

**BREEDING ECOLOGY OF PIPING PLOVERS NESTING AT  
CAPE COD NATIONAL SEASHORE - 1994**

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South Wellfleet, MA 02667

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## ACKNOWLEDGEMENTS

Monitoring 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 times work between districts as needs shift and problems arise. This was especially true in 1994 because of the severe cutbacks in staffing levels experienced at the beginning of the season.

Monitoring the plovers this year were: John O'Neill (Shorebird Ranger, North District), Vera Fruhafova (Student Conservation Assistant, North District), Laurie Whittaker (Volunteer-In-Park, North District), Russ Keyes and Mike Flynn (Shorebird Rangers, South District), Brandon Kibbe (Student Conservation Assistant, South District), and Laura Megyesi (Volunteer-In-Park, South District). All of these individuals' assistance was greatly appreciated. In addition, North and South District, respectively, Supervisory Park Rangers Gene Valli and Dennis St. Aubin provided monitoring and logistical assistance throughout the season. Thanks are also due Kyle Jones (Biologist) and David Crary (then Acting Chief of Natural Resources) for their logistical support.

**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 third week of April and peak nesting occurred in mid-June. Eggs began hatching in late May and peak hatching occurred the last week of June. This year, 72 pairs of plovers were observed at the 9 beaches. This represents an increase of 12 (20%) pairs from 1993. Twenty-six and 46 pairs of plovers were observed in the South and North Districts, respectively. Hatching success was 67% (range 43% - 78%). Fledging success was 79% (range 53% -100%). Productivity was 2.5 fledged chicks/pair (range 1.6 fledged chicks/pair to 3.5 fledged chicks/pair). Thirty-eight percent of all nests initiated (n=105) failed to hatch at least 1 egg. Overwash was the leading cause of failure, accounting for 48% (n=19) of all nests lost. Predator exclosures were installed around 76% (n=80) of all nests. Eighty percent (n=64) of exclosed nests success-fully hatched. In contrast, 9% (n=2) of unexclosed nests successfully hatched. Berm habitat was used as nesting habitat by plovers 43% of the time. This year, 22 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 June and July, when the majority (70%) of the Race Point North and South (90%) beaches were closed for approximately 1.5 months and 1 month, respectively. By 8 August, the entire ORV corridor was opened, 9 days earlier than in 1993.

## 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 1100 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 1986).

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 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. In 1994, a record number of nesting plovers were recorded (72 pairs, representing

20% of the state total, nested on beaches managed by the NPS). Productivity (number of chicks fledged per pair) at Cape Cod National Seashore rose from 0.7 to 2.5 fledged chicks per pair during the same time period.

This report summarizes the 1994 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, 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), Brown (1992), and Brown and Hoopes (1993).

### **METHODS**

Observations of Piping Plovers began on 3 April at the time of plover arrival and territory establishment and continued through August when plovers are observed in 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 every six to ten days. Once nests were established, all beaches were

visited almost daily ( $\geq 5$  times per week) except for Long Point and Ballston, which were visited 4 times per week. During each visit to a beach, monitors searched for new nests until the end of the first week in July. 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. Locations of adults and chicks were reported based on a grid system (50 or 100 m intervals) set up at each study beach.

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 (ATV's) were used to access all sites. Once chicks hatched out, however, ATV's were the preferred conveyance for most beaches, especially Wood End/Long Point. In the South District, Great Island was accessed by ATV's, 4WD vehicle, and on foot. Marconi and Coast Guard beaches were accessed primarily by foot.

Each nest or nesting area was protected by symbolic fencing. Predator exclosures were installed around plover nests within 3 days of clutch completion. There were three modifications from previous years' methods of installing exclosures (Meisel 1991, Brown 1992). Tops of most 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. Only one wire tie per post was used for attaching the exclosure to support stakes. In the North District, ends of exclosures were attached prior to entering the nesting area. This saved time spent attaching the ends of the exclosure at the nest site. It was very easy to walk

with the pre-assembled enclosure, assuming there are three people to install the enclosure. Two people would have more difficulty handling the pre-assembled enclosure and all the equipment needed for installation.

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, 3 banded plovers nested at the 9 study beaches (Appendix A).

## RESULTS AND DISCUSSION

### Seasonal Chronology

Plovers were first observed on 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 Seashore beaches. This is most certainly the case for sites such as Marconi Beach.

Egg-laying began in the third week of April for both North and South districts. In April, 4 nests were located, 3 in the North and 1 in the South district. Of these, 3 successfully fledged young and 1 was abandoned prior to clutch completion. Peak nesting for the Seashore occurred during mid-June (Fig. 1). The last nest was initiated on 13 June at High Head. Peak nesting for the Seashore this year is consistent with the patterns exhibited in past years. However, prior to the use of exclosures, peak nesting typically occurred 1 - 2 weeks later in the season (MacIvor et al. 1987a).

Peak hatching for the Seashore occurred during the last week of June and the first week of July (Fig. 2). Hatching dates ranged from 27 May to 15 July. Peak hatching in each district followed a similar pattern to that of the Seashore, although two smaller peaks occurred in the South District during weeks 8 and 11 and in the North District during weeks 9 and 11. The reason for these bi-modal peaks is mostly due to nest loss to overwash earlier in the season. Fledging dates ranged from 27 June to 12 August. These dates are comparable between districts and years.

### Productivity

Seventy-two pairs of Piping Plovers were monitored at 9 sites in Cape Cod National Seashore (Table 2). This represents approximately 20% of the total breeding population of Massachusetts. Preliminary figures estimate the state population in 1994 was 354 pairs. Numbers of nesting plovers at the 9 sites monitored increased by 20% from 1993 and 300% since monitoring began in 1985. All study beaches monitored exhibited increases in numbers of breeding pairs except Race Point Beach South where numbers decreased by 2 pairs. This decrease is not significant and simply reflects annual changes in nest distribution. The greatest increase in numbers of nesting pairs since 1993 occurred at Long Point, where numbers rose from 7 to 11 pairs; and at Race Point Beach North, where numbers rose from 6 to 10 pairs. All other sites, except Race Point Beach South and Head of the Meadow, exhibited a 1 pair increase.

Hatching success (total number of eggs hatched/total number of eggs laid) for all sites combined was 67% and ranged from 43% to 78% (Table 2). Overall,

Productivity (number of chicks fledged/nesting pair) for all sites was 2.5 (178 chicks fledged from 72 nests) and ranged from 1.6 to 3.5 (Table 2). Overall, productivity increased from 1993. In fact, it is the second highest productivity figure reported at Cape Cod National Seashore (productivity was 2.6 in 1990 and 1991). Ballston Beach (3.50), Head of the Meadow (3.00), and Marconi Beach (2.90) had the highest productivity; while Coast Guard (1.55), Long Point (2.18), and High Head (2.33) had the lowest productivity (Table 2). It is important to note, however, that productivity greater than 2.0 is considered outstanding. Further, productivity at Cape Cod National Seashore far exceeded productivity statewide. Preliminary data suggests 1994 productivity for the state was 1.7 (S. Melvin, pers. comm.) from approximately 300 pairs.

