THREATENED, ENDANGERED, AND NONGAME BIRD AND MAMMAL INVESTIGATIONS

Nongame Program
Biological Services Section
Wyoming Game and Fish Department

Annual Completion Report

Period Covered:
15 April 2002 to 14 April 2003

Edited by: Andrea O. Cerovski

15 September 2003

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INTRODUCTION

The Nongame Program of the Wyoming Game and Fish Department (Department) was initiated in July 1977. This report summarizes data collected from 15 April 2002 to 14 April 2003 on various nongame bird and mammal surveys and projects conducted by Department personnel, other government agencies, and individuals in cooperation with the Department. Cooperating agencies and individuals are listed in Appendix I or in the individual completion reports, but we recognize that the listing does not completely credit the valuable contributions of the many cooperators, including Wyoming Game and Fish Department Regional Biologists and members of the public.

In October of 1987, a Nongame Strategic Plan was distributed; this Plan was updated and renamed in May of 1996. The 1996 Nongame Bird and Mammal Plan presents objectives and strategies for the management and study of nongame birds and mammals in Wyoming. This completion report presents information in four major sections similar to the Nongame Bird and Mammal Plan: threatened and endangered species, species of special concern, raptors taken for falconry, and other nongame surveys.

This report serves several purposes. First, it provides summaries of nongame surveys for the benefit of other agencies and individuals that need this information for management purposes. Second, it provides a permanent record of summarized data for future use. Although some of this information is in lengthy tables, it was felt that these data should be published rather than kept in the files of the Nongame staff. Some information, such as Bald Eagle and Merlin nest sites and bat roost locations, is sensitive and is not provided in this document. Those needing this information for purposes that will lead to better management of these species can request the data from the Nongame staff.

Common bird names used in this report follow the most recent American Ornithologists' Union guidelines and supplements, cited in Appendