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WADING BIRD NESTING SURVEY

FISH SPRINGS NATIONAL WILDLIFE REFUGE

1995

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INTRODUCTION

Over eighty percent of the American continental breeding population of white-faced ibis (*Plagadis chihi*) occur in Utah, primarily in the Great Salt Lake marshes. These marshes experienced extreme flooding during the mid-1980's which displaced many of the ibis populations. Some of the birds moved to the marsh system at Fish Springs National Wildlife Refuge where they began to breed, producing young in numbers many times greater than had ever been recorded on the refuge.

After the flood waters receded, the Great Salt Lake marshes recovered and ibis re-established most of their rookeries in that region. At Fish Springs, however, a breeding population of about 300 birds continued to utilize several rookery sites on the marsh. The population has continued to breed since that time.

Fish Springs National Wildlife Refuge is able to manage their marsh system to provide high quality, preferred habitat for many species including ibis, snowy egret *(Egretta thula)*, black-crowned night heron (*Nycticorax nycticorax)*, and great blue heron *(Ardea herodias)*. The marsh system is spring fed and provides a consistent year-round supply of water that is virtually unaffected by annual and seasonal fluctuations in precipitation. The result is a managed marsh system which has consistent, year-to-year habitat available to nesting and migrating birds.

In an effort to gain additional knowledge that will enable the refuge to manage the marsh system more effectively, a colonial nesting wading bird study was done for a second

consecutive year in 1995. The survey was completed by volunteers in 1994 (the first year), and in 1995.

OBJECTIVES:

1) Quantify nest site characteristics of wading bird species as well as the overall characteristics of the major rookeries.
2) Determine nest success in observable rookeries.
3) Estimate production for each wading bird species and individual rookeries
4) Band young ibis

STUDY AREA

Fish Springs is located at the southern end of the Great Salt Lake Desert in Juab County, Utah. Large daily and seasonal fluctuations in temperature are typical of this desert environment. The weather was unusually cold and wet this season. The average annual precipitation here is 8.04 inches. By the end of May there was already 5.89 inches and the average rainfall of June was exceeded by the third with more rain to come. There were also several nights of high wind and rain.

There are 10,000 acres of marshland on the refuge fed by several springs. The water is contained and controlled by the network of dikes creating nine marsh units. Mallard Unit was found to be the nesting site of choice this season. It is a 24.6 acre area of which 55% is open water, the rest is grassy islands or those of emergent vegetation. Six off-shore islands, composed

of hardstem bulrush (*Scirpus acutus*) and alkali bulrush (*Scirpus maritimus)* are completely surrounded by water. All of the nesting in Mallard Unit occurred on these islands, primarily in the hardstem bulrush. White-faced ibis, snowy egret, and black-crowned night heron were the predominate nesters. Great blue heron and cattle egret also nested within the study area. A second rookery was located in south Curlew Unit where study began on June 5. This area was densely covered by Olney's three-square bulrush, which was growing in an average of .5m of water. There were occasional small islands of dry ground and one area of hardstem bulrush which was 9m by 5m. The nearest open water was across the dike south of the rookery.

METHODS

The 1995 nesting survey of colonial wading birds at Fish Springs National Wildlife Refuge began on May 22. Nests were located by quietly wading through each rookery early in the morning on hot days to prevent heat exhaustion of the hatchlings. On cold days, nest searching was done later when it became warmer to prevent hypothermia. Calm conditions and no precipitation were additional requirements.

The nests were identified by numbered, metallic tags secured to nearby vegetation. These numbers corresponded to those on the worksheet on which the data was recorded (Fig.1). For all nests, the distance to the nearest nest, vegetative species, number of eggs and young, and bird species was recorded. Species was determined by the egg size, shape, and color as well as the nest

characteristics. Distance to open water, depth of water at the nest, height of vegetation at the nest, and the height of the nest above substrate were also recorded, but only at every third nest in order to minimize destruction of vegetation and stress to the hatchlings. For the same reason, the distance to open water was often estimated. All measurements were recorded to the nearest quarter-meter.

The researchers returned every six to eight days to document progress in the nests. As they occurred, new nests and re-nests were tagged and documented. To determine nest success, the researchers recorded the number of young and eggs on the nest at every visit. Those nests in which eggs produced young were deemed to be successful nests. Nest production was determined by the number of young presumed to still be living at the end of the recording period.

Young ibis were banded as they matured throughout the re-check period using accepted techniques. They were banded at the nest when their feet were big enough to hold the band on but the birds were not big enough to flee. The transition between these stages was found to be only a few days, so careful observation of the rookery was necessary to ensure this window did not pass.

Throughout the study, care was taken to minimize disturbance of the nestlings and destruction of vegetation.

RESULTS

This year (1995), 512 nests produced 1,072 wading birds (Tables 1 and 3). Mallard unit was found to have the greatest

(Tables 1 and 3). Mallard unit was found to have the greatest number of nests (491) and Curlew Unit contained 21 nests. The nests in Mallard unit had a success rate of 86.97% while the nests in Curlew Unit resulted in a 23.80% success rate.

