R1-57

UNITED STATES GOVERNMENT

Memorandum

FISH AND WILDLIFE SERVICE

TO : Files, Anaho Island NWR
Stillwater Wildlife Management Area

DATE: May 26, 1989

FROM : Wildlife Biologist, Steve Thompson
Fallon, Nevada

SUBJECT: Results of population estimates for Anaho Island NWR, 1987 &1988

Introduction

Anaho Island is a 248 acre National Wildlife Refuge established by Executive Order 1819 on September 4, 1913, by Woodrow Wilson. The island is surrounded by land owned by the Pyramid Lake Paiute Tribe. The primary purpose of Anaho Island NWR is to provide safe nesting habitat for colonial nesting species. It is one of nine major breeding areas used by the western population of American White Pelicans.

Methods

Anaho Island NWR was censused according to procedures outlined in the Stillwater WMA station Wildlife Inventory Plan. The plan calls for three trips to Anaho in May, June and July. An effort is made to count total nesting birds and estimate the number of nests for the following species: American White Pelican, Double-crested Cormorant, Great Blue Heron, California Gull, and Black-crowned Night-Heron. The location of each nesting colony is then mapped on xeroxed copies of aerial photographs.

The census of nesting birds has been conducted at the same location for several years. A good vantage point approximately 3/4 of the way up the island on the east side has been used. In 1987 and 1988 censuses were conducted from the elevated vantage point using 20-60x spotting scopes and binoculars. Birds were counted and recorded as adults or young. Nests were counted if adults were incubating eggs or brooding small young. The location of each colony and its estimated number of nesting birds was then recorded on field data sheets, aerial photographs, and in biological field journals. More detailed field notes and records are available in the refuge biological files. In 1987 field surveys were conducted on May 12-13, June 17-18, and July 14-15. In 1988 field surveys were conducted on April 22, May 11 & 26, June 14 & 15, and July 19. Censuses and colony mapping were generally completed between 0800-1100 before major nest exchanges occurred.

Results 1987 & 1988

The exceptional conditions for fish eating colonial species of 1983-86 began to decline in 1987. Fish die-offs from several thousand to over 7.5 million occurred at almost regular intervals on Stillwater WMA. By 1988 there were few remaining feeding areas for pelicans and Great Blue Herons in Lahontan Valley.

1988 has been a tough year for fish-eating birds in the Lahontan Valley. Fish-eaters were generally in poor body condition, many weighed 1/2 of their normal body weight. Birds most commonly found dead at Stillwater were American White Pelicans, Black-crowned Night-Herons, Western Grebes and Great Blue Herons. Young Great Blue Herons were being found dead in their nests in almost every colony at Stillwater and Carson Lake.

Mike Sevon (NDOW) measuring dead Tui Chub per linear foot. We estimated 72 fish per linear foot for approximately 40 miles; conservative estimate of 7.5 million dead Tui Chub.

Sick American White Pelican, showing center board projection, February 12, 1987, on Carson Sink.

American White Pelicans

1987

The nesting season was initiated 1-2 months earlier than in most previous seasons. During the winter of 1986-87, 20-30,000 pelicans wintered on the Carson Sink taking advantage of the 7.5 million fish that were trapped in the receding waters. In 1986 on May 13, we had about 7,000 nests but no visible chicks. On the same date in 1987 we had almost 5,500 nests but the young (4,619) were very large and roaming the island in pods of 100-500 birds, most of the young were 1/3-2/3 adult size. We collected 20 pelican eggs in 1987 for trace elements and organochlorine analysis, while collecting eggs we noted 80 dead young pelicans.

By June 18, 1987, we counted 5,840 young and estimated that a minimum of 6,000 would reach flight stage. Many birds from our last trip fledged and probably departed Pyramid Lake. We noted many more dead pelicans than in 1986, when just about all the young survived. We saw at least 50 dead young pelicans along the east shore and 66 dead among the nesting colonies. I estimated that a minimum of 200 chicks had died so far that season.

On July 15, 1987, it became obvious that those pelicans that nested late in the season were running out of food. Fish die-offs at Stillwater (their primary feeding grounds) left only a few fishing spots available and these were apparently insufficient to feed both adults and young. Hundreds of adults were found dead, we counted 743 dead pelican chicks on Anaho Island. The Pyramid Lake Tribe reported that several hundred dead pelicans washed up on shore. We estimated that a minimum of 1000 young birds had died. On both the June and July visits very few adults were present.

1988

On April 22, 1988, we visited Anaho Island to collect pelican eggs for contaminant analysis. We collected one egg from only those nests that had two egg clutches. A total of 20 eggs were collected. Nesting chronology was back to normal for most of the birds that we examined on 1-3 egg clutches, just starting to incubate. Colony "B" had a lot of nest scrapes, 45 single egg clutches, 23 two egg clutches, and no three egg clutches. In general, the number of colonial nesting birds was down substantially from 1986 and 1987. Only 3 small colonies were going at this time. Colony "A" had about 500+ nests with eggs, colony "B" 200+ nests with eggs, and colony "C" about 400+.

On our first official count, May 26, 1988, we found that almost all of the nesting birds had abandoned nesting efforts. At first we thought the abandonment might have been caused by egg collecting activities, but colonies that we hadn't visited also abandoned nesting. Numbers were down to 325 adult birds with about 50 active nests. The number of birds loafing on the shoreline (1,370) far outnumbered active breeders. Only 10 young about 1/3 adult size were seen. Most of the 325 adults were sitting or standing around typical nesting areas, but no eggs or young were seen. While night-lighting on June 14, 1988, we found a few single and double egg clutches (perhaps 10 nests) and a few pink chicks (5). Adult birds flushed but young birds were fascinated by the lights. Once captured the young pelicans calmed down quickly and it became much like a childrens petting zoo. We found only 30-35 young with two adult birds. On June 21, 1988, we saw a few more pink young but we believe it was a bust year for pelicans in 1988; at best we produced 35 young to flight.

Table 4. Results of nesting population estimates for Anaho Island NWR, 1988.

Survey Dates	Adults at Nests	Young	Estimated Nests
American White Pelicans			
April 22	4,000	-	-
May 26	325	-	50
June 15	350	35	50
Double-crested Cormorants			
April 22	1,500	-	-
May 26	975	-	-
June 15	575	?	575
Great Blue Heron			
April 22	125	-	-
May 26	22	15	-
June 15	35	-	25
California Gull			
April 22	3,000	-	-
May 26	3,300	-	2,500[1]
June 15	3,000	-	-

[1] 3,300 nesting birds x 0.75 = 2,475 = 2,500 nests.

Table 5. Results of nesting population estimates for Anaho Island NWR, 1987.

Survey Dates	Adults at nest	young	Estimated nests
	American White Pelican		
May 13	5,328	4,619	5,500
June 18	153	5,840	6,000
July 15	115	1,710	
	Double-crested Cormorants		
May 13	1,345	0	1,500
June 18	?	5,400	2,000
July 15		641	
	Great Blue Heron		
May 13	140	0	150
June 18	-	175	125
July 15	-	50	-
	California Gull		
May 13	2,800[1]		2,100
June 18	-		-
July 15	-		-

[1] Estimated nesting birds x 0.75 = estimated nests, example 2,800 nesting birds x 0.75 = 2,100 nests.

Table . . Estimates of nesting population size of American White Pelicans on Anaho Island NWR, 1903-1986.

