

# Impact of Vehicular Traffic on Beach Habitat and Wildlife at Cape San Blas, Florida

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Technical Report #50

Florida Cooperative Fish and Wildlife Research Unit  
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on Beach Habitat and Wildlife  
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**Completed for Eglin Air Force Base**

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## Introduction

Cape San Blas is located on a barrier spit, St. Joseph peninsula, between St. Joseph Bay and the Gulf of Mexico in Gulf County, Florida (Fig. 1). Locally, the name of the cape is often used to refer to the entire peninsula. St. Joseph Peninsula State Park (SJPS) comprises the northern 10 miles of the 22 mile-long peninsula. This section is closed to development and provides protection for representative coastal habitats, including sand dune and scrub pine. Two other parks are found on the peninsula, Joe B. Rish Park, a state-managed facility for the handicapped, and county-managed Salinas Park. Much of the cape itself falls under the domain of Eglin Air Force Base (AFB) (775 acres), and includes 2.8 miles of shoreline. The remainder of the peninsula is privately owned land developed principally for beach residences. All beach on the peninsula below mean high water is state-owned with Gulf County exercising proprietary jurisdiction.

Cape San Blas (outside the state park) is the only area in the Florida panhandle, other than short stretches of shore in Walton County, where beach driving is still allowed. Vehicular access to the shore is managed by Gulf County under a permit system. Although beach driving is valued by local surf anglers and beachfarers, concerns have been raised regarding its effects on beachfarer safety, habitat quality, and wildlife, particularly locally occurring species that are federally listed as endangered or threatened. Eglin AFB property on the cape is believed to provide important regional habitat for a variety of nesting and migrant shorebirds, as well as nesting loggerhead marine turtles (*Caretta caretta*).

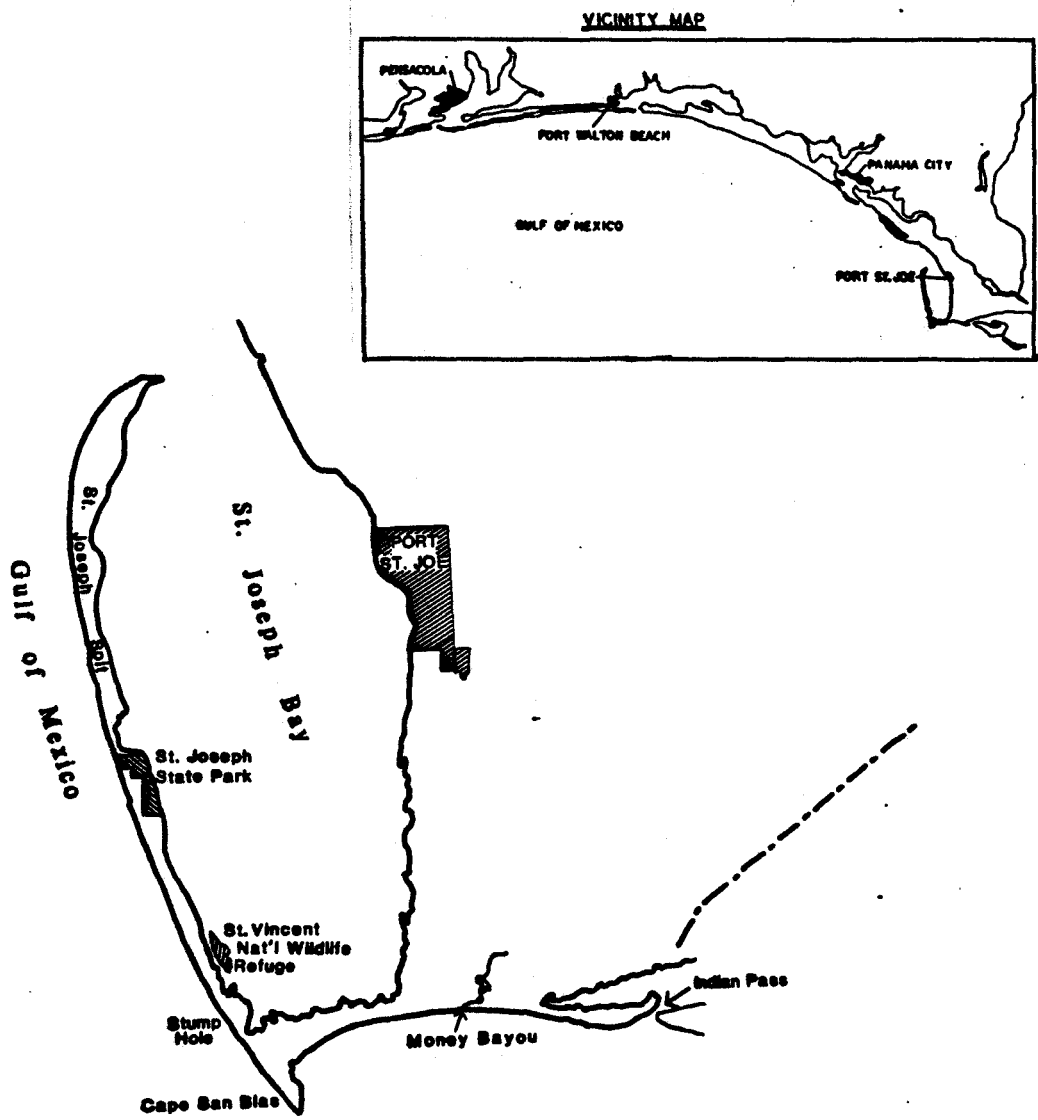


Figure 1. St. Joseph Peninsula and Cape San Blas, Fla.

The objectives of this study were to (1) determine the magnitude and types of vehicular traffic on Eglin AFB property; (2) assess current knowledge of federally listed species on Cape San Blas to determine distribution, habitat needs and other biological requirements; (3) conduct surveys of marine turtle nesting activities in cooperation with other entities on the peninsula; (4) assess the relationship between human/vehicular disturbance and the federally listed species; (5) conduct a winter survey of federally listed shorebirds on Air Force property; and (6) provide management options.

## **Study Area**

### *General Physiography and Vegetation*

The northwestern boundary of Eglin AFB property at Cape San Blas is characterized by numerous fallen trees and stumps exposed by beach erosion. Scrub forest of slash pine (*Pinus elliottii*) and various shrubs predominate inland from the secondary dune system in this region. The southeastern boundary occurs along accreting shoreline and low dune. A swarth of brackish marsh grasses and small ponds lies inland and grade landward to old dune and swales overgrown with slash pine and coarse grasses.

Much of the Eglin AFB property is a scrollscape of parallel ridges formed by old dune lines and alternating swales. Rosemary (*Ceratiola ericoides*) predominates among dune scrub. Slash pine, saw palmetto (*Serenoa repens*), and other flatwood species fill intervening swales, grading towards the sea to marsh grass

associations. These range from high freshwater marshes of Cladium jamaicense and Muhlenbergia capillaris to brackish tidal facies near the beach where Spartina spp. and Iva frutescens predominate.

### *Cape Habitats*

The cape is located at the approximate center of Eglin AFB shore property and features a relatively large expanse of open sand and shell flats. This habitat, particularly the shell flats, is poorly represented elsewhere on the peninsula. Isolated tufts of vegetation and low dune occur on the gulf front, and extensive mud flats are exposed at low tide along the lagoon. Physical features at the tip of the cape are subject to overwash and reconfiguration by storm fronts, and the shoreline is continually reshaped by converging currents.