#### Nest Loss

Thirty-eight percent (40 of 105 nests) of all nests initiated failed to hatch at least 1 chick (Table 3). Overwash was the leading cause of nest loss, accounting for 19 (48%) of all nests lost (Table 3). Abandonment and crows were the second and third leading causes of nest loss, respectively. All sites had one of the above factors as the leading cause of nest failure. Coast Guard and Long Point had the highest numbers of nests lost, 11 and 9 respectively. Over half of the losses at these sites were attributable to overwash. However, 3 of the 11 nests (27%) lost at Coast Guard Beach were lost to red fox (*Vulpes vulpes*), although only 1 of these 3 nests were exclosed when predated. Coast Guard Beach has a history of fox presence (Hoopes et al. 1987), but this represents the first time in several years that foxes have predated exclosed nests. Red fox activity at other sites was virtually

hatching success was the same as in 1993. Great Island (78%), Marconi (76%), and Head of the Meadow (75%) had the highest hatching success; while Coast Guard (43%), Long Point (44%), and Race Point Beach South (61%) had the lowest hatching success (Table 2). The relatively low hatching success recorded at Coast Guard was attributable to predation and at Long Point to the great number of renests caused by overwashes. Nineteen percent (13 of 70) of the nests that hatched left 1 or 2 eggs in the scrape. This is considerably less than in 1993 when 35% of nests failed to hatch 1 or 2 eggs (Brown and Hoopes 1993). Sites throughout the state reported similar figures and were also much higher in 1993. Partially hatched clutches may be reflective of younger, less experienced birds' attempts at nesting. The reason for the differences in numbers of unhatched eggs between years is unknown.

Fledging success (total number of chicks fledged/total number of eggs hatched) for all sites combined was 79% and ranged from 53% to 100% (Table 2). Overall, fledging success increased 10% from 1993. Ballston (100%), Head of the Meadow (100%), and Long Point (88%) had the highest fledging success; while Coast Guard (53%), High Head (75%), and Great Island (76%) had the lowest fledging success (Table 2). Fledging success at Great Island and High Head, however, were not significantly lower than the overall fledging success for the Seashore. Fledging success at Ballston Beach and Head of the Meadow have been high consistently, but represent few nests. Coast Guard Beach fledging success was 9% higher than in 1993, but typically has been lower than other sites.

non-existent with very few signs of fox use of the beaches. Reduced red fox activity on most study beaches may be due in part to the expansion of the Eastern coyote (*Canis latrans*) into established red fox territories. Coyotes and coyote tracks were often seen on study beaches (e.g., Long Point and Race Point Beach South), however, there has been no evidence of coyote predation on Piping Plover eggs or chicks at Cape Cod National Seashore.

#### Predator Exclosures

Predator exclosures were installed around 80 of the 105 (76%) nests. Of the 80 exclosed nests, 64 (80%) successfully hatched young. Of the 16 exclosed nests that did not hatch, 9 (56%) failed due to overwash, 3 (19%) abandoned, 2 (12%) were infertile, and 2 (12%) were lost to predators (Table 4). Of the 2 exclosed nests lost to predators, 1 nest was lost to red fox and 1 was lost to crows. It could not be determined if the fox tunneled under, or jumped over, the exclosure. The nest lost to crows did not have a string top. Hatching success of exclosed nests would have been substantially increased (90%, 64 of 71 nests) if overwash was not a factor in nest loss. Of the 25 unexclosed nests, 23 (92%) failed to hatch. Of these, 10 (46%) were lost to overwash, 3 (14%) were abandoned, and 1 (5%) was lost for unknown reasons. In all of these cases, nests were lost prior to clutch completion. The remaining 9 unexclosed nests that were lost were lost to predators. In 8 of these 9 cases of unexclosed nest loss, nests were lost prior to clutch completion. In the future, exclosures should be strung at the time of installation and every effort should be made to exclose nests within 3 days of clutch completion.

## Mortality

Chick mortality factors were extremely difficult to assess. Most of the time chicks are lost, there is no evidence as to why. 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 (Table 5). This pattern is consistent with data from previous years (MacIvor 1990, Meisel 1991, Brown and Hoopes 1993). Two chicks were found dead, presumed to have died of exposure. At Coast Guard Beach, red foxes were suspected as a major cause of chick mortality. Red fox tracks were routinely observed on Coast Guard Beach. 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 103 nests was categorized according to the macrohabitat types defined by MacIvor (1990). Berm habitat was used for nesting 43% of the time (Table 6). The next most utilized habitats for nesting were foredune (27%) and overwash (23%, Table 6). Overwash continued to be the primary nesting habitat of Piping Plovers at Coast Guard Beach. This trend has continued throughout the 10 years that monitoring has been conducted at that site. It is interesting to note that foredune habitat was used for 52% and 83% of the nesting

attempts by Piping Plovers at Race Point Beach South and Race Point Beach North, respectively (Table 6). This maybe due in part to off-road-vehicle (ORV) activity at those sites. A majority (80%) of the nests in berm habitat at these sites were established either before regular ORV traffic was allowed in the area or after ORV activity was ceased. These patterns are consistent with those found by MacIvor et al. (1987b) at the North Beach/South Beach Island complex in Chatham.