R	# OF YOUNG	# OF NESTS	# OF ADULTS	YG/NESTS	SOURCE
1903	3000			<DIV 0>	Chapman (1908)
1917	5500			<DIV 0>	Evermann (1923)
1921	4181			<DIV 0>	Evermann (1923)
1924	4534	5000	10000	0.91	Hall (1925)
1931			7000	<NA>	Thompson (1933)
1932	2994	3000	6000	1.00	Thompson (1933)
1940	3000			<DIV 0>	Bond (1940)
1942	3314			<DIV 0>	Alcorn (1943
1944	5417			<DIV 0>	Alcorn (1946)
1950	4160	4900	9800	0.85	Marshall & Giles (1953)
1951	3742	5629	11258	0.66	Marshall & Giles (1953)
1952	4053	3973	7947	1.02	USFWS Anaho Island NWR
1953	3803	5598	11197	0.68	USFWS Anaho Island NWR
1954	5340			<DIV 0>	
1958	6400			<DIV 0>	
1959	3500	2750	5500	1.27	
1960	4000	3750	7500	1.07	
1961	3000			<DIV 0>	
1962	3000	3250	6500	0.92	
1963	2500	3000	6000	0.83	
1964	2314	2343	4686	0.99	
1965	2700	2400	4800	1.13	
1966	2550	2475	4950	1.03	
1967	1655	3172	6345	0.52	
[illegible]8	3090	2705	5410	1.14	
[illegible]9	3400	2800	5600	1.21	
1970	1822	3344	6688	0.54	
1971	2980			<DIV 0>	
1972	2980			<DIV 0>	
1973	3200			<DIV 0>	
1974	1725			<DIV 0>	
1975	1700			<DIV 0>	
1976	2475			<DIV 0>	
1977	1400	1500	3000	0.93	
1978	1540	1710	3420	0.90	
1979	1575	1750	3500	0.90	
1980	1400	1500	3000	0.93	Anderson (1982)
1981	2880	3000	6000	0.96	Anderson (1982)
1982	3350	3400	6800	0.99	Anderson (1982)
1983	3300	5700	11500	0.58	USFWS Anaho Island JWR
1984	4800	2950	6000	1.63	
1985	5000	4475	9000	1.12	
1986	7500	10700	21500	0.70	
1987	5500	6000	13800	1.09	
1988	35	50	4000	0.70	
AVERAGE	3352	3584	6982	0.94	

Table 2. Results of census for Anaho Island NWR on May 13, 1987.

WEATHER: _____

OBS: S. Thompson, L. Neel, T. Bowman

Anaho Island - Field form for summary data

TIME: _____ DATE: 5-12/13-87

Colony #	A	B	C	D	E	F	G	H	I	J	K			TOTALS	
	**	**	**	**		*	*	*							
AWP NESTS	380	89	1008	1950	226	?	?	?	1435	240				5328	
ADULTS	380	89	1008	2300	226	190	617	90	1435	240				6575	
YOUNG					151	400	1089	2000	832	47				4594	
DEAD															
LOAFERS														325	Adults
														25	Young
DCC NESTS	70	-	250	150	85				790					1345	
ADULTS	151	-	-	-	79									230	
YOUNG									140					140	
DEAD															
LOAFERS															
GBH NESTS															
ADULTS															
YOUNG															
DEAD															
C. GULL NESTS									1700		1100			2100	1
														2800	
ADULTS	23													150	Loafers
YOUNG														23	
DEAD															
BCN-HERON NESTS															
ADULTS															
YOUNG															
S. EGRET NESTS															
ADULTS															
YOUNG															

* = Large young - many in big pods

** = Most on eggs

1 nesting birds x 0.75 = estimated nests

Table 3. Results of census for Anaho Island NWR on June 18, 1987.

WEATHER: _____

OBS: S. Thompson, L. Neel, R. Vega

Anaho Island - Field form for summary data

TIME: 0800-1100 DATE: 6-18-87

	A	B	C	D	E	F	G	H	I	J	K			
AWP NESTS		0	115	38									153	
ADULTS	13	0	446	38[1]		24			38				549	
YOUNG	200	0	1225	515		1250			1900				5090	
DEAD			14			52							66	
LOAFERS													750	Young
													50	Adults
DCC NESTS														
ADULTS														
YOUNG	150		550						4700				5400	
DEAD														
LOAFERS														
GBH NESTS														
ADULTS														
YOUNG	15								160				175	
DEAD									*		*			
C. GULL NESTS														
ADULTS														
YOUNG														
DEAD														
BCN-HERON NESTS									20				20	
ADULTS														
YOUNG														
S. EGRET NESTS														
ADULTS														
YOUNG														

1 = Adults apparently without nests on edge of colony may have young or non-breeders

* = Use 5-12-87 count for nests, a lot of young 2-3 broods most young are 1/3-2/3 of adult size.

Table 4. Results of census for Anaho Island NWR on July 15, 1987

WEATHER: _____

OBS: S. Thompson, R. Vega, T. Bowman

Anaho Island - Field form for summary data

TIME: 0815 - 0930 DATE: 7/15/87

Colony #	A	B	C	D	E	F	G	H	I	J	K			TOTALS
AWP NESTS														
ADULTS														
YOUNG				780					440					1420
DEAD							235		A64[1]					299
LOAFERS						dead -	44[2]		115	adults				115
DCC NESTS									490	young				534
ADULTS														
YOUNG				291										291
DEAD							95[3]		235[1]					330
LOAFERS												11[2]		11
GBH NESTS												350	young	350
ADULTS														
YOUNG									50					50
DEAD									5[1]					5
C. GULL NESTS														
ADULTS														
YOUNG														
DEAD									49[1]	7[2]	loafers			56
BCN-HERON NESTS														
ADULTS														
YOUNG									25					25
S. EGRET NESTS														
ADULTS														
YOUNG									5					5

1 = C-lonies A,B,I & J (7-14-87)
2 = Partial Shoreline Count (25%)
3 = Colonies H,G,F,E,D,C (7-15-87)

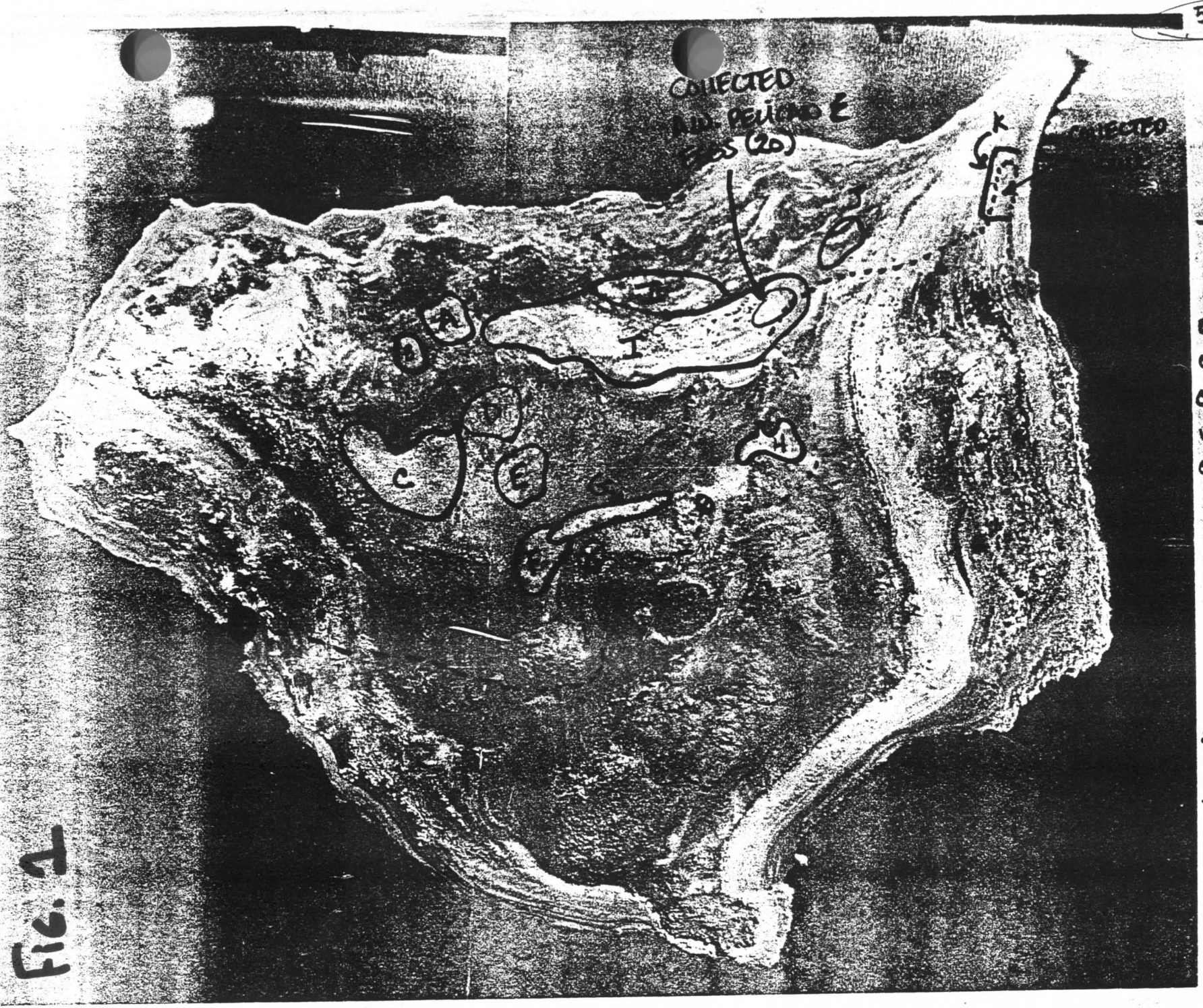

Figure 1. Location of boat landing, walking route, observation points, and nesting colonies on May 13, 1987, Anaho Island NWR.

