

BREEDING ECOLOGY OF PIPING PLOVERS
NESTING AT
CAPE COD NATIONAL SEASHORE, 1996

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ABSTRACT

Piping Plovers were monitored at 9 study beaches managed by the National Park Service at Cape Cod National Seashore. Observations of plovers began in early April and continued through August. Egg-laying began the fourth week of April and peak nesting occurred in mid-May and mid-June. Eggs began hatching in early June and peak hatching occurred the third week of June. This year, 77 pairs of plovers were observed at the 9 beaches. This represents a decrease of 6 (8%) pairs from 1995. Thirty-seven and 40 pairs of plovers were observed in the South and North districts, respectively. Hatching success was 38% (range 0% - 79%). Fledging success was 46% (range 0% - 100%). Productivity was 0.9 fledged chicks/pair (range 0 chicks/pair to 3.00 chicks/pair). Sixty-four percent of all nests initiated (n = 116) failed to hatch at least 1 egg. Predation by crows was the leading cause of failure, accounting for 27% (n = 20) of all nests lost. Predator exclosures were installed around 63% (n = 74) of all nests. Forty-six percent (n = 34) of exclosed nests successfully hatched. In contrast, 19% (n = 8) of unexclosed nests successfully hatched. Berm habitat was used as nesting habitat by plovers 43% (n = 50) of the time. This year, 24 pairs of plovers nested in the off-road vehicle (ORV) corridor. As these nests hatched, affected sections of the ORV corridor were closed. Maximum closures occurred in late July, when the South beach was completely closed to ORV's. By 9 August, the entire ORV corridor was opened, approximately one week later than in 1995.

ACKNOWLEDGEMENTS

Monitoring Piping Plovers at Cape Cod National Seashore is a large and ever-increasing task. As a result, cooperative efforts between a variety of organizational divisions is essential. While each district has personnel devoted to shorebird management, these personnel often work between districts as needs shift and problems arise.

Piping Plovers were monitored this year by: Ed Hoopes (Biological Technician), John O'Neill (Shorebird Ranger, North District), Jill Seale (Student Conservation Assistant, North District), Nora Sulzmann (Biological Technician, South District), Lloyd Oja (Shorebird Ranger, South District), Michele Breen (Student Conservation Assistant, South District), and Tyler Studds (Volunteer-In-Park). All of these individuals' assistance was greatly appreciated. North and South district supervisory Park Rangers Gene Valli and Dennis St. Aubin provided logistic and monitoring assistance throughout the season. Thanks are also due to Kyle Jones (Biologist) and Mike Reynolds (Chief of Natural Resources) for their logistic support.

INTRODUCTION

The Piping Plover (*Charadrius melodus*) is a Nearctic shorebird endemic to central and eastern North America. Three distinct populations exist; Great Lakes; Northern Great Plains; and Atlantic Coast. Both the Northern Great Plains and Atlantic Coast populations were federally listed in 1986 as threatened (Federal Register 1985). The Great Lakes population was listed as endangered.

Plovers on the Atlantic coast traditionally nest from the Maritime provinces of Canada south to the North Carolina/South Carolina state line. The Atlantic coast population is currently estimated at approximately 1350 pairs, up significantly from the 790 pairs estimated in 1985. It is believed that the population has declined significantly

since the 1940's, mostly due to loss of habitat from development, increased human recreational use of the coastal zone, and, to a lesser extent, natural habitat loss (U.S. Fish and Wildlife Service 1996).

The first concerted efforts to monitor Piping Plovers on the Atlantic coast were initiated in 1985. At that time, there were 139 pairs estimated nesting in the Commonwealth of Massachusetts. Also in 1985, the National Park Service (NPS) began a plover monitoring program and 18 pairs nested on Cape Cod National Seashore beaches managed by the NPS. Productivity that year was less than 1 chick fledged per pair (Table 1). Over the next several years, numbers of plovers nesting in the National Seashore decreased while numbers of plovers nesting in the state remained relatively stable. Eventually, numbers of nesting plovers rose significantly, both at Cape Cod National Seashore and throughout Massachusetts. However, in 1996, numbers of nesting plovers at Cape Cod National Seashore decreased 8% from 1995 numbers, the first decrease in nesting pairs since 1988. Productivity (number of chicks fledged per pair) at Cape Cod National Seashore ranged from 0.7 to 2.6 fledged chicks per pair during the same time period. Productivity this year was 0.9 fledged chicks per pair. This was the lowest productivity recorded since 1988. This year National Seashore staff took over the primary responsibility of monitoring nesting success on Plover Spit (formerly Plover Island), which is now an extension of Coast Guard Beach.

This report summarizes the 1996 nesting season at Cape Cod National Seashore. A variety of factors are discussed including seasonal chronology, productivity, limiting factors, and nesting habitat.

STUDY AREA

Piping Plover nesting and brood-rearing were monitored at 9 beaches in Cape Cod National Seashore from Provincetown to Orleans. These study beaches were divided among two districts: North (Wood End/Long Point, Race Point Beach North, Race Point Beach South, High Head (includes Head of the Meadow), and Ballston) and South (Great Island/Jeremy Point, Marconi Beach, and Coast Guard Beach). These sites were described in Meisel (1991) and Brown and Hoopes (1993).

METHODS

Observations of Piping Plovers began on 1 April at the time of plover arrival and territory establishment and continued through August when plovers were observed on their southward migration. In April, during the period of the plovers' arrival and courtship, most beaches were visited three to four times per week. Exceptions were Wood End/Long Point, Ballston, and Great Island, which were monitored approximately once per week. Once nests were established, all beaches were visited almost daily (≥ 5 times per week) except for Long Point and Ballston, which were visited 4 times per week. During each visit to a beach, the person monitoring searched for new nests. A variety of information was collected at each site and included: 1) sex of bird incubating the nest, 2) signs of predation, 3) locations and behavior of adults and chicks, and 4) number and location of chicks in each brood.

The 9 beaches where plover monitoring occurred are dispersed over approximately 70 km (30 mi) of beach. To access these sites, varying methods were used. In the North District, four-wheel-drive (4WD) vehicles and all-terrain vehicles (ATVs) were used to access all sites. Once chicks hatched out, however, ATVs were the preferred conveyance for most beaches, especially Wood End/Long Point. In the

South District, Great Island was accessed by ATVs, 4WD, and on foot. Marconi and Coast Guard beaches were accessed primarily on foot.

Each nest or nesting area was protected by symbolic fencing. Predator exclosures were installed around plover nests within 1 day of clutch completion. Tops of all exclosures were strung at the time the exclosure was installed (stringing process described in Brown and Hoopes 1993) rather than waiting a day or two after installation. Plastic poultry netting (mesh size 0.75" - 1.5") was used to top exclosures at all nesting beaches after repeated nest predation in exclosures with cotton twine tops was encountered.

Since the U.S. Fish and Wildlife Service banding moratorium in 1989, numbers of color-banded plovers observed at Cape Cod National Seashore have decreased. This year, 2 banded plovers nested at the 9 study beaches (Appendix A).

RESULTS AND DISCUSSION

Seasonal Chronology

Plovers were first observed at Cape Cod National Seashore beaches on 16 March and most study beaches had plovers present by mid-April. Plovers continued to arrive at the sites into mid-June. It is likely that some of these later arriving birds may have lost nests at other sites before moving to National Seashore beaches.

Egg-laying began in the fourth week of April for the South District and first week of May for the North District (Appendix B). Peak nesting for the Seashore occurred during the third week of May and second week of June (Fig. 1). Latest nest initiation occurred on 29 June at Marconi Beach and High Head. Peak nesting for the National Seashore this year was not consistent with the patterns exhibited in past years. Plover nesting patterns rarely have a bi-modal distribution such as exhibited this year. These

two peaks were produced due to heavy predation by crows and red foxes and relatively high abandonment of nests (12 nests abandoned or 16% of total nests).

