



4-30-1988

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Recommended Citation

Findholt, Scott L. and Berner, Kevin L. (1988) "Current status and distribution of the Ciconiiforms nesting in Wyoming," *Great Basin Naturalist*. Vol. 48 : No. 2 , Article 20.

Available at: <https://scholarsarchive.byu.edu/gbn/vol48/iss2/20>

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CURRENT STATUS AND DISTRIBUTION OF THE CICONIIFORMS NESTING IN WYOMING

Scott L. Findholt^{1,2} and Kevin L. Berner^{1,3}

ABSTRACT—Five species of Ciconiiforms breed in Wyoming: the American Bittern (*Botaurus lentiginosus*), Great Blue Heron (*Ardea herodias*), Snowy Egret (*Egretta thula*), Black-crowned Night-Heron (*Nycticorax nycticorax*), and White-faced Ibis (*Plegadis chihi*). Field surveys conducted from 1984 through 1986 indicate that at least 151 Great Blue Heron colony sites exist in Wyoming, making it the most abundant and widespread Ciconiiform in the state. Only small breeding populations have been discovered for the remaining species. Except for the Snowy Egret, where numbers of active nests have remained relatively stable, population trends are unknown for the other species. We believe most colonies have been found in Wyoming, but additional inventories may result in the discovery of other nesting areas, especially for the Great Blue Heron.

From 1981 through 1983 the first comprehensive statewide survey for breeding locations of Ciconiiforms in Wyoming was conducted by Findholt (1984), mostly by a review of historical and recent published and unpublished reports; through correspondence with professional biologists, amateur bird-watchers, and others considered knowledgeable of colony sites; and through a request in a newspaper article for information on Great Blue Heron (*Ardea herodias*) colonies. This survey was based on limited field inventories. Since 1983, however, intensive field surveys have been made for breeding sites of colonially nesting waterbirds. Our purpose is to provide information on the distribution and population status of the Ciconiiforms known to nest in Wyoming.

METHODS

Surveys were conducted in Wyoming from 1984 through 1986 to locate new breeding sites of colonially nesting waterbirds, including the Ciconiiforms. From 4 April to 31 May 1984 and from 28 March to 5 June 1986, 15 aerial searches in fixed-wing aircraft totaling 67.1 hrs of flight time were made to locate new nesting areas. Reservoirs, lakes, marshes, and other potential breeding locations not observed during aerial surveys were checked

from the ground with binoculars or a 20-45X spotting scope.

In most colonies active nests were counted when birds were in late incubation or early hatching stages. The majority of colonies were censused by making ground counts of nests during a single visit to each colony. Where ground counts were not feasible, we estimated the number of nests (ground estimates) or used counts of nests made during aerial surveys.

In some Great Blue Heron colonies we marked the position of all nests on a rough map to determine how many nests were active. Also, estimates of active nests in a few very large Great Blue Heron colonies were made by noting the status (active or inactive) of at least 75% of the nests there. From these sampling results, estimates of the total nesting population were extrapolated by entering the colony and counting all nests present.

As discussed by Buckley and Buckley (1979), a waterbird colony is difficult to define. For this study we defined a colony as an assemblage of nesting birds (Kushlan 1986). In addition, Great Blue Heron nests were not considered as separate colonies unless they were at least 200 m from the main breeding group. Nests were classified as active if birds were sitting or standing on nest platforms, if incubation was observed, or if eggs or young were present (McCrimmon 1982).

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TABLE 1. Location, number of nests, and habitat of Snowy Egret colonies in Wyoming, 1984-1986.^a

Colony name	Location	Number of active nests			Habitat
		1984	1985	1986	
Albany County					
Bamforth Lake	41°24'N, 105°44'W				Lake
(Bamforth Island)		0	0	16	
(Peninsula Island)		7	0	0	
Carroll Lake	41°25'N, 105°44'W	NC ^b	15	0	Lake
Fremont County					
Sand Mesa WHMU	43°19'N, 108°20'W	1	0	0	Reservoir
Natrona County					
Soda Lake					Reservoir
(East Island)	42°54'N, 106°18'W	0	2	0	
(West Island)	42°54'N, 106°19'W	2	3	0	
(Man-made Island)	42°54'N, 106°18'W	1	1	3	
Sweetwater County					
Old Eden Reservoir	42°13'N, 109°23'W	NC	0	1-2 ^c	Reservoir

^aAll colonies were censused by making total ground counts of nests except as otherwise noted.