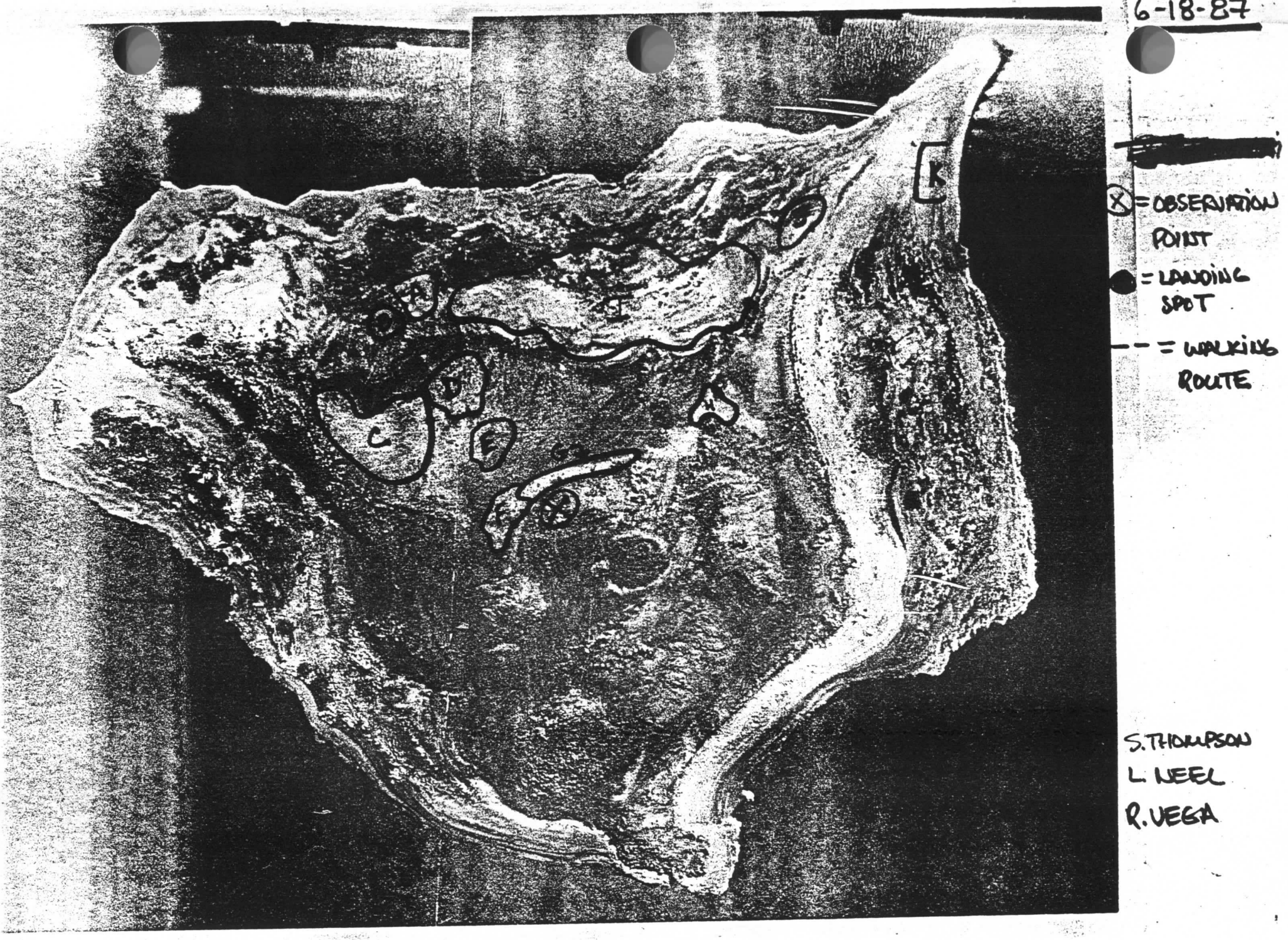

Figure 2. Location of boat landing, walking route, observation points, and nesting colonies on June 18, 1987, Anaho Island NWR.

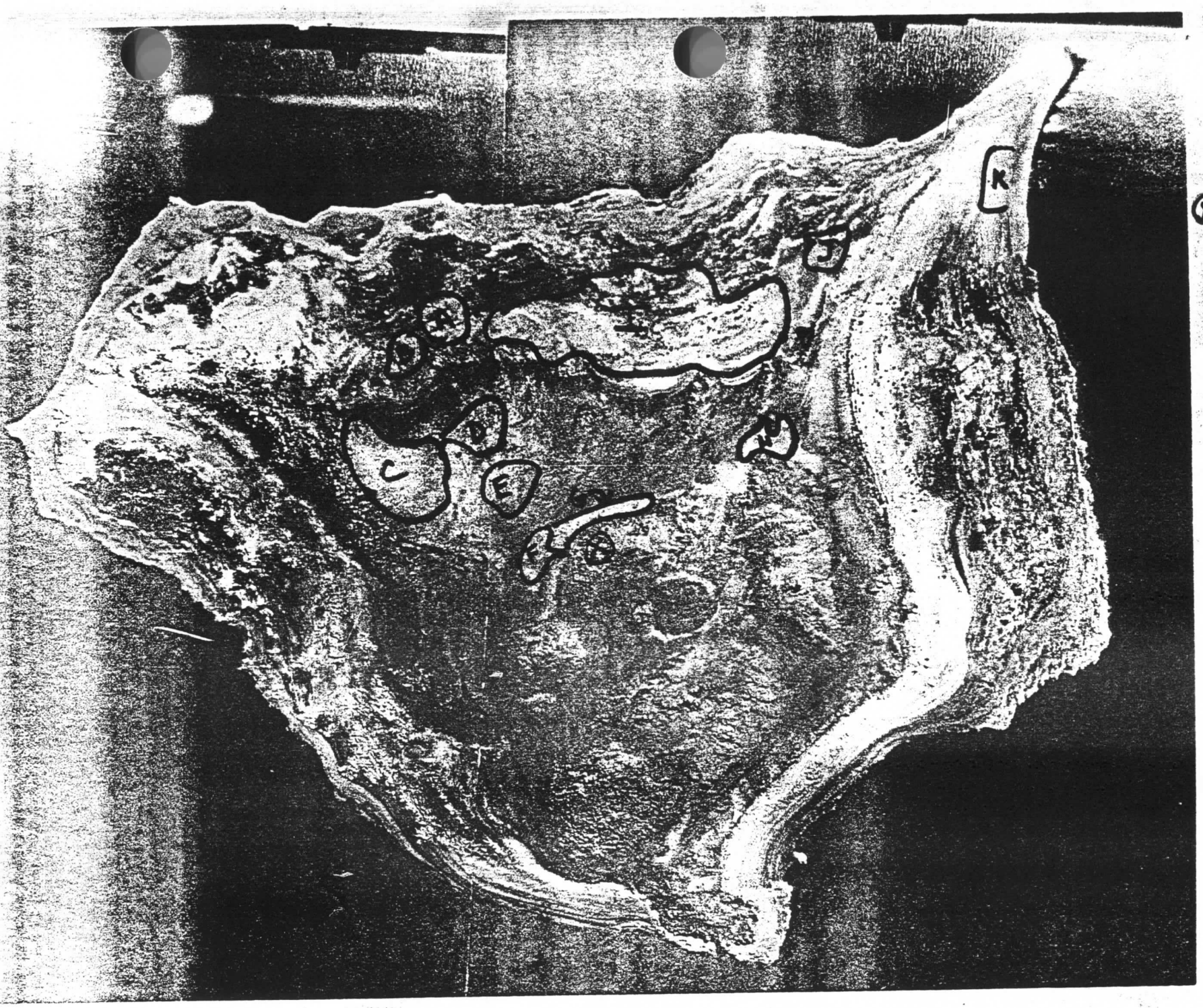

Figure 3. Location of boat landing, walking route, observation points, and nesting colonies on July 15, 1987, Anaho Island NWR.