Peak hatching for the National Seashore occurred during the third week of June (Fig. 1). Hatching dates ranged from 6 June to 11 July. Fledging dates ranged from 30 June to 7 August. These dates are comparable between districts and years.

Productivity

Seventy-seven pairs of Piping Plovers were monitored at 9 sites in Cape Cod National Seashore (Table 2). This represents approximately 16% of the total breeding population of Massachusetts. Preliminary figures estimate the state population in 1996 was approximately 480 pairs. Numbers of nesting plovers at the 9 sites monitored decreased by 8% from 1995 but still were up 427% since monitoring began in 1985. Marconi Beach had 2 more pairs than last year, while numbers of nesting pairs at all other sites decreased by ≥ 1 pairs except for Coast Guard and Ballston beaches, which maintained the same number of pairs as in 1995. The overall decrease observed at the National Seashore is not significant and simply reflects annual changes in nest distribution. The greatest decrease in numbers of nesting pairs since 1995 occurred at Race Point North Beach, where numbers declined from 16 to 10 pairs, exactly as many as there were in 1994.

Hatching success (total number of eggs hatched/total number of eggs laid) for all sites combined was 38% and ranged from 0% to 79% (Table 2). Overall, hatching success was the lowest recorded since wide-scale use of predator exclosures was initiated. Ballston Beach (79%) and Coast Guard Beach (76%) had the highest hatching success; while Race Point North (0%) and Long Point (6%) had the lowest hatching success (Table 2). The relatively low hatching success recorded at Race Point

North and South beaches and Long Point was attributable to predation by crows and red foxes. Twenty-three percent (9 of 40) of the nests that hatched left 1, 2, or 3 eggs in the scrape. This is higher than previous years (1994, 19%; 1995, 15%, Hoopes 1994, 1995). Partially hatched clutches may reflect younger, less experienced birds' attempts at nesting or may be due to environmental conditions at the time the eggs were produced or during incubation.

Fledging success (total number of chicks fledged/total number of eggs hatched) for all sites combined was 46% and ranged from 0% to 100% (Table 2). Overall, fledging success decreased 15% from 1995. Ballston Beach (100%) and High Head (87%) had the highest fledging success; while Race Point North and Long Point (0%) and Coast Guard (19%) had the lowest fledging success (Table 2). Fledging success at Ballston Beach typically has been high. Fledging success for that site should be viewed with caution, however, because there were only 3 nesting pairs. Coast Guard Beach fledging success was 26% lower than in 1995, and typically has had lower fledging success than other sites.

Productivity (number of chicks fledged/nesting pair) for all sites was 0.9 (68 chicks fledged from 77 pairs) and ranged from 0 to 3.0 (Table 2). Overall, productivity decreased from 1995 by 50%. In fact, it is the lowest productivity figure reported at Cape Cod National Seashore since 1988. Ballston Beach (3.00) and High Head (2.60) had the highest productivity; while Race Point North and Long Point (0.00) and Marconi Beach (0.60) had the lowest productivity (Table 2). Productivity at Cape Cod National Seashore in 1996 was far below productivity statewide and the 12 year National Seashore average of 1.6. Preliminary data suggests 1996 productivity for the state was 1.5 (S. Melvin, personal communication).

Nest Loss

Sixty-four percent (75 of 116 nests) of all nests initiated failed to hatch at least 1 chick (Table 3). Predation by crows was the leading cause of nest loss, accounting for 20 (27%) of all nests lost (Table 3). Abandonment and predation by red foxes were the second and third leading causes of nest loss (16% and 13% of total nests lost, respectively). If 5 additional nests abandoned due to repeated visits of red foxes are counted as direct loss to red fox, then red fox would be the second leading cause of nest loss in the National Seashore in 1996 (n = 15 nests, 20%). All sites, except Plover Spit, had one of the above factors as the leading or second leading cause of nest failure. Race Point Beach North and South had the highest numbers of nests lost, each had 20 nests lost. Approximately 27% of the losses at these sites were attributable to crows. Nest loss at Coast Guard Beach was reduced by more than 50% from 1995. Coast Guard Beach has a history of fox presence (Hoopes et al. 1987), but this was not a major factor in nest loss at this site in 1996. However, foxes were a major problem at Race Point Beach North and the northernmost 2 miles of Race Point Beach South. Red foxes accounted for 30% (12 of 40 nests, includes 4 nests abandoned due to red fox activity) of all nests lost at these sites. Increased red fox activity on these beaches may be due in part to the absence of the Eastern coyote (*Canis latrans*) and the anthropogenic sources of den sites that abound in the vicinity of Race Point Ranger Station and Old Harbor Lifesaving Station. Correcting these artificial sources of den sites should be top priority for National Seashore management. Coyotes and coyote tracks were not observed on study beaches where they had been observed in previous years.

Predator Exclosures

Predator exclosures were installed around 74 of the 117 (63%) nests. Of the 74 exclosed nests, 34 (46%) successfully hatched young. Of the 40 exclosed nests that did not hatch, 10 (25%) failed due to crow predation, 10 (25%) were abandoned, 6 (15%) were lost to red fox, and 14 (35%) were lost to other factors (Table 4). Mesh-topped exclosures successfully hatched eggs more often than string-topped exclosures (Table 4). In 1996, far fewer unexclosed nests successfully hatched young, compared to exclosed nests. In almost all situations, mesh-topped exclosures prevented avian predation of plover nests. In only one case did mesh-topped exclosures fail to protect eggs from avian predation. In this case a side of the netting had come undone and provided access into the exclosure. Mesh-topped exclosures did not, however, prevent mammalian predation. In several instances, exclosure height was increased to 5 - 6 feet above ground and depth buried was increased to 8 inches. Red foxes could not tunnel under the exclosure but had no problem climbing or jumping into the exclosures and eating the eggs through the netting. Of the 43 unexclosed nests, 35 (81%) failed to hatch. Of these, 11 (31%) were lost to crow, 9 (26%) were lost to unknown causes, 6 (17%) were lost to overwash, and 9 (26%) were lost to other factors (Table 4). In most of these cases, nests were lost prior to clutch completion. In the future, every effort should be made to exclose nests on the day the clutch is completed. To prevent avian predation, exclosures should be topped with mesh instead of string, unless managers know for certain avian predation is not a major threat.

Mortality

Chick mortality factors were extremely difficult to assess. Most of the time, when chicks are lost, there is no evidence as to what happened. A chick was presumed dead

only when it was never seen again before the remainder of the chicks in the brood fledged. A brood was considered lost only when there was no sign of the chicks after three consecutive days of searching. Most chick mortality at the 9 sites occurred within the first 10 days after hatching, but there was one case at Coast Guard Beach where a chick was lost after 18 days. This pattern is consistent with data from previous years (Brown and Hoopes 1993, Hoopes 1994, 1995). Three chicks were found dead this year. Although actual causes of these deaths are unknown, the presumed cause is exposure. Additionally, on 15 July, 1 chick from a brood of 3 was observed being taken by a Great Black-backed Gull (*Larus marinus*). At Race Point North and South beaches, red foxes and fox tracks were routinely observed at these sites. In contrast to previous years, raptors (e.g., American Kestrels, *Falco sparverius*, and Merlins, *F. columbarius*) did not appear to be a factor in chick mortality. In fact, few raptors were observed on the beaches during the chick-rearing stage. There were no known cases of adult mortality at Cape Cod National Seashore this year.