^bNC = not censused.

^cNests not actually located but suspected of being present.

RESULTS AND DISCUSSION

American Bittern

Other than the apparently large breeding population of American Bitterns (*Botaurus lentiginosus*) in marshes adjacent to the Bear River in Lincoln and Uinta counties, this species has been documented as nesting at few locations in Wyoming (Findholt 1984). Since 1983 one additional breeding area has been found. On 19 June 1986 we located one nest containing four eggs at Caldwell Lake, about 23 km southwest of Laramie, Albany County. Because accurate counts of American Bitterns nesting in Wyoming have not been made, population trends are unknown. Most available habitat for American Bitterns has been surveyed; therefore, probably few new nesting areas will be located.

Great Blue Heron

The Great Blue Heron (*Ardea herodias*) was the most widespread and abundant Ciconiiform in Wyoming (Appendix). During 1984 and 1986 we documented 151 heronries, which is a 148% increase in known heronries since 1983 when Findholt (1984) reported 61 colony sites. Assuming that heronries censused in 1984 contained the same number of active nests in 1986, at least 1,929 nesting pairs of Great Blue Herons occur in Wyoming. Although widespread in the state, most colonies occurred in the Bighorn,

Green, North Platte, Powder, and Wind river drainages. Twenty-five (17%) heronries occur in the North Platte River drainage, which is the greatest concentration of colonies in the state. Of 147 (97%) known heronries censused in 1984 or 1986, the mean number of active nests was 13.1 ± 1.9 (SE, extreme values 0-150). Excluding 34 (23%) heronries that were inactive, the mean number of active nests for 113 heronries was 17.1 ± 2.4 (SE, extreme values 1-150). Of these, 3 (3%) contained 89 or more occupied nests, 23 (20%) contained from 22 to 70 occupied nests, and the remaining 87 (77%) contained 20 or fewer occupied nests.

Of 34 heronries inactive during recent surveys, at least 4 were probably abandoned due to human disturbance, namely: Glendo Reservoir, Converse County, (human recreational activity); Boulder, Sublette County, and Crazy Woman Creek, Johnson County, (trailer houses placed too close to colonies); Afton, Lincoln County, 15 adults were shot, but nesting resumed in 1985). We are uncertain why the remaining 30 colonies were inactive in 1984 or 1986.

Population trends cannot be assessed because most heronries have been censused only once. Although the majority of Great Blue Heron colonies in Wyoming have undoubtedly been located, a few additional colonies may be discovered through future surveys.

TABLE 2. Location, number of nests, and habitat of Black-crowned Night-Heron colonies in Wyoming, 1984–1986.^a

Colony name	Location	Number of active nests			Habitat
		1984	1985	1986	
Albany County					
Bamforth Lake	41°24'N, 105°44'W				Lake
(Bamforth Island)		1	0	23	
Caldwell Lake	41°09'N, 105°48'W	NC ^b	NC	48	Lake
Carroll Lake	41°25'N, 105°44'W	NC	125	41	Lake
Hutton Lake NWR	41°11'N, 105°44'W	0	0	0	Marsh
Kay Ranch	41°15'N, 105°42'W	16	19	4	Marsh
Pilger Lake	41°23'N, 105°50'W	NC	NC	9	Lake
Webb Lake	41°21'N, 105°59'W	NC	NC	28	Lake
Carbon County					
Rouse Reservoir	41°13'N, 106°39'W	NC	NC	5–7 ^c	Reservoir
Lincoln County					
Bear River	42°01'N, 110°58'W	0	0	2	Marsh
Natrona County					
Soda Lake					Reservoir
(East Island)	42°54'N, 106°18'W	1	1	2	
(West Island)	42°54'N, 106°19'W	3	2	1	
(Man-made Island)	42°54'N, 106°18'W	0	0	5	
Sweetwater County					
Old Eden Reservoir	42°13'N, 109°23'W	NC	40–50 ^c	54	Reservoir

^aAll colonies were censused by making total ground counts of nests except as otherwise noted.

