1994 STATUS AND BREEDING SUMMARY OF PIPING PLOVERS AND COMMON TERNS AT LAKE OF THE WOODS, MINNESOTA

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PIPING PLOVERS

Methods

In 1994 we made observations and/or conducted management activities at Pine and Curry Island SNA on 20 days between 3 May - 3 August. Observations of piping plovers were made regularly at Pine and Curry Island and Morris Point. Zippel Bay was visited twice (6, 14 June) and Rocky Point was visited once (1 June). All piping plovers observed were checked for bands and their breeding status was determined. Nests were located and a wire mesh predator exclosure was placed around each. Exclosures were constructed of 5 x 10 cm mesh welded wire 1.3 m tall. A 3 m diameter circle of wire was placed around the nest and was fastened to three steel rods driven into the ground. The bottom edge of the fence was buried approximately 15 cm deep to inhibit predators from digging under the barrier. Heavy string was tied across the top in a cris-cross pattern to discourage avian predators. Installation of an exclosure took about 15 minutes. Plovers could easily pass through the openings in the mesh. We attempted to nest trap and band unbanded adults or birds in need of new color bands once incubation was well underway. When possible, chicks were captured with a butterfly net when 7-10 days old and banded with a USFWS aluminum band.

Air photos of Pine and Curry Island, Morris Point, Zippel Bay, and Rocky Point were taken on 22 July. Data on Lake of the Woods (LOTW) water levels were obtained from the U.S. Army Corps of Engineers, St. Paul.

Results

LOTW water levels were low at the start of the season (Table 1) exposing broad sandy beaches in the areas traditionally used by piping plovers. The lake level rose slowly during the summer, but did not cause problems for nesting piping plovers. By August, water levels were quite high once again and signs of beach erosion became evident.

In 1994 one adult piping plover and three chicks were banded. In addition, three adults were recaptured and given new color bands (see Table 2 and attached banding schedule). These adults had been banded as chicks on the SNA last year. Interestingly, one other adult was 11 years old and had been banded as a chick on Pine and Curry Island in 1983.

A total of 15 adult piping plovers (12 breeders, 3 non-breeders) were present this year (Table 3) representing a population increase from 11 adults in 1993. No piping plovers were seen at Zippel Bay or Rocky Point. Six piping plover nests were found between 17-23 May (Fig.1, Table 4). Of these, only the nest at Oak Point failed to hatch. The male of the Oak Point pair was the 11 year old bird noted above. After this pair had incubated 59 days (normal incubation = 25-28 days), we checked the eggs and found them to be infertile. On 3 August a seventh nest was found abandoned on "Tern Island". We believe this was a renesting attempt by a pair whose chicks disappeared shortly after hatching. All adult piping plovers had departed Pine and Curry Island by 3 August and the nest bowl was filled in with wind-blown sand. Two of the three eggs were infertile. Surprisingly, the third egg was pipped. We collected the pipped

egg and sent the specimen to Sue Haig for use in her DNA studies. Of 19 chicks that hatched, only 4-7 (21-37%) fledged representing a fledge rate of 0.7-1.2 chicks per breeding pair (Table 5). As usual, chicks failing to fledge disappeared during the first few days after hatching.

COMMON TERNS

Methods

We visited Pine and Curry Island SNA four times (27 June, 11, 20 July, 3 August) in 1994 to monitor common tern colony size and assess reproductive success. The "Tern Island" colony was systematically censused on 27 June. Also on 27 June, we set up two circular (5 m diameter) chicken wire enclosures in areas of high nesting density. The enclosures prevented tern chicks from departing the fenced area prior to fledging and allowed us to monitor chick survival and fledging success on subsequent visits. Any dead chicks were removed from enclosures after each count. On 3 August we surveyed fledged chicks visible on "Tern Island" beaches as well as nearby beaches on the SNA.

Results

"Tern Island" - The colony census tallied 379 nests (28 - 1 egg, 86 - 2 egg, 265 - 3 egg). This was the largest breeding population present at this site in recent years (Table 6). Possibly, the brush cutting we conducted in October, 1993 created habitat more attractive to breeding terns.

The two enclosures contained a total of 15 nests (41 eggs) on 27 June (Table 7). We found one egg with a small peck hole in the side on 20 July. No other evidence of predation on eggs or chicks was noted. Chicks that failed to fledge died from undetermined causes (perhaps exposure) within the first few days after hatch. Small dead chicks decomposed quickly and were sometimes difficult to find. This may, in part, explain why the numbers of chicks and eggs observed during the 11 and 20 July counts did not total the original number of eggs present (Table 7). A total of 13 chicks fledged from the enclosures. This was a fledge rate of 0.87 chicks per breeding pair. If this rate is extrapolated to the colony as a whole, the estimated number of fledglings becomes 330.