The cape is a focal point on the peninsula for both human and wildlife activity. The varied foraging habitats support a diverse community of shore and seabirds, frequently attracting large congregations of gulls, terns and pelicans. Suitable nesting habitat is available for loggerhead marine turtles, although this area likely represents a more significant nesting habitat for shorebirds. In addition, the cape provides excellent fishing opportunities, and vehicular access to this area is particularly valued by these users. Perhaps the finest shelling on the peninsula is found along the shoreline of the cape, particularly at the tip where overwashes regularly deposit a variety of shells, including large whelks, clam, and cockle shells.

### *Shoreline Erosion*

Except for the extreme northern section of St. Joseph peninsula, the



remainder of the spit north of the cape fronting the gulf has experienced rapid beach and dune erosion. Erosion has been most severe just north of the cape, particularly near Stump Hole (Fig. 1) where the rate exceeded 30 ft per year in 1992 (DEP). This was the largest historical rate of beach erosion recorded in Florida (DEP 1992). Shoreline retreat has been accompanied by a trend of cape elongation (Fig. 2).

North of the cape and extending for several miles past the Eglin AFB boundary, many shrubs and pine trees behind the secondary dune system were reduced to standing deadwood by a March, 1993 storm. This vegetation has been gradually disappearing as beach erosion continues. From July to mid-November 1993, the shoreline receded about 20 feet in this area, grading to nearly 30 feet towards the southern extremity of the cape (pers. obs.). The erosion rate was not uniform but associated with the passage of storm fronts in mid-August, late September and late October. Severest erosion occurred coincident with lunar high tides (pers. obs.). The beach there has narrowed to less than 50 feet and is completely overwashed by lunar high tides. By contrast, beach east of the cape as far as Indian Pass was accreting and more than 150 ft wide in some sections. Open beach of 50-100 feet in width was only rarely exposed to tidal overwash.

### **Assessment Methods**

A variety of methods were used to collect data. Monitoring regimes quantified the incidence and activity of vehicles on Eglin AFB, as well as wildlife

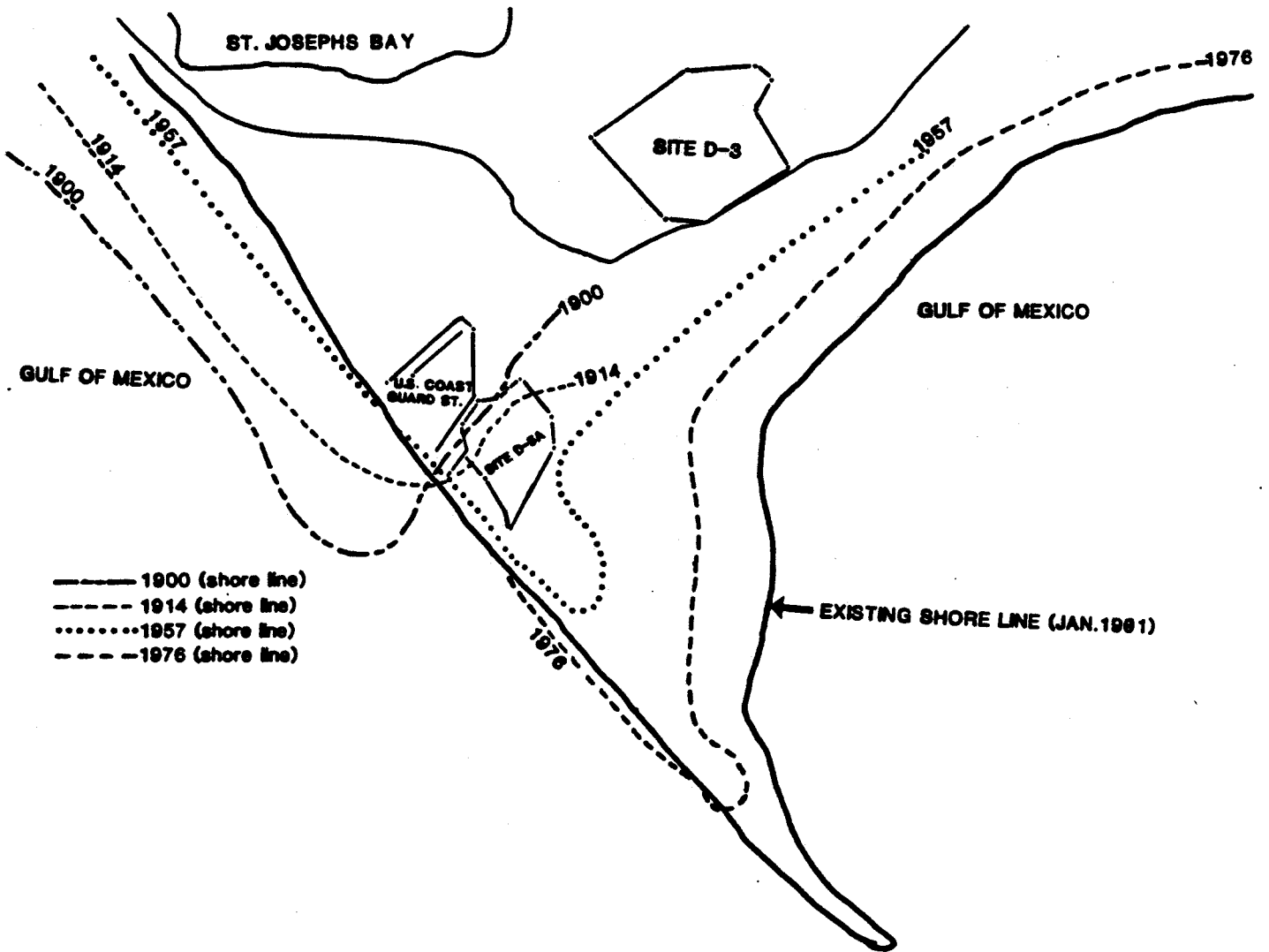


Figure 2. Cape San Blas, Fla., 1900 - 1991.

species of particular concern. Local authorities, officials, and user group representatives were interviewed. Although formal interviews with beachfarers were not possible, views of management issues were frequently sought on an informal basis.

### *Vehicular Traffic*

Counts were conducted on the type and origin of vehicles (Gulf County, other Florida counties, out of state) in addition to the number of occupants and their principal activity (beachfaring, fishing, official). Tracks left by vehicles were categorized by depth: shallow (1-2"), moderate (2-4"), and deep (>4"). Monitoring patrols were conducted on a regular basis (usually daily) at peak times of human activity, stressing weekend afternoon hours. Observations of driving on sand dunes and vegetation were also noted during the course of vehicle counts. The main patrol routes concentrated on the Eglin shoreline, but for comparative purposes, ranged less frequently to the state park boundary in the north and Money Bayou along the southeast shore.

### *Campfires*

A survey was conducted of the incidence and character of campfires from the southern boundary of SJPSP to Indian Pass in August, 1993. Although Air force policy has prohibited campfires on beach property, violations were still known to occur.

### *Marine Turtles*

Beaches from the state park boundary to Money Bayou were surveyed most

mornings for evidence of crawls. Apparent nests were flagged or temporarily staked until permitted volunteers could screen and mark them. Nests were regularly checked for evidence of predation and other disturbance. At the conclusion of the nesting period (mid-August), consecutively numbered nest codes were assigned to known sites in three divisions: cape (CAP), Eglin property (EGL), and the remainder of the peninsula outside SJPSP (PSL). Volunteers were accompanied on several occasions to inspect nests shortly after predicted hatching dates to determine hatching success and the causes of egg mortality.

Nesting data obtained from volunteers were stored and statistical analyses conducted using Symantec's Q & A. Nesting data from SJPSP were also incorporated into the data base.

Incidents of disturbance to nesting females, driving across nests, and damage to marked nests were noted during the study. Hatchling tracks from 4 nests were observed to determine the effect of vehicle tracks on disorientation.