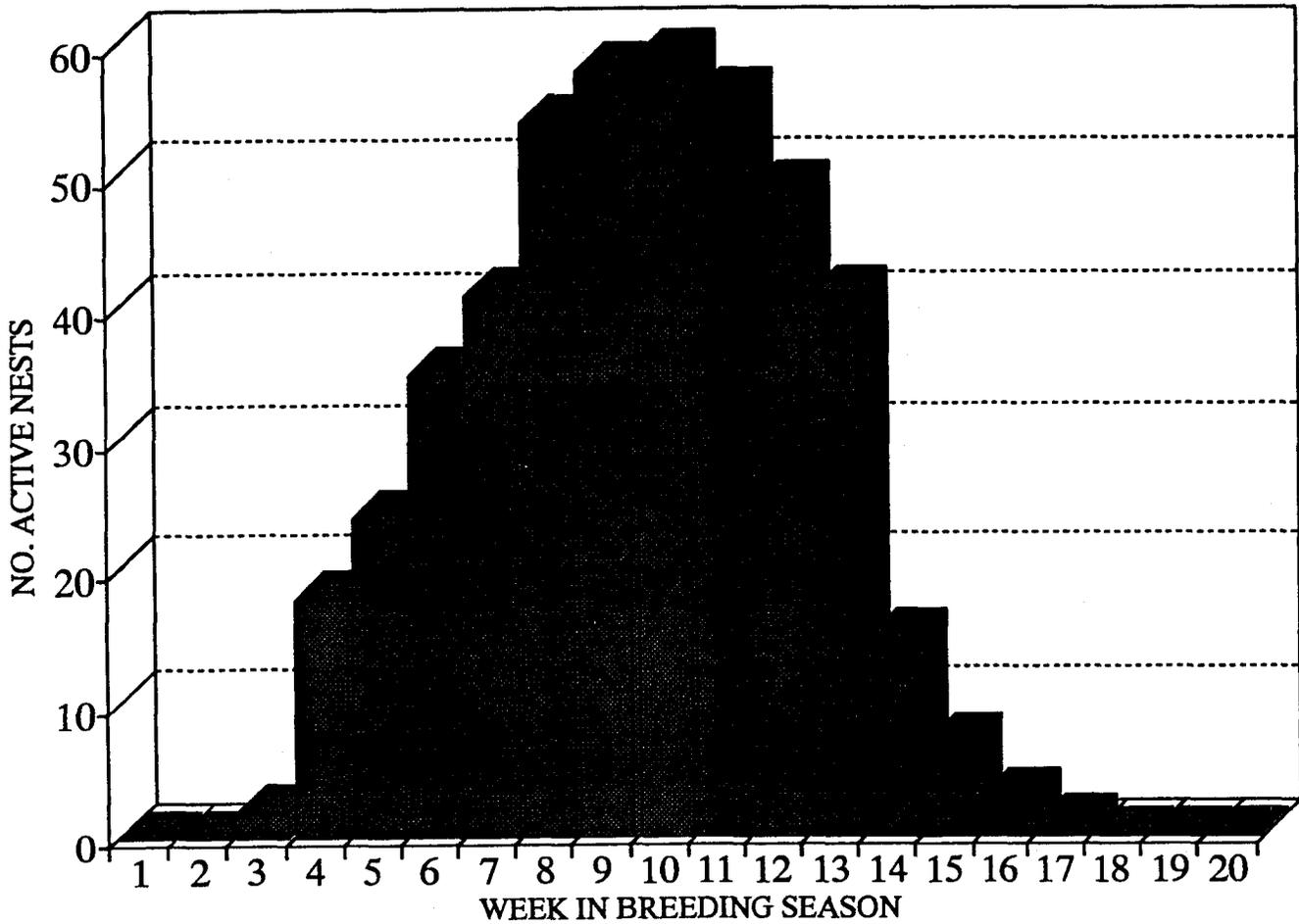
#### ORV Management

ORV management, as it relates to plover management at Cape Cod National Seashore, is a dynamic process. This year, 22 pairs of plovers nested along the ORV corridor (1 more pair than in 1993). As these nests hatched, affected sections of the ORV corridor were closed to vehicles (Appendix C). Closures were imposed only when eggs hatched and were kept in effect through the chick-rearing stage until fledging. When the outer beach at Race Point Beach North was closed on 1 June, the powerline route was opened for vehicle access to the Race Point Light area. The north self-contained area was moved once due to beach closures this year. The entire North Beach was closed for approximately 1.5 months due to asynchronous hatching of nests. The South Beach was closed, except for 0.5 mi at the extreme southern end of the route, and remained closed for approximately 1 month. The beaches began opening up to ORV traffic again in late July and early August. As chicks fledged, portions of the ORV corridor that could be opened, were. By 8 August, the entire ORV corridor was reopened to vehicles. This was 9 days earlier than in 1993.

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**NESTING CHRONOLOGY OF PIPING PLOVERS,  
CAPE COD NATIONAL SEASHORE, 1994**



PIPING PLOVER PEAK HATCHING,  
CAPE COD NATIONAL SEASHORE, 1994

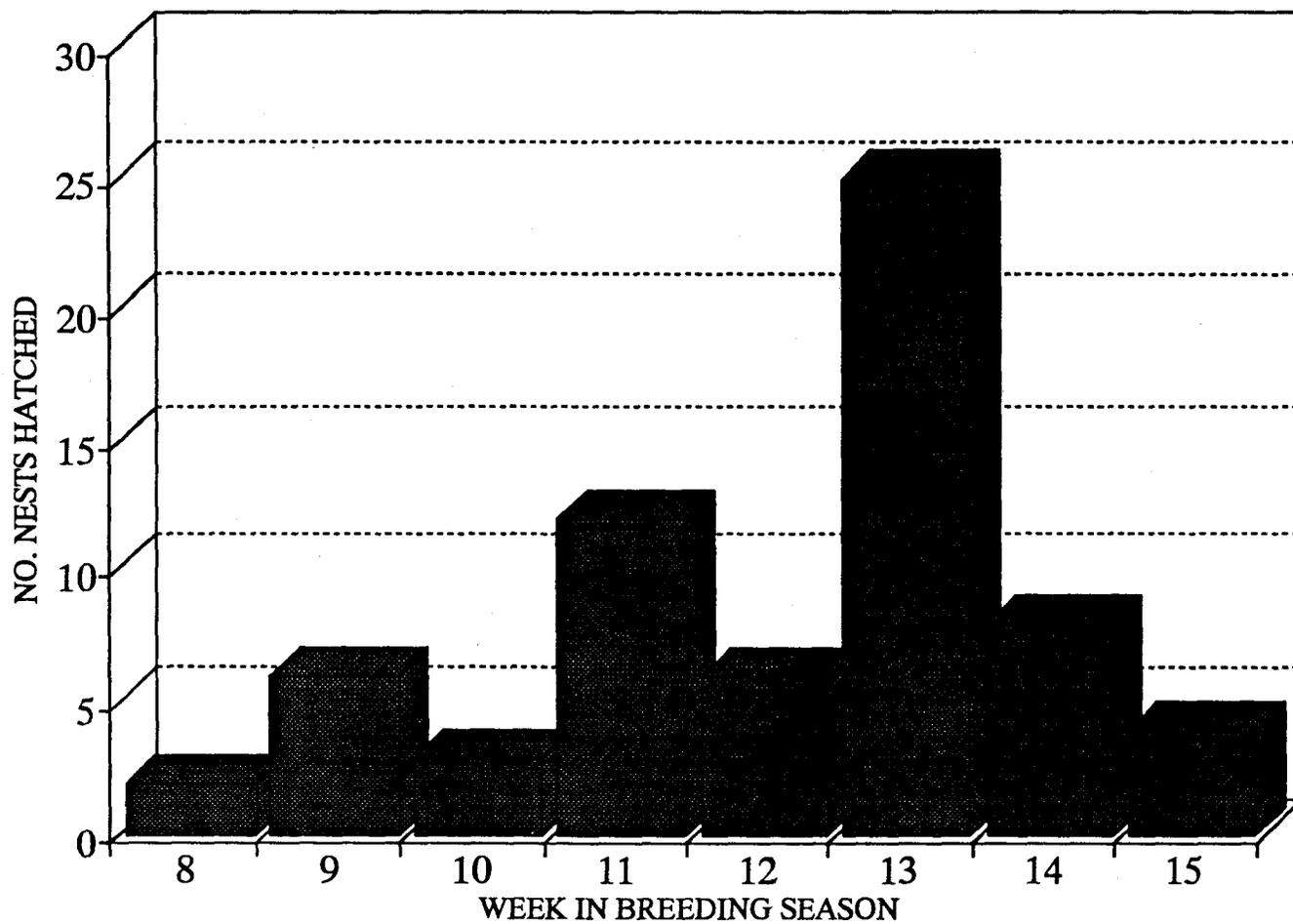


Table 1. Number of Piping Plover breeding pairs and nest productivity on beaches managed by the National Park Service, Cape Cod National Seashore, 1985-1994

Year	No. Pairs	Productivity <sup>1</sup>
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

<sup>1</sup> Number of chicks fledged per pair

Table 2. Number of Piping Plover breeding pairs, hatching and fledging success, and nest productivity, by site, Cape Cod National Seashore, 1994

Site	No. Breed. Pairs	No. Nests	No. Eggs/ Site <sup>1</sup>	No. Eggs Hatch <sup>1</sup>	No. Chicks Fledge	Hatch Succ. <sup>1,2</sup>	Fldg. Succ. <sup>3</sup>	Prod. <sup>4</sup>
Coast Guard	9	18	60	26	14	.43	.53	1.55
Marconi	10	13	46	35	29	.76	.82	2.90
Great I.	7	9	32	25	19	.78	.76	2.71
Ballston	2	3 <sup>5</sup>	11 <sup>5</sup>	7	7	.63	1.00	3.50
Head of the Meadow	1	2	4	3	3	.75	1.00	3.00
High Head	9	11	39	28	21	.71	.75	2.33
Race Pt South	13 <sup>6</sup>	19	65	40	34	.61	.85	2.61
Race Pt North	10 <sup>7</sup>	13	50	35	27	.70	.77	2.70
Long Pt	11 <sup>8</sup>	17	61	27	24	.44	.88	2.18
Total	72	105	338	226	178	.67	.79	2.47

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/pair

5 Includes 1 pair and nest that made an initial nesting attempt at Newcomb Hollow North, lost the nest to crows, and is believed to have moved to Marconi Beach

6 Includes 1 pair that was not known to have nested

7 Includes 1 pair that hatched before nest was found

8 Includes 1 nest that had unknown number of eggs laid and hatched

Table 3. Causes of Piping Plover nest failures, by site, Cape Cod National Seashore, 1994