Nesting Habitat

Nesting habitat for 117 nests was categorized according to the macrohabitat types defined by MacIvor (1990). Berm habitat was used for nesting 43% of the time, the same as in 1995 (Table 6). The next most utilized habitats for nesting were foredune (34%) and overwash (19%, Table 6). Overwash continued to be the primary nesting habitat of Piping Plovers at Coast Guard Beach and was used exclusively at Plover Spit, although other nesting habitats are in relatively low abundance there. This trend has continued throughout the 12 years that monitoring has been conducted at Coast Guard Beach. Berm habitat was used for 59% of the nesting attempts by Piping Plovers at Race Point Beach South (Table 6).

ORV Management

ORV management, as it relates to plover management at Cape Cod National Seashore, is a dynamic process. This year, 24 pairs of plovers nested along the ORV corridor (9 fewer pairs than in 1995). As these nests hatched, affected sections of the ORV corridor were closed to vehicles (Appendix C). Closures were imposed only when eggs hatched and closures were kept in effect through the chick-rearing stage until fledging. Due to severe egg predation by crows and red foxes, Race Point Beach North was not closed this year. Hence, the powerline route was not opened for vehicle access to the Race Point Light area. The north self-contained area was placed at the entrance of Race Point Beach North, early in the season, thereby preventing having to move it during the peak hatch and when more people were using the area. The traditional self-contained area continues to have a relatively high concentration of nesting plovers. This site was used for nesting by 4 pairs this year and is one of the first sites plovers establish territories in early April. It is probably wise to continue setting up the self-contained area at the entrance to the North Beach early in the season, before plover nests begin to appear and chicks hatch. The entire South Beach was closed for 12 days between 21 July and 2 August. As chicks fledged, portions of the ORV corridor were opened. On 2 August, approximately 2.3 miles of beach were opened (from High Head entrance) with other portions opening gradually. By 9 August, the entire South Beach was opened to ORV traffic. This was about a week later than in 1995 and was due to delayed nest initiation and severe predation in the northern 2 miles of the South Beach.

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Table 1. Number of Piping Plover breeding pairs and productivity on beaches managed by the National Park Service, Cape Cod National Seashore, 1985-1996.

Year	No. Pairs	Productivity ¹
1985	18	0.7
1986	16	0.3
1987	15	0.4
1988	13	0.9
1989	15	1.4
1990	15	2.6
1991	28	2.6
1992	43	2.4
1993	60	2.1
1994	72	2.5
1995	83	1.8
1996	77	0.9

¹ Number of chicks fledged per pair

Table 2. Number of Piping Plover breeding pairs, hatching and fledging success, and nest productivity, by nesting beach, Cape Cod National Seashore, 1996

Site	No. Breed Pairs	No. Eggs/Site ¹	No. Eggs Hatch ¹	No. Chicks Fledge	Hatch Succ. ^{1,2}	Fledge Succ. ³	Prod. ⁴
Plover Spit	7	34	17	5	.50	.29	0.71
Coast Guard Beach	9	42	32	6	.76	.19	0.67
Marconi Beach	12	54	21	7	.39	.33	0.58
Great Island	9	43	26	8	.61	.31	0.89
Ballston Beach	3	13	9	9	.69	1.00	3.00
High Head	5	19	15	13	.79	.87	2.60
Race Point South	14	85	26	20	.31	.77	1.43
Race Point North	10	64	0	0	0	0	0
Wood End/Long Point	8	35	2	0	.06	0	0
Total	77	389	148	68	.38	.46	0.88

¹ Includes renests

² Total number of eggs hatched/total number of eggs laid

³ Total number of chicks fledged/total number of eggs hatched

⁴ Number of chicks fledged per pair

Table 3. Causes of Piping Plover nest failures, by nesting beach, Cape Cod National Seashore, 1996.

Site	Total No. Nests	Cause of Failure	No. (%) ¹ Failed	Total No. Failed	% Total Failed
Plover Spit	9	Unknown Pred.	4 (100)	4 ²	44
Coast Guard Beach	11	Crow	1 (33)	3	27
		Unknown Pred.	1 (33)		
		Overwash	1 (33)		
Marconi Beach	16	Crow	3 (30)	10	63
		Unknown Pred.	2 (20)		
		Abandoned	2 (20)		
		Prob. crow	1 (10)		
		Overwash	1 (10)		
		Unknown	1 (10)		
Great Island	11	Red Fox	1 (20)	5 ³	45
		Prob. fox	1 (20)		
		Gull spp.	1 (20)		
		Overwash	1 (20)		
		Abandoned	1 (20)		
Ballston Bch.	4	Crow	1 (100)	1	25
High Head	6	Crow	1 (50)	2	33
		Abandoned	1 (50)		
Race Point South	29	Crow	6 (30)	20	69
		Red Fox	4 (20)		
		Overwash	4 (20)		
		Gull spp.	2 (10)		
		Abandoned	2 (10)		
		Unknown	2 (10)		
Race Point North	20	Crow	5 (25)	20	100
		Red Fox	4 (20)		
		Abandoned (fox)	4 (20)		
		Unknown Pred.	3 (15)		
		Abandoned ²	2 (10)		
		Gull spp.	1 (5)		
		Overwash	1 (5)		

Table 3 Continued

Site	Total No. Nests	Cause of Failure	No. (%) ¹ Failed	Total No. Failed	% Total Failed
Wood End/Long Point	10	Abandoned	4 (40)	10	100
		Crow	3 (30)		
		Red Fox	1 (10)		
		Abandoned (Fox)	1 (10)		
		Overwash	1 (10)		
Total	116	Crow	20 (27)	75	64
		Abandoned	12 (16)		
		Red Fox	10 (13)		
		Overwash	9 (12)		
		Unk. Pred.	7 (9)		
		Unknown	6 (8)		
		Abandoned (fox)	5 (7)		
		Gull spp.	4 (5)		
		Prob. Red Fox	1 (1)		
		Red Crow	1 (1)		

¹ Percent total of failed nests at that site.

² Two of the nests lost eggs over a 1-2 week period, entire clutch not taken at one time.

³ Nest of 5 eggs was partially (3 eggs) predated by gull 1 day prior to hatching. Other 2 eggs hatched, did not fledge.

Table 4. Fates of exclosed and unexclosed Piping Plover nests, Cape Cod National Seashore, 1996.

Status	No. Nests	No. (%) Hatched	No. (%) Unhatched	Reason for Failure	No. (%) Failures
Exclosed	74	34 (46)	40 (54)	Crow	10 (25)
				Abandoned	10 (25)
				Red Fox	6 (15)
				Unknown	5 (13)
				Aban. (fox)	5 (13)
				Prob. Gull	2 (5)
				Prob. Crow	1 (3)
				Overwash	1 (3)
Mesh	33	18 (55)	15 (45)	Abandoned	7 (47)
				Aban. (fox)	5 (33)
				Red Fox	2 (13)
				Crow	1 (7)
String	41	16 (39)	25 (61)	Crow	9 (36)
				Unknown	5 (20)
				Red Fox	4 (16)
				Abandoned	3 (12)
				Prob. Gull	2 (8)
				Prob. Crow	1 (4)
				Overwash	1 (4)
Unexclosed	43	8 (19)	35 (81)	Crow	11 (31)
				Unknown	9 (26)
				Overwash	6 (17)
				Red Fox	5 (14)
				Abandoned	2 (6)
				Gull spp.	2 (6)

Table 5. Nesting habitat of Piping Plovers, Cape Cod National Seashore, 1996.

Site	Berm	Foredune	Overwash	Interdune	Blowout	Total
Wood End/Long Point	6	2	2	1	0	11
Race Point North	8	10	0	0	2	20
Race Point South ¹	17	12	0	0	0	29
High Head	3	3	0	0	0	69
Ballston Beach	1	3	0	0	0	4
Marconi Beach	10	4	1	1	0	16
Great Island	2	5	3	1	0	11
Coast Guard Beach	3	1	7	0	0	11
Plover Spit	0	0	9	0	0	9
Total	50	28	22	3	2	117

¹ One nest not found before chicks hatched.

