarity in the two graph lines for October through March. This is the "tourist season" in Sarasota, when more people are fishing, and a period during which one would expect the influence of humans to be the greatest.

Figure 1. DAILY POPULATION PATTERNS OF PELICANS, BY AGE CLASS, AT BLIND PASS (February, 1975 through July, 1976)

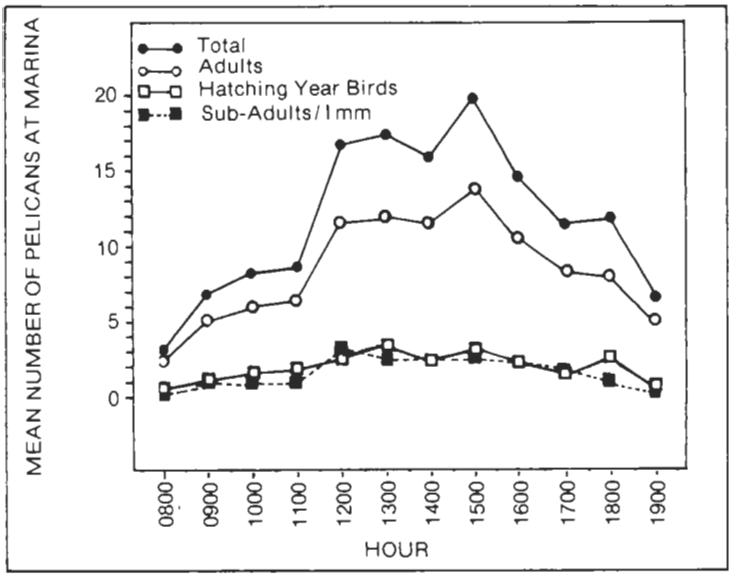


Figure 2. RELATIONSHIP BETWEEN NUMBER OF PELICANS AND INCIDENCE OF "FEEDING", BY HOUR, AT BLIND PASS (February, 1975 through July, 1976).

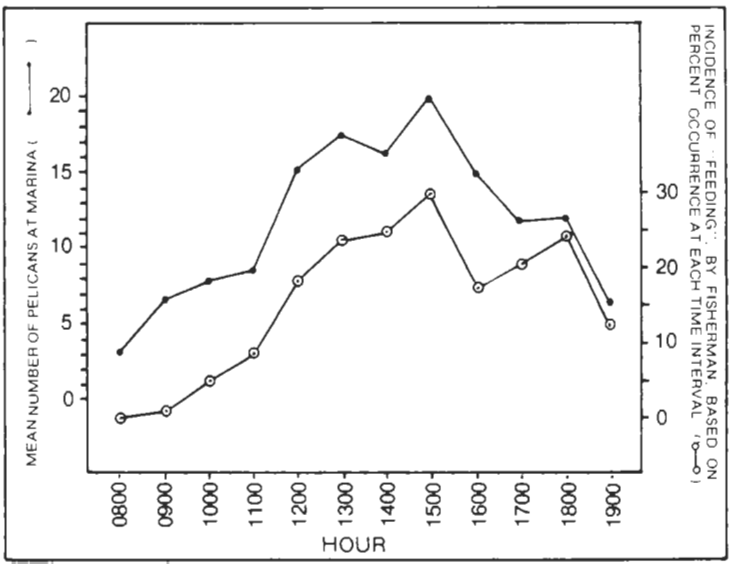
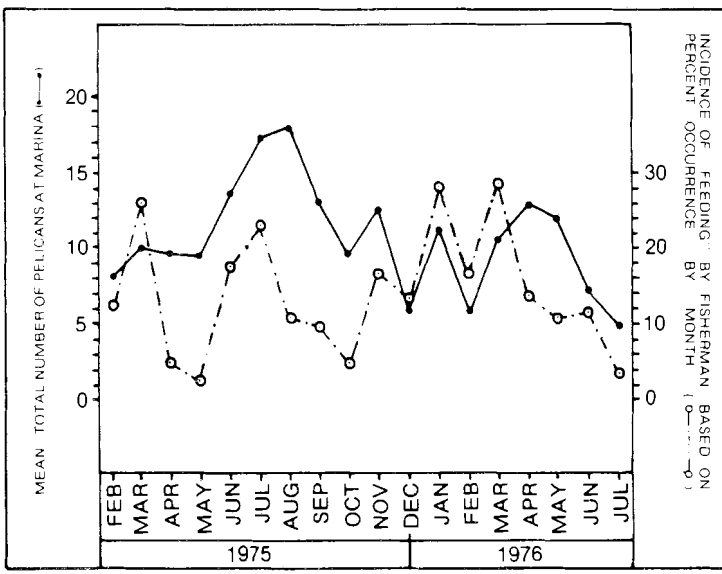


Table 1. CORRELATION BETWEEN MEAN NUMBER OF PELICANS AND INCIDENCE OF "FEEDING", BY FISHERMEN FOR SELECTED TIME INTERVALS (February, 1975 through July, 1976).