Site	Tot. No. Nests	Cause of Failure	No. (%) Failed	Total No. Failed	% Total Failed
Coast Guard <sup>1</sup>	18	Overwash	5 (45) <sup>2</sup>	11	61
		Red Fox	3 (27)		
		Crow	1 (9)		
		Infertile	1 (9)		
		Unknown	1 (9)		
Marconi	13	Overwash	3 (100)	3	23
Great I.	9	Overwash	1 (33)	3	33
		Unk. Pred.	1 (33)		
		Abandoned	1 (33)		
Ballston	3	Crow	1 (33)	1	33
Head of the Meadow	2	Overwash	1 (100)	1	50
High Head	11	Overwash	2 (100)	2	18
Race Pt. S.	19	Crow	3 (43)	7	37
		Abandoned	2 (29)		
		Unknown	2 (29)		
Race Pt. N.	13	Gull spp.	1 (33)	3	23
		Abandoned	2 (67)		
Long Point/ Wood End	17	Overwash	7 (78)	9	53
		Skunk	1 (11)		
		Infertile	1 (11)		
Total	105	Overwash	19 (18)	40	38
		Crow	5 (5)		
		Red Fox	3 (3)		
		Skunk	1 (1)		
		Gull spp.	1 (1)		
		Unk. Pred.	1 (1)		
		Infertile	2 (2)		
		Abandoned	7 (17)		
		Unknown	1 (3)		

1 Crow ate 1 egg, left 1 egg in a nest

2 ( ) percent of failed nests at that site

Table 4. Fates of exclosed and unexclosed Piping Plover nests, Cape Cod National Seashore, 1994

Status	No. Nests	No. (%) Hatched	No. (%) Unhatched	Reason for Failure	No. (%) Failures
Exclosed	80	64 (80)	16 (20)	Overwash	9 (56)
				Abandoned	3 (19)
				Infertile	2 (12)
				Red fox	1 (6)
				Crow	1 (6)
Unexclosed	25	2 (8)	23 (92)	Overwash	10 (46)
				Crow	4 (18)
				Abandoned	3 (14)
				Red fox	2 (9)
				Skunk	1 (5)
				Gull spp.	1 (5)
				Unk. Pred.	1 (5)
				Unknown	1 (5)

Table 5. Life table of Piping Plover chick survival, Cape Cod National Seashore, North District\*, 1994.

Age (Days)	s <sup>1</sup>	d <sup>2</sup>	q <sup>3</sup>
0-5	144	13	.09
6-10	131	6	.05
11-15	125	6	.05
16-20	119	3	.03
21-25	116	0	.00
26-30	116	0	.00

\* South District data not available

1 s = number of chicks alive at end of each time period

2 d = number of chicks that died during each time period

3 q = d/s

Table 6. Nesting habitat of Piping Plovers, Cape Cod National Seashore, 1994

Site	Habitat					Total
	Berm	Foredune	Interdune	Overwash	Blowout	
Coast Guard	1 (5) <sup>1</sup>		1 (5)	15 (83)	1 (5)	18
Marconi Beach	12 (92)		1 (7)			13
Great Island	3 (33)		5 (55)	1 (11)		9
Ballston Beach	2 (67)	1 (33)				3
Head of the Meadow	2 (100)					2
High Head	8 (72)	3 (27)				11
Race Pt. Beach S.	9 (47)	10 (52)				19
Race Pt. Beach N.	1 (8)	10 (83)	1 (8)			12
Long Pt./ Wood End	5 (31)	3 (19)	1 (7)	7 (43)		17
Total	43 (43)	27 (27)	9 (7)	23 (23)	1 (1)	103

1 ( ) percent of total nests in that habitat at each site. May not equal 100% due to rounding.

APPENDIX A

COLOR-BANDED PIPING PLOVERS NESTING  
IN CAPE COD NATIONAL SEASHORE, 1994

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 3 birds are at least 6 years of age.

S: USFWS aluminum band  
f: Black flag, designates State of Massachusetts origin  
B: Black  
\_: No band

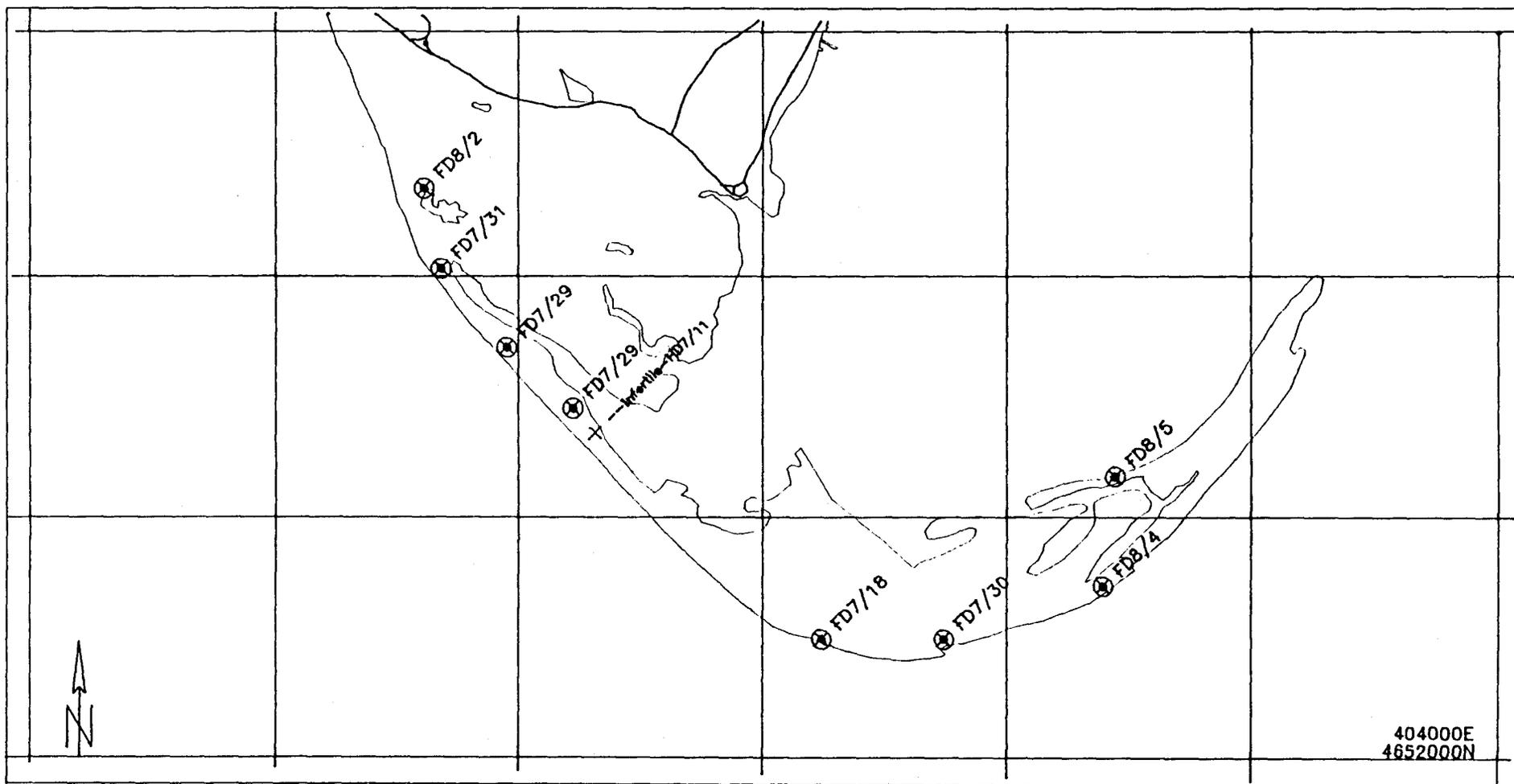
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Color-bands	Sex	Nest Location	Nest Name
S:f	M	Race Pt. North	Cobblefield
S:f	M	Great Island	Gannet
SB:_	M	Coast Guard Beach	Marsh 2