^bNC = not censused.

^cEstimate (ground) of active nests present.

Snowy Egret

Seven active Snowy Egret (*Egretta thula*) colonies were present at four locations in Wyoming during the 1984–1986 period (Table 1). However, not all colonies were active each year. The Carroll Lake colony was the only new nesting area discovered during our recent surveys. Based on the 1986 censuses, we estimated that the number of active nests in the state was 19. Although nests were not discovered at Old Eden Reservoir, one or two pairs were suspected of breeding there. Snowy Egrets have not been found nesting at Sand Mesa Wildlife Habitat Management Unit (WHMU) since 1984, when the colony was destroyed by humans. Small numbers of Snowy Egrets continued to nest at Soda Lake. Man-made Island was not used for nesting until 1984 because it was developed after the 1983 breeding season. In 1986 all Snowy Egrets nested on Man-made Island probably because nesting habitat had deteriorated on East and West islands. In 1985, 15 active nests existed at Carroll Lake, but none were present in 1986 probably because of low water levels. However, in 1986, 16 active nests were present at Bamforth Lake, only 2 km away. It appears that this species breeds at either

Bamforth Lake or Carroll Lake, depending on existing nesting conditions.

In 1983 Snowy Egrets in Wyoming nested at three locations consisting of three colonies and 22 active nests (Findholt 1984). Since 1983, except for a possible decline in active nests in 1984, the Snowy Egret breeding population has remained relatively stable. Although it is possible that very small colonies or solitary nesting pairs may have been overlooked during recent surveys, it seems unlikely that any large colonies were missed.

Black-crowned Night-Heron

Twelve colonies of the Black-crowned Night-Heron (*Nycticorax nycticorax*) existed in Wyoming at 10 locations in 1986 (Table 2). Based on the 1986 censuses, we have calculated that approximately 222–224 active nests were present. This compares to 20 active nests in five colonies at four locations in 1983 (Findholt 1984). The increase in the breeding population was primarily a consequence of locating seven additional nesting areas during recent surveys. Although one new colony each was discovered in the Bear, Green, and North Platte river drainages, most were found

TABLE 3. Location, number of nests, and habitat of White-faced Ibis colonies in Wyoming, 1984–1986.^a

Colony name	Location	Number of active nests			Habitat
		1984	1985	1986	
Albany County					
Caldwell Lake	41°09'N, 105°48'W	NC ^b	NC	19	Lake
Hutton Lake NWR	41°11'N, 105°44'W	0	0	0	Marsh
Lincoln County					
Bear River	42°01'N, 110°58'W	0	0	1	Marsh
Bear River	42°01'N, 110°58'W	0	0	32	Marsh
Sweetwater County					
Old Eden Reservoir	42°13'N, 109°23'W	NC	0	14(15–20) ^c	Reservoir

^aAll colonies were censused by making total ground counts of nests except as otherwise noted.

^bNC = not censused.

^cEstimate (ground) of active nests present.

in the Laramie River drainage near Laramie, Albany County.

