

Distribution And Dispersal Of Snowy Plovers In Florida During The Breeding And Post-Breeding Period

Final Report to the Edna Baily Sussman Foundation

by

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Introduction

Snowy Plovers (*Charadrius nivosus*) are a small, ground-nesting shorebird found in coastal and inland lake habitats in North and South America (Page et al. 2006). In North America, Snowy Plovers are separated into three distinct populations: Pacific coast, Interior, and Gulf Coast/Caribbean. On the Gulf Coast, nesting occurs discontinuously from Tamaulipas, Mexico to the Southwest coast of Florida, with localized records in the Caribbean (Gorman and Haig 2002, Page et al. 2006). The Gulf Coast population has likely experienced declines since the 1800s due to an increase in development and human use of coastal areas, and is under ongoing consideration for federal endangered species listing. In Florida, where the 225 remaining pairs are listed as state-threatened, Snowy Plovers breed in coastal beach habitats, preferring inter- and foredune areas with sparse to little vegetation (Himes et al. 2006). Approximately 80% of the state's population is in the Panhandle region, from the Alabama state line to Alligator Point, FL. The remaining 20% is clustered in the southwest portion of the state (Himes et al. 2006). There is evidence to suggest that Snowy Plovers were once common in Florida, and have undergone declines and range contraction in the past century (Gorman and Haig 2002, Himes et al. 2006). Though little is known about movement and dispersal, Florida Snowy Plovers appear to be partially migratory. Though some birds stay local throughout the winter, the breeding population has been tallied at 1.5x the wintering population, indicating that birds are moving outside the state (Lamonte et al. 2006).

During the breeding season, which spans from February-August in Florida, Snowy Plovers lay a three-egg clutch in a shallow scrape in the sand. Chicks are precocial, and able to run and feed themselves within 24 hours of hatching. Some female Snowy Plovers exhibit polyandry, and will abandon their mate and brood shortly after hatching to initiate a new nest with a different male. Even if pairs remain together, the long breeding season on the Gulf Coast makes it possible for Snowy Plovers to fledge multiple broods in a season. Snowy Plovers prefer sparsely vegetated interdune areas on mainland beaches, barrier islands, and barrier peninsulas for nesting on the Florida Panhandle. Brood-rearing and foraging occurs on Gulf beach intertidal zones, back beach/bay areas, and near ephemeral pools. Their diet consists primarily of terrestrial and marine invertebrates, captured by foraging in short running bursts or pulling marine worms from intertidal areas (Page et al. 2006). Snowy Plovers' ground nests and free-ranging, precocial chicks, coupled with a low population in Florida, make them particularly vulnerable to threats, particularly those associated with human activity. Habitat loss and degradation due to coastal development, disturbance from human recreation, an increase in human-commensal predators, beach renourishment and habitat

alteration are all threats to the Gulf Coast Snowy Plover population, though data evaluating their impacts is lacking.

While most of the important nesting areas for Snowy Plovers in the central and eastern Panhandle (Eglin AFB east to St. Vincent NWR) have been intensively monitored, productivity for the far Western Panhandle is lacking. The region contains Gulf Islands National Seashore (GUIS), consisting of two large, undeveloped barrier islands thought to hold up to one-fifth of the state's breeding population. Due to its large size (33km for all three units) and lack of banded birds in the area, little is known about nest and chick survival. As a result of the lack of banding effort, the dispersal of juveniles and adults from GUIS after the breeding season is entirely unknown. Additionally, there have been limited band resight surveys in this region, so potential movement of Snowy Plovers banded in other parts of the Panhandle through GUIS is not well documented. Florida Parks Service (FPS) has undertaken a large banding effort in the eastern and central Panhandle, but is unable to devote resources to resighting birds in the western Panhandle. Additionally, accurate productivity and dispersal information for this key subpopulation is necessary in order for wildlife managers, including FPS, to manage Snowy Plovers at the state and regional levels. The objective of my internship with FPS was to collect nest density, reproduction, and movement data in the western Florida Panhandle. This knowledge will aid in the determination of recovery targets and shed light on factors that may be contributing to declines.