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APPENDIX B

Piping Plover Nest Locations on Beaches Managed  
by the National Park Service at  
Cape Cod National Seashore, 1994



X plover nesting sites

• hatched broods

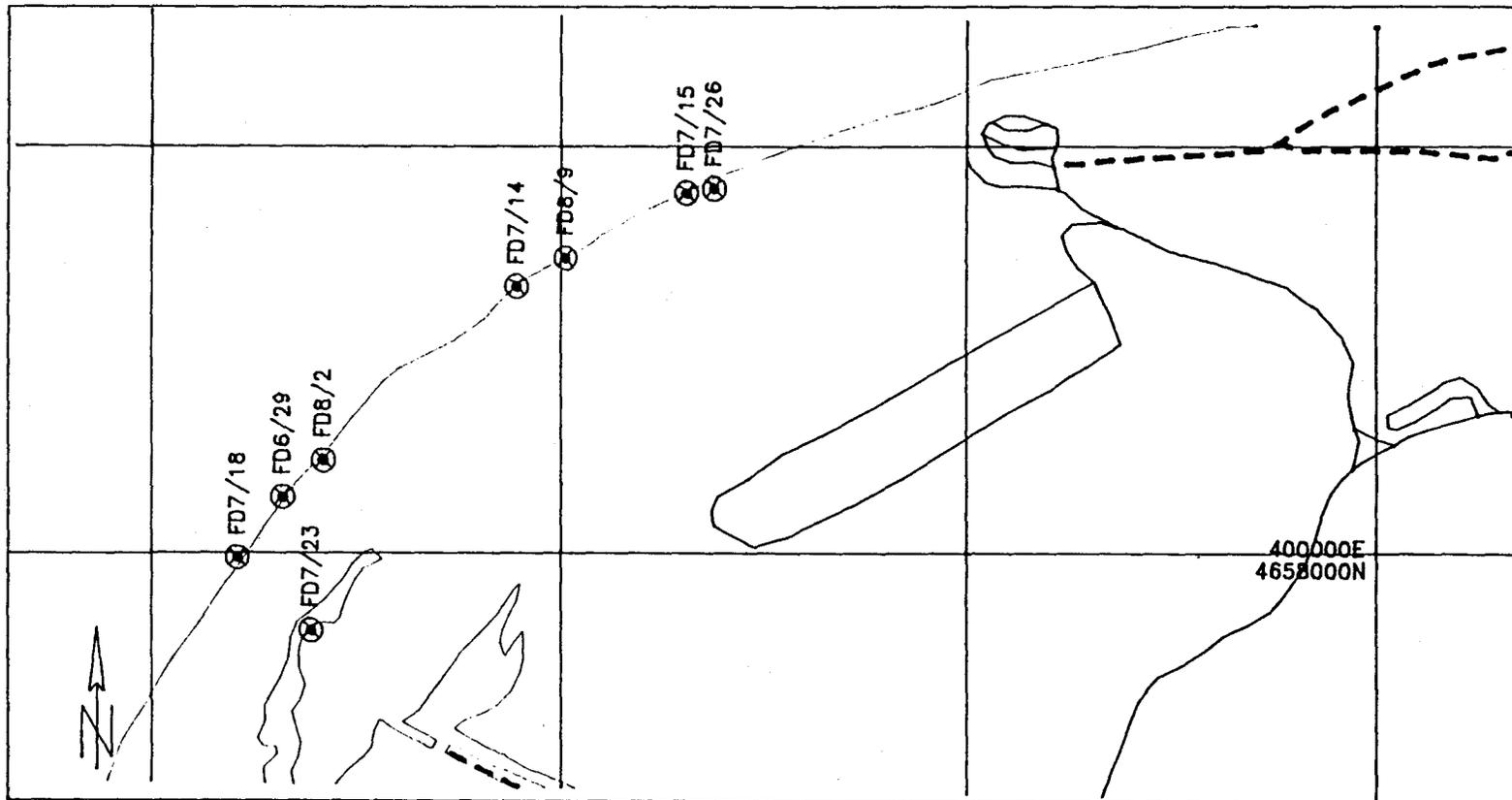
○ fledged broods

HD = hatch date  
FD = fledge date

## Piping Plover Nesting Sites

### Wood End to Long Point → Cape Cod National Seashore

scale 1:25000 map:plov.lpt mba:11/94



X plover nesting sites

• hatched broods

○ fledged broods

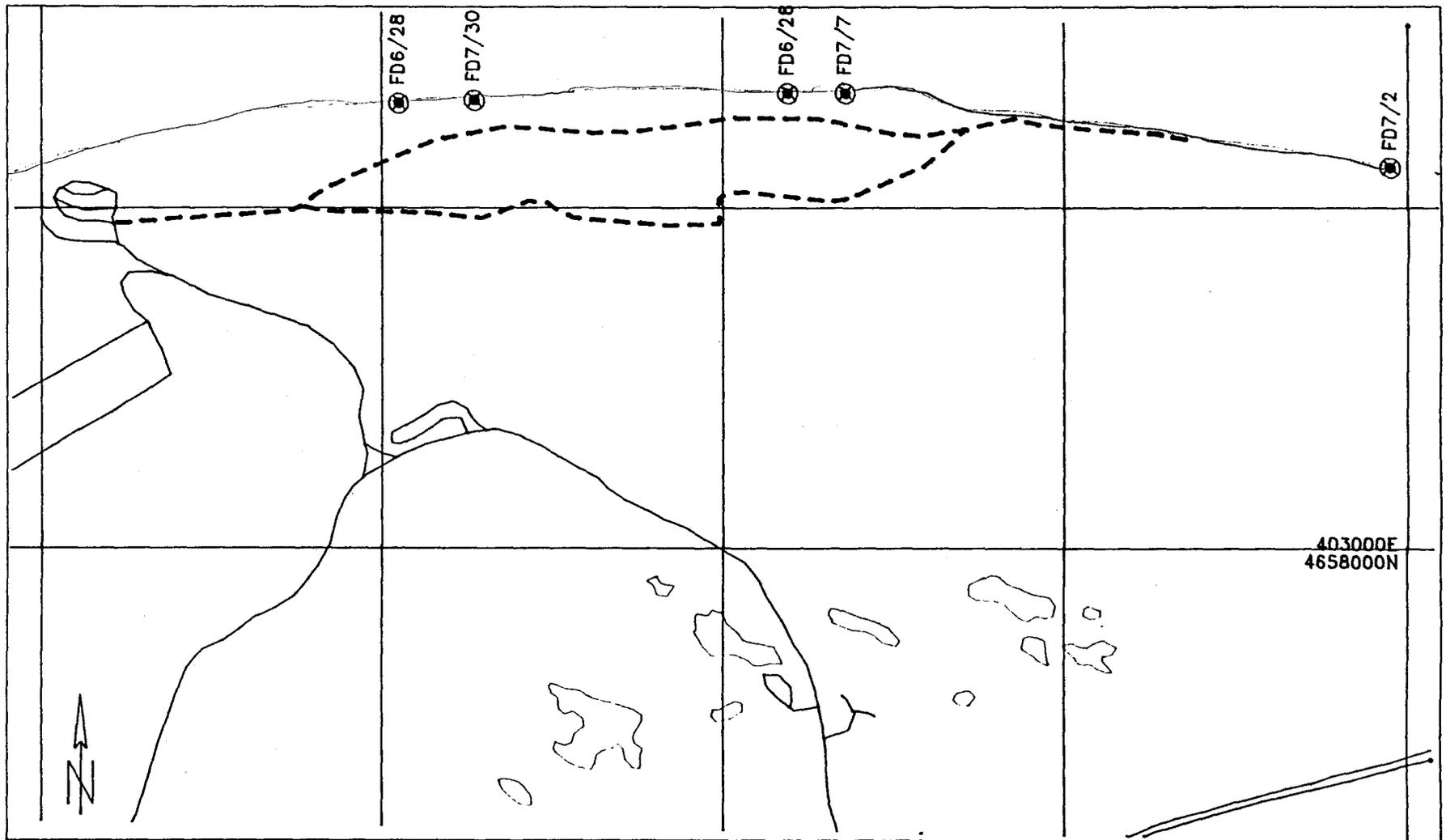
HD = hatch date  
FD = fledge date