Night-herons failed to breed at Hutton Lake National Wildlife Refuge (NWR) during the 1984–1986 period, most likely because of poor nesting conditions resulting from excessively high or low water levels. In 1986 low water levels appeared to contribute to a decline in active nests at both Carroll Lake and the Kay Ranch. Compared to previous years, Bamforth Lake supported an unusually large nesting population in 1986. It appears that Bamforth Lake is an alternate nesting site utilized by night-herons when nesting conditions are unsuitable at nearby Carroll Lake. Four to eight pairs nested at Soda Lake from 1984 through 1986. Night-herons initiated nesting on Man-made Island in 1986, two years after the island was developed. Most night-herons at Soda Lake will probably nest on Man-made Island in the future as nesting substrate disappears on East and West islands. Rouse Reservoir probably will not be used by night-herons in the future because the reservoir drained in 1986 after the dam collapsed.

Population trends of Black-crowned Night-herons are difficult to assess because of the large number of new colonies discovered since 1984. Although most potential night-heron nesting habitat has been surveyed in Wyoming, small breeding populations may have been overlooked.

White-faced Ibis

In 1986 White-faced Ibis (*Plegadis chihi*) nested in Wyoming at three locations consisting of four different colonies (Table 3). This was the first year since 1982 that ibis have

been documented as breeding in the state. In 1982 two White-faced Ibis nests existed at Hutton Lake NWR, and 40 nests were in the marshes adjacent to the Bear River, south of Cokeville, Lincoln County (Findholt 1984). During our recent surveys White-faced Ibis were not discovered nesting at Hutton Lake NWR. However, two colonies were located in marshes associated with the Bear River in the vicinity of the site where they nested in 1982. This species may not have nested along the Bear River in 1984 and 1985 and at Hutton Lake NWR during the 1984–1986 period because of poor nesting conditions brought on by excessively high or low water levels. In 1986 previously unknown colonies were found at Caldwell Lake and Old Eden Reservoir. Old Eden Reservoir did not contain nesting ibis in 1985. It is unknown whether colonies were present here before 1985 or at Caldwell Lake before 1986 because these areas were not surveyed.

Population trends are unknown for White-faced Ibis in Wyoming because of the new colonies located in 1986. It seems doubtful that any White-faced Ibis colonies were overlooked during our recent surveys.

CONCLUSIONS

Much interest and concern exist with the conservation and management of the Ciconiiforms in the United States and elsewhere. These species occupy high trophic levels on aquatic food chains and are probably sensitive to disturbance of aquatic ecosystems, especially loss of wetland habitat and contamination by chemical pollutants. In addition, because most of these species nest in colonies,

they are vulnerable to human intervention. We hope that natural resource management agencies will develop long-term monitoring programs to determine population trends and implement appropriate management strategies to ensure that current breeding populations of the Ciconiiforms are maintained in Wyoming.

ACKNOWLEDGMENTS

We thank Nancy Findholt for helpful comments. This study was funded by the

Wyoming Game and Fish Department, Nongame Program.

LITERATURE CITED

- BUCKLEY, P. A. AND F. G. BUCKLEY. 1979. What constitutes a waterbird colony? Reflections from the northeastern U.S. *Colonial Waterbirds* 3: 1-15.
- FINDHOLT, S. L. 1984. Status and distribution of herons, egrets, ibises, and related species in Wyoming. *Colonial Waterbirds* 7: 55-62.
- KUSHLAN, J. A. 1986. Commentary. Colonies, sites, and surveys: the terminology of colonial waterbird studies. *Colonial Waterbirds* 9: 119-120.
- MCCRIMMON, D. A., JR. 1982. Populations of the Great Blue Heron (*Ardea herodias*) in New York State from 1964 to 1981. *Colonial Waterbirds* 5: 87-95.

APPENDIX Location, number of nests, and habitat of Great Blue Heron colonies in Wyoming, 1984-1986.^a