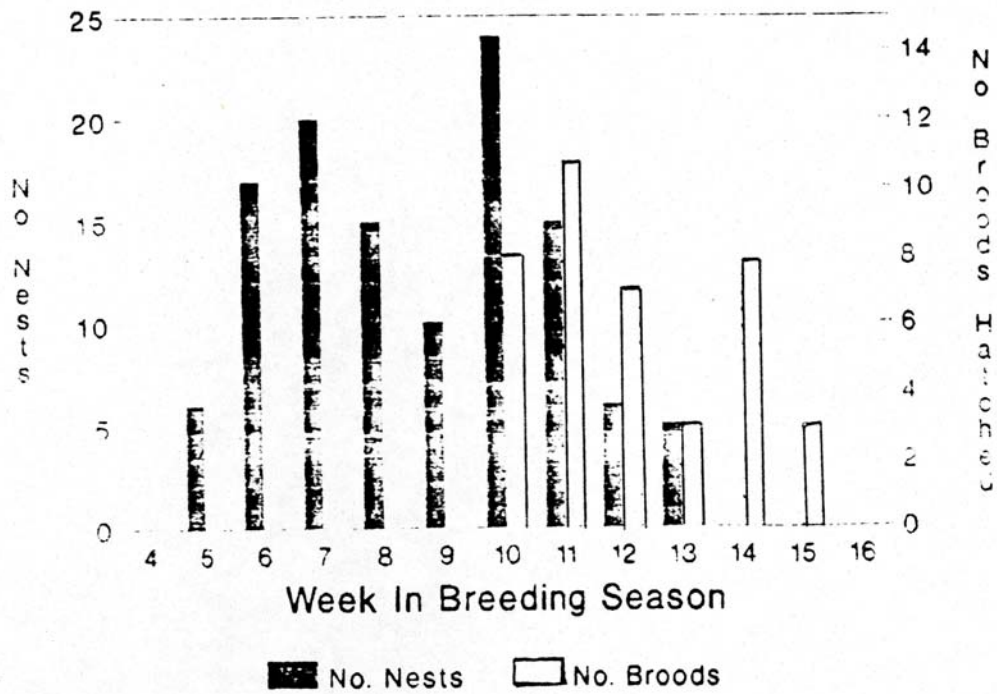


Figure 1. Peak nesting and hatching of Piping Plovers nesting on beaches managed by the National Park Service, Cape Cod National Seashore, 1996.

APPENDIX A

**Color-banded Piping Plovers nesting on beaches
managed by the National Park Service,
Cape Cod National Seashore, 1996**

The birds' left leg bands are read first, top to bottom, then the right leg bands are read, top to bottom. Adults and chicks were color-banded at Cape Cod National Seashore, and elsewhere throughout the state, from 1985 through 1988. Therefore, these 2 birds are at least 8 years of age.

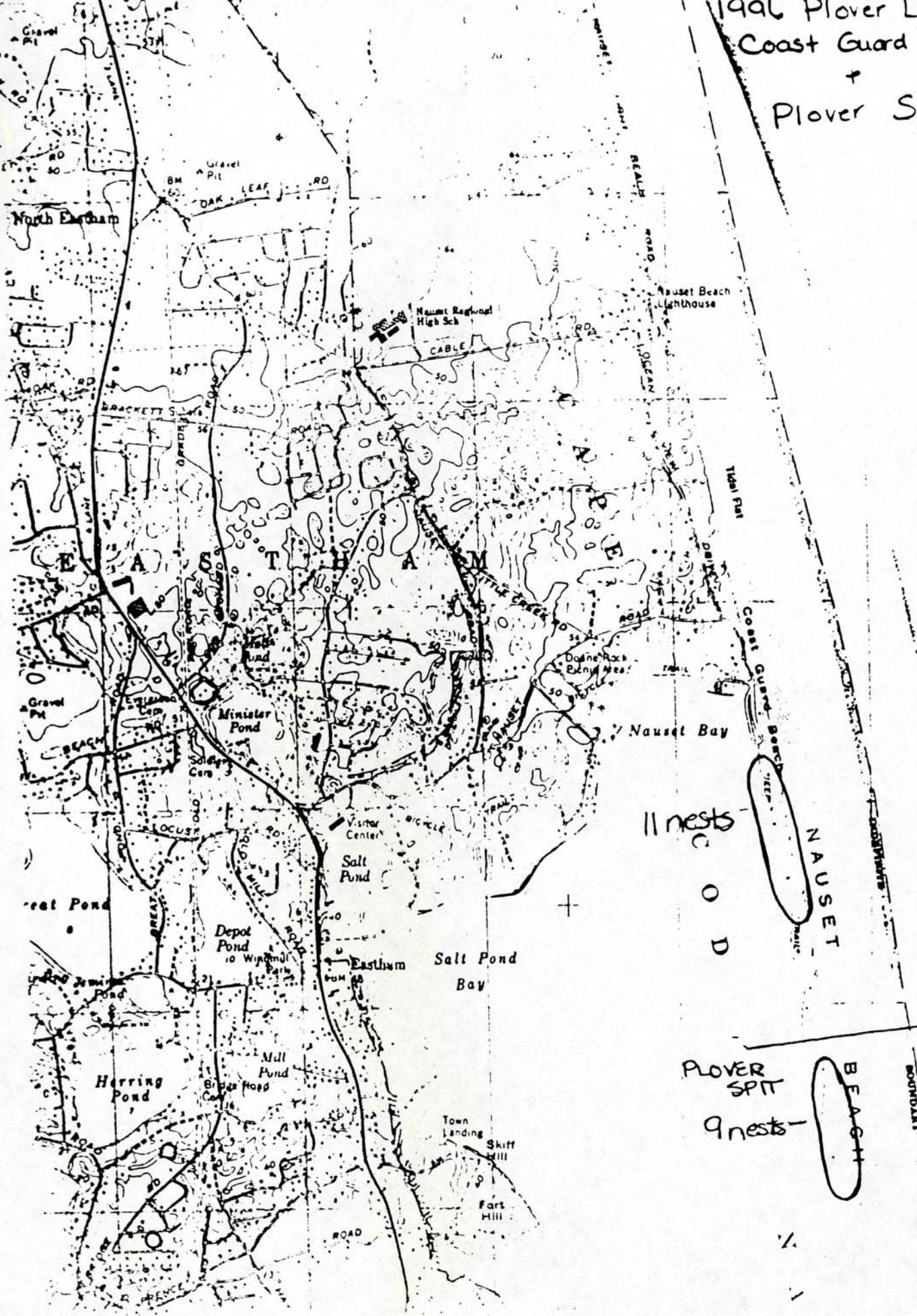
S: USFWS aluminum band
B: Black
_: no band