# Piping Plover Nesting Sites

## Race Point Beach west

### Cape Cod National Seashore

scale 1:18000 map:plov.raceptw mba:10/94



x plover nesting sites

○ hatched broods

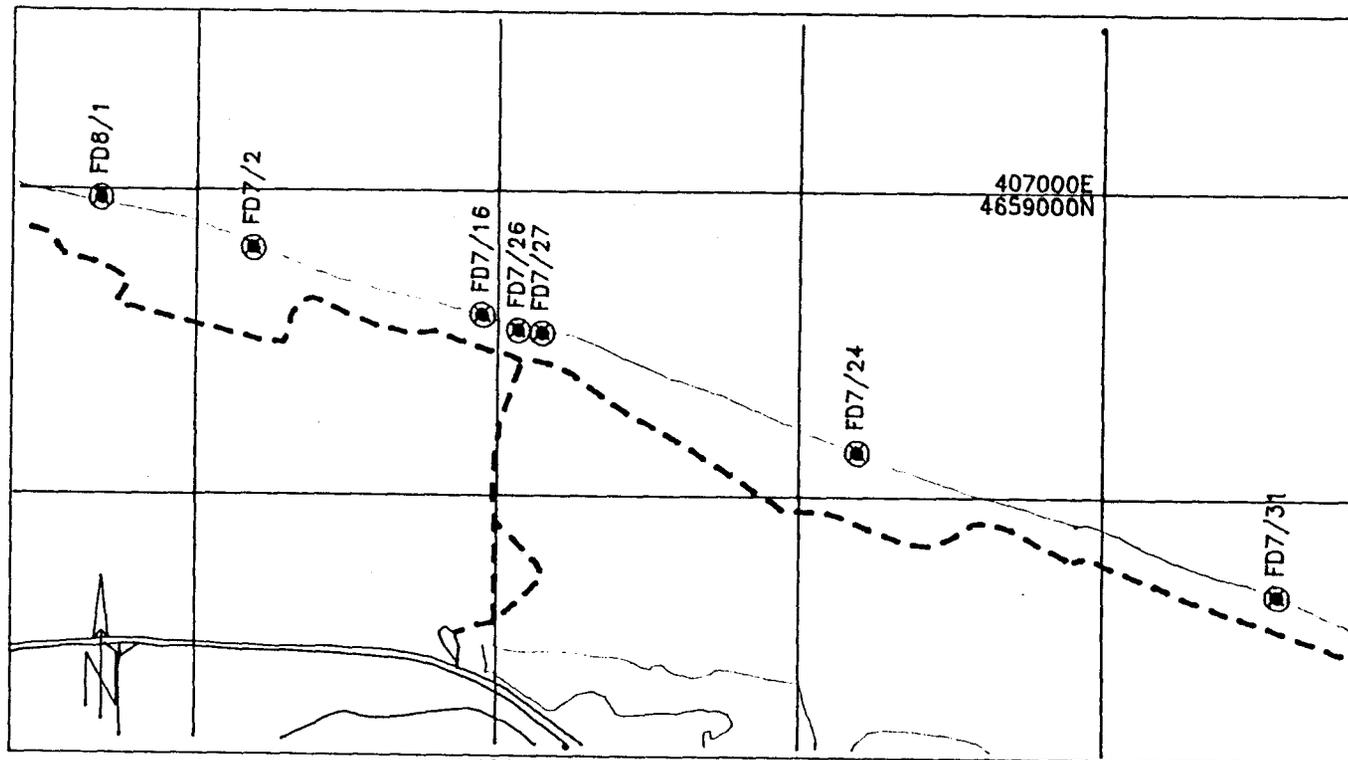
● fledged broods

HD = hatch date  
FD = fledge date

## Piping Plover Nesting Sites

### Race Point Beach east – Cape Cod National Seashore

scale 1:18000 map:plov.racepte mba:10/94



x plover nesting sites

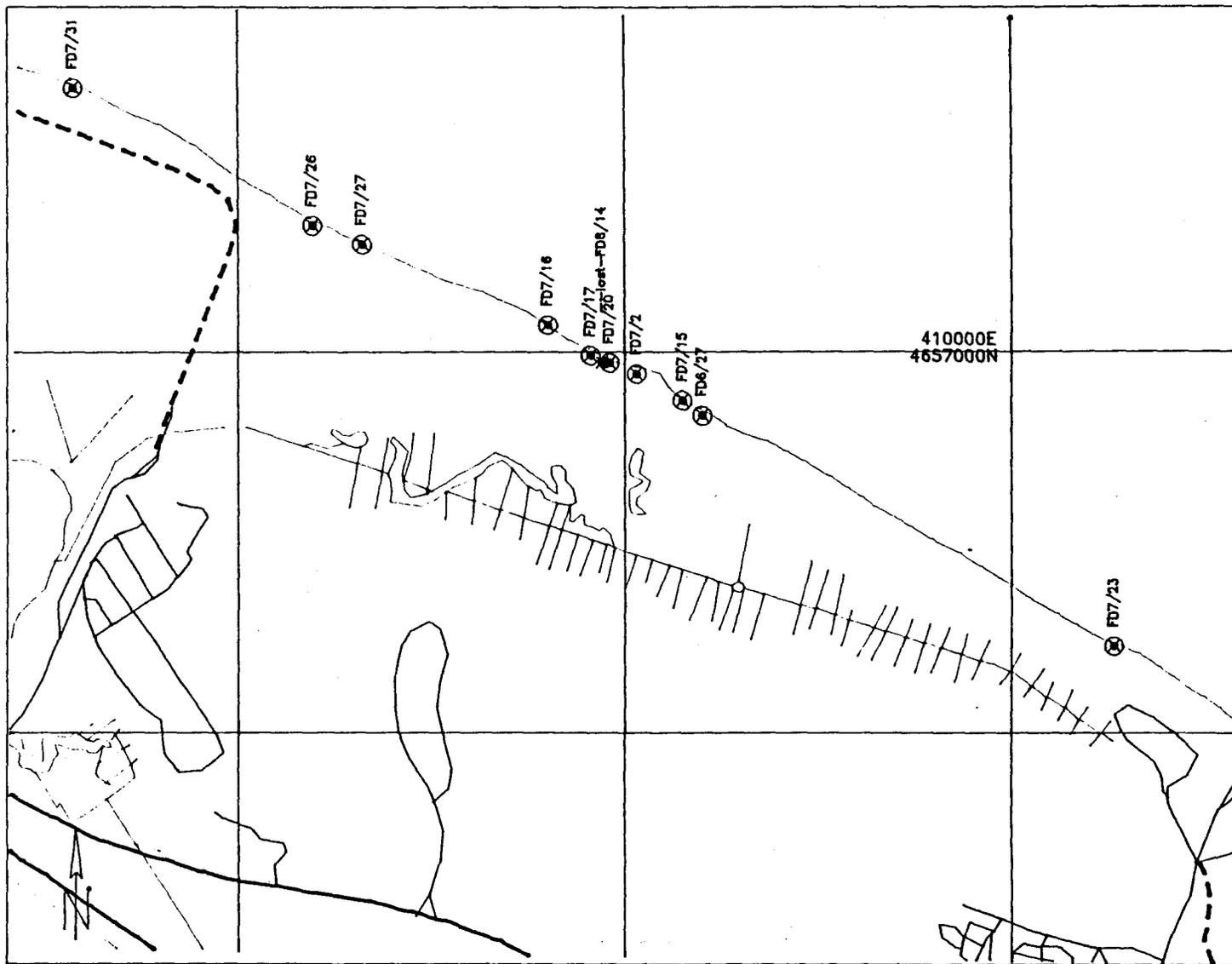
○ hatched broods

● fledged broods

HD = hatch date  
FD = fledge date

**Piping Plover Nesting Sites**  
**Race Point Beach <sup>East</sup> west to High Head**  
**Cape Cod National Seashore**