Colony name	Location	Number of nests		Date censused	Habitat
		Active	Inactive		
Albany County					
Lake Hattie	41°14'N, 105°58'W	8 ^b	0	5 June 1986	Reservoir
Laramie River (east)	41°09'N, 105°51'W	20-25 ^b		22 April 1986	Riparian woodland
Laramie River (west)	41°10'N, 105°49'W	8-12 ^b		22 April 1986	Riparian woodland
Pioneer Canal (north)	41°14'N, 105°51'W	11	4	23 May 1984	Riparian woodland
Pioneer Canal (south)	41°13'N, 105°51'W	9	1	23 May 1984	Riparian woodland
Twin Buttes Lake	41°14'N, 105°51'W	5	1	3 May 1984	Reservoir
Big Horn County					
Big Horn Lake	44°52'N, 108°13'W	7	0	5 July 1984	Riparian woodland
Big Horn River (north)	44°47'N, 108°10'W	0	70	30 April 1984	Riparian woodland
Byron	44°48'N, 108°27'W	70	11	13 April 1984	Riparian woodland
Manderson (north)	44°19'N, 108°01'W	5	0	30 April 1984	Riparian woodland
Manderson (south)	44°18'N, 108°00'W	0	5	12 April 1984	Riparian woodland
Nowood Creek (north)	44°11'N, 107°42'W	14	4	12 April 1984	Riparian woodland
Nowood Creek (south)	44°11'N, 107°42'W	0	11	12 April 1984	Riparian woodland
Nowood Creek	44°11'N, 107°42'W	0	6	12 April 1984	Riparian woodland
Shell Creek (lower)	44°32'N, 107°57'W	1 ^b	0	28 March 1986	Riparian woodland
Shell Creek (upper)	44°33'N, 107°51'W	3 ^b	0	28 March 1986	Riparian woodland
Wardel Reservoir	44°21'N, 108°19'W	4	8	30 April 1984	Reservoir
Yellowtail WIMU	44°52'N, 108°16'W	8	35	30 April 1984	Riparian woodland
Campbell County					
Avery Ranch	44°48'N, 105°23'W	6	0	15 April 1986	Riparian woodland
Bow and Arrow Ranch	44°58'N, 105°56'W	0	9	24 April 1984	Riparian woodland
Little Powder River (reservoir)	44°27'N, 105°29'W	5 ^b	0	8 April 1986	Reservoir
Little Powder River (south)	44°51'N, 105°21'W	0	3	16 April 1986	Riparian woodland
Piney	44°05'N, 105°14'W	1	1	17 April 1984	Riparian woodland
Trail Creek	44°55'N, 105°20'W	5	3	16 April 1986	Riparian woodland
Weston (north)	44°45'N, 105°22'W	0	3	15 April 1986	Riparian woodland
Weston	44°38'N, 105°18'W	4	8	16 April 1986	Riparian woodland
Carbon County					
Beaver Creek (north)	41°11'N, 106°37'W	1	3	2 May 1984	Riparian woodland
Beaver Creek (south)	41°11'N, 106°37'W	0	3	2 May 1984	Riparian woodland
Bennett Peak	41°16'N, 106°40'W	2	4	23 May 1984	Riparian woodland
Little Snake River	41°01'N, 107°25'W	6	0	31 May 1984	Riparian woodland
Mill Iron Ranches	41°25'N, 106°46'W	68	26	2 May 1984	Riparian woodland
Patlfinder Reservoir	42°23'N, 106°56'W	38	5	15 June 1984	Reservoir
Rattlesnake Butte	41°48'N, 107°00'W	0	12	24 May 1984	Riparian woodland
Rouse Reservoir	41°13'N, 106°39'W	30	8	11 June 1986	Reservoir
Savery Creek	41°04'N, 107°24'W	5	9	31 May 1984	Riparian woodland
Sheep Mountain	41°30'N, 106°50'W	0	20	24 May 1984	Riparian woodland

Appendix continued.