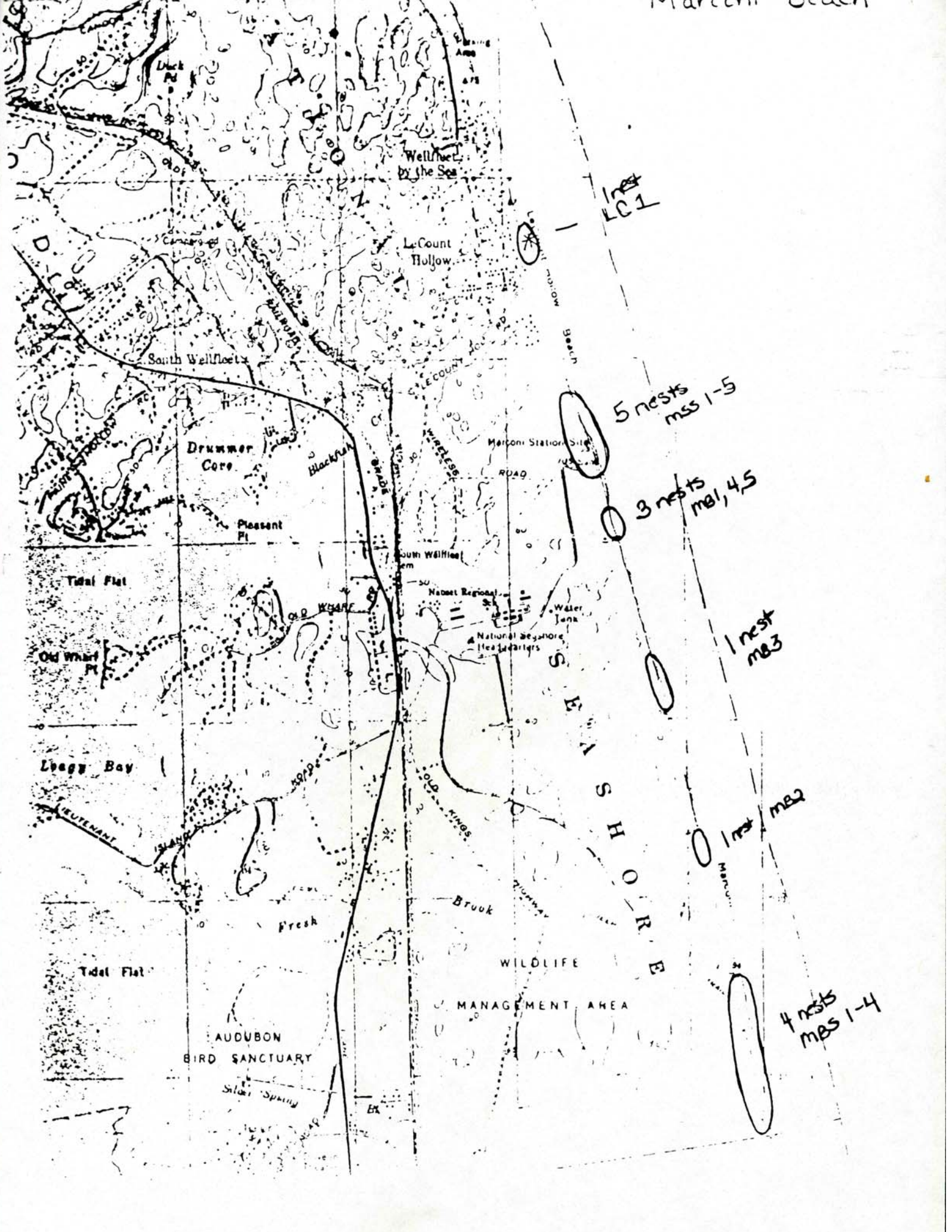
Color-bands	Sex	Nest Location	Nest Name
SB:_	M	Coast Guard Beach	M1
S:_	F	Coast Guard Beach	M1