Methods

Study Area

Data collection took place on the Perdido Key (PK) and Fort Pickens (FP) Units of Gulf Islands National Seashore in Escambia County, FL. Both units are National Parks that are open to the public, and attract many pedestrians and boaters. Both areas also contain roads driven by park visitors and staff. The Perdido Key study area is seven miles of barrier island, the first two miles of which are bisected East-West by a 25mph road used for parking and boardwalk access. Both gulf and bayside habitat is available throughout the entire site. Snowy Plovers primarily nest behind the primary dune line in interdune pockets, and occasionally in on the Gulf or bayside upper beach. A small number of plovers at Fort Pickens nest in a flat, moderately vegetated area with thick shell substrate at the eastern portion of the site. Snowy Plover foraging at FP and PK occurs on both the Gulf and bayside shorelines, particularly near coves and the peninsula tips. Plovers also forage for insects on the roads at both sites in the early morning and late evening hours. The Fort Pickens site is seven linear miles of barrier peninsula, all of which is bisected by a 35mph road connecting Pensacola Beach to the site of historic Fort Pickens at the tip of the peninsula, a popular tourist attraction. Gulf beach habitat is available the whole length of the peninsula, and bayside habitat on approximately 60%. In areas where Gulf and bayside plover habitat is available, birds nest on both sides of the road, and frequently cross it with young chicks.

Monitoring

To obtain productivity data for Snowy Plovers, we monitored all birds breeding at FP and PK. All breeding pairs within the study area were located, and each site was searched for nests at least once per week. Nest searching occurred on foot, with two observers walking in an S-pattern through plover habitat, looking for tracks or birds exhibiting territorial defense behavior. If a territorial pair or a nest scrape was located, but an active nest was not, the territory was recorded and thoroughly re-checked 2-3 days later. Once nests were identified, they were checked 2-3 times per week, and all activity recorded. If nests were found as an incomplete clutch, hatch date was estimated by counting forward 26 days from the date the third egg was laid. Eggs found as complete clutches were floated in a sealed jar of fresh water. The age of each egg can then be determined by the angle at which the egg comes to rest (Liebezeit et al. 2007). If a nest failed or was depredated, we attempted to determine cause of loss by reading tracks and signs around the nest area. After hatching, broods were monitored until fledging, defined as the period at which a juvenile bird can undertake long distance flights. Last known areas of all broods were checked 2-3x per week, and a complete site search for broods was conducted at least once per week. If chicks could not be observed, parental chick defensive behavior (alarm calls, low circling flights) were noted as an indication that at least one chick remained, and an attempt was made to count chicks on the subsequent visit. Broods were considered lost if both parents were observed without chicks, and did not exhibit chick defense behavior over three subsequent visits. Brood behavior, habitat use, and age were recorded at every observation.

Trapping and Color Banding

To differentiate between individual plovers, adults were captured and banded with a unique color band combination. For adults and large chicks, two unsealed ultraviolet-stable Darvic plastic bands were placed on each upper leg, for a total of four bands. For small chicks, one color band was placed on each upper leg. All chicks in a brood were sometimes marked with the same color combination until they were near fledging, at which time any surviving chicks with duplicate colors were caught, and additional distinct bands added. Color bands allowed for the observation of individual birds over seasons, the detection of inter-season movement, and resighting of birds that moved outside the study area by other researchers and managers. Banding also enabled association of unbanded plover chicks with their marked parents, and thus facilitated tracking of brood survival, as male adult plovers remain with their chicks until fledging and beyond. Some females remain with the brood to fledging, whereas other re-nest shortly after hatching. Banding of females allowed for detection of polyandry among plover pairs.

Incubating Snowy Plovers were trapped on the nest using a walk-in funnel trap (Lessells 1984). Nest traps were only used on completed clutches, to reduce the risk of nest abandonment by adults. The nest trap consisted of a wire mesh cylinder approximately 25 cm in diameter, with fine mesh bird netting covering the top, and a plover-sized entrance cut into the bottom on one side. A trap door attached to a length of rope was affixed to the funnel entrance. Before trap placement, the plover eggs were

removed from the nest and held in a safe container until the completion of trapping. Artificial clay eggs painted to resemble real eggs were placed in the nest before the funnel was set to prevent the adult plover from inadvertently damaging its nest during the trapping process. After the trap was secured over the artificial eggs, a researcher released the trap door remotely after the adult plover entered the funnel to incubate its nest. Once the plover was removed from a trap, it was placed directly into a cloth bag and weighed. Once removed from the bag, the bird was banded and culmen length, tarsus length, and wing length were measured. After processing was completed, the bird was released and the real eggs replaced into the nest. All trapped nests were monitored to ensure that adults resumed incubation.

Chicks were hand-captured by 2-3 researchers using small nets, and chases were only attempted in habitat where there was not a risk of pushing chicks or adults in close proximity to a road or water. After chicks were caught, they were banded with two or four color bands, depending on size, and released quickly back to the adults. Body measurements were not collected on chicks, in order to reduce handling time.

Band Resighting

Each site was surveyed 1-2 times a week by foot and ATV for banded Snowy Plovers. The band combination, sex, and location of both resident birds and those from other areas were recorded. Each banding project in the Panhandle has a unique color banding scheme, so Snowy Plovers from other regions/projects were easily identifiable.

Results

Productivity

A total of 105 nests laid by 49 unique females were located and monitored from March-August 2012 at Gulf Islands National Seashore (Table 1). Less than half of all nests hatched one or more chicks, with Perdido Key having a slightly higher hatch rate than Fort Pickens (Table 1, Figure 2). Only 27% of nests laid at PK and 14% of nests laid at FP produced one or more fledglings (Figure 1). Of hatched chicks (those that were known to have emerged completely from the egg), 28% survived to fledging at PK, and only 12% at FP. On average, GUIS female Snowy Plovers only produced 0.46 chicks each in 2012 (Table 1).

Table 1. Productivity of Snowy Plovers monitored at Gulf Islands National Seashore in Escambia County, FL, from March – August 2012. Because Snowy Plovers exhibit polyandry, number of unique females is a more accurate measure of the breeding population than breeding pairs. Fledged chicks are considered to be those capable of making long distance flights.

	Fort Pickens	Perdido Key	Total
Unique Females	28	21	49
Nests Found	67	38	105
% Nests Hatched	43%	45%	44%
Chicks Fledged	10	13	23
Chicks Fledged per Female	0.36	0.6	0.46