We noticed a few chicks already fledged on 20 July. On 3 August we counted 63 fledglings on "Tern Island" beaches and 29 others on the beach at "West End" (total = 92). Likely there were other chicks hidden in the herbaceous cover on "Tern Island" and some of the older fledglings may have already left the vicinity of the colony. While the true number of fledglings probably lies somewhere between 92-330, this appears to be the largest number of chicks fledged from this colony in the past seven years (Table 7).

We observed no sign of mammalian predation on Tern Island this year. However, there was evidence of owl predation. We found a raptor-depredated gull on 6 and 13 June and a depredated adult tern on 13, 14, and 27 June. Our observations of small dead chicks, both inside and outside of the enclosures, are consistent with chicks dying of exposure when adults abandon the colony at night due to nocturnal disturbance by an owl.

Oak Point - A single nest containing 3 eggs was found on 13 June. This nest apparently was depredated.

Rocky Point - Five common terns were present on the beach during our 1 June survey. No evidence of nesting attempts was observed.

Fourblock Island and **Techout Island** - These islands were not surveyed in 1994.

PREDATOR MANAGEMENT

Mammals

In 1994 Jim Walton continued trapping mammalian predators on Pine and Curry Island and Morris Point. Ten trap sets (6 mink, 4 fox/skunk) were maintained from 10 May to 15 July totalling 670 trap nights. One mink, 2 red foxes, and one skunk were captured. While mammal tracks were evident in many areas of the SNA in early-mid May, they were virtually absent thereafter with the exception of tracks and scent posts of otters. We saw no sign of mammalian predators on "Tern Island" this year.

Crows/Ravens

As in 1992-1993, we attempted to disrupt nesting attempts by crows and ravens on Pine

and Curry Island and Morris Point. A raven nest containing three nearly-fledged chicks was found on 17 may. However, issuance of the depredation permit allowing us to shoot ravens nesting on the island was delayed and did not become effective until 25 May.

We were unsuccessful in attempts to shoot crows this year although we did destroy 19 nests. Two other nests were too high to reach and were left undisturbed. Only two of the nests contained eggs when destroyed. While some nests were no doubt those remaining from 1993 (17 nests had been destroyed in 1993), others were current nests destroyed before the birds began egg laying. We estimate that at least seven breeding pairs of crows are typically present on the SNA.

Raptors

There was evidence that a great horned owl was a nocturnal visitor to "Tern Island" again this year (see section on common terns). Delay in obtaining our depredation permit precluded any attempts at owl removal prior to 25 May. On 20 June we were unsuccessful in an attempt to lure an owl in to taped crow calls at dusk. Two other attempts were canceled due to stormy weather.

Of potential concern to piping plovers, a peregrine falcon was seen on the SNA on four occasions between 3-18 May. Also, a merlin was observed on 3 and 17 May.

The bald eagle nest was not active this year.

Gulls

As in prior years, one of our primary objectives was to prevent ring-billed gulls from nesting on "Tern Island" where they have attempted to breed since 1985. Gulls compete with piping plovers and common terns for breeding space and are a potential source of nest and chick predation. In 1992 and 1993 we were successful in causing gulls to abandon the site by placing an elevated grid of string in the traditional nesting area. In 1993 only a few pairs attempted to breed. This year very few ring-billed gulls were seen on "Tern Island" at any time (Table 8) and none attempted to breed. We are hopeful that the continued use of the string deterrent has finally broken the gull's nesting tradition at this site.

As usual, large numbers of loafing gulls (mostly Franklin's gulls in 1994) began congregating on Pine and Curry Island SNA beaches during late June and early July. Between 21 June - 11 July we observed 10 Franklin's gulls that had numbered, orange patagial tags. These were breeding adults marked in late May at Agassiz NWR by Joanna Burger. These data suggest that the Franklin's gulls congregating on the SNA in July each year are coming from Agassiz NWR after they finish their breeding efforts. None of the marked gulls was seen on more than one day which further suggests that individual gulls are not remaining on the SNA for extended periods. Gull numbers peaked on 11 July when we surveyed some 5,082 birds (4,470 Franklin's, 534 ring-billed, 78 herring). Unfortunately, the gulls congregate on the same

beaches used by piping plover broods. It is likely not a coincidence that this is the time when many plover chicks disappear. In 1993 we set up a string grid on a beach area near a piping plover nest. The string appeared to deter gulls from using the area. This year we again set up a string grid on a "Tern Island" beach adjacent to a piping plover nest. The grid was quite successful in deterring gull use of the site. For example, on 11 July when over 2,000 gulls were present on "Tern Island" (Table 8), we observed a tight cluster of 800 gulls on one side of the grid and another tight grouping of 450 gulls on the other side. Only 4-5 gulls were under the grid. The piping plover brood was also under the grid as this was literally the only available open spot along that entire section of beach. The grid remained in place from 27 June - 3 August. No birds became entangled in the highly visible string. Installation of string grids on beaches used by piping plovers appears to have considerable potential for providing the plovers a relatively disturbance-free area for rearing their chicks.

RECOMMENDATIONS

1. Continue to trap mammalian predators during May-July on Pine/Curry Island and Morris Point.

2. Prevent ring-billed gulls from nesting on"Tern Island" by use of a grid of elevated string as necessary.

3. Install grids of elevated string on beaches near piping plover nests to deter landing by flocks of gulls.

4. Continue to use nest enclosures on "Tern Island" to monitor common tern reproductive success.

5. Continue to destroy crow and raven nests on Pine/Curry Island and Morris Point. Shoot adults as opportunities arise.

6. Trap or shoot great horned owls, as necessary, to prevent nocturnal disturbance and/or predation on piping plovers and common terns. Attempt to obtain a seasonal depredation permit covering a three year period.

7. Continue to use wire mesh predator exclosures around piping plover nests.

8. Continue to distribute brochures and information to resort owners and other interested parties in the vicinity of LOTW to encourage compliance with sanctuary regulations. Encourage MDNR Enforcement personnel to continue enforcing these regulations.

9. Cut trees and shrubs, as needed, in areas occupied by piping plovers to eliminate crow/raven/raptor perches and to maintain relatively open habitat conditions.

ACKNOWLEDGEMENTS

Bruce Lenning and Tammy Larson provided assistance in the field. Jeff Dittrich, Mike Haws, and Kevin Olson posted sanctuary areas in early May and removed the signs in September. Rick Cousins supplied us with LOTW water depths. Curt Adolfson and Matt Snebolt assisted with brush cutting in October.

LITERATURE CITED

Haig, S. M. and L. W. Oring. 1987. Population studies of piping plovers at Lake of the Woods, Minnesota, 1982-1987. Loon 59:113-117.

Wiens, T. P. 1986. Nest site tenacity and mate retention in the piping plover (Charadrius melodus). M.S. Thesis, University of Minnesota - Duluth, 34 pp.