APPENDIX B

**Piping Plover nest locations on beaches managed
by the National Park Service,
Cape Cod National Seashore, 1996**

1996 Plover Location
Coast Guard Beach
+
Plover Spit





~~LC1~~
LC1

5 nests
mss 1-5

3 nests
mb1, 4, 5

1 nest
mb3

1 nest
mb2

4 nests
mbs 1-4

AUDUBON
BIRD SANCTUARY

WILDLIFE
MANAGEMENT AREA

S
E
A
S
H
O
R
E

Wellfleet
by the Sea

LeCount
Hollow

South Wellfleet

Drummer
Core

Pleasant
Pt

Tidal Flat

Old Wharf
Pt

Leaky Bay

Tidal Flat

AUDUBON
BIRD SANCTUARY

Silver Spring

WILDLIFE

MANAGEMENT AREA

S
E
A
S
H
O
R
E

Wellfleet
by the Sea

LeCount
Hollow

South Wellfleet

Drummer
Core

Pleasant
Pt

Tidal Flat

Old Wharf
Pt

Leaky Bay

Tidal Flat

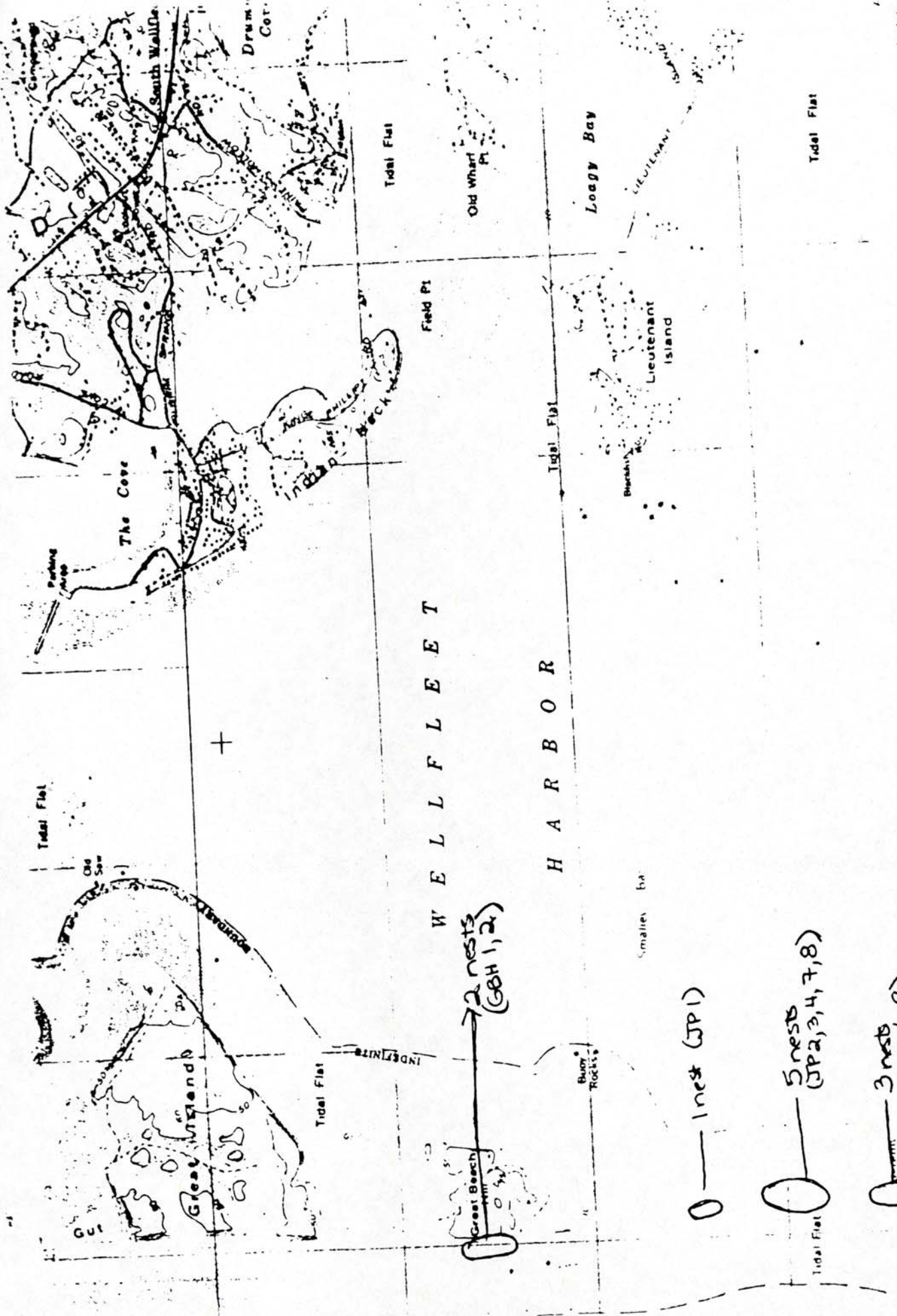
AUDUBON
BIRD SANCTUARY

Silver Spring

WILDLIFE

MANAGEMENT AREA

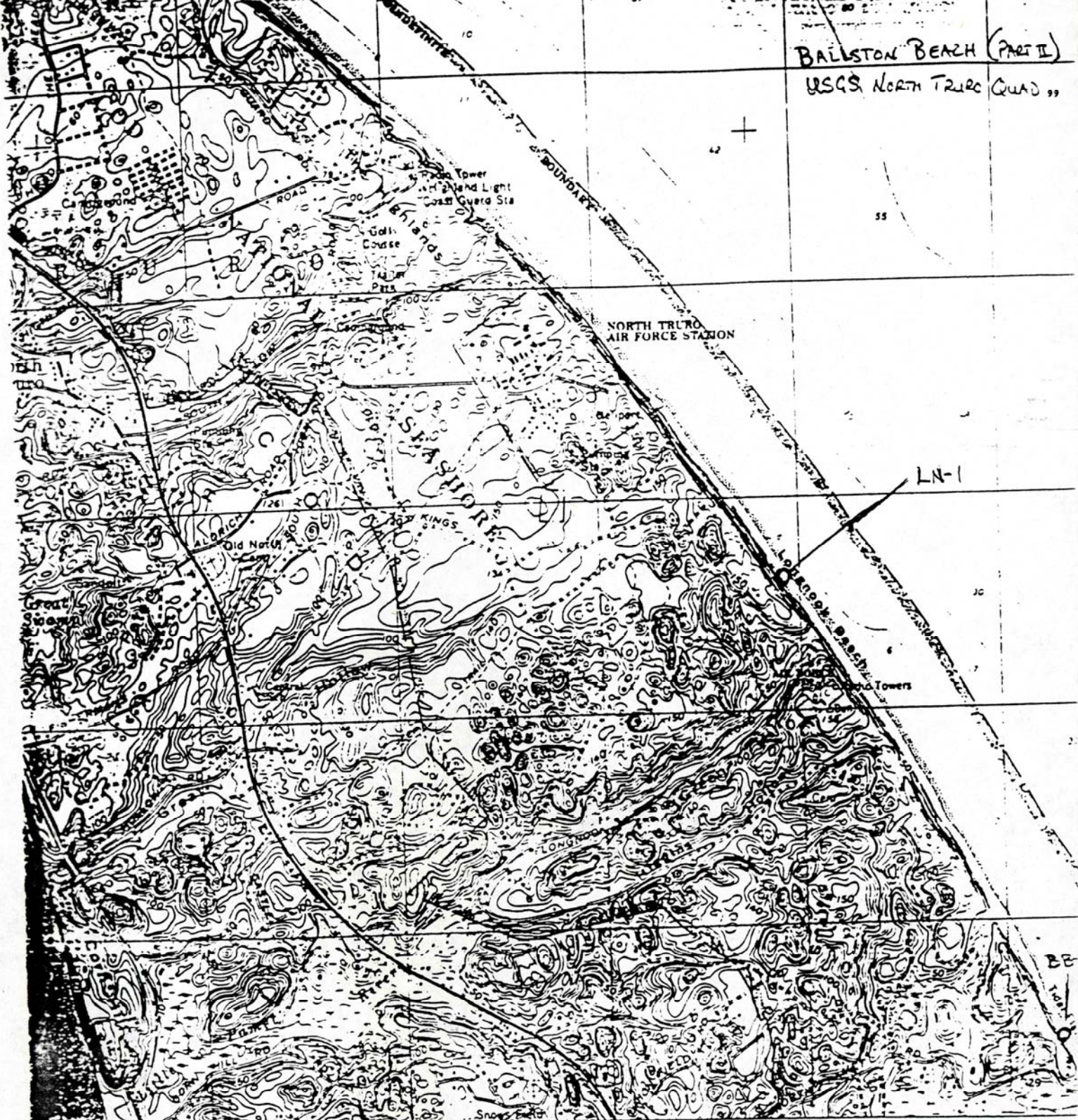
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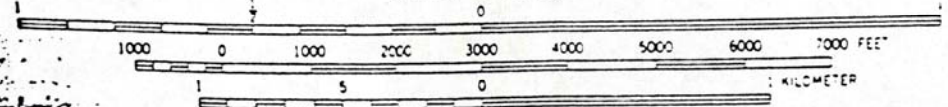
1996 Plover Locations
Great Island / Jeremy Pt.

BALLSTON BEACH (PART II)

USCS NORTH TRURO QUAD 99



(WELLFLEET)
6967 (INE)
SCALE 1:25 000



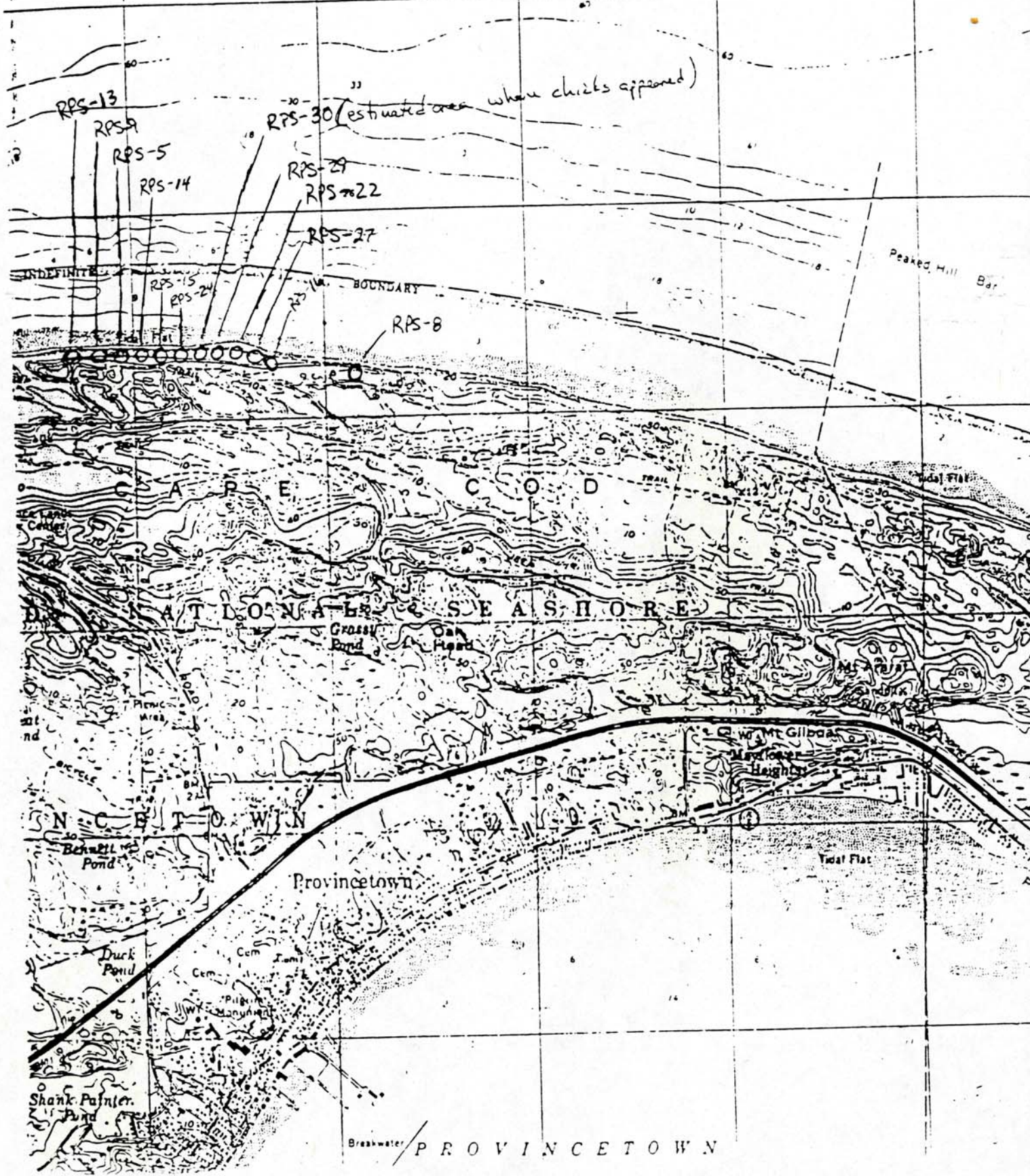
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

