

A report on disturbance rates and reactions of feeding piping plovers (*Charadrius melodus*) at Holgate Unit - Edwin B. Forsythe National Wildlife Refuge

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July, 1987

Introduction

It is policy of the US Fish & Wildlife Service, to preserve, restore, and enhance in their natural ecosystems, all species of animals and plants that are endangered or threatened with becoming endangered (2 R.M. 1.4). In working toward this goal, it is further stated that in regards to endangered species, refuges will ensure that conflicts between endangered species and other wildlife management or public-use programs are resolved in favor of endangered species. (2 R.M. 1.4)

On January 10, 1986, the Atlantic coast population of the piping plover was included as threatened on the federal endangered species list.

Piping plovers normally breed at the Holgate Unit of Edwin B. Forsythe NWR, which also receives extensive public-use by; sunbathers, hikers, beachcombers, birdwatchers and fishermen. In keeping with the above stated policy to resolve public-use conflicts in favor of endangered species, several management actions have been instituted to render the above public-uses compatible with the nesting birds. Some of the actions have been; the erection of 2 1/2 miles of fence to protect nesting areas, education and interpretation to the public, increased signing, and active law enforcement. It is felt that these actions adequately protect nesting sites for not only piping plovers but other colonial nesters such as least terns, and black skimmers.

Unlike terns and skimmers, however, which feed out in the bay or ocean and are thus not subjected to human disturbance outside the fenced nesting area, plovers normally feed in the intertidal zone along either the ocean front or bay where they frequently interact with passing humans.

Due to extensive public-use at Holgate during the piping plover breeding season it was felt that continued disturbances may prolong plover feeding periods. Adverse effects of these prolonged feeding periods may result in lower nest success by causing adults to spend greater amounts of time away from duties such as nest attendance or care of very small young.

Thus for the above stated reasons, data was collected during the 1986 nesting season on extent of human disturbance and reactions to these disturbances by piping plovers, at Holgate Unit, Edwin B. Forsythe NWR.

Study Area

For a detailed description of the study area see Laskowski (1987).

Methods

Data for this study were collected between May and September 1986.

Data was collected by observing, with the aid of binoculars or spotting scope, both feeding or incubating piping plovers, from a distance of approximately 200-300 ft. Information gathered were time and type of disturbance, reaction to the disturbance, and location of the plover along Holgate Unit. Various types of disturbances recorded are shown in Table 1.

Table 1. Types of human disturbance to feeding piping plovers at Holgate Unit - 1986.

	<u>Type of Disturbance</u>	<u>Data Code</u>
1)	1-2 pedestrians	01
2)	> 2 pedestrians	02
3)	Jogger	03
4)	Beach buggy	04
5)	Pedestrian/pet	05
6)	Other	06

To maintain consistency in data collection the various reactions of piping plovers to disturbances were assigned to 1 of 10 different categories, Table 2.

Table 2. Reaction of feeding piping plovers to various human disturbances at Holgate - 1986.

Reaction	Data Code
1) No reaction to disturbance	000
2) Pause-stand alert-continue activity	010
3) Run/walk, short distance, continue activity	021
4) Run/walk, discontinue activity for 3 minutes	022
5) Run/walk discontinue activity entirely	023
6) Flush short distance, continue activity	031
7) Flush, discontinue activity for 3 minutes.	032
8) Flush, discontinue activity entirely	033
9) Discontinue activity of its own accord	040
10) Unknown	099

Data analysis was completed by converting total number of disturbances observed during variable length observation periods to a standardized rate of minutes per disturbance. Due to generally small sample sizes, statistical analysis to determine confidence intervals for rate of disturbance was not performed.

Reaction of feeding plovers was analyzed thru the use of a 2x3 chi square contingency table comparing type of disturbance to reaction. Due to small sample sizes within various categories of both disturbances and reactions, several of these had to be lumped together to fulfill the assumption for chi square analysis of having no more than 20% of expected frequencies being less than 5. This rule precluded analysis of disturbances by pets and joggers and essentially left a comparison between pedestrians and vehicles. Reactions of plovers were also lumped into 3 categories grading from little or no reaction to the most severe reaction.

Results

During 490 minutes of observation of piping plovers engaged in incubation, no disturbances were recorded by people engaged in legal activities outside of the fenced nesting areas. This reaffirmed staff feeling that nesting areas were adequately protected and compatible with legal public-uses on the beach.

Although not observed during data collection for this report, several illegal human activities within the fenced area caused severe disturbance to at least 2 incubating plovers and may have led to eventual failure of these nests.

Within the intertidal zone human, disturbance rates to feeding piping plovers were classified into 4 categories; by weekend or weekday and north or south of station 50 + 0 (see figure 1). As was expected the highest rate of disturbance was from pedestrians, on weekends, within the northern 5000 ft. of beach, being 1 disturbance for every 4.15 minutes. (Table 3). This rate was followed again by pedestrian disturbance during weekdays within the same area at a rate of 1 disturbance per 5.43 minutes.