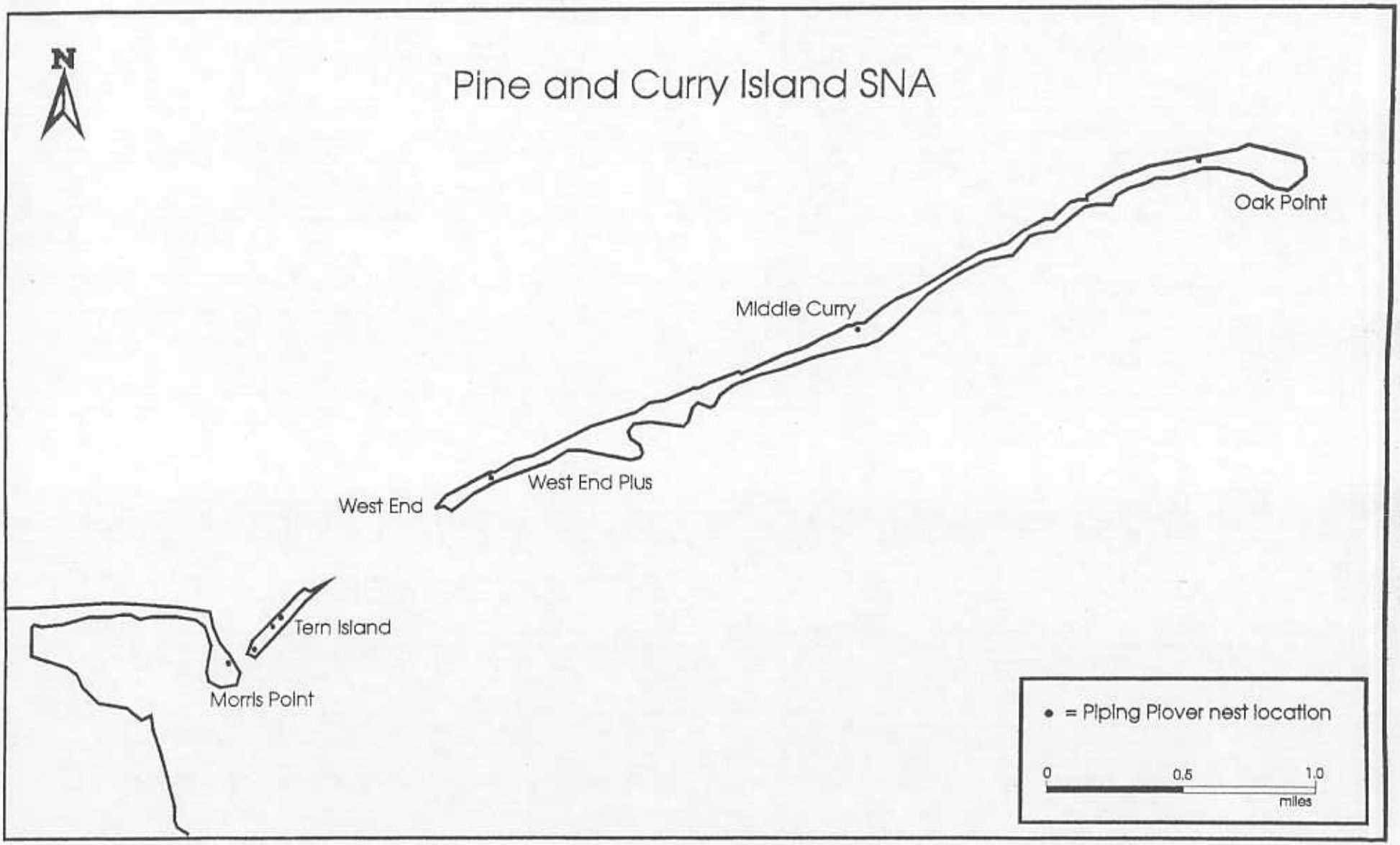

Figure 1. Piping Plover nest site locations, 1994.

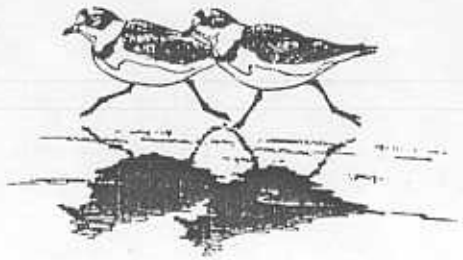

Table 1. Monthly mean water levels (ft. above sea level) at Lake of the Woods, 1982-1994.

	May	June	July	August	Mean
1982	1059.3	1060.0	1060.1	1060.3	1059.9
1983	1058.7	1059.0	1059.8	1059.7	1059.3
1984	1058.9	1059.6	1060.5	1060.6	1059.9
1985	1060.3	1061.0	1061.5	1061.0	1060.9
1986	1060.6	1060.6	1060.5	1060.1	1060.4
1987 /1	--	--	--	--	
1988	1057.8	1057.9	--	1057.9	1057.9
1989	1059.6	1060.5	1061.5	1060.9	1060.6
1990	1058.1	1059.3	1060.0	1059.4	1059.2
1991	1058.5	1059.4	1060.0	1059.7	1059.4
1992	1060.3	1060.3	1060.5	1060.4	1060.4
1993	1058.9	1059.3	1060.0	1060.0	1059.6
1994	1058.5	1059.0	1060.0	1060.4	1059.5
Mean	1059.1	1059.7	1060.4	1060.0	

/1 1987 data are not available.

Table 2. Adult piping plovers given new band combinations in 1994.

Band Number[/1]	Old Band Combination[/2]	New Band Combination	Location	Date
901-39478	A:-	FA:dBW	Morris Point	13 June 94
901-39477	A:-	FA:WG	Tern Island	13 June 94
901-39482	-:A	RdB:FA	Tern Island	13 June 94

[/1] These birds were banded as chicks on Pine and Curry Island in 1993.

[/2] Bands are read left leg top to bottom: right leg top to bottom. A = USFWS band, F = green international flag, dB = dark blue, W = white, G = green, R = red.

Master Permit No. 08035

BAND PREFIX: 901 ←	COLOR MARKER CODE*	ALPHA CODE	SPECIES #	STATUS	AGE-SEX	REGION	LAT-LONG	LOC	DATE MO. - DAY - YR
51 52									
53 54									
55 56									
57 58									
59 60									
61 62									
63 64									
65 66									
67 68									
69 70									
71 72									
73 74									
75 76									
77 78									
79 80									
81 82									
83 84									
85 86									
87 88 394	BB:FA	PIPL	277.0	301	AHY-U	250	485-0944	A	06-13-94
89 90 ↓		↓	↓	300 ↓	L-U ↓	↓	↓	↓	06-20-94 06-28-94
91 92									
93 94									
95 96									
97 98									
99 00									

REMARKS: Color code is read - left leg top to bottom & right leg top to bottom.
Colors are as follows - B = blue, F = green international flag, A = USFWS band.