### *Shorebirds*

Local distribution and abundance of charadriid plovers at Cape San Blas were studied from 9 September through 15 November. Included were the snowy plover (Charadrius alexandrius), piping plover (C. melodus), semipalmated plover (C. semipalmatus), and Wilson's plover (C. wilsonia). A 1.2 mile course comprising representative examples of shoreline habitats was walked at nearly daily intervals. Walks were scheduled for times of the day when low and mid-level tides predominated so that approximately the same amount of habitat, particularly

mudflat, was exposed. The route along much of the shoreline was maintained about 60 feet inland in order to minimize disturbance. Observations from this distance also minimized flushing birds ahead of the observer where they might be recorded again.

Counts of plovers were also carried out periodically in open beach habitat from the Coast Guard Station to SJPSP boundary in order to compare relative densities and species mix, and to make inferences about the ability of this habitat type to support plover populations. The northern extremity of St. Joseph peninsula was surveyed 3 times.

## **Results and Discussion**

### *Impact of Vehicular Traffic*

#### *Vehicle counts*

Analyses of vehicle count data showed a relatively low incidence of beach traffic. The mean daily number of vehicles observed during count periods was 6.2. Higher numbers of vehicles occurred on weekend (Saturday and Sunday) days ( $\bar{x} = 9.1$ ) compared to other days of the week ( $\bar{x} = 5.7$ ). The number of out-of-county visitors decreased as vehicle counts proceeded from summer to fall, markedly so after Labor Day weekend (4-5 September).

Although the precise origin of vehicles could not be accurately determined, conversations with many of their occupants revealed that most were from nearby towns and rural areas of the county rather than beach residents or out-of county

visitors. The origin of vehicles as indicated by license plate information was not a good reflection of driver/passenger origin. Gulf County license plates may have included visitors that resided in nearby towns and rural areas as well as semi-permanent beach residents. Origin was further obscured by semi-permanent beach residents who maintained out-of-county license plates, but were issued beach driving permits at the local rate because they owned property in Gulf county.

Numbers of out-of-county drivers likely would have been greater were it not for the high non-local annual permit fee (\$150) for beach driving (vs. \$15 for county residents and property owners). Gulf County charged the higher fee in an effort to control the number of beach vehicles.

Data collected from the Gulf County Tax Collector's Office for 1990-93 showed that the county received approximately \$13,000 - \$15,000 per annum in revenue from beach driving permits. Florida Statute 161.58 requires that such revenue be applied to beach management activities. The number of local permit holders increased during this period from 512 to 568, but the total number of permit holders declined from 718 to 631, due primarily to the steep fall in the number of out-of-county permittees (136 to 29). Observations during vehicle counts also revealed that much of the beach traffic is composed of repeat users and that most permittees either drove the beach rarely or not at all during the study period.

#### *Activity type*

Fishing was rated the most popular activity of beach drivers (53.7 % of

traffic on weekdays; 59.6% on weekends), with clusters of vehicles often found parked at the cape. Activity was closely associated with tidal period, with more activity recorded during the transition from high to low tide.

The other common type of vehicular visitor was classified as beachfarers (36.7% of visitors on weekdays; 36.7% on weekends) and included shellers, sightseers, and sunbathers. These individual user groups were combined because they could not be accurately differentiated in the field. Beachfarers favored the wide beach east of the cape, particularly in the vicinity of the Money Bayou designated entry point. Beach in the Stump Hole area was seldom used by vehicles. Erosion of underlying humic soils in this area created a murky surf, which along with the emergent stumps, made the area unattractive to the beachfaring public. Beach driving there was further discouraged by the stumps, fallen trees, and the proximity of highway C-30 to the beach. Surf anglers and other beachgoers enjoyed easy access by parking their vehicles along the shoulder of C-30, less than 150 feet from the beach.

#### *Mechanical effects of beach traffic*

Two-wheel drive vehicles were found by casual observation to produce deeper tracks than 4-wheel drive vehicles. The most adversely affected areas were the soft sands between the 0.4 and 1.0 mile markers. Tracks became deeper during the hot and dry period of mid-July through August, with some ruts > 6 inches deep giving a corrugated appearance to the beach. Overwash associated with storm fronts in September and October re-compacted beach sand to a

smoother texture, however.

While vehicle tracks may contribute to beach erosion by compaction of sand and the shearing of tidal scarps, there was little evidence for this. Storm fronts seemed to represent a much more significant force in beach and dune erosion.

Driving vehicles on dunes has been reported by residents to be a problem, but only one incident was reported (at Indian Pass) during the course of this study. No incidents were observed on Eglin AFB property during this period.

#### *Compliance with new driving regulations*

Entry into dunes from the Coast Guard compound to the eastern border of the Eglin AFB property was restricted in June, 1993. Painted signs were placed from mile markers 0.5 to 1.8, including exclusive posting of the sand and shell flats. Posting of the cape was designed to protect most of the unique sand and shell flats and gulf shoreline at the tip. A corridor crossing the tip was left open to allow anglers and shellers access to the opposite shore.

No incidents of sign removal or destruction were observed during the study, although signs at the cape and northwest of the inlet crossing were occasionally trampled by vehicles. Signs at the east shore of the inlet crossing were regularly knocked down by vehicles turning around. Pliant carsonite stakes were substituted for wooden ones and found to withstand being backed over without noticeable damage.

Presence of the field investigator appeared to dissuade some violators. After



an interruption in sign monitoring from mid-November to the end of December, a variety of fresh and old tracks were found at the cape, but further incidence virtually stopped with resumption of daily patrols.

Vegetation, composed of halophytes and lianas, was found to rapidly colonize open sand along the posting line from the cape eastward, where the beach is largely unaffected by erosion. Salt spray and sand from storms in September and October were observed to kill much of this emergent vegetation, however.

The area was patrolled on an almost daily basis for beach driving infractions (Appendix A). Violators were reported to Jackson Guard, and in some instances, to personnel of the Gulf County Sheriff's Department. Most infractions occurred as a result of short cuts in the driving courses, avoidance of surf during high tides, turn arounds in tightly posted areas, and maneuvers around fallen trees. The most serious offenses included criss-crossing and driving down the center of the sand and shell flats of the cape, and deliberate gouging of adjacent areas of soft sand. Depending on weather conditions and the depth of tracks, 3 to 6 weeks were usually required for tracks to be filled. A complete overwash was required to repair deep (> 2 in) tracks and replenish crushed shells of the flats.

Observed disturbance during the study period was limited to scattering of birds and minor degradation of the shell component of the habitat. Similar incursions during the shorebird nesting season, however, may have interfered with courtship behavior, destroyed active nests, and/or caused birds to abandon nests.

The pattern of most infractions, based on direct observation and interviews with violators, indicated that a limited number of persons (5-8) were responsible. Most infractions occurred during weekends and a substantial proportion were probably at night when patrols were not conducted.

Vehicular access to the beach at Cape San Blas was hindered by the lack of designated entry points. There were only 3 legal, marked access points: 2 at Money Bayou and one at Indian Pass, all of which lie east of Eglin AFB property. There were, however, several non-designated entry points to the west: about 500 feet beyond the western boundary of Eglin AFB, and several tracks south of SJPSP. On Eglin AFB beach front, 4 old tracks northwest of the Coast Guard compound allow access for 4-wheel drive vehicles. These non-designated entry points were posted with large "No Motor Vehicles Allowed" signs in June, 1993, but were removed 2 months later. By November, 1993, erosion had rendered the beach roadheads steep and the shore cluttered with stumps so that vehicle passage was no longer practical.

### *Campfires*

A survey of campfire remnants found a high incidence of construction material (42%, n = 26; likely higher as the origin of many remnants was indeterminate). While litter (bottles and cans) was associated with some campfires (15%), more campfires were found to reduce construction debris washed up by the sea and eroded from beach homes. How significantly the practice served to control litter was difficult to assess, however. There was no observable effect on

live vegetation, although inclusion of driftwood and debris (mostly fallen branches) may have adversely impacted local habitat.