Great blue heron and cattle egret nests were 100% successful this year, although the small sample size of both species may not be an accurate representation of their overall success. Night herons were the next most successful breeders, followed by ibis and snowy egret (Table 2).

Ibis and Snowy egret were the predominate nesters for this years' study. These species constructed 200 and 204 nests, respectively. Night herons nests were the next most prevalent (99), while few nests were found for great blue herons (7) and cattle egret (2) (Table 2).

Nest site characteristics were similar for all species (Tables 5 and 6).

DISCUSSION

Overall wading bird nest success for 1995 was nearly 20 percent higher than that observed in 1994 (Table 1). This may have been due to the fact that the majority of nesting in 1995 occurred in the Mallard Unit rookery, which provides greater protection from predators than the Pintail Slough rookery, where most nesting in 1994 occurred.

In the 1994 study there were three rookeries, Pintail Slough being the main nesting site. During the 1995 study there were

nesting. Pintail Unit was in a management drawdown in 1995, so no nesting occurred there during this time. The contrasting geographical nature of the two main rookery sites used during the 1994 and 1995 studies resulted in appreciable variation of nest site characteristics. This was seen primarily in distance of the nest to open water and vegetation height. The predominate nesting vegetation in both studies was hardstem bulrush. However, in Pintail rookery it was a narrow band of vegetation lining both sides of the slough. In Mallard Unit rookery, the hardstem created six islands of emergent vegetation in the middle of an open water unit. The various results for both studies are shown in Tables 5 and 6. Here it can be seen that there were extreme differences between distance of the nest to the open water and vegetative height for the two studies.

Although nesting occurred in Mallard Unit in 1994, it was not the main rookery site. For the 1995 study, all previous nesting sites were searched and found to have no noticeable nesting. It was noted that Curlew Unit did have some nesting which had never been recorded before. Although Curlew did not have significant nesting during the 1995 study, it may be used to a greater extent in later years.

The banding on young ibis was extremely successful this year because of several factors. The young were observed closely as they matured so they could be banded while still on the nest. Most of the young of a particular species matured at the same time on a particular island. This ensured that the banding was done at the appropriate time. Several small banding sessions

were undertaken in addition to re-checks of the nests. Banding a few birds at a time, with few people, during the cool part of the day decreased stress upon the young birds and facilitated ease of completion.

During the first half of the 1995 study there was an unusual amount of cold, wet, and windy weather. This atypical weather was responsible for the deaths of many young birds and may have effected the number of young produced.

In this study, the nest success for the two rookeries were substantially different. Mallard unit may have been a more successful rookery because of the isolation of the nests on islands which provided protection from predators. Curlew unit, on the other hand, was easily accessible to predators, which may account for its low nest success percentage.

In 1995, there was a greater amount of nesting by wading birds than in 1994, indicating that the characteristics of rookery sites in 1995 were more conducive to nesting. The most important of these characteristics appeared to be the existence of hardstem bulrush islands, as evidenced by our results.

Several observations were made on the colonial behavior of the birds in the study. All of the great blue heron nested together on the same island. They were also the first wading birds to nest. It is presumed that when they began to nest, other wading birds began to nest with them; early for these other species. There were no night herons on this island but there were many snowy egret and ibis here. The young snowy egrets on this island were among the first to mature in the study area.

The first ibis in the area to hatch were also on this island. There was one small island which had 11 ibis nests and three night heron nests. All of these nests were the last to hatch in the study area, including the night herons. On all other islands where night herons were present they were the first to hatch followed by snowy egret then ibis. The researchers observed that because these birds are colonial nesters, the date of hatching and fledging was effected by the date nesting was initiated on a particular island.

Throughout the course of the study, the adult birds became accustomed to the presence of the researchers in the rookery. The birds would wait around the perimeter of the island while data was collected and quickly returned to the nests as the researchers moved on.

Other observations were made about nest site characteristics. There were no snowy egret nests observed in any other vegetation than hardstem bulrush. The height of snowy egret nests was consistent no matter how dense the vegetation; so were the night herons, even in other vegetation. Ibis nests were always on top of the vegetation. Ibis nests are often clean and lined with finer materials. An egret nest often had a clay-like lining of feces. Great blue herons were found to use greasewood as nesting material but the nests were still assembled among the hardstem bulrush. Snowy egrets were the predominate re-nesters during the study period.

RECOMMENDATIONS: 1) Consider modifying nest monitoring activity

to a portion of the overall rookery. In doing this, more detailed data should be obtained concerning various aspects of colonial wading bird nesting activity. 2) Consider marsh management strategies that would enhance ideal rookery site characteristics. 3) Banding of young ibis should continue to be done in accordance with methods used in 1995.

Table 1: Nest success of colonial wading birds in units of study for the years 1994 and 1995.

Unit	# of Nests		Successful Nests		Nest Success %	
	1994	1995	1994	1995	1994	1995
Pintail	295	0	181	N/A	69.62	N/A
Mallard	74	491	40	427	54.05	86.97
Egret	9	0	6	N/A	66.67	N/A
Curlew	0	21	N/A	5	N/A	23.80
Total	342	512	227	432	66.37*	84.38*

*weighted averages

Table 2: Nest success of colonial wading birds by species for the years 1994 and 1995.