CORRELATION COEFFICENT	HOUR 0800 0900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900	HOURS (N)
.9025 (P<0.001)		0800-1900 (12)
.9677 (P<0.001)		0800-1200 (5)
.9810 (P<0.001)		0800-1300 (6)
.9787 (P<0.001)		0800-1400 (7)
.9849 (P<0.001)		0800-1500 (8)
.8531 (P<0.002)		1300-1900 (7)
.8533 (P<0.05)		1400-1900 (6)
.8418 (P<0.05)		1500-1900 (5)
.6072 (P<0.04)		1600-1900 (4)

Figure 3. RELATIONSHIP BETWEEN NUMBER OF PELICANS AND INCIDENCE OF "FEEDING" BY FISHERMEN, BY MONTH, AT BLIND PASS (February, 1975 through July, 1976).



It is also the non-breeding period, when the pelican's attention is not dominated by raising young and other nesting-related activities.

Although the overall diurnal patterns may be similar for each month (Herbert and Schreiber 1975), the mean number of pelicans varies with the month being considered for both studies. It is important to recognize however, that the month-to-month population pattern may also vary considerably when comparing two different years (see February through July for 1975 and 1976, respectively, in Figure 3). This variation is particularly interesting since the number of pelicans at marinas often reflect, very closely, the seasonal trends for the larger local population at least in the Sarasota area (pers. obs., J. Lincer).

These data from Blind Pass indicate that at least a portion of the Sarasota area pelican population responds to fish-cleaning activities at marinas. This is based primarily on the correlative relationship between higher numbers of pelicans being present during those hours of most frequent feeding. The mean number of pelicans (i.e. 17.3 individuals) observed at Blind Pass in July 1975, for instance, represents only approximately 9 percent of the Sarasota area population (i.e. 198 individuals) for that month (unpub. data). However, this is a conservative estimate of percentage, since this feeding area at Blind Pass represents only one of many feeding areas in the Sarasota area. Accordingly, the impact of the pelican-fisherman relationship is likely to be far more widespread.

Several other facets of this relationship are being investigated. For instance, the fish pelicans receive from the fishermen usually represent a higher trophic level than do the fish pelicans usually catch. Initial data indicate that the pesticide levels in this unnatural diet may be an order of magnitude higher than those in the plankton-feeding fishes, which represent the more normal prey species (Lincer and Heyl, in prep.). It would be interesting to investigate the effects of this "unnatural" diet on pelican physiology and behavior. A number of basic questions should also be answered. For instance, what proportion of the population is the "pier bum" contingency? Is energy unnecessarily expended by the pelicans while chasing potential, yet ultimately unproductive, sources of these handouts? Are pelicans kept from learning to feed on their own by the availability of this artificial source? Without detailed studies to provide the above information, it will be impossible to determine whether "pan-handling" by pelicans actually results in a *net* benefit or loss to the population of this species.

Conclusions

It would seem likely that these Brown Pelicans acquire this behavior over time and adjust their daily habits to capitalize on human handouts as a source of food. The diurnal population pattern for pelicans at Blind Pass, Sarasota County, strongly resembles a diurnal pattern at another Florida marina

(Herbert and Schreiber 1975). The daily population pattern at Blind Pass is highly correlated with the frequency of feeding by fishermen but the seasonal patterns for pelicans and fishermen (on a month-to-month basis) do not correspond as well. The monthly variation of the whole population, however, is a very important aspect of the Brown Pelican's biology and this is reflected by the variation observed at the marina.

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County of Sarasota, P.O. Box 8, Sarasota, Florida 33578; 1252 Ingerson Road, St. Paul, Minnesota 55112; SFWMD, 3301 Gun Club Rd., W. Palm Beach, Florida 33402.