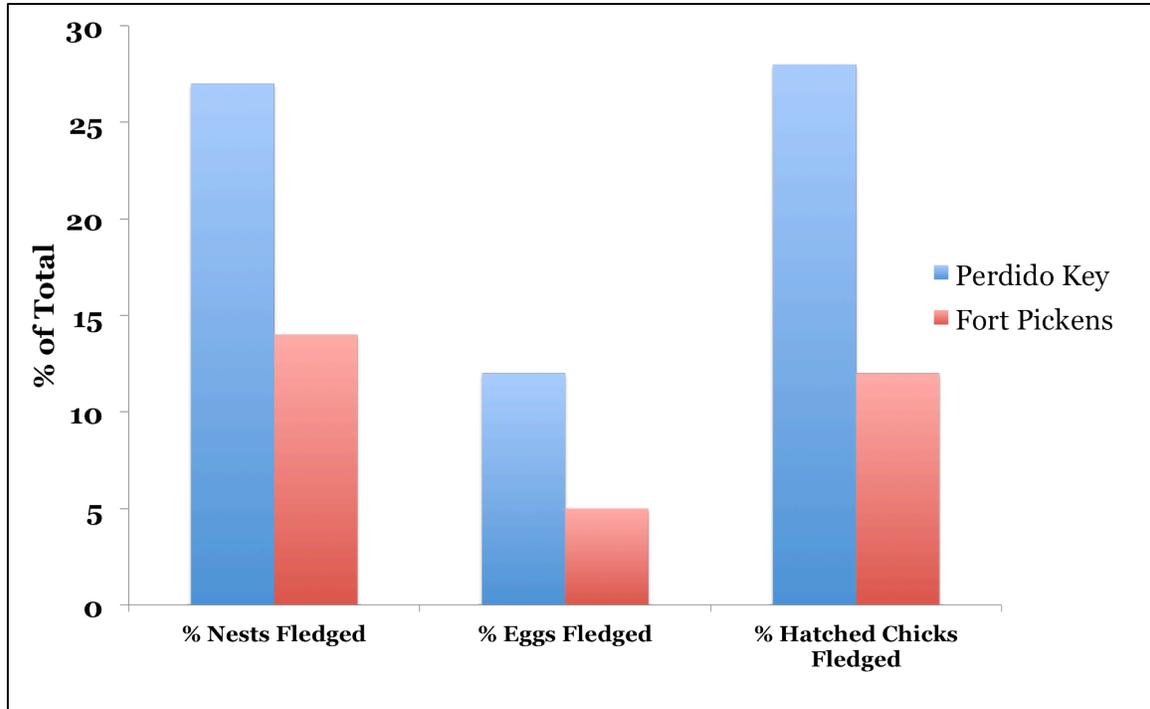


Figure 1. Fledging success of Snowy Plovers monitored at Gulf Islands National Seashore in Escambia County, FL from March-August 2012. Fledged chicks are considered those capable of making long distance flights.

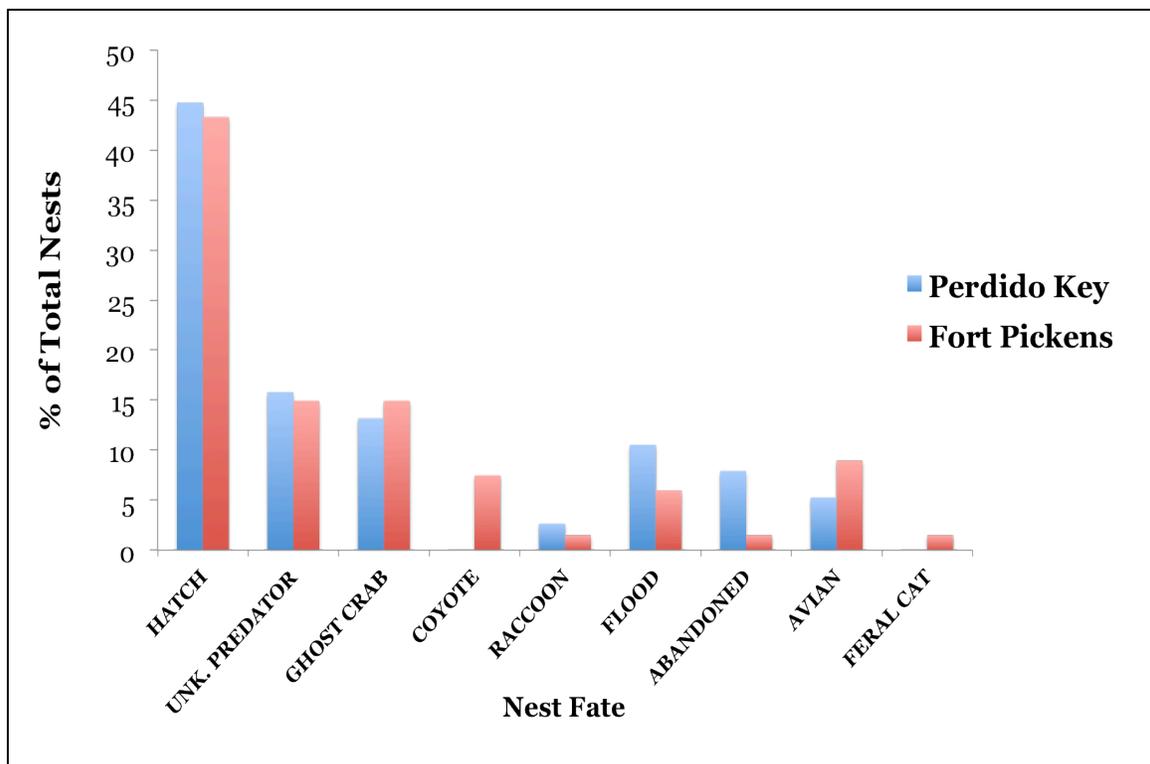


Figure 2. Fate of nests monitored at Gulf Islands National Seashore in Escambia County, FL from March-August 2012. Hatch nests represent any nest that hatched at least one egg.