Banding

1987

Using volunteers we were able to band 33 young pelicans on June 18, 1987, and 66 on July 15, 1987 (519-26201-300). We used a 14 foot inflatable zodiac, 25 hp outboard motor, and 3 people to capture young birds on the water. The young pelicans could almost fly or fly only short distances. This method was used to reduce the disturbance and death caused by previous upland banding conducted during the day. Because most of these birds were expected to attain flight within a week of banding our chances for returns should have been increased.

1988

Because drive trapping has been documented as resulting in high levels of mortality when used on colonial-nesting birds we attempted to trap birds by night-lighting. Well after dark, using hand-held, high intensity flashlights we walked slowly through the colonies of birds, most often focusing the beams of 3 or more lights on pods of young pelicans or single adults. Although adults often flushed easily if we moved up on them quietly and steadily 1 person could catch the adult on the nest using a long-handled dip net. This technique worked relatively well on both adult pelicans and cormorants.

Young pelicans were most often mesmerized by the lights so that pods of 6-20 or more could be easily surrounded. Once captured the young birds calmed down and often hung out around their captors even after being banded and released. Young cormorants were captured on the nest. One person, carrying 2 flashlights (held at approximately 90° angles) would blind a young bird while a second person would sneak up and grab the bird (must wear leather gloves) behind the head and then immobilize the feet. In this posture birds could be stretched so that a 3rd person could band the animal with little harm being inflected on the bird or members of the banding team. Young cormorants are placed back on their own nest after being handled, although some cormorants will jump from the nest after being handled. Young gulls were taken on or near their nest, banded, and returned to the nest site. This entire procedure, when done quietly and efficiently (each person is assigned a task), caused little disturbance to any of the birds outside our immediate field of light.

We believe this technique greatly reduced the level of mortality that often results from diurnal banding. Adults were thought to have returned to their nests soon after we left each of the colonies. Caution must be used in determining how long a banding crew can safely remain in any given area. Banders must consider ambient temperature, wind conditions, age of the nestlings (i.e., naked or feathered), and the total length of time the parents are expected to be absent from the nest when gauging the amount of time that can be safely spent in the colonies.

Deformities

On July 14, 1987, we picked up a severely deformed pelican chick. It was almost ready to fly and represents the third bill deformity we saw that year. All deformed birds were alive but would not be able to survive once the adults stoped feeding them.

Deformed young pelican affectionately known as the Elephant Man, from Anaho Island, July 14, 1987.

Double-crested Cormorants

1987

On May 12, 1987, many of the cormorants were incubating full clutches or brooding small young. On a short walk through one colony we encountered the following nesting chronology information:

Nest Contents	Number of Nests
1 egg	1
2 eggs	5
3 eggs	1
1 egg/2 young	4
1 egg/3 young	1
2 egg/2 young	2
2 young	5
3 young	4
4 young	3
5 young	1
	27

By June 18, 1987, it had become impossible to count nests because each cormorant nest seemed to contain between 2-4 young. We counted 5,400 young from our elevated vantage point. I estimated that most should have been able to fledge, our production estimate was 5,400. Because the colony was not totally synchronized in nesting chronology this production may have been slightly underestimated. At best 6,000-6,500 may have reached flight stage. During our May census we found 1,400 nests and estimated production at ,400 or 3.9 fledged young/nest. This would have been extremely high and probably

reflected an error in our nest estimate. Normally 2-3 young cormorants are fledged per nest on Anaho which indicates we had 1,800-1,700 nests. Another potential error would be adult birds that might be counted as young. This should be a relatively small error.

On July 15, 1987, most of the young cormorants had fledged. We counted 641 young in nests. It became obvious that those cormorants which nested early were generally successful, while those that nested at more normal dates or late were unsuccessful. We found 436 dead young, often entire broods, which indicated that the adults had abandoned nesting efforts.

1988

On April 22, 1988, most of the cormorants were paired and going through courtship behavior at their nest. In colony "B" some birds were on eggs, about 10 nests had fresh clutches of 1-4 eggs. By May 11, 1988, approximately 20% of the cormorants using the island appeared to be on eggs. Numbers still appear very low when compared to 1986 & 1987.

By May 26, 1988, we had 975 adult birds at nests, but over 1,450 adult birds loafing on the shoreline.

Our next visit to the island was on June 14 & 15, 1988. Night-lighting with large flashlights we looked at around 500 nests. Approximately 80% were incubating three egg clutches with a few fours and one egg clutches. About 15% of the nests had small chicks <1/3 of adult size. Many of the chicks were less than one week old. The remaining active nests contained large, 1/3-2/3 adult size young. We captured several adults on the nests, they were aggressive and bit hard!

By June 21, 1988, most of the cormorants had young which had just hatched, less than one week old. There seemed to be pretty good hatching success for those that did nest.

Great Blue Heron

From 1926 through the early 1950's only 10-25 pairs nested on Anaho Island, however, since that time the number of herons nesting on the island has increased. Since Great Blue Herons feed in close proximity to their nests they may be taking advantage of the new fish hatcheries at Sutcliff and possibly below Nixon.

1987

On May 12, 1987, we did look at 14 nests which contained the following:

Nest Contents	Number of Nest
2 eggs	1
3 eggs	2
4 eggs	0
1 egg/2 young	1
2 eggs/2 young	4
1 young	1
2 young	2
3 young	2
5 young	1

n = 14

By June 18, 1987, we had 175 young. It appears that we had 175 fledged young from 140 nest for 1.25 fledged young/nest. This appears comparable with previous years. On the July 15, 1987, census on 50 young Great Blue Herons remained in their nests. Most of the young birds had fledged with over 100 standing along the island shoreline.

1988

On April 22, 1988, the Great Blue Heron numbers appeared low when compared to 1986 and 1987. Most of the birds were attending nests but we didn't record any nests with eggs. We returned to Anaho Island on May 11, 1988, to collect five eggs from five nests. The nests were near the tops of tall greasewood (Sarcobatus vermicullatus) plants from 4-7 feet above the ground.

By May 26, 1988, we had only 15 nests with about 25 adult birds. On June 14, 1988, while night-lighting we found a few nests with eggs and one nest containing small young <1/3 of adult size.

California Gull

1987

On our May 12, 1987, visit to the southern most gull colony "K" we recorded the following clutch size and chronology data:

Table 5. Results of May 12, 1987, examination of California Gull nesting chronology.

	Number of Nest	
Nest Contents	South of Colony	Mixed North Colony
Scrape	12	1
One egg	37	4
Two eggs	202	6
Three eggs	474	0
1 egg/1 chick	1	0
2 eggs/1 chick	1	0
1 egg/2 chick	1	0
1 chick	1	0
2 chicks	1	0
	730	11

On June 18, 1987, most of the nests in the southern colony had 2-3 chicks about 1/3-2/3 adult size. It appeared we had about 2,800 nesting birds with good production in 1987. On July 15, we recorded 56 dead chicks, otherwise production appeared good. In general there appeared to be more adults than nests; a conversion factor of 0.75 was closest in estimating the number of nests. Therefore 2,800 nesting birds x 0.75 would equal approximately 2,100 nests.