*If applicable

Master Permit No. 08035

BAND PREFIX: 901 ←	COLOR MARKER CODE*	ALPHA CODE	SPECIES #	STATUS	AGE-SEX	REGION	LAT-LONG	LOC	DATE MO. - DAY - YR
51 52									
53 54									
55 56									
57 58									
59 60									
61 62									
63 64									
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69 70									
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87 88									
89 90									
91 92									
93 94									
95 96									
97 98									
99 395 00		PIPL	277.0	300	L-U	250	485-0944	A	07-05-9

REMARKS:

*If applicable

Table 3. Population summary of piping plovers from 1982-94 at Lake of the Woods, Minnesota. /1

Year	Breeding Birds				Non-breeders	Total
	Pine/Curry Island	Morris Point #479	Zippel Bay	Rocky Point		
1982	24	4	0	2	14	44
1983	32	6	2	2	7	49
1984	36	8	0	0	3-6	47-50
1985	19-36	4	0	-	1-2	24-42
1986	18	4	0	1	9-10	32-33
1987	12	2	0	-	12	26
1988	18	4	0	4	4	30
1989	14	2	0	4	2	22
1990	8	2	-	2	4	16
1991	12	0	0	0	2	14
1992	10	0	0	0	3	13
1993	9	0	0	0	2	11
1994	10	2	0	0	3	15

/1 1982-84 data from Wiens 1986.
1985-87 data from Haig and Oring 1987.

Table 4. Reproductive success by breeding location for piping plovers, 1994.

	Morris Point	Tern Island	West End Plus	Middle Curry	Oak Point	Total	
						No.	%
No. nests	1	3	1	1	1	7	--
No. eggs laid	4	10	4	4	4	26	--
No. successful nests /1	1	2	1	1	0	5	71.4
No. eggs hatched	4	7	4	4	0	19	73.1
No. chicks fledged	0-1	2	1	1-3	0	4-7	21.1-36.8

/1 Successful = at least one egg hatched.

Table 5. Reproductive success of piping plovers at Lake of the Woods, Minnesota from 1982-1994. /1

Year	No. Nests	Chicks fledged	Chicks fledged/pair
1982	24	26	1.7
1983	22	44	2.1
1984	27	13	0.6
1985	--	7-10	0.4-0.5
1986	--	9	0.8
1987	7	2-21	0.3-3
1988	13	12-15	1.0-1.25
1989	10	1	0.1
1990	7	4	0.7
1991	6	2-4	0.3-0.7
1992	5	4	0.8
1993	6	9	1.8
1994	7	4-7	0.7-1.2

/1 1982-1984 data from Wiens 1986.
1985-1987 data from Haig and Oring 1987.

Table 6. Colony size and reproductive success of common terns nesting on Pine and Curry Island SNA, 1988-1994.

Year	No. Nests	No. Fledged	
		Observed	Estimated[/1]
1988	52	0	
1989	120	1	
1990	180	70	
1991	274	9	
1992	186	0	
1993	153	84+	159
1994	379	92+	330

/1 Estimate based on extrapolation from fledge rate in enclosures to all nests.

Table 7. Contents of common tern nest enclosures on "Tern Island", 1994.

Date	East enclosure	West enclosure
27 June	8 nests (21 eggs)	7 nests (20 eggs)
11 July	7 live chicks 3 dead chicks 1 egg	8 live chicks 1 dead chick 7 eggs (6 pipping)
20 July	7 live chicks 1 dead chick 2 eggs (1 pecked)	6 live chicks 5 dead chicks 1 egg
3 August	empty	1 chick (large)

Table 8. Total gulls present on "Tern Island", 1994.

Date	Estimated Number of Gulls Present			
	Ring-billed	Franklin's	Herring	Total
May 4	6	0	0	6
12	0	0	2	2
17	1	0	3	4
23	0	0	2	2
31	8	0	5	13
June 1	12	0	0	12
6	0	6	3	9
13	0	0	0	0
14	0	0	0	0
21	8	15	1	24
27	8	100	0	108
28	0	50	0	50
July 5	11	125	1	137
11	20	2,000	6	2,026
20	5	125	0	130
Aug 3	3	3	0	6