Table 3. Rate of public-use disturbances to feeding piping plovers at Holgate - 1986 breeding season. (Rate = minutes/disturbance)

Type of Disturbance

	<u>2 Pedestrian</u>	<u>2 Pedestrian</u>	<u>Pedestrian</u>	<u>Vehicle</u>	<u>Total</u>
Weekend 50+0	6.00	14.08	4.15	5.86	2.43
Weekend 50+0	19.35	46.15	11.45	10.79	5.69
Weekday 50+0	9.25	43.47	5.43	18.51	4.50
Weekday 50+0	14.28	44.78	9.70	50.00	8.77

The highest rate of vehicle disturbance, 1 per 5.86 minutes was recorded on weekends for that portion of beach north of station 50+0. Data on vehicle disturbance south of station 50+0 was somewhat confounded by a closure of the beach south of station 77+0 to all vehicles between July 16 and August 16. Thus, the weekend disturbance rate in this area of 1 per 10.79 minutes may not be entirely accurate. Personal observation of vehicles operating the beach on weekends show that the vast majority travel the full length of beach to the point, for fishing purposes, with only a few short stopping at lower station numbers. This discrepancy is felt to be an artifact of the beach closure at 77+0 to vehicles and very small sample sizes.

It is noted in Table 3 that pedestrian disturbance remains fairly constant between weekends and weekdays. Reason for this is felt to be a result of most pedestrians being on vacation at Long Beach Island, thus, maintaining a somewhat consistent beach use throughout the week. Vehicle usage of the beach drops off drastically during weekdays and is probably a result of most vehicle operators being southern New Jersey residents not on vacation, thus, limiting their beach activities to weekends only.

Total disturbance rates for all types of disturbances combined, ranged from 1 disturbance per 2.43 minutes on weekends north of 50+0 to 1 disturbance per 8.77 minutes on weekdays south of 50+0.

Reaction of feeding plovers to the various disturbances revealed that pedestrians caused significantly more traumatic reactions than did beach buggies ($p = 0.001$, $x = 16.53$, 2 d.f.) The most common reaction to vehicles was for the bird to either not react at all or to pause and stand alert. Reactions to pedestrians generally resulted in a greater number of birds run/walking or flushing and discontinuing their feeding activity (Table 4). Most disturbances to feeding birds were generally found to occur within approximately 125 ft. of the birds position.

Table 4. Observed and expected values of various reactions of piping plovers to disturbances

at Holgate Unit during feeding bouts.

Reaction

None/Pause	Run/Walk	Flush/Discontinue	Total
<u>000+010</u>	<u>021+022</u>	<u>023+031-3</u>	

Disturbance

Pedestrian obs.	15	42	20	77
exp.	24.79	35.89	16.31	
Vehicle obs.	23	13	5	41
exp.	13.2	19.11	8.69	
Total	38	55	25	118

Data for analysis of reaction to joggers was not sufficient to analyze, however, of 9 observations, 8 resulted in the plover discontinuing its activity for several minutes or flushing and discontinuing feeding activity entirely.

It is thus found that of the various categories of disturbances to feeding piping plovers, pedestrians caused the most frequent and highest degree of direct disturbance. This result is not unexpected, in that numerous researchers, photographers and birdwatchers alike often utilize an automobile as a blind to watch or photograph birds close-up without disturbing them.

Discussion and Management Recommendations

During a portion of the 1986 breeding season and nearly the entire 1987 season, vehicles were eliminated from either a portion or all of Holgate for the purposes of protecting breeding piping plovers. From data presented in this report, it appears that this action may have been directed at the wrong public-use user group if the purpose was to solely reduce direct disturbance to the birds. It has been found that pedestrians result in both more frequent disturbances and more severe reactions by feeding plovers.

This data is in conflict with results presented by Fleming (1984) who found high vehicular activity on beaches significantly reduced the number of young plovers fledged per successful nest. Thus, it appears that vehicles on a beach may cause some indirect effect which results in reduced plover production. Several possible effects are listed as follows:

- 1) A reduction in food resources within the intertidal zone thru compaction by vehicle tires.
- 2) Creation of tire ruts in soft sand which are difficult for young plovers to cross, thus, expending energy reserves at a time when rapid development is essential, especially in the first 10 days of life. (Wilcox, 1959).
- 3) Direct mortality of young from being struck by passing vehicles. It has been noted from personal observation that immature oystercatcher chicks when caught in a vehicles headlights at night, run directly toward the vehicle. If piping plover chicks react in a similar manner, they would be extremely difficult to observe in order to avoid a collision.

- 4) An additive effect to the direct disturbances reported in this paper. Although pedestrians cause a more severe reaction than a vehicle does, it should be noted that most vehicle occupants generally become pedestrian themselves.

It is also found that numerous vehicles become stationary on the beach, often with several vehicles clustered together and their occupants becoming pedestrians. If this were to continually occur within a specific feeding territory of a pair of piping plovers at the feeding period of low tide, then a significant disturbance to that pair of birds would probably result.

It is thus recommended to conduct further research on indirect effects of vehicular usage on a beach, to production of piping plovers. It is also recommended that since piping plovers feed within the intertidal zone, an area which obviously cannot be fenced, and they are frequently disturbed in this area by the general public, then a reduction or elimination of public-use on beaches where piping plovers occur should be instituted during the critical breeding season. This recommendation would be in keeping with Fish & Wildlife Service policy on endangered species management within National Wildlife Refuges.

Literature Cited

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