1988

We found gulls back at the same nesting colonies as in 1986 and 1987 on our first visit (April 22, 1988). The numbers appeared comparable to 1986 and 1987. On May 11, 1988, the gulls appeared to be well synchronized with previous years (1986 and 1987). About 25% of the gulls were incubating eggs. We noted two single egg clutches, 12 two egg clutches, and nine three egg clutches. It appears that 1,500-2,000 birds are using the north colony. We floated a few eggs (5), to determine incubation stage, they appeared to be about 80% complete. The gulls nested in the same 2 colonies in 1987 as they did in 1986. One colony along the south contained only California Gulls. The other colony was mixed with Double-crested Cormorants, Great Blue Herons, and American White Pelicans. Gulls that nested among the other colonial birds seemed to be at about the same incubation stage as the southern colony. On May 26, 1988, we counted 1,900 birds at the northern colony "A" and 1,400 birds at the southern colony "B". The island total then is about 3,300 nesting birds.

We night-lighted several thousand gulls on June 14, 1988. It was easy to capture adults and chicks. Most (80%) of the gulls had two chicks or one chick about 1/3 of adult size. Approximately 15% of the nests had two or three egg clutches.

Caspian Terns

Caspian Tern nesting was not noted in 1987 or 1988

Black-crowned Night-Heron

1987

This species tends to nest on the northern fringe of colony "I". We found about 20 nests in 1987 on several of our walking trips, but they were not observed from our elevated censusing points. This is a species that would be easily missed using the standard censusing methods. On balance it probably isn't worth disturbing the other nesting birds to get an accurate Black-crowned Night-Heron count. Night-lighting should be used to census this species, which would essentially eliminate gull predation. It should be noted that the greasewood plants and area preferred by the Black-crowned Night-Herons has had the highest density of rattlesnakes. Our highest encounter rate was six singles per hour, at least one rattlesnake was encountered on almost every visit.

1988

On May 11, 1988, Black-crowned Night-Herons appeared about ready to nest. They were down lower in greasewood plants. Perhaps 25 nests with about 50 birds were using the island at that time.

Snowy Egret

1987

Tim Bowman and Dr. Chuck Henny located what appears to be the first nesting record for Snowy Egrets at Anaho Island. They located a minimum of two nests with three and one small young respectively on our July 14, 1987 census.

1988

While night-lighting on June 15, 1988, 5 Snowy Egrets were flushed from the large greasewoods near colony "A". At least 3 nests were found, each of which had 3 eggs. Nests are well hidden in the greasewood and can be easily overlooked.

Goats

On June 18, 1987 Larry Neel and I found two goat horns in separate locations on the west side of Anaho Island. Goats apparently were introduced to the island for a short period.

Other Migratory Birds

Table 6. List of other migratory birds noted while censusing colonial birds at Anaho Island NWR, and around Pyramid Lake, 1987.

May 12 & 13, 1987

Western Grebe (20), Common Merganser, Spotted Sandpiper, Canada Goose*, Common Raven*, Mallard*, Harlequin Duck (1 at Pyramid), Mourning Dove, Turkey Vulture, and Golden Eagle (adult).

June 17 & 18, 1987

Western Grebe, Common Merganser, Common Raven* (2 adults-3 young), Northern Harrier (1), and Golden Eagle.

July 14 & 15, 1987

Western Grebe, Common Merganser with brood, Northern Harrier (1)*, Common Raven, Rock Wren, Mourning Dove.

April 22, 1988

Northern Harrier (1)*, Eared Grebes, Western Grebe, and Common Raven.

May 14, 1988

Canada Goose (150)

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*Nesting on Anaho Island NWR

Fish

May 12, 1987 Most of the fish we saw walking through the pelican nesting colony were carp in the 12-14 inch range. A few carp were 18-20 inches long. Other fish scattered about the pelican colony were cui-ui (1) and tui-chub.

As the Carson Sink receded carp moved upstream in 1987 and 1988. Thousands of 8-14 inch carp became easy pickens for pelicans at the TJ and D-Line Junction.

Table 7. Identification guide for adult and young American White Pelicans, May-June.

	Adults	Young Birds
feet & bill color	bright orange/yellow	dull orange/yellow
nape	white or black[1]	downy white heads
centerboard	present[2]	none
breast	rust ring around breast	white
upperwing	occasionally rusty & white	beige, gray & white

[1] Adults get a black nape about the time the chicks hatch

[2] Centerboards are present from the onset of the breeding season February - March, until the chicks start to hatch, usually in May. Both sexes have centerboards, they shed these projections with the postnuptial molt to black napes. This plumage change is apparently stimulated by the arrival of chicks.

Table 8. Results of census for Anaho Island NWR on April 22, 1988.

WEATHER: _____

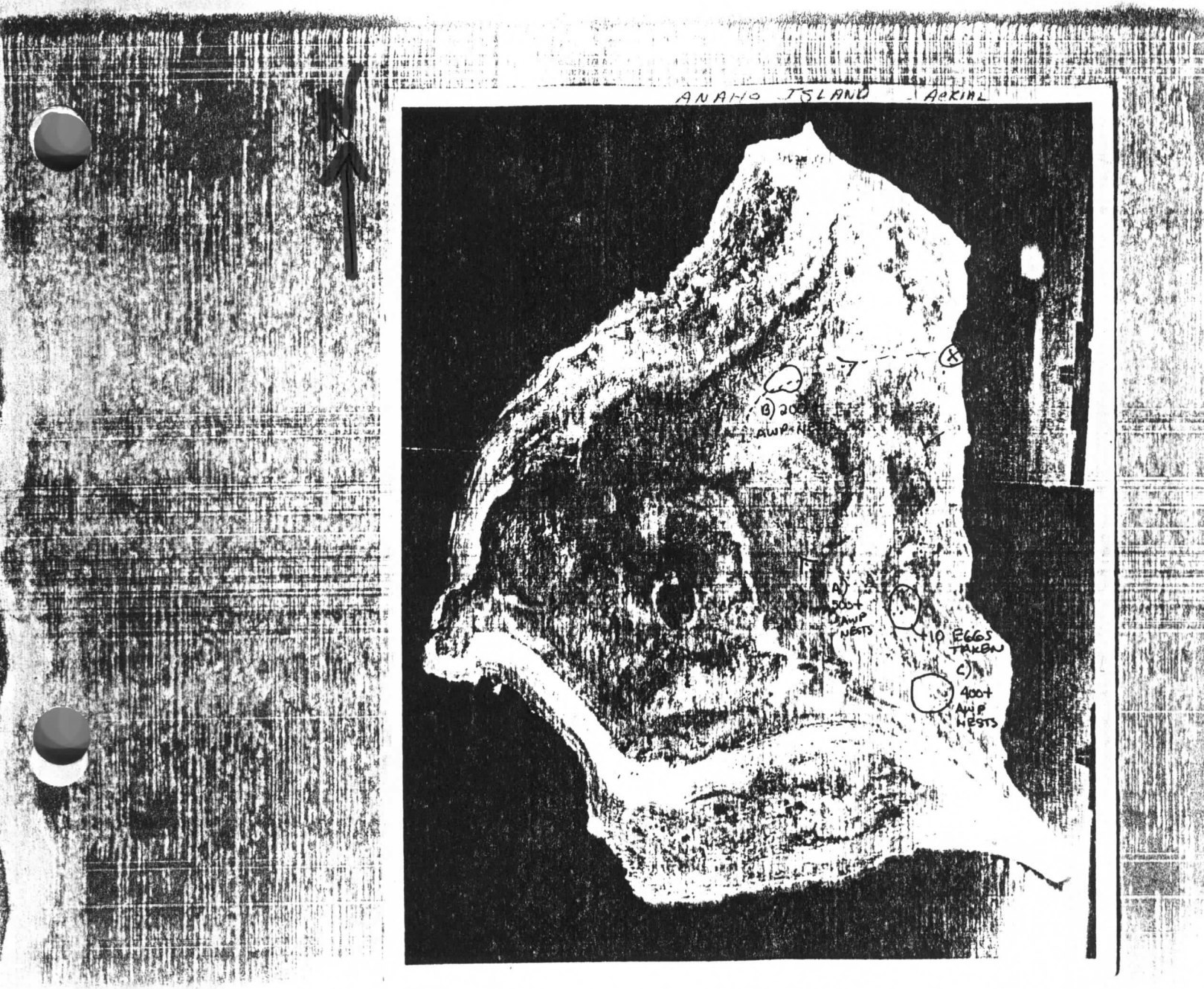
OBS: S. Thompson, L. Dubuc, T. Bowman, A. Raymond, K. Merritt