scale 1:18000 map:plover.hhead mbs:10/94



X plover nesting sites

• hatched broods

○ fledged broods

HD = hatch date  
FD = fledge date

## Piping Plover Nesting Sites High Head Area Cape Cod National Seashore

scale 1:18000 map:plover.hom mba:10/94



× plover nesting sites

• hatched broods

○ fledged broods

HD = hatch date  
FD = fledge date

1000 0 1000 2000 3000 4000 FEET

## Piping Plover Nesting Sites

**Ballaton Beach Area – Cape Cod National Seashore**

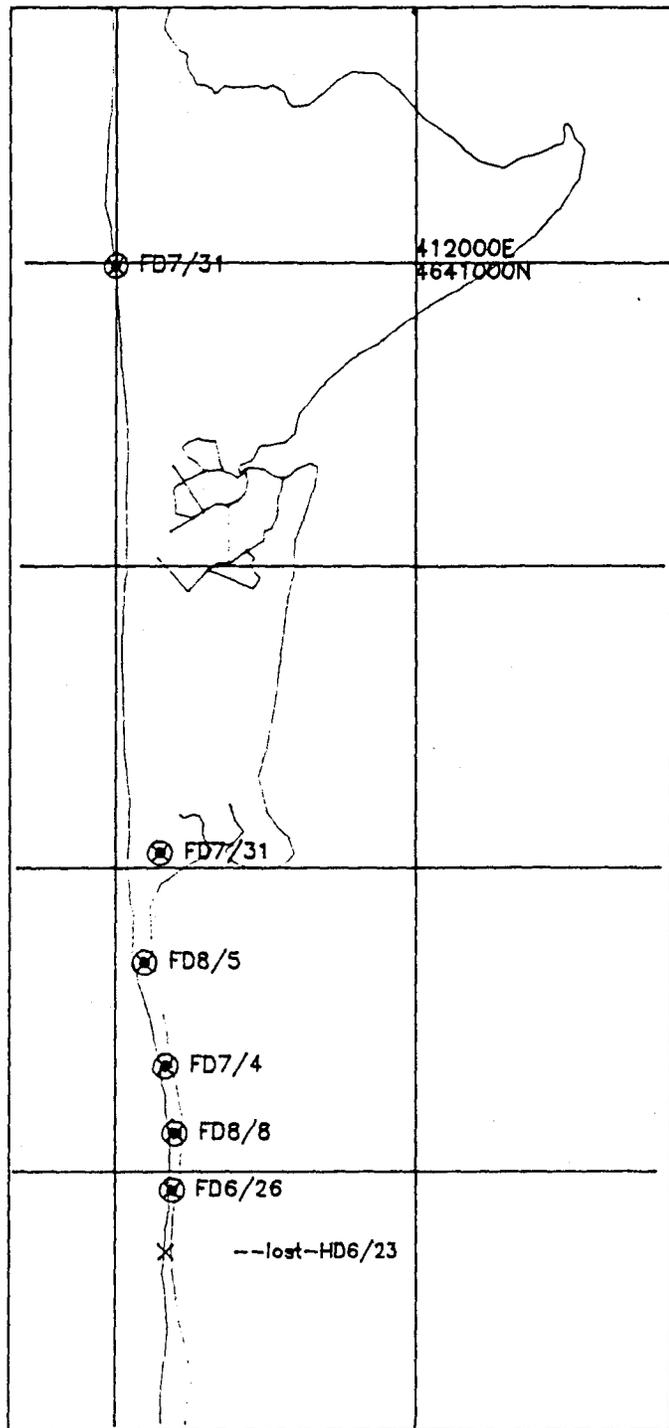
scale 1:18000 map:plov.pamet mball/94

416000E  
4648000N

# Piping Plover Nesting Sites

Great Island  
Cape Cod  
National Seashore

scale 1:25000  
map:plover.gris mba:11/94



x plover nesting sites

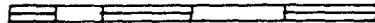
• hatched broods

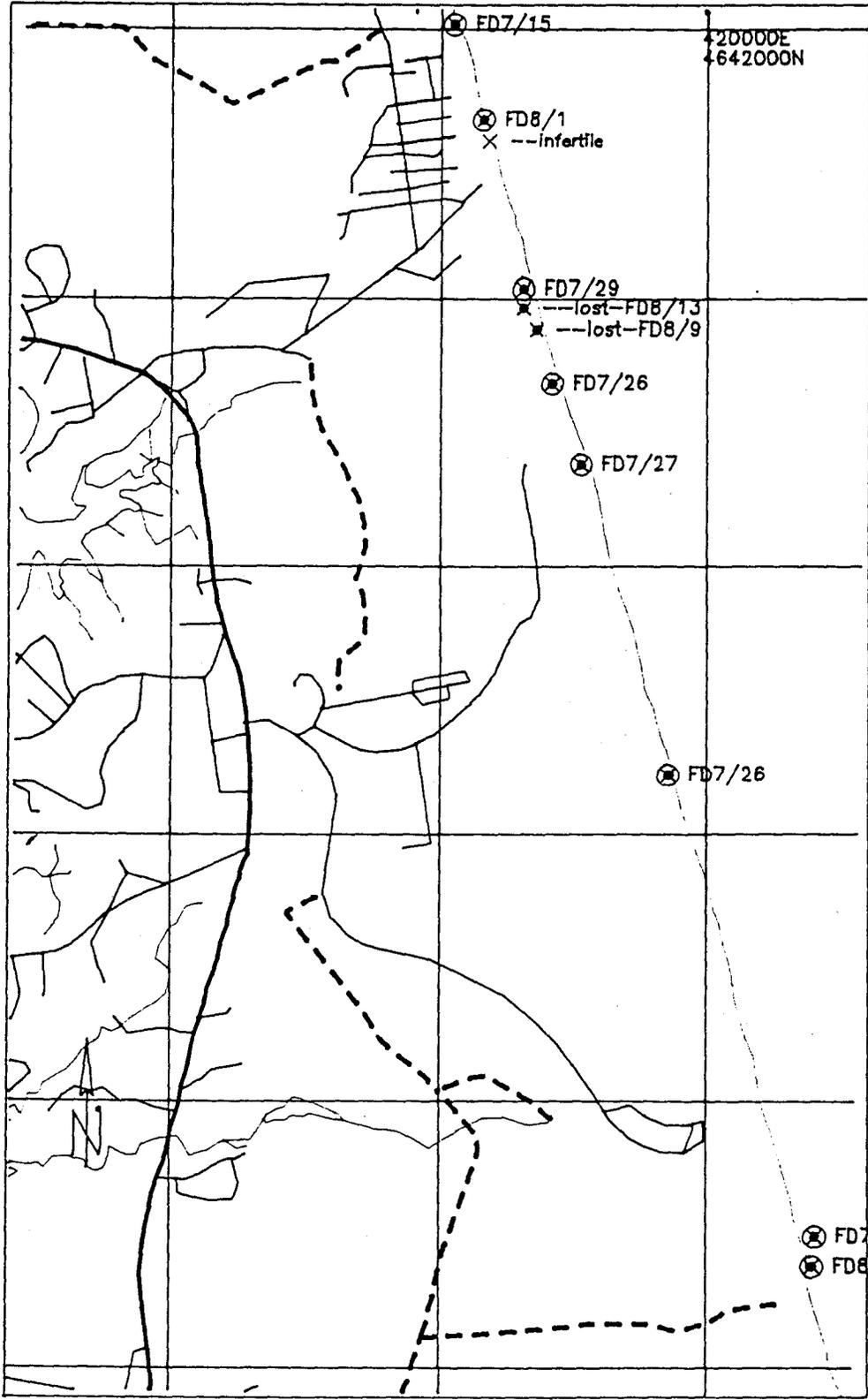
○ fledged broods

HD = hatch date

FD = fledge date

1000 0 1000 2000 3000 FEET

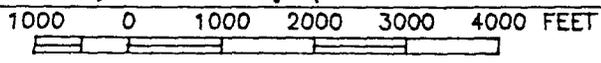


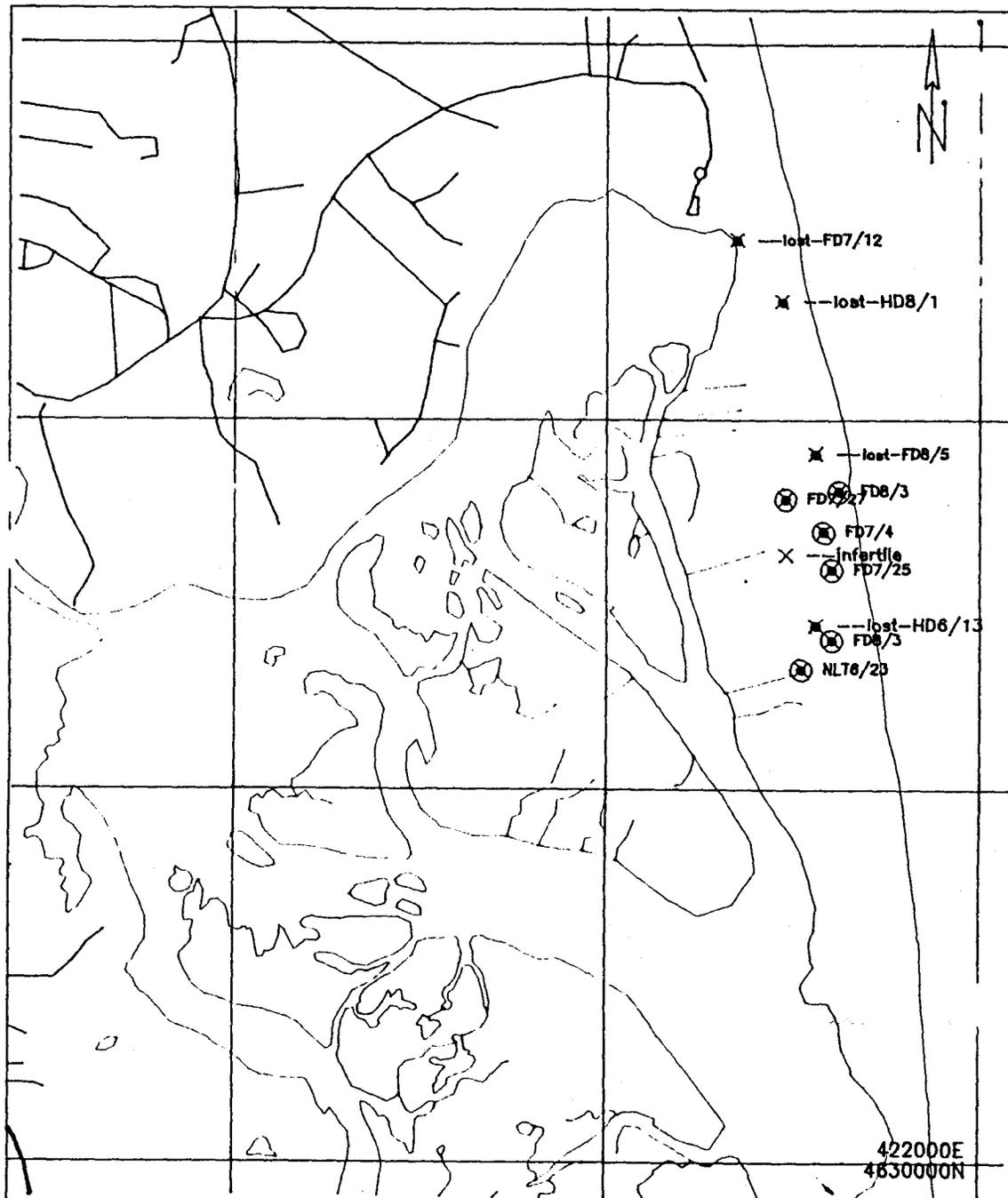


**Plover Nesting Sites**  
**South Wellfleet Area**  
**Cape Cod Nat. Seashore**

scale 1:25000  
 map:plov.swell mba:10/94

- x plover nesting sites
- hatched broods
- fledged broods
- HD = hatch date
- FD = fledge date





## Plover Nesting Sites

Coast Guard Spit  
Cape Cod Nat. Seashore

scale 1:18000  
map:plover.cg mba:10/94

X plover nesting sites

• hatched broods

○ fledged broods

HD = hatch date  
FD = fledge date

422000E  
4630000N

1000 0 1000 2000 3000 4000 FEET

APPENDIX C

DATES OF ORV CORRIDOR OPENINGS AND CLOSURES,  
RACE POINT NORTH AND SOUTH BEACHES, 1994

Date	Beach	Action
15 April	Both	North and South beaches are opened for the season. 0.1 mi of corridor around Race Pt. Light on the outside closed due to impassable section of beach.