Species	# of Nests		Successful Nests		Nest Success %	
	1994	1995	1994	1995	1994	1995
W. F. Ibis	164	200	108	169	65.85	84.50
S. Egret	135	204	85	159	62.96	77.94
B. C. N. Heron	37	99	28	95	75.68	95.95
G. B. Heron	1	7	1	7	100	100
C. Egret	5	2	5	2	100	100

Table 3: Colonial wading bird production in units of study for the years 1994 and 1995.

UNIT	# of Nests		Production		Average Young/Nest	
	1994	1995	1994	1995	1994	1995
Pintail	259	N/A	570	N/A	2.20	N/A
Mallard	74	491	118	1060	1.59	2.16
Egret	9	N/A	14	N/A	1.55	N/A
Curlew	0	21	N/A	12	N/A	.57
Total	342	512	702	1072	1.78	2.09

Table 4: Production of wading birds by species for the years 1994 and 1995.

SPECIES	# of Nests		Avg. Clutch size		Production		Avg. Young/Nest	
	1994	1995	1994	1995	1994	1995	1994	1995
W.F. Ibis	164	200	3.22	3.46	322	453	1.96	2.26
S. Egret	135	204	3.84	3.70	285	376	2.11	1.84
B.C.N Heron	37	99	3.51	3.57	83	213	2.24	2.15
G.B. Heron	1	7	3	3.37	3	23	3	3.28
C. Egret	5	2	3.20	3.50	9	7	1.8	3.50

TABLE 5a: Average and (range) in meters of snowy egret, black crowned night heron and ibis nest site characteristics at Fish Springs NWR, 1994 & 1995.

Variable		Snowy Egret	Wht-faced Ibis	Blck-Crowned Night-Heron
Distance to nearest nest	1994	1.3 (.5-10.0)	2.0 (.3-4.1)	2.2 (0.0-5.0)
	1995	1.0 (.3-1.8)	1.9 (.5-4.5)	1.7 (.5-15.2)
Distance to open water	1994	3.5 (0.0-10.0)	3.3 (.6-10.0)	2.8 (.5-15.0)
	1995	4.4 (.6-9.1)	5.5 (.3-16.8)	6.1 (.8-21.9)
Water depth at nest	1994	.2 (0.0-1.0)	.2 (0.0-.7)	.2 (0.0-.6)
	1995	.1 (0.0-.5)	.1 (0.0-.3)	.1 (0.0-.1)
Height of nest above substrate	1994	.6 (0.0-1.5)	.5 (0.0-1.5)	.4 (0.0-1.2)
	1995	.5 (.3-.9)	.5 (.2-.9)	.4 (.1-.4)
Maximum height of vegetation at nest	1994	2.0 (.9-2.7)	1.8 (.9-2.7)	2.0 (1.2-2.4)
	1995	1.4 (.3-1.8)	1.3 (.8-1.8)	1.4 (.9-1.7)

Table 5b: Average in meters of great blue heron nest site characteristics at Fish Springs NWR, 1994 and 1995.

Dist. to nearest nest	1994*	1.5
	1995	1.9
Dist. to open water	1994	2.0
	1995	2.0
Water depth at nest	1994	.1
	1995	.02
Hgt. of nest above substrate	1994	.6
	1995	.7
Max. vegetation at nest	1994	1.8
	1995	1.6

*Only one great blue heron nest in 1994 survey

Table 6: Average nest site characteristics of Mallard and Curlew Unit rookeries for the 1995 wading bird nesting study.

	MALLARD	CURLEW
Dist. to nearest nest	1.6m	4.3m
Hgt. of nest above substrate	.5m	.8m
Max. vegetation at nest	1.4m	1.5m
Water depth at nest	.1m	.2m
Dist. to open water	4.5m	N/A*

*nearest open water in rookery was an appreciable distance away across the dike

Figure 1 : Sample data form for 1995 wading bird nesting study

CICONIIFORM NEST DATA

Nest Number 105

Unit Mallard

Bird Species Wht.-faced Ibis

Nest Site Characteristics:

Vegetative Species (1 m radius) (and percentages) Hrd. Stm Bul.

Dist to nearest nest (+/- .1 m) _____

Dist to open water (+/- .1 m) _____

Water depth at nest (+/- 1 cm) _____

Height of nest above substrate (+/- 1 cm) _____

Max. height of veg at nest (+/- 1 cm) (within .5 m radius) _____

Visitation Data: (6-8 day interval)

Date	# of Eggs/ # of Young	Dist to Nearest Nest	Bird on Nest? (Y or N)
5-22-95	4E	3.5 ft	
5-29-95	4E		
6-5-95	4E		
6-12-95	2Y 2E		
6-20-95	4Y		
6-27-95	4Y		

Fate of Nest:

___ Depredated

___ Abandoned

X Successful
Number of Young 4

Remarks: (Banded, band #'s) _____