Anaho Island - Field form for summary data

TIME: 1200-1315 DATE: 4/22/88

AWP NESTS	
ADULTS	4000
YOUNG	
DEAD	
LOAFERS	
DCC NESTS	
ADULTS	1500
YOUNG	
DEAD	
LOAFERS	
GBH NESTS	
ADULTS	125
YOUNG	
DEAD	
C. GULL NESTS	
ADULTS	3000
YOUNG	
DEAD	
BCN-HERON NESTS	
ADULTS	
YOUNG	
S. EGRET NESTS	
ADULTS	
YOUNG	

- Rough estimates, trip taken to collect A.W. Pelican eggs for contaminants.



4/22/88 1200-1315 VISIT TO ANAHO ISLAND TO COLLECT 20 AMERICAN WHITE PELICAN EGGS.

1200-1315 WITH STEVE THOMPSON, LESLIE DUBUC, TIM BOWMAN, KEN MERRITT AND ADAN RAYMOND.

(X) = LANDING SPOT

- - - = PATH WALKED

Figure 4. Location of boat landing, walking route, observation points, and nesting colonies on April 22, 1988.

Table 9. Results of census for Anaho Island NWR on May 26, 1988.

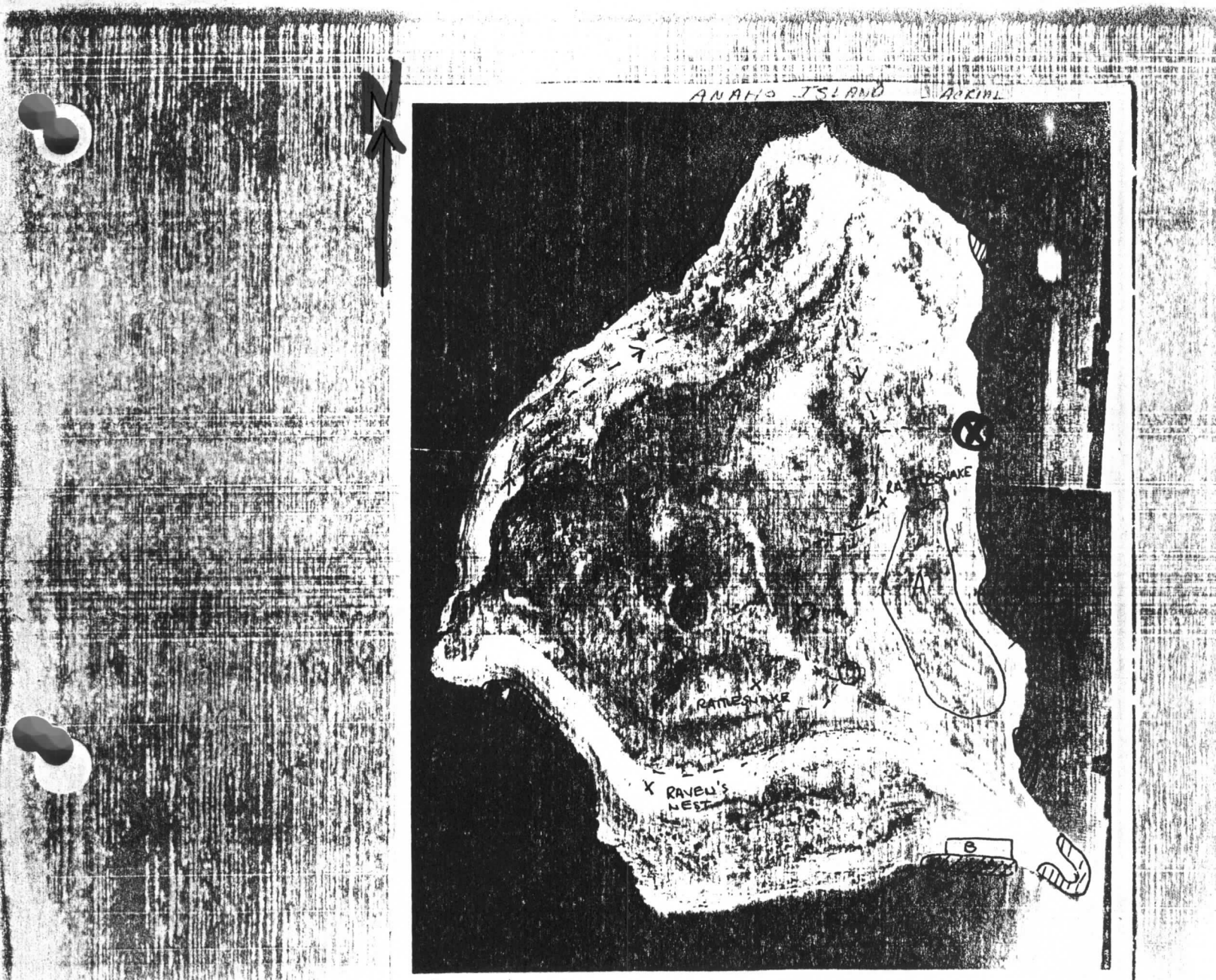
WEATHER: _____

OBS: S. Thompson, T. Bowman, K. Merritt

Anaho Island - Field form for summary data

TIME: 0830-1100 DATE: 5/26/88

Colony	A	B	TOTAL ESTIMATE	
AWP NESTS	50		50	
ADULTS	325		325	
YOUNG				
DEAD				
LOAFERS			1370	
DCC NESTS				
ADULTS	975		975	
YOUNG				
DEAD				
LOAFERS			1450	
GBH NESTS	15		15	
ADULTS	22		22	
YOUNG				
DEAD				
C. GULL NESTS				
ADULTS	1900	1400	100 3300	Loafers
YOUNG				
DEAD				
BCN-HERON NESTS				
ADULTS				
YOUNG				
S. EGRET NESTS				
ADULTS				
YOUNG				



= LANDING SPOT

= SHORELINE LOAFING SPOT FOR A.W. PELICANS & D.C. CORMORANTS.

= OBSERVATION POINT

5-26-88 STEVE THOMPSON, TIM BOWMAN, KEN MERRITT 0830-1100

A) DCC 975 B
— N

AWP 325 B
50 N

GBH 22 B
15 N

C. GULL 1900 B
— N

B) ~~1400~~ CALIF. GULL 1400 B

SHORELINE LOAFERS

DCC 1450

AWP 1370

GAGU 100

Figure 5. Location of boat landing, walking route, observation points, and nesting colonies on May 26, 1988.

B = BIRDS N = NESTS

Table 10. Results of census for Anaho Island NWR on June 15, 1988.