### *Marine Turtles*

There were 124 loggerhead marine turtle nests documented in 1993 from the southern boundary of SJPSP to the base of the peninsula at Indian Pass. Of those, 37 occurred on Eglin AFB property (Table 1; Appendix B). One hundred eight (87.1%) were screened within 48 hours following egg deposition. St. Joseph Peninsula State Park recorded 87 loggerhead nests (J. Mitchell, SJPSP, unpubl. data). The combined total of 221 represents the highest seasonal nesting effort recorded on the peninsula. The high count may have reflected past inconsistent monitoring, however. At an overall density of about 9 nests/km in 1993 (Table 2), St. Joseph Peninsula represented an important nesting area for loggerheads in the panhandle region (e.g., St. Andrews State Recreation Area had 1.2 nests / km in 1993; Watson, pers. comm.).

Green marine turtle (*Chelonia mydas*) nests have been rarely documented on the panhandle coast. One nest (PSL 051) may have been the effort of a green turtle, although this could not be confirmed.

Leatherback (*Dermochelys coraciacea*) nesting was documented in 1993 on St. Joseph Peninsula for the first time in 20 years. The clutch of one nest was inspected and screened inside SJPSP but failed to produce hatchlings, ostensibly due to infertility. The apparent nest of another leatherback was screened in the park, but no eggs could be located (Joe Mitchell, SJPSP, pers. comm). There was

Table 1. Summary of 1993 loggerhead marine turtle nesting activity on Eglin AFB property at Cape San Blas, Fla.

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Total nests	37
Unscreened nests:	6
Screened nests	31
Relocated nests	11
Nests producing hatchlings	24
Totally predated nests	8
Nests lost to erosion	3
Nests totally flooded	1
Nests where fate unknown	1
Mean clutch size	112.0
Hatching success of eggs in relocated nests (%)	78.2
Hatching success of eggs <i>in situ</i> screened nests	61.7
Estimated hatching success of total nests	51.1

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Table 2. Loggerhead marine turtle nesting density in 4 divisions of St. Joseph Peninsula, Fla. during 1993.

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Division	km of shoreline	Number of nests	Nest density (nest/km)
SJP State Park	9.5	88	9.26
Peninsula (PSL)	6.1	77	12.62
Eglin AFB property (EGL)	3.5	37	10.57
Lower cape (CAP)	5.2	10	1.92
TOTAL	24.3	222	9.13

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no indication of nesting by the species elsewhere on the peninsula.

### *Nest Relocation*

Nests likely to be flooded by high tides or storms were usually relocated to sites on foredunes directly landward from original nest sites. More distant relocations were carried out on Eglin AFB property. Due to severe erosion at Stump Hole, most nests in this area were moved to sites on foredunes east of the cape, and to a lesser degree on remnant dune between the cape and lighthouse. Similarly, all nests on the cape flats were relocated to higher sand because of the danger of severe overwash.

Concerns were expressed by DEP personnel near the end of the nesting season regarding detrimental effects of nest relocation (i.e. changes in incubation temperature and moisture content affecting hatchability and hatchling fitness; R. Mesic, pers. comm). As a result, most nests subsequently discovered were left *in situ*, regardless of the presumed degree of flood danger.

Although no attempt was made to assess the impact of nest relocation on hatchling fitness, a comparison of known hatching success between *in situ* and relocated nests on the entire peninsula outside SJSP shows that relocation had a positive effect on nesting success. Relocated nests produced a mean of 84.5 emergent hatchlings per nest ( $n = 47$ ) versus 62.2 for *in situ* nests ( $n = 44$ ), although the difference was inflated due to the higher mean clutch size of relocated nests (112.2 vs. 100.4). The effect of differential clutch size was factored out by comparing the mean number of hatchlings per egg: 0.753 ( $n =$

5,274) vs. 0.619 ( $n = 4,417$ ), respectively. Relocation was then determined to have produced an additional 707 emergent hatchlings.

### *Nest disturbance*

One nest of the 106 nests that were monitored was driven over. The nest had not yet been screened, so the drive-over may have been unintentional. No disturbance or damage to screened nests on the peninsula was observed, although reports regarding the predation of two nests (CAP 010 and PSL 005) suggest that these may have been raided by humans (L. Howell, pers. comm.; B. Tuten and C. Carroll, pers. comm., respectively). Penalties under Florida law for destruction of sea turtle nests are severe, but some local residents claim that illegal harvesting of eggs may still occur on a small scale.

Three instances of disturbance to nesting females were recorded by volunteers. Small groups of beachwalkers with flashlights were found to frequently observe egg laying, and in at least one case, may have caused nest abandonment before egg deposition (B. Tuten and C. Carroll, pers. comm.). Interference with hatchlings was also documented in one instance (PSL 071). Children were observed playing with emergent hatchlings and stepping on them (B. Tuten and C. Carroll, pers. comm.). No other reports of hatching disturbance were received.

The effect of driving at night on the beach was not investigated, but in the recent past accounted for at least one incident of crushing emergent hatchlings (J. Stevens, pers. comm.).

### *Predation*

Predation was not formally assessed due to the practice of screening nests. The wire was thought sufficiently heavy and mesh fine enough to exclude local mammals, although screening atop 2 nests was found ripped open by predators, presumably by dogs (Canis domesticus) or coyotes (C. latrans). Coyotes were reported as the almost exclusive predator (95.2%; n = 21) of the state park's screened nests during 1993, of which a third (33.9%; n = 62) were depredated (Joe Mitchell, unpubl. data). Ghost crab holes were commonly observed in the tops and sides of screened nests, and the pattern of some eggshell fragments indicated that crabs spoiled at least some eggs, but the incidence of depredation was not quantified.

### *Hatchling disorientation*

Hatchling disorientation was observed indirectly in four instances (EGL 010/012/015/020) by examination of hatchling tracks. Vehicle tracks were thought to be a contributing factor at two sites (EGL 012/020), causing some hatchlings to make a perpendicular diversion of more than 300 feet en route to the sea. Some hatchling tracks terminated within vehicle tracks, which suggests that the latter may lengthen the time of critical exposure to beach predators, particularly ghost crabs.

At one site (EGL 020), topography of the cape may have caused a helter-skelter pattern of emergence. A horizon of water lies both to the west and east of where the nest was located at the narrow hook of the cape, and may have



confused emerging hatchlings.

Beachfront lighting may also have been a factor in hatchling disorientation. Lights at the radio tower on Eglin AFB property were turned off during the emergence period. External lights were observed on some beach residences, however, mostly north of Eglin AFB property. The lighthouse at the former Coast Guard Station also may have represented a source of disorientation to nearby nests.

### *Shorebirds and Other Avifauna*

The results of plover counts showed that the cape provides important habitat for charadriids on the peninsula (Table 3). The piping plover was the most common charadriid observed in late summer and fall, with the highest density recorded at the cape. The Wilson's plover was recorded nowhere else on the peninsula, and the snowy plover was found in a variety of the cape's habitats.

In counts that categorized sightings by sub-habitat type (shoreline and mudflats vs. interior sand and shell), most snowy and Wilson's plovers were observed in the flats. Piping and semipalmated plovers occurred mainly along the shoreline, although they could be found resting in the interior.

One of the 3 plover counts conducted at the northern tip of the peninsula resulted in a total of 9 snowy plovers. (The other 2 counts produced none.) Suitable foraging habitat for the species also existed in patches from the SJPSP gulf shore boundary to the Coast Guard Station, where 5 birds were recorded on 11 November, but usually only 1-3 birds were noted. The best patches of snowy

Table 3. Charadriid plover counts from surveys (n = 45) on Eglin AFB property Jul - Oct, 1993, at Cape San Blas, Fla.