Colony name	Location	Number of nests		Date censused	Habitat
		Active	Inactive		
Converse County					
Ferris Ranch	42°38'N, 105°07'W	150 ^c	25	19 April 1984	Riparian woodland
Fetterman	42°51'N, 105°33'W	6	4	19 April 1984	Riparian woodland
Glendo Reservoir	42°37'N, 105°06'W	0	16	19 April 1984	Riparian woodland
Morton	42°49'N, 105°26'W	28	1	19 April 1984	Riparian woodland
Upper Glendo Reservoir	42°35'N, 105°02'W	45-50 ^b		6 May 1986	Upland coniferous forest
Valentine Ranch	42°51'N, 106°00'W	35	42	19 April 1984	Riparian woodland
Crook County					
Alzada	44°59'N, 104°28'W	3 ^b	0	8 April 1986	Reservoir
Bush Creek Reservoir	44°52'N, 104°48'W	32	6	7 June 1984	Reservoir
Crow Creek Reservoir	44°53'N, 104°07'W	6	8	18 June 1986	Reservoir
Hulett	44°38'N, 104°39'W	3-4 ^b		8 April 1986	Riparian woodland
Keyhole Reservoir Dam	44°24'N, 104°46'W	10-15 ^b		8 April 1986	Riparian woodland
Little Missouri River (north)	44°53'N, 104°48'W	8	8	7 June 1984	Reservoir
Moorcroft (north)	44°20'N, 104°56'W	14	5	24 April 1984	Riparian woodland
Moorcroft (south)	44°19'N, 104°57'W	5	0	17 April 1984	Riparian woodland
Oak Creek Reservoir (east)	44°45'N, 104°06'W	8	3	18 June 1986	Reservoir
Oak Creek Reservoir (west)	44°45'N, 104°06'W	5	1	18 June 1986	Reservoir
Spring Creek	44°22'N, 104°34'W	NC ^d			Upland coniferous forest
Fremont County					
Arapaho	42°58'N, 108°27'W	14	15	6 May 1984	Riparian woodland
Ethete	43°02'N, 108°49'W	23	3	13 May 1984	Riparian woodland
Givens Ranch (east)	43°00'N, 108°39'W	9	2	13 May 1984	Riparian woodland
Givens Ranch	43°00'N, 108°39'W	8	4	13 May 1984	Riparian woodland
Lander	42°52'N, 108°38'W	37	22	10 April 1984	Riparian woodland
Lenore	43°20'N, 109°10'W	9	2	19 May 1984	Riparian woodland
Morton	43°10'N, 108°45'W	7	1	14 May 1984	Riparian woodland
Muddy Creek (east)	43°17'N, 108°19'W	2	0	19 May 1986	Riparian woodland
Muddy Creek (west)	43°18'N, 108°22'W	0	4	19 May 1986	Riparian woodland
Muddy Creek	43°18'N, 108°22'W	12	7	12 May 1984	Riparian woodland
Noble Hill	43°07'N, 108°15'W	4	2	13 May 1984	Riparian woodland
Riverton	43°08'N, 108°12'W	2	1	13 May 1984	Riparian woodland
Shotgun Butte	43°26'N, 108°44'W	3	0	19 May 1986	Riparian woodland
Wind River	43°06'N, 108°39'W	0	5	14 May 1984	Riparian woodland
Yellowstone Ranch	42°40'N, 108°19'W	13	2	20 June 1984	Riparian woodland
Goshen County					
Hawk Springs Reservoir	41°42'N, 104°11'W	NC		19 June 1986	Reservoir
Rawhide	42°06'N, 104°20'W	45	6	3 May 1984	Riparian woodland
Whalen Diversion Dam	42°15'N, 104°38'W	89	17	3 May 1984	Riparian woodland
Hot Springs County					
Kirby	43°47'N, 108°10'W	0	13	30 April 1984	Riparian woodland
Owl Creek (north)	43°14'N, 108°33'W	12	2	19 April 1986	Riparian woodland
Owl Creek (south)	43°43'N, 108°40'W	0	4	19 April 1986	Riparian woodland
Johnson County					
Clear Creek	44°32'N, 106°32'W	0		15 April 1986	Riparian woodland
Crazy Woman Creek (old)	44°06'N, 106°31'W	0	8	4 June 1984	Riparian woodland
Crazy Woman Creek (new)	44°04'N, 106°36'W	7	8	15 April 1986	Riparian woodland
Kaycee I	43°40'N, 106°45'W	4	1	1 May 1984	Riparian woodland
Kaycee II	43°40'N, 106°46'W	7	0	1 May 1984	Riparian woodland
Linch	43°42'N, 106°20'W	4	5	4 June 1984	Riparian woodland
Powder River (North Fork)	43°47'N, 106°45'W	0	2	1 May 1984	Reservoir
Shell Creek	44°30'N, 106°47'W	12	2	5 June 1984	Riparian woodland
Lincoln County					
Afton	42°44'N, 110°58'W	0	18	16 May 1984	Upland deciduous forest
Border	42°11'N, 111°02'W	39	7	16 May 1984	Riparian woodland
Cokeville	42°06'N, 110°57'W	8	5	16 May 1984	Riparian woodland
Diamondville	41°45'N, 110°29'W	11	2	15 May 1986	Riparian woodland
Kemmerer Reservoir	41°53'N, 110°37'W	14	4	23 May 1986	Riparian woodland
Marse	42°09'N, 111°00'W	0	21	16 May 1984	Riparian woodland
Names Hill	42°10'N, 110°11'W	36	15	9 May 1984	Riparian woodland
Opal	41°46'N, 110°18'W	0	14	16 May 1984	Riparian woodland