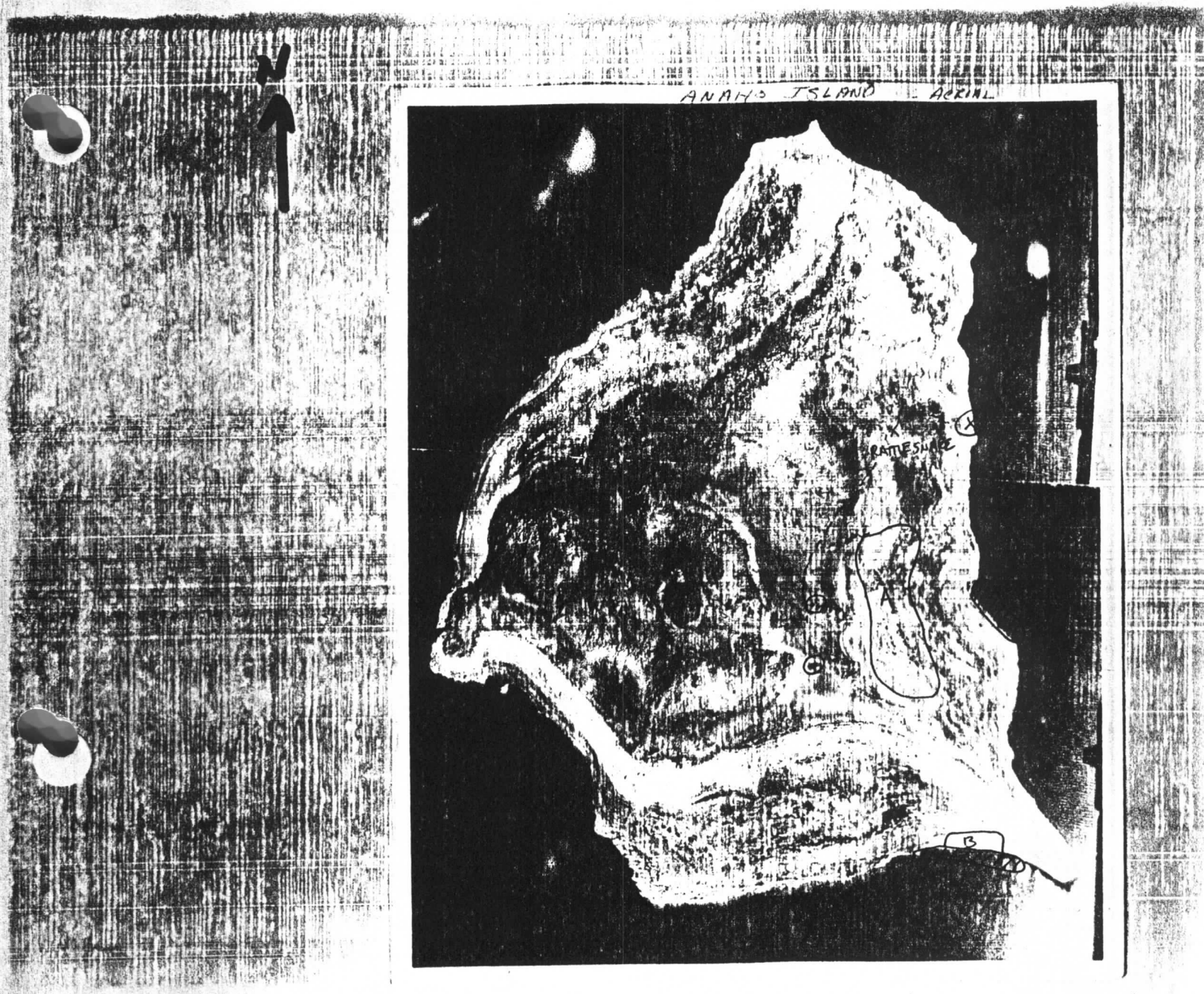
WEATHER: _____

OBS: T. Bowman, S. Thompson, J. Stanton

Anaho Island - Field form for summary data TIME: 1000-1058 DATE: 6/15/88

	A	B	TOTAL NESTING BIRDS	
AWP NESTS	50		50	
ADULTS	350	-	350	
YOUNG	10		10	*35 night lighting
DEAD				
LOAFERS	440	200	640	
DCC NESTS	488		488	
ADULTS	568		575	
YOUNG	?			
DEAD				
LOAFERS	600	380	980	
GBH NESTS	21		21	*25
ADULTS	35		25 35	loafers
YOUNG				
DEAD				
C. GULL NESTS				
ADULTS	1800	1250	3050	100 loafe
YOUNG				
DEAD				
BCN-HERON NESTS				
ADULTS	25			
YOUNG				
S. EGRET NESTS				
ADULTS				
YOUNG				

See Steve Thompson field notes June 14-15, 1988, P. 42-46.