Species	Mean number observed (birds/survey)	Maximum observed	Minimum observed
Piping	13.7	59	2
Semipalmated	10.1	37	0
Snowy	3.3	7	0
Wilson's	2.3	6	0

plover habitat in this area were the wide white backbeach about 0.5 miles south of Barrier Dunes and in the vicinity of Sunset Point.

### *Species accounts*

The study yielded observations of bird species which are known to occur at Cape San Blas, but for which little information on local status and distribution was available (see also Appendix C). Those species listed by the State of Florida (FL) and/or U.S. Fish and Wildlife Service (FWS) for conservation action are indicated.

Least tern (*Sterna antillarum*). FL: Threatened (T). During July, a transient colony of least terns were observed defending territories in flats along the northwest shore of the cape. No nests or fledglings were located. Large flocks of 30-100 birds were noted at the cape throughout July with a few birds remaining until mid-August. The least tern is recorded as a common summer resident at SJSP (DEP, 1988) and Bay County with confirmed breeding in SJSP (Loftin, Stedman and Francis 1987).

Piping plover (*Charadrius melodus*). FL: T. FWS: T. This species was the most common plover at the cape from late summer through the end of the year. Individuals were first noted on 8 August. The highest count of 59 was recorded on 28 December 1993. Occasional plover counts from the Coast Guard Compound to SJSP boundary showed that the cape was a much more important foraging area for the species than gulf front beach.

American Oystercatcher (*Haematopus palliatus*). FL: Species of Special Concern

(SSC). Occasional in summer, at the tip of the cape and opposite shore on the mainland as far east as Eglin AFB property boundary. Singly or in small groups. The maximum number of 6 was recorded in August. Often in small scattered groups with other shorebirds. Noted as "casual" in Bay County but few recent records (Loftin, Stedman and Francis 1987). Not recorded from SJSP (DEP, 1988).

**Brown Pelican (Pelecanus occidentalis).** FL: SSC. Common at the tip of the cape where 30-200 birds congregate almost daily. The maximum number of about 320 was noted in October. Small groups regularly seen flying and fishing along the entire Eglin shoreline. Attracted to offshore fish trawlers where > 1200 birds observed off the tip of the cape in August. Common resident in appropriate Bay County habitats (Loftin, Stedman and Francis 1987). Listed as abundant at SJSP (DEP, 1988).

**Little Blue Heron (Egretta caerulea).** FL: SSC. Fairly common in summer and early autumn on mudflats and littoral at the main lagoon of the cape and, less frequently, along adjacent shores. Also reported as fairly common during the same period in Bay County (Loftin, Stedman and Francis 1987) and common at SJSP (DEP, 1988).

**Snowy Egret (Egretta thula).** FL: SSC. A common and widely dispersed resident of Eglin shores. Most common at the edge of lagoons associated with the cape. Noted as a fairly common summer resident in Bay County (Loftin, Stedman and Francis 1987) and abundant in SJSP (DEP, 1988).

Tricolor (Louisiana) Heron (*Egretta tricolor*). FL: SSC. Occasionally one or two at the littoral and on mudflats of the main lagoon at the cape. Noted as an uncommon summer resident in Bay County and rare in winter (Loftin, Stedman and Francis 1987). Reported, by contrast, as an abundant permanent resident at SJSP (DEP, 1988).

Bald Eagle (*Haliaeetus leucocephalus*). FWS: Endangered (E). FL: T. Occasional around the former Coast Guard station. A pair of adults and an immature noted in October. Also considered occasional in Bay County, although rare in winter (Loftin, Stedman and Francis 1987). No record from SJSP (DEP, 1988).

Arctic Peregrine falcon (*Falco peregrinus tundrius*). FWS: T. FL: E. No observations recorded. A rare winter visitor along the panhandle coasts, seen most frequently on autumn migration (DEP, 1988; Loftin, Stedman and Francis 1987).

Southeastern kestrel (*Falco sparverius paulus*). FWS: Under review. FL: T. Several sightings of pairs in the vicinity of the compound during migration in October and early November. Described as a rare summer and fairly common winter residents in Bay County (Loftin, Stedman and Francis 1987) and abundant in winter at SJSP (DEP, 1988).

Merlin (*Falco columbarius*). A pair was recorded once in October at the Coast Guard Station. Described as a rare transient and very rare winter resident in Bay County (Loftin, Stedman and Francis 1987). Similarly listed as a rare

autumn migrant at SJSP (DEP, 1988).

Sandwich tern (*Sterna sandvicensis*). The tip of the cape is an important congregation point for this species. Colonies of 30 to 120 birds, usually in the company of Royal Terns, were observed regularly throughout the summer and early autumn. Although not listed by federal or state authorities, the species is limited in its U.S. range to southeastern coasts, occurring in sporadic colonies, with Cape San Blas one of two major ones in Florida (Peterson 1980). Recorded in Bay County as an uncommon transient and summer visitor (breeding not confirmed), rare in winter (Loftin, Stedman and Francis 1987). Reported as uncommon summer resident at SJSP (DEP, 1988).

Caspian Tern (*Sterna caspia*). A few occasionally noted with Royal and other terns at the tip of the Cape and on mudflats of the adjacent main lagoon. The maximum number of eight was recorded on 15 August 1993. Reportedly rare further west in the panhandle (R. Ingram, pers. comm.).

Osprey (*Pandion haliaetus*). (Formerly FL: SSC). Fairly common/ common along coastal Eglin property, especially along the Stump Hole shoreline where standing deadwood is used for hunting perches. A pair was regularly sighted during all months of field work.

## **Management Options**

*Maintain Current Beach Driving Practices*

Current vehicle regulations on Cape San Blas beaches allow the public easy access for fishing, shelling, and other activities. Many in the local community favor maintaining beach driving privileges for that reason. Vehicular disturbance on the cape may adversely affect wildlife, however, particularly shorebirds and marine turtles examined in this study.

While the effect of beach driving on breeding shorebirds could not be assessed, detriments to reproductive success may have included egg and nestling mortality, nest evacuation, reduced nestling mass or slower growth, premature fledging and modified adult behaviors. Disturbance to foraging and resting shorebirds was noted, although not quantified.

Evidence of marine turtle disturbance was documented. Deep vehicle tracks interfered with hatchling seaward movement in 2 emergent events, increasing energy expenditure and exposure time to predators. In one instance, a vehicle drove directly over a nest. Although the effects of night driving were not examined, there are a number of potential problems associated with this practice. Lights from vehicles may disrupt nesting females causing them to abandon their nesting effort. Emergent hatchlings may become disoriented from the lights and/or crushed by vehicles.

If driving is to be continued on the beach, community involvement would aid its management. One such possibility is the reformulation of a governing committee, made up of officials and local residents, that would decide upon regulations (including restricted areas, restricted times, access points, fees, etc.).

A neighborhood watch program also might be effective in managing beach driving practices. Many beach users respect current regulations, are concerned about wildlife conservation, and would likely report violations if they believed that follow-up action by authorities would result. Increased revenue from higher beach driving fees could provide funds for a full-time employee to monitor driving and enforce posted regulations.

#### *Increase Regulations Restricting Beach Driving*

Prohibition of beach driving would lessen the likelihood of human disturbance to wildlife. This option merits serious consideration due to the regional importance of the cape to critical shorebird species (piping plover, snowy plover, least tern) and nesting loggerhead turtles. Total prohibition would provide the greatest degree of protection, although partial prohibition may adequately serve management interests.

Areas of the cape are currently restricted to vehicles to protect shorebird habitat. Shorebird breeding areas may be better protected at the tip of the cape by total exclusion of vehicles in this area or roping off selected sites.