DEPTH CURVES AND SOUNDINGS IN FEET - DATUM IS MEAN LOW WATER
SHORELINE SHOWN APPROXIMATELY TO APPROXIMATE MEAN HIGH WATER

Primar
hard s
Secor
hard s

MASS

RACE POINT BEACH SOUTH (PART I)
USGS PROVINCETOWN QUAD



RPS-30 (estimated area where chicks appeared)

RPS-13
RPS-5
RPS-14

RPS-29
RPS-22
RPS-27

RPS-15
RPS-24

RPS-8

BOUNDARY

AT DONALD SEASHORE

Grassy Pond
Oak Head

Mt. Gilboa
Mayflower Heights

Provincetown

Breakwater / PROVINCETOWN

Shank Painter Pond

Duck Pond

Behrett Pond

Cem. Land
Pilgrim Monument

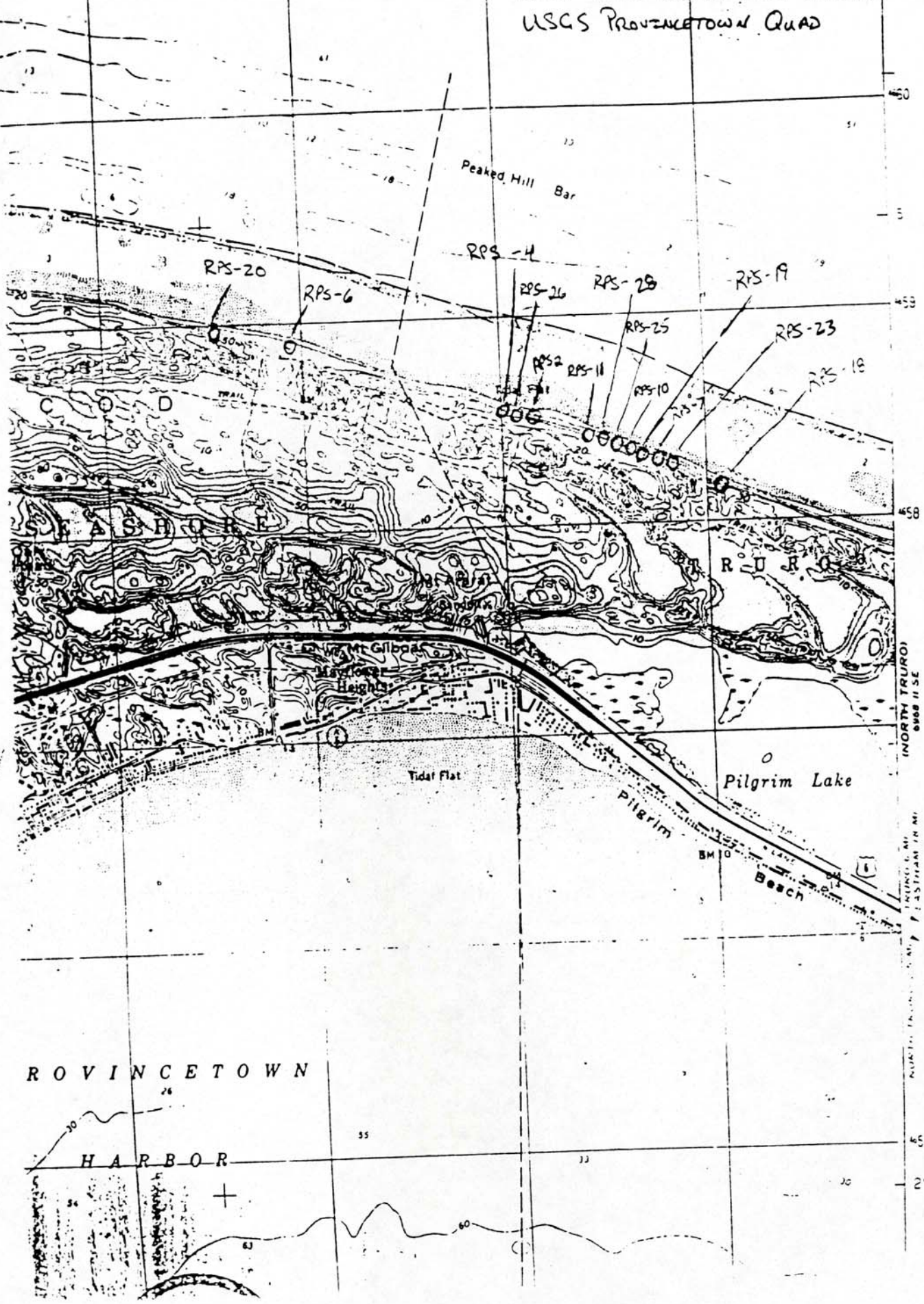
Tidal Flat

Peaked Hill Bar

Tidal Flat

KACE POINT BEACH SOUTH (PART II)
USGS PROVINCE TOWN QUAD

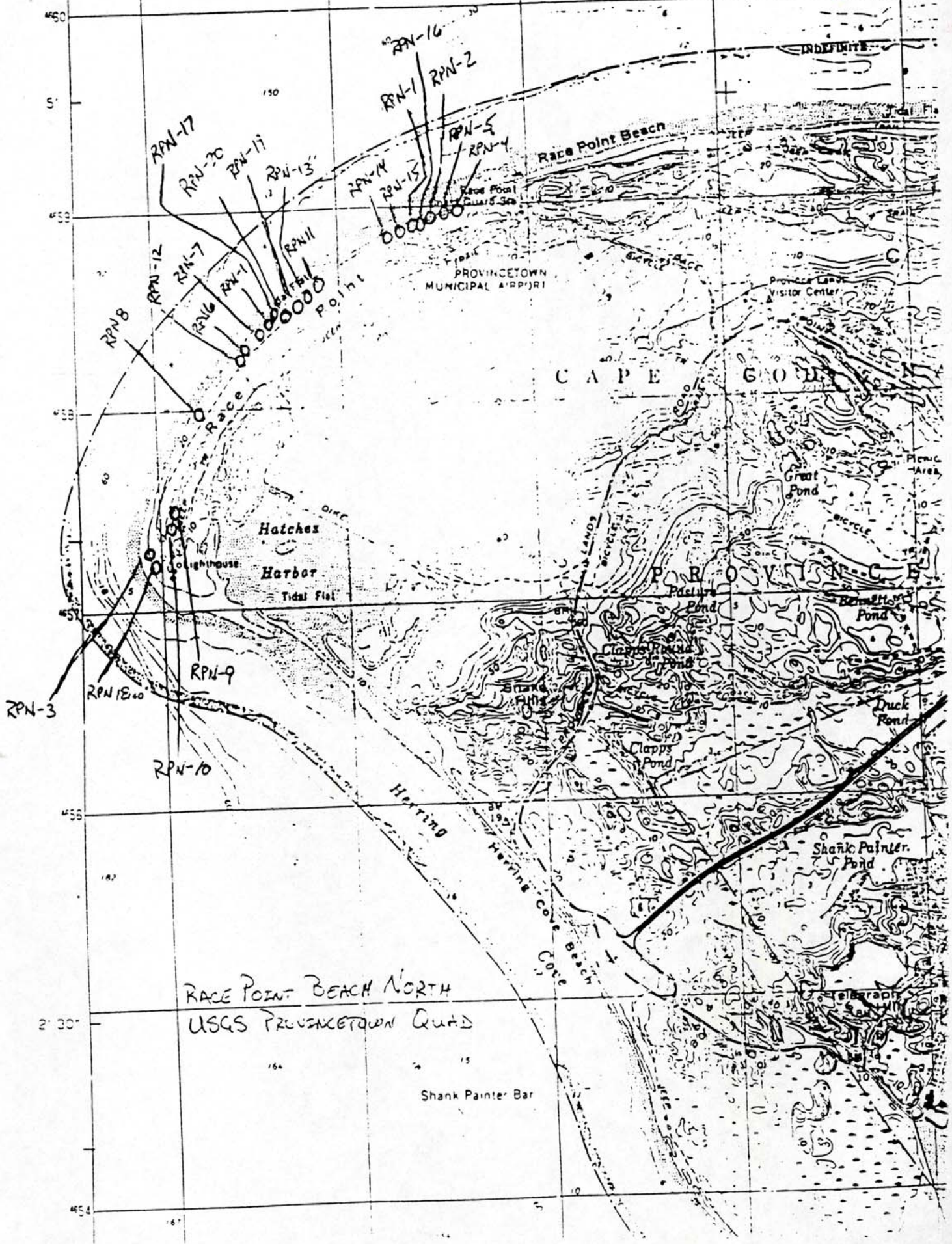
CONVERSION SCALES



Feet	Meters
1	3048
2	6096
3	9144
4	12192
5	15240
6	18288
7	21336
8	24384
9	27432
10	30480

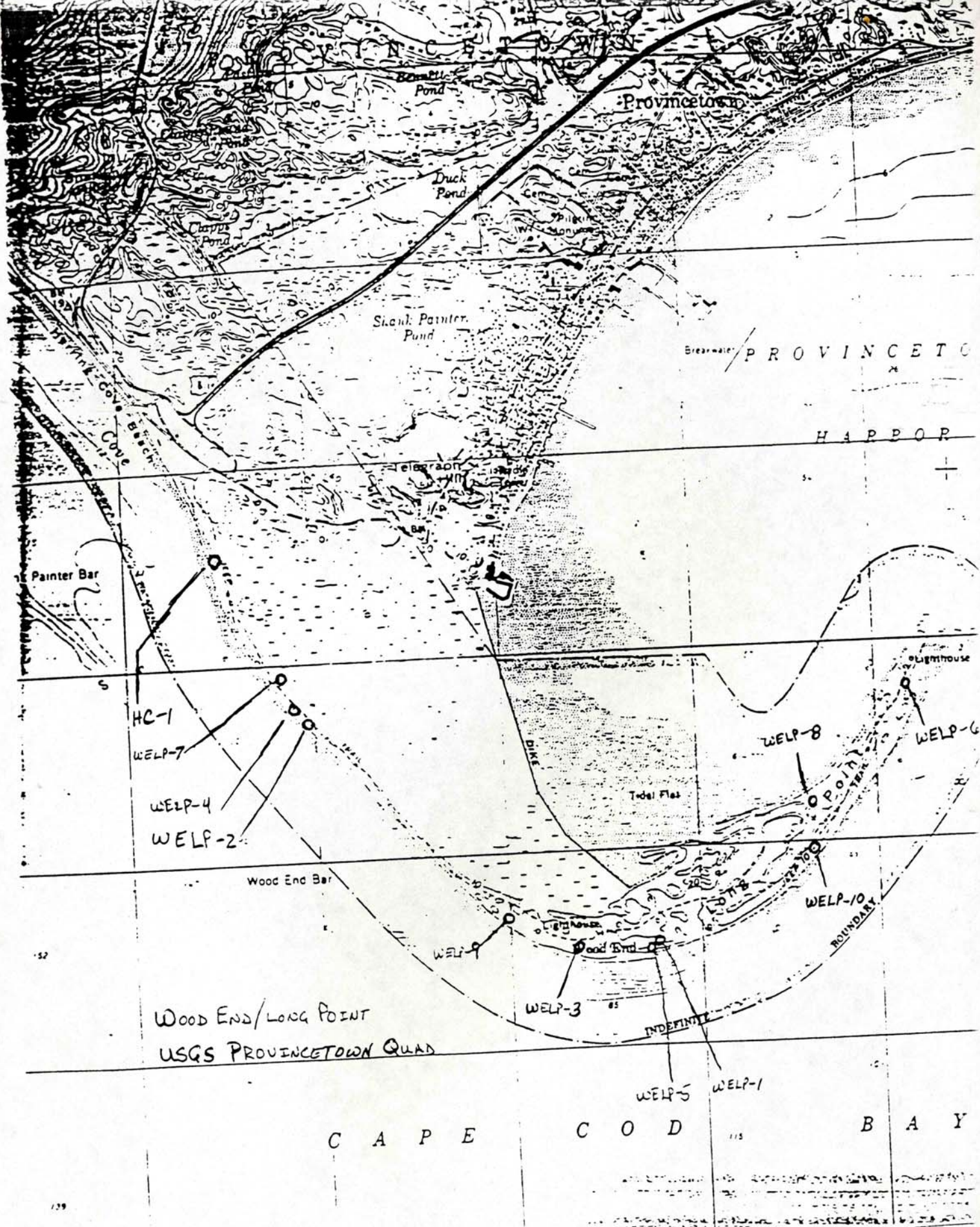


RICE JOHN RICH SANTI (RICE III)
USIS NORTH TAIWAN QUAD



RACE POINT BEACH NORTH
USGS PROVINCETOWN QUAD

Shank Painter Bar



WOOD END/LONG POINT
USGS PROVINCETOWN QUAD

C A P E C O D B A Y

APPENDIX C

**Dates of ORV corridor openings and closures,
Race Point North and South Beaches,
Cape Cod National Seashore, 1996**

<u>Date</u>	<u>Beach</u>	<u>Action</u>
15 April	Both	North and South beaches opened for the season. 0.1 mi of corridor around Race Point Light closed due to impassable beach configuration. High Head access and 0.25 mi north of the access are closed due to impassable beach configuration. North self-contained area set up at entrance to North Beach.
8 June	South	0.5 mi closed centered around Peaked Hill. Effectively closes 3.0 miles of beach because High Head remains closed due to cuts and scarps.
2 July	South	Additional 1.0 mi closed from south of Exit 8 to previous closure. Exit 9 closed to dune tours.
13 July	South	All but 0.5 mi of beach closed due to unexpected appearance of a brood on the beach. Chicks begin to move 1.0 mi into open ORV corridor, which remains open for now with constant monitoring by staff.
21 July	South	Remaining 0.5 mi of beach closed due to daily incursions of chicks into open ORV corridor. Not enough staff to provide amount of monitoring required to allow for ORV use and protect chicks. A 100 m section in front of Exit 8 is opened for dune tours to come down and turn around.
30 July	South	Dune tours allowed access to beach at Exit 9. Closed to tours and ORVs at Exit 8,
2 August	South	High Head access opened. Beach opened to ORV traffic from High Head to Exit 9.
9 August	South	Entire south beach opened.