18 May	North	North self-contained area moved to entrance of North Beach due to plovers nesting in original self-contained area.
1 June	North	Beach closed from 1 mi N of entrance to Emergency Route entrance. Powerline Route opened for access to Race Pt.
	South	Beach closed from Race Pt. South entrance S to Peaked Hill.
15 June	North	Remainder of beach on outside closed except for the first 0.3 mi N of the entrance for self-contained vehicles and 0.4 mi at Race Pt. Light area.
24 June	South	Beach closed from 0.1 mi S of Charlies to Peaked Hill. Total beach closed runs from Race Pt. South entrance to S of Charlies.
1 July	South	Beach closed from Armstrong Area to closure S of Charlies. Total beach closed runs from Race Pt. South entrance to Armstrong Area.
12 July	South	Exit 9 closed. Dune tours cannot use the beach at Exit 9.
15 July	South	South end of closure at Armstrong Area extended an additional 0.15 mi S because chicks from HHN-3 were continuously moving into open ORV corridor.
26 July	South	0.6 mi of beach from Race Pt. South entrance opened to ORV access.
29 July	South	South self-contained area opened and 0.1 mi also opened to ORV access.
1 August	South	2.5 mi of beach opened to ORV access from High Head entrance N to Exit 9. Exit 9 opened to Dune tours.

2 August	South	0.7 mi of beach from Exit 9 to Exit 8 opened to ORV access.
3 August	North	0.6 mi of beach from Emergency Route S opened to ORV access.
4 August	South	Entire beach opened to ORV access.
6 August	North	Entire beach opened to ORV access.
8 August	North	Self-contained area moved back to original position.