Among failed nests, the leading cause of loss was predation of unknown cause (Figure 2). Due to the very temporary nature of tracks left in the sand by predators, and the lack of tracks left by avian predators such as gulls, crows, and terns, it was not always possible to positively identify what type of predator was responsible for nest loss. Of predation events that could be identified with certainty, Ghost Crabs (*Ocypode sp.*) were the leading cause of loss followed by Coyotes (*Canis latrans*) and avian predators (Figure 2). Due to two large storm events during the breeding season, 10.5% and 5.9% of nests at FP and PK, respectively, were lost to flooding or overwash events (Figure 2).

Color Banding

In addition to the 45 adult Snowy Plovers previously banded at GUIs in 2011, 62 Snowy Plovers were banded in the park in 2012. Thirty-one of these were chicks, of which only 16 ended up surviving to fledge. When combined with the 31 adults banded, this resulted in an additional 47 Snowy Plovers added to the marked population in the state (Table 2).

Table 2. Snowy Plovers color banded at Gulf Islands National Seashore in Escambia County, FL from March-August 2012. Chicks surviving to fledge are those known to have survived to the age at which they are capable of making long distance flights.

Total # Snowy Plovers Banded	62
Total # Adults Banded (Male/Female)	31 (10/21)
Total # Chicks Banded	31
Total # Banded Chicks Surviving to Fledge	16

Resighting

Despite frequent survey efforts in the park over a six-month period, relatively low numbers of birds from other regions were sighted in the park. Only three birds banded in the eastern Panhandle were sighted at Gulf Islands (Table 3). Two of these birds stayed in the area for a short amount of time, indicating they were likely stopping over en route to a location further west. The third bird, banded as a fledgling in June 2012 at Tyndall Air Force Base near Panama City, FL, was hit by a car on the road at Fort Pickens and killed in early August. Though this outcome is concerning, the color bands allowed us to identify the bird's origin, and indicated that the road may present a danger to migrating Snowy Plovers from other regions of the state, in addition to resident birds. Three birds that were originally banded at Eglin Air Force Base in Fort Walton, FL, nested on GUIs, and an additional five were observed passing through the area (Table 3).

Birds banded at Gulf Islands National Seashore in 2011 and 2012 have been sighted by other researchers and birdwatchers across the eastern Gulf (Table 4). The longest distance records were of an adult female originally banded at Fort Pickens sighted

on Petit Bois Island, MS (an uninhabited barrier island off the coast of Pascagoula) and a male banded on Fort Pickens sighted after the breeding season on Cayo Costa State Park, FL (an island off the coast of Ft. Myers roughly 420 miles from GUIIS). This second sighting represents the first known record of a GUIIS Snowy Plover wintering in SW Florida, where there is a small, highly imperiled subpopulation.

Table 3. Snowy Plovers banded outside of the Western Panhandle sighted at Gulf Islands National Seashore in 2012. Transient birds are those that were not known to have bred at GUIIS in 2012.

Origin	Breeding at GUIIS	Transient
Florida Park Service/Eastern Panhandle	0	3
Eglin Air Force Base	3	5

Table 4. Snowy Plovers banded at Gulf Islands National Seashore that were resighted outside of the western Florida Panhandle in 2012. For color bands: G=green, O=orange, L=black, b= light blue, Y= yellow.

Color Band Combo	Band Site	Resight Location	Resight Date(s)
GL/OL	Perdido Key	Dauphin Island, Alabama	10/1/12
YO/YL	Perdido Key	Dauphin Island, Alabama	8/17/12
bO/bG	Fort Pickens	Petit Bois Island, Mississippi	4/30/12
bL/LO	Fort Pickens	Cayo Costa State Park, FL (Off the coast of Ft. Myers)	10/27/12, 12/1/12
GG/YL	Perdido Key	Fort Morgan, Alabama	9/2/12
YO/YG	Perdido Key	Pelican Island, Alabama	7/18/12

Future Work

Data collected from this project will be used to estimate productivity and understand dispersal at the state and regional levels, as well as to model long-term population trends. In the coming year a population viability analysis (PVA) for Snowy Plovers in Florida will be produced, using this information as well as data from other sites and years. This will help researchers and managers in the region to set population

and management goals for this species. Monitoring and resighting efforts should be continued in this region, in order to collect a multi-year dataset on nest success and fledge rates in the park. It will be also be important for resighting efforts to gather information on whether banded chicks return to GUIs to nest, or disperse elsewhere.

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