Increased restrictions might involve closing the beach to vehicles at night during the turtle nesting season. This would eliminate many of the potential problems associated with marine turtle nesting and hatchling movement towards the sea.

The difficulties associated with eliminating beach driving center around the reaction of the local community and enforceability. Adverse community reaction



may be lessened through involvement in decision-making processes and education concerning the impact of beach driving on wildlife species. The problem of enforceability may be lessened through those ideas brought forth above.

As the human population on the cape and surrounding areas continues to grow, wildlife disturbance in this area will increase. Means to minimize this disturbance should be examined. Total elimination or increased restrictions of vehicles on the beach represents such a means.

#### **Literature Cited**

Loftin, H., S.J. Stedman and T. Francis. 1987. An annotated check-list of the birds of Bay County, Florida. Bay County Audubon Society. Panama City.

Appendix A. Vehicular infractions of posted areas at Cape San Blas, Fla.

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1. 16 Jul 1993. Between mile posts 0.2 and 0.3. Vehicle approached from the beach between dunes through swale and into salt marsh where tracks are deep and wide. Path goes toward D-3B facility. Later found to be a front-end loader associated with site activities.
2. 17 Jul 1993. Found a blue, late model Isuzu pick-up truck with FL plate KER 15M beyond the last markers at the tip of the point by about 100 ft. Did not approach, but tag number was easily read with binoculars. On technical grounds, perhaps not a violation because vehicle was below mean high tide mark. Two occupants were cast netting on the one side as far as the tip of the point along the shoreline. Noted at  $\approx$  1940 hrs. Reported by phone to Jackson Guard the following morning.
3. 24 Jul 1993. Met same party involved with infraction #2 again, this time above high tide mark past the signs by about 100 ft. Was waved over to the vehicle by a drunken elderly man and talked with him and 2 other passengers for  $\approx$  30 min. Seemed to understand the possible ramifications of the incursion and promised not to do it again. Infraction occurred at  $\approx$  2000 - 2040 hrs. Amiable conversation except for "Daddy's" disparaging remarks about the Federal government.
4. 30 Jul 1993. At 1920 hrs met a new, bright red pick-up leaving the area at the tip of the point. Driver deliberately drove inside of signs and performed a wide ( $\approx$  50 ft) turn behind the signs. Then passing by me, the lone passenger leaned out and asked of his maneuver "didn't that piss you off?" and then muttered something about my mother. A rather tense but interesting conversation ensued for the next 30 min. or so. License plate somewhat obscured by the legs of children dangling over the tail gate but either XT 9150 or XT 8150 (Georgia). Reported to deputy sheriff who could not obtain "listing" for it.
5. 2 Aug 1993. Extensive tracks observed in sand and shell nesting habitat to the east of the inlet towards the tip. Four markers to the east of the inlet approach were knocked down. Also one loop to the west between the 1.7 and 1.8 mile markers. Deliberate incursion. Vegetation not disturbed. No wheelies or deep tracks. Appeared just to be driving through.
6. 4 Aug 1993. Additional tracks observed, particularly to the east of the inlet approach where ruts now multiple and some becoming deeper. No additional signs knocked down but one black "No Vehicles" sign missing.

7. 7 Aug 1993. More driving behind the signs this time west of the point between markers 1.6 and 1.7. No evidence of wheelies or rough driving. No signs knocked down. Occurred during the previous night or late evening.
8. 8 Aug 1993. Additional driving behind the signs, particularly in between dunes at approximately the 1.65 mile point. Retraced loop behind signs between 1.7 and 1.8 mile markers. Obviously not reckless, as drivers careful not to damage vegetation although some sea oats slightly trampled at the 1.65 mark. Also a short-cut across nesting habitat at the point, but tracks only faint.
9. 22 Aug 1993. Extensive driving behind the signs to the east of the inlet where tracks are noticeably deep. Also a loop to the west at approximately the 1.75 mile mark. Several sets of tracks behind the signs in nesting habitat inside the point, along both sides of the permitted alley way.
10. 30 Aug 1993. Blue Isuzu FL tag KER 15M parked at the very tip of the point, the two occupants fishing with a long net. Approached by them on their way back to access road. Pulled alongside me as I walked back to the compound from Eglin Southeast. Same two who were met previously: one with a beard about 30-32 y.o. and the other a corrections officer from Wewahitchka. Amiable conversation ensued. Reminded them of posting policy and the seriousness of the violations but had to agree with them that their infringement caused little if any damage to habitat or wildlife. Discussed possible future actions to close off traffic, planned prohibition of camping and campfires, which elicited a strong negative reaction directed mainly at beach property owners (who they felt to be behind efforts to gradually close off the point to vehicular traffic) including what might happen to their real estate if they are successful at prohibiting driving along the beach. Parted amicably. Violation occurred between 1855 - 1940 hrs.
11. 04 Sep 1993. Again found the Blue Isuzu FL tag number KER 15M parked behind the signs at the tip of the point. Observed through binoculars from the inlet while talking with Walter Webb, another Gulf county corrections officer. Appeared to be the same two vehicle occupants as for the 30 August violation. However, on this occasion, there were two other passengers and a large black dog which was allowed to roam free chasing the shorebirds along the length of the tip. It even ventured out to sea about 30 feet to reach an injured pelican which pecked the dog on the head, causing it to retreat to the shore and resume chasing other birds. Vehicle driven just above the high tide line in order to gain access for netting fish with an inner tube.

12. 12 Sep 1993. Noticed tracks of vehicles between the 1.8 and 1.9 mile markers where a looping turn taken. Beach is sufficiently wide at this point to permit a vehicle to turn around without having to enter the prohibited area. Driver careful to enter and exit between signs. Evidently a deliberate incursion.

A second incursion noted on the point where a vehicle drove between the signs starting at the southern extremity of the point north to the very tip. Retraced its tracks on exit.

13. 19 Sep 1993. While talking with Mr. Barnes and Phil between the 0.9 and 1.0 mile markers, either a white Jeep or red GMC pick-up passed us and proceeded to knock down the No Vehicles sign at the eastern side of the inlet crossing while making a U-turn, which included driving over some low vegetation. Obviously deliberate. Ample space in open sand to turn around.
14. 20 Sep 1993. Another set of tracks cutting through the middle of the open sand and shell at the tip of the point. Also a shortcut to the alley way (access lane to adjoining lagoon). Hard to tell if deliberate because some of the outermost signs taken by recent high tides (replaced later in the day).

Also a single short incursion at the southern extremity of the posted area. Entered and exited within a 50 feet area.

15. 25 Sep 1993. A single set of tracks (retraced) at the very tip of the point where the Blue Isuzu has repeatedly entered to fish.
16. 27 Sep 1993. A short incursion between the 1.7 and 1.8 mile markers. where a vehicle (probably travelling) from then CG compound side to the point entered and exited around a sand dune, the shore side of which is eroded with the high tide reaching the base of the dune. Adjacent to this is an opening in the low dunes which has been staked off with extra signs since incursions noted there. Appeared driver was avoiding the surf in order to reach the point.

Blue Isuzu FL tag number KER 15M again noted behind the signs at the very tip of the point. Corrections officer (driver) and his bearded passenger sighted. Was approached by a third occupant (Dallas Jones) while counted Snowy Plovers in the center of the tip. Did not talk with the other two, but had a comfortable conversation with Mr. Jones who explained that the tip of the point needed to be totally staked off at the end points so people would know driving not permitted along the shoreline. the problems of high tide eroding any such posted signs was explained to him. He also suggested using tape between the signs but the AF policy of no barricading was

mentioned to him.

17. Blue Toyoto pick-up FL tag number GCR 54S noticed parked and jutting past the line between two signs at the eastern shore of the inlet. Occupants observed letting their labrador run along the shore behind the signs at the tip of the point, but no shorebirds present to disturb.