6-15-88 TIM BOWMAN, JOHN STANTON, HARRIET HILL, JOHNATHAN, LIZ STEVE THOMPSON

A

50 AWP NESTS, 350 BIRDS

480 DCR. NESTS, 960 BIRDS

21 GBH NESTS, 35 BIRDS

~~13~~ CAGULL NESTS, 1800 BIRDS

~~5~~ S. EGRET NESTS, 5 BIRDS

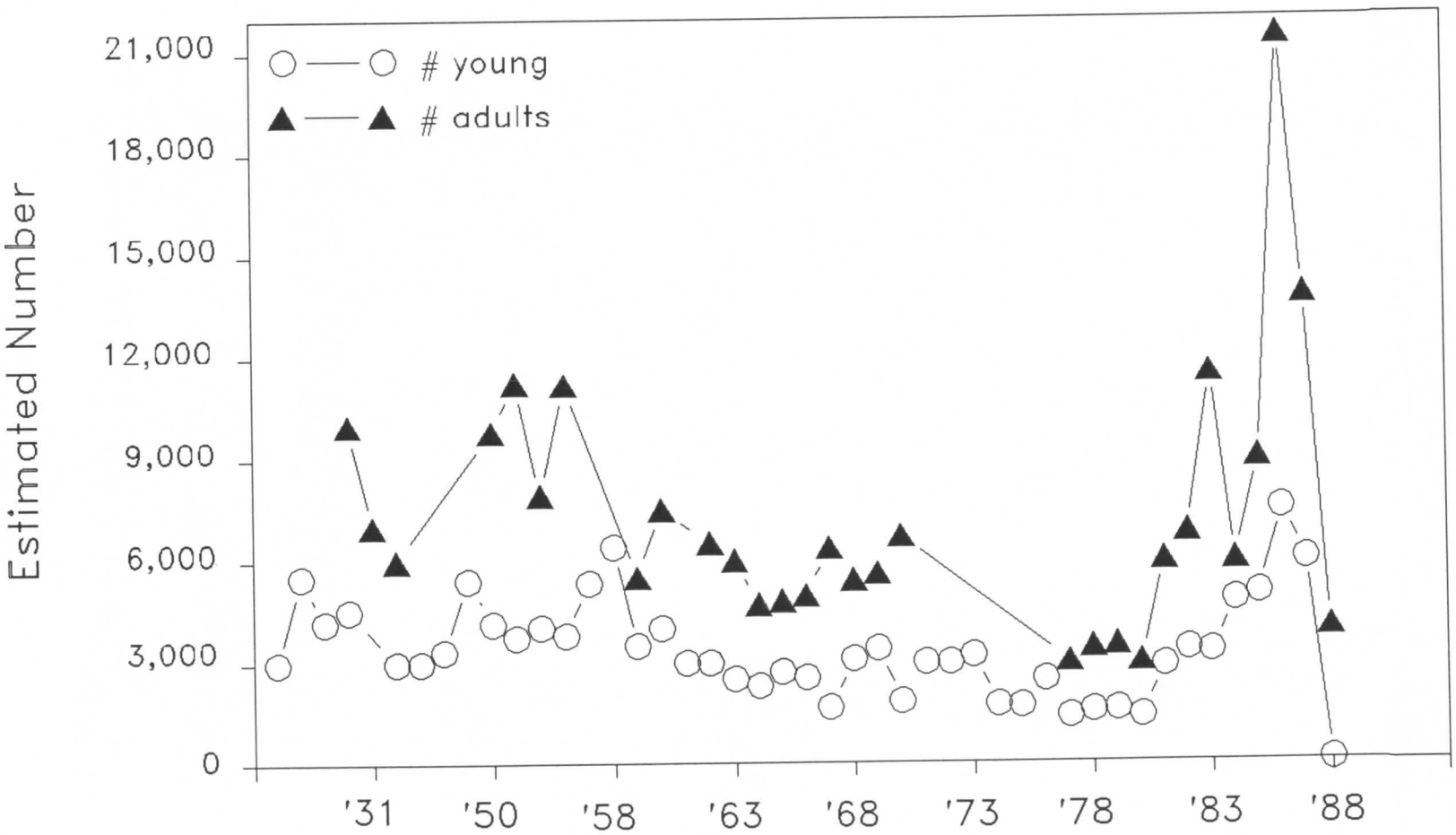
~~—~~ BCN-HERON NESTS, 25 BIRDS

B

1250 ~~1800~~ CALIF. GULL BIRDS

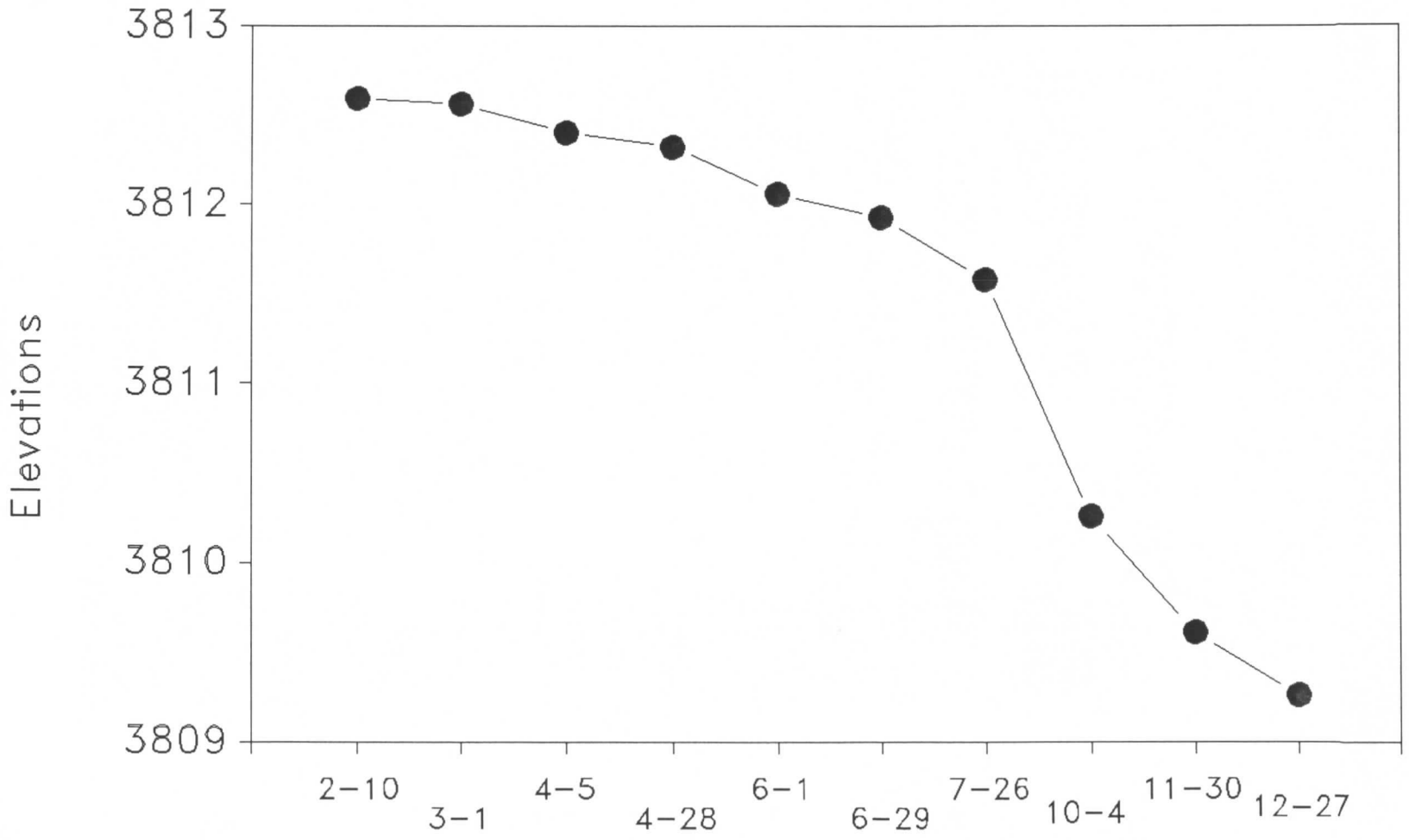
Figure 6. Location of boat landing, walking route, observation points, and nesting colonies on June 15, 1988.

Estimates of Nesting Populations of Am. White Pelicans



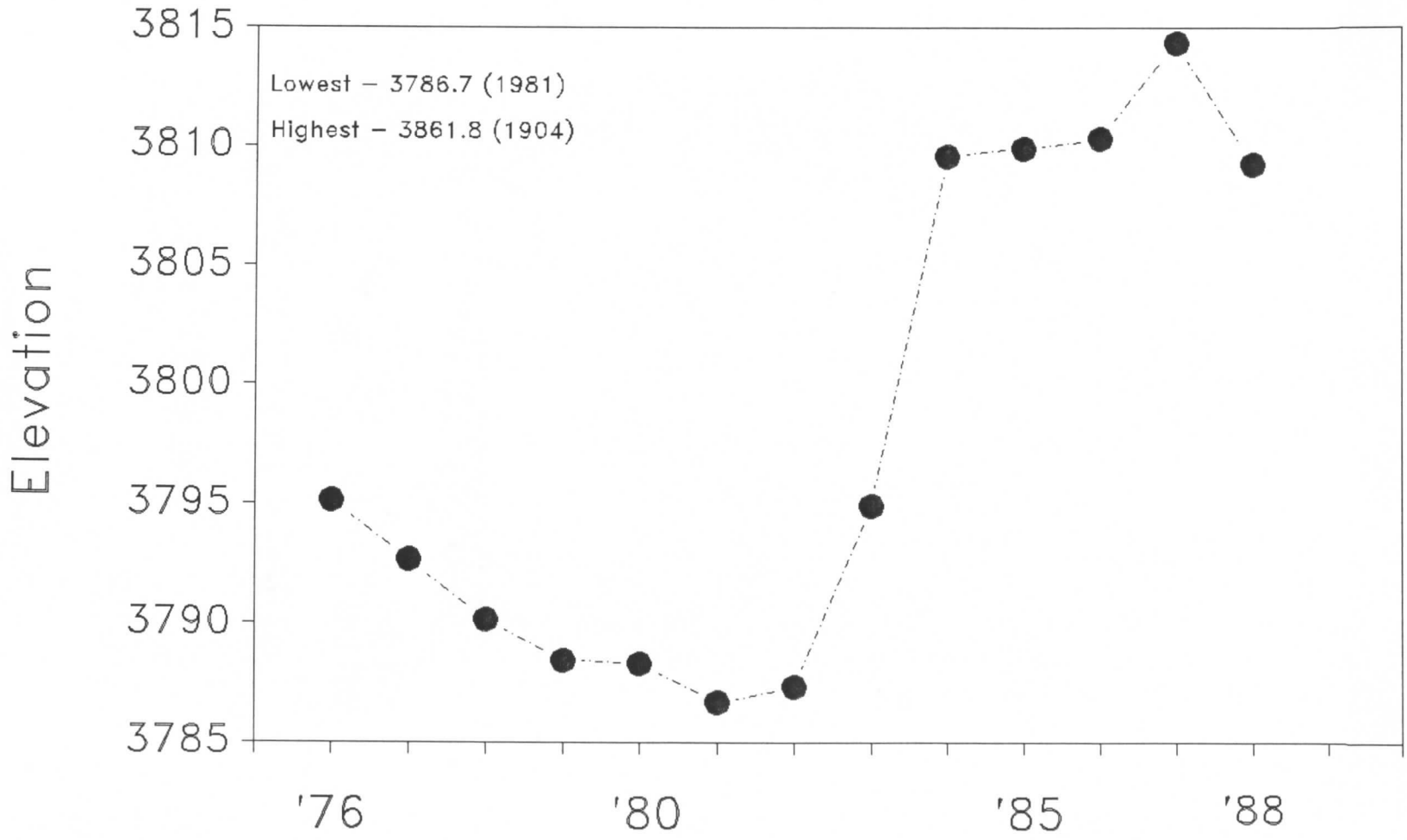
Pyramid Lake Elevations (1988)

USGS Data



Pyramid Lake Minimum Elevations

USGS Data



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