Appendix continued.

Colony name	Location	Number of nests		Date censused	Habitat
		Active	Inactive		
Natrona County					
Bates Creek (lower)	42°40'N, 106°34'W	0	7	16 April 1984	Riparian woodland
Bates Creek (upper)	42°34'N, 106°23'W	37	6	18 April 1984	Riparian woodland
Bates Creek	42°39'N, 106°27'W	1	0	18 April 1984	Riparian woodland
Strand Ranch	42°52'N, 106°07'W	5	6	19 April 1984	Riparian woodland
Niobrara County					
Manville	42°54'N, 104°44'W	7	0	14 June 1984	Reservoir
Park County					
Bobeat Ranch	44°16'N, 109°30'W	2	9	19 July 1984	Riparian woodland
T E Ranch	44°16'N, 109°29'W	0	7	19 July 1984	Riparian woodland
Valley	44°11'N, 109°35'W	NC			Riparian woodland
Platte County					
Guernsey Reservoir	42°20'N, 104°50'W	5	3	13 June 1984	Reservoir
Uva	42°08'N, 104°54'W	70	20	13 June 1984	Riparian woodland
Wendover	42°24'N, 104°56'W	15	20	19 April 1984	Riparian woodland
Sheridan County					
Arvada I	44°37'N, 106°05'W	2	0	4 July 1984	Riparian woodland
Arvada II	44°37'N, 106°05'W	3 ^b	0	15 April 1986	Riparian woodland
Clear Creek	44°51'N, 106°06'W	6	7	6 June 1984	Upland deciduous forest
Clearmont	44°42'N, 106°19'W	0	3	15 April 1986	Riparian woodland
Goose Creek	44°51'N, 106°58'W	22	4	1 May 1984	Riparian woodland
Leiter	44°44'N, 106°16'W	1	1	15 April 1986	Riparian woodland
Parkman	44°57'N, 107°17'W	0	15	5 June 1984	Reservoir
Powder River (south)	44°47'N, 106°05'W	0	3	6 June 1984	Riparian woodland
Powder River	44°50'N, 106°04'W	0	7	6 June 1984	Riparian woodland
Ranchester	44°57'N, 107°16'W	0	1	23 April 1984	Reservoir
Story	44°34'N, 106°54'W	1	0	2 July 1986	Upland coniferous forest
Tongue River	44°54'N, 107°07'W	42	11	23 April 1984	Riparian woodland
Ucross	44°34'N, 106°35'W	69	12	23 April 1984	Upland deciduous forest
Sublette County					
Boulder	42°46'N, 109°45'W	0	15	7 May 1984	Riparian woodland
Circle Cattle Company	42°37'N, 109°57'W	43	28	8 May 1984	Riparian woodland
Cottonwood Creek	42°41'N, 109°59'W	6	31	8 May 1984	Riparian woodland
Daniel (east)	42°54'N, 110°08'W	7	32	9 May 1984	Riparian woodland
Daniel (west)	42°57'N, 110°08'W	5	17	9 May 1984	Riparian shrub
Daniel	42°53'N, 110°02'W	3	56	7 May 1984	Riparian woodland
Fear Ranch	42°26'N, 110°06'W	0	18	8 May 1984	Riparian woodland
Five-mile Bridge	42°30'N, 110°04'W	0	11	15 April 1986	Riparian woodland
Hoback River	43°14'N, 110°27'W	11	3	27 May 1984	Upland coniferous forest