Fresh tracks found from one shore to the other across the tip of the point. Occurred between late Saturday evening and Sunday morning. Not malicious; unclear if gaining access for fishing or just riding behind the signs; initiated from furthest point that is legally drivable along the eastern side of the tip.

18. Upon return from a ten day trip to Tallahassee, Gainesville and Melbourne, noted that a black vehicle sign at the western side of the inlet (on the point) was backed over and its wooden stake snapped. Unclear if deliberate or not. To be replaced with a carsonite stake. Otherwise no new tracks / incursions noted since travels began.
19. 17 Oct 1993. Watched a bronze Jeep FL plate Okaloosa county GS- 16C (third digit/letter indeterminate) turn around in a loop, half of which behind the signs. Occurred just NW of the small dune at the southwestern extremity of the Eglin property before the main track turns to cross the inlet. Driver and single passenger observed collecting shells along the shore of the point tip about 20 before violation. Took several photos at the tip showing recent overwash and erosion including one of the driver wading at the tip (searching for shells with his feet?) and a group of  $\approx 80$  flushed pelicans sitting offshore about 300 feet in the background.
20. 21 Oct 1993. Vehicle entered along inside edge of signs on the eastern shore of the point. Appeared that it was avoiding the surf because the area just outside the signs subject to overwash at high tide. No malicious intent evident.

Also, a vehicle turning at the eastern side of the inlet crossing looped behind the signs, only slightly trampling the vegetation. Date: 21 October 1993.

21. Returned 30 Oct from almost a week away to find point area transfigured by stormy front during past 2-3 days. Check of beach on 31 Oct showed extensive driving behind signed off area, both where signs remain posted and where washed away. Center of point driven through and along entire shore. Fresh tracks found to N of inlet where deposited sand now

makes it easy to cross. Appears from tracks to be the work of one vehicle.

22. Watched as two-toned brown and cream Ford Bronco sped onto point and proceeded to tip for cast netting. On approach noticed the driver and sole vehicle occupant to be "Jimbo", met earlier in the study. Drove car down center of point. Explained possible ramifications of driving behind the signs. His excuse was that no birds are nesting this time of year. Explained importance of resting and foraging habitat, particularly for Snowy Plovers. License number: ILF 27U (FL Gulf). Jimbo admitted to doing the driving which left other recent tracks on the point (as described in instance # 21).
23. Same Bronco as in violation # 22 (plate number: ILF 27U (FL Gulf) revisited point and drove to tip for castnetting, but this time kept to side. Talked at length with the driver (Jimbo) and explained further the need to set aside the center of the point for shorebirds. Showed him and the other vehicle occupant through the binoculars four Snowy plovers huddled in drift line drift in the center, and discussed their protection requirements. Jimbo seems to better understand the importance of not driving in the point center.
24. Early afternoon inspection of point area showed that NE of the inlet crossings a vehicle had driven behind the signs as well as around and through the dunes to cross the inlet (new crossing). Fresh tracks, probably occurred within the past few hours as heavy rain had fallen last night and earlier this morning. Driving not malicious, and for the most part may have been trying to avoid the surf at high tide.

Appendix B. Marine turtle nesting results on Eglin AFB property at Cape San Blas, Fla., 1993.

Nest #	Relocated?	Hatching Status	Total Clutch Size	# Hatched
01	No	Hatched	84	37
02	No	Hatched	124	47
03	No	Hatched	98	91
04	No	Hatched	125	108
05	No	Hatched	132	125
06	No	Hatched	123	121
07	Yes	Hatched	95	6
08	Yes	Hatched	91	86
09	Yes	Hatched	133	117
10	No	Hatched	86	65
11	No	Hatched	112	106
12	Yes	Hatched	143	134
13	No	Hatched	100	5
14	Yes	Hatched	102	80
15	No	Hatched	112	106
16	Yes	Hatched	121	121
17	Yes	Hatched	123	107
18	Yes	Hatched	104	92
19	Yes	Hatched	141	73
20	Yes	Hatched	123	117
21	No	Unk-Erosion	-	-
22	Yes	Unk-Erosion	-	-
23	No	Hatched	101	64
24	No	Hatched	111	42
25	No	Failed-Flooding	99	0
26	No	Hatched	106	9

27	No	Hatched	111	98
28	No	Failed-Predation	-	-
29	No	Failed-Predation	-	-
30	No	Failed-Predation	-	-
31	No	Unk	-	-
32	No	Failed-Predation	-	-
33	No	Failed-Predation	-	-
34	No	Failed-Predation	-	-
35	No	Failed-Predation	-	-
36	No	Failed-Predation	-	-
37	No	Unk-Erosion	-	-



Appendix C. Birds Recorded at Cape San Blas, Fla., 3 Jul - 16 Nov 1993 and 28 Dec 1993 - 10 Jan 1994.

SPECIES	SITE(S)	REMARKS
Double-crested Cormorant ( <u>Phalacrocorax auritus</u> )	P, CB,	in small flocks, mostly at pt; max. # of 46 (11/11)
Snow (Blue) Goose ( <u>Chen caerulescens</u> )	P	a pair in early Nov for several days
Mallard ( <u>Anas platyrhynchos</u> )	L	in pairs or small groups in early fall
Bufflehead ( <u>Bucephala albeola</u> )	P	2 females off-shore on 30 Dec
Red-breasted Merganser ( <u>Mergus serrator</u> )	P	small flocks in late Dec and early Jan
American Coot ( <u>Fulica americana</u> )	P	single bird washed ashore dead on 5 Nov
Brown Pelican ( <u>Pelicanus occidentalis</u> )	P, L, MB, CB, EN	common at the pt.; usually 50-200; max 1,200
Northern Gannet ( <u>Morus bassanus</u> )	P	exhausted or sick birds occ. found sitting in dry sand.
Laughing Gull ( <u>Larus atricilla</u> )	P, L, MB, CB, EN	common during summer and fall
Franklin's Gull ( <u>Larus pipixcan</u> )	P	occ., mostly during summer
Bonaparte's Gull ( <u>Larus philadelphia</u> )	P	common in late Dec & early Jan, patrolling shorelines
Herring Gull ( <u>Larus argentatus</u> )	P, MB, EN	common during summer and fall

Ring-billed Gull ( <u>Larus delawarensis</u> )	P	fairly common at the point during summer & fall
Sandwich Tern ( <u>Sterna sandvicensis</u> )	P, L, MB, CB	common at the pt. where flocks of 30-120 congregate
Royal Tern ( <u>Sterna maxima</u> )	P, L, CB, EN, MB	common at the pt. flocks of 50-150 congregate
Caspian Tern ( <u>Sterna caspia</u> )	P, L	occ. a few with flocks of Royal & other terns
Little (Least) Tern ( <u>Sterna albifrons</u> )	P, L, MB, CB	flocks of 30-100 in summer defending pt. territory
Common Tern ( <u>Sterna hirundo</u> )	P, L, MB, CB	fairly common at the pt. in fall
Forster's Tern ( <u>Sterna forsteri</u> )	P	occ. a few with other terns at the pt.
Black Tern ( <u>Sterna niger</u> )	P, L	regularly during Jul/Aug at the pt.
Black Skimmer ( <u>Rynchops niger</u> )	P, L, MB	regularly in pairs or of 3-12, with immatures
Great Blue Heron ( <u>Ardea herodias</u> )	P, L, MB, EN	common along a variety littoral & in shallow water
Little Blue Heron ( <u>Florida caerulea</u> )	L, P	fairly common at the edge of lagoons and shore at the pt.
Tricolor (Louisiana) Heron ( <u>Hydranassa tricolor</u> )	L, P	occ. in the main lagoon & shore at the pt.

Yellow-crowned Night Heron ( <u>Nyctanassa violacea</u> )	P, L, RT	fairly common in shallows; occ. in dune swales
Great Egret ( <u>Casmerodius albus</u> )	P, L, MB, EN	commonly noted but only a few; at shores & lagoon
Snowy Egret ( <u>Egretta thula</u> )	P, L, MB, EN	common along shores
Reddish Egret ( <u>Dichromanassa rufescens</u> )	L, P	common in shallows
Cattle Egret ( <u>Bubulcus ibis</u> )	RT	noted once in flooded grass next to radio shack
Clapper Rail ( <u>Rallus longirostris</u> )	L	occ. at the edge of the main lagoon
American Oystercatcher ( <u>Haematopus palliatus</u> )	P, MB	occ. in summer; max # of 6 together in Aug
Black-bellied plover ( <u>Pluvialis squatarola</u> )	P, L, MB, EN, CB	common at shores, shallows, and at times in open sand
Ruddy Turnstone ( <u>Arenaria interpres</u> )	P, L, MB, CB, EN	common at a variety of littoral habitats
Semipalmated plover ( <u>Charadrius semipalmatus</u> )	P, L, MB, CB, EN	common at main lagoon and along main beach shore
Piping Plover ( <u>Charadrius melodus</u> )	P, L, MB, CB, EN	common from Aug on, especially at the pt.
Wilson's Plover ( <u>Charadrius wilsonia</u> )	P, L	up to 6 birds at the shore and mudflat on the pt.

Snowy Plover ( <u>Charadrius alexandrinus</u> )	P, L, MB,	up to 6 birds at the pt.; also along wide open beach
Killdeer ( <u>Charadrius vociferus</u> )	P	only once in Nov. (a pair)
Short-billed Dowitcher ( <u>Limnodromus griseus</u> )	P, L	occ. at the pt.
Red Knot ( <u>Calidris canutus</u> )	P	small, confiding parties in late Dec and early Jan
Marbled Godwit ( <u>Limosa fedoa</u> )	P, L, MB	occ. at the pt. and along beach shores
Whimbrel ( <u>Numenius phaeopus</u> )	MB, L	occ. along shorelines
Willet ( <u>Catoptrophorus semipalmatus</u> )	P, L, MB, CB, EN	common along shorelines and shallow mudflats
Lesser Yellowlegs ( <u>Tringa flavipes</u> )	P, L	fairly common at the pt.
Solitary Sandpiper ( <u>Tringa solitaria</u> )	P, CB, EN	occ. in late summer and fall
Stilt Sandpiper ( <u>Micropalama himantopus</u> )	P	once at the pt. in Nov
Sanderling ( <u>Calidris alba</u> )	P, CB, EN	recorded at shoreline in Nov
Dunlin ( <u>Calidris alpina</u> )	P	occ. in winter along the shoreline
Least Sandpiper ( <u>Calidris minutilla</u> )	P, L, MB, CB, EN	apparently common (difficult to separate)
Western Sandpiper ( <u>Calidris mauri</u> )	P, L, MB, CB, EN	apparently common (difficult to separate)

Northern Harrier ( <u>Circus cyneus</u> )	RT	once over marsh & grass in Oct
Swainson's Hawk ( <u>Buteo swainsoni</u> )	CD	twice in Oct (once with Audubon Soc. members)
Bald Eagle ( <u>Haliaeetus leucocephalus</u> )	CD	occ.; perches in tall deadwood of the compound
Osprey ( <u>Pandion haliaetus</u> )	P, L, EN, CB	fairly common, often perched in tall dead pines of EN
Turkey Vulture ( <u>Cartartes aura</u> )	P, L, MB, EN, CD	common scavenger
American Kestrel ( <u>Falco sparverius</u> )	CD	occ.
Merlin ( <u>Falco columbarius</u> )	CD	a pair once in Oct
Great Horned Owl ( <u>Bubo virginianus</u> )	CD	regularly noted in tall pines Jul-Oct
Barred Owl ( <u>Strix varia</u> )	CD	once in Dec along paved road leading to compound
Mourning Dove ( <u>Zenaida macroura</u> )	CD, P	occ. in late summer
Ground Dove ( <u>Columbina passerina</u> )	P, CD, MB, EN	common in dune swales and open grass
Belted Kingfisher ( <u>Megaceryle alcyon</u> )	P, CD, CB	fairly common, sometimes hunts atop KEEP OUT signs
Common Flicker ( <u>Colaptes auratus</u> )	EN	once in pine forest inland

Red-bellied Woodpecker ( <u>Melanerpes carolinus</u> )	CD, EN	fairly common in pines
Eastern Phoebe ( <u>Sayornis phoebe</u> )	RT	fairly common in low trees and scrub
Eastern Kingbird ( <u>Tyrannus tyrannus</u> )	CD	fairly common in pine trees
Cliff Swallow ( <u>Pterochelidon pyrrhonota</u> )	P, RT	regularly noted over grassy swales and beach scrub
Barn Swallow ( <u>Hirundo rustica</u> )	P, RT, L	common over grassy swales and dunes; also along shores
Fish Crow ( <u>Corvus ossifragus</u> )	P, L, CB	regularly observed and heard
American Crow ( <u>Corvus brachyrhynchus</u> )	P, CD, CB	commonly noted
Blue Jay ( <u>Cyanocitta cristata</u> )	CD, RT	common in adjoining forest and scrub
Carolina Chickadee ( <u>Parus carolinus</u> )	CD	in forest scrub adjacent to compound
Ruby-crowned Kinglet ( <u>Regulus calendra</u> )	RT	in pine & scrub forest inland from radio tower
Brown Thrasher ( <u>Toxostoma rufum</u> )	RT	fairly common in dense scrub
Gray Catbird ( <u>Dumetella carolinensis</u> )	RT	common in shrubs and thickets
Northern Mockingbird ( <u>Mimus polyglottos</u> )	CD, RT, EN	commonly noted
Eastern Bluebird ( <u>Sialia sialis</u> )	CD	once, a threesome in Dec

White-eyed Vireo ( <u>Vireo griseus</u> )	RT	common in low thickets
Yellow-rumped Warbler ( <u>Dendroica coronata</u> )	RT	fairly common on migration and in early winter
Palm Warbler ( <u>Dendroica palmarum</u> )	RT	fairly common on migration and in early winter
Nashville Warbler ( <u>Vermivora ruficapilla</u> )	P, CD	twice on migration; found in dune vegetation on pt.
Red-winged Blackbird ( <u>Agelaius phoeniceus</u> )	P, L, MB, CD	commonly noted
Eastern Meadowlark ( <u>Sturnella magna</u> )	CD	once in Nov; common in late Dec & early Jan
Scarlet Tanager ( <u>Piranga olivacea</u> )	CD	flying overhead while on migration in Oct
Northern Cardinal ( <u>Cardinalis cardinalis</u> )	CD, RT	common in forest and scrub
Rufous-sided Towhee ( <u>Pipilo erythrophthalmus</u> )	RT	fairly common
Field Sparrow ( <u>Spizella pusilla</u> )	RT	once, in Dec
Song Sparrow ( <u>Melospiza melodia</u> )	RT	fairly common from Oct
Savannah Sparrow ( <u>Passerculus sandwichensis</u> )	P	fairly common in dune veg. from Oct
Sharp-tailed Sparrow ( <u>Ammodramus caudacuta</u> )	P	occ. in marsh grass & dune veg. from Oct

Key to Sites: EN = Eglin North (Stump Hole area)

CD = Coast Guard compound  
RT = Radio Tower southeast of CD  
L = Lagoons in the cape vicinity  
P = Point or southern extremity of the cape  
MB = Money Beach to cape shoreline