Horse Creek	42°56'N, 110°14'W	4	0	15 May 1984	Riparian shrub
New Fork River	42°40'N, 109°48'W	0	28	8 May 1984	Riparian woodland
North Piney Creek	42°37'N, 110°13'W	14	1	9 May 1984	Riparian woodland
South Piney Creek	42°30'N, 110°13'W	7	7	9 May 1984	Riparian shrub
Sweetwater County					
Henrys Fork (east)	41°01'N, 109°42'W	8	45	13 May 1986	Riparian woodland
Henrys Fork (west)	41°03'N, 109°47'W	35	4	13 May 1986	Riparian woodland
Pal Heronry (north)	41°52'N, 109°48'W	50	17	10 May 1984	Riparian woodland
Pal Heronry	41°51'N, 109°47'W	44	15	10 May 1984	Riparian woodland
Teal Island	41°58'N, 110°00'W	16	3	10 May 1984	Riparian woodland
Teton County					
Blacktail Ponds	43°41'N, 110°42'W	24	7	26 May 1984	Riparian woodland
Goosewing Creek	43°34'N, 110°18'W	6	4	28 June 1984	Riparian shrub
Moran	43°50'N, 110°31'W	11	0	29 June 1984	Riparian woodland
Oxbow (north)	43°52'N, 110°33'W	10	5	26 May 1984	Riparian woodland
Oxbow (south)	43°52'N, 110°33'W	14	1	26 May 1984	Riparian woodland
Prichard Pond	43°17'N, 110°48'W	7	1	27 May 1984	Riparian woodland
South Park	43°28'N, 110°51'W	150 ^c	37	17 May 1984	Riparian woodland
Uinta County					
Evanston I	41°12'N, 110°53'W	2	9	14 May 1986	Riparian woodland
Evanston II	41°12'N, 110°53'W	0	4	14 May 1986	Riparian woodland
Evanston (Substation 1)	41°18'N, 111°01'W	2	0	14 May 1986	Riparian woodland

Appendix continued.

Colony name	Location	Number of nests		Date censused	Habitat
		Active	Inactive		
Evanston (Substation II)	41°18'N, 111°00'W	1	1	14 May 1986	Riparian woodland
Millburne	41°13'N, 110°27'W	1	0	13 May 1986	Riparian woodland
Mountain View (east)	41°14'N, 110°26'W	6	1	13 May 1986	Riparian woodland
Mountain View (west)	41°14'N, 110°26'W	4	2	13 May 1986	Riparian woodland
Woodruff Narrows	41°24'N, 111°01'W	0	7	14 May 1986	Riparian woodland
Washakie County					
Kirby II	43°52'N, 108°08'W	5-6 ^b		28 March 1986	Riparian woodland
Worland (south)	44°04'N, 107°57'W	11	1	12 April 1984	Riparian woodland
Worland (north)	44°04'N, 107°56'W	1	8	12 April 1984	Riparian woodland
Yellowstone National Park					
Yellowstone Lake					Lake
(Frank Island)	44°25'N, 110°22'W	NC			

^aAll colonies were censused by making total ground counts of nests except as otherwise noted^bEstimate (fixed-wing airplane) of active nests present^cEstimate (ground) of active nests present.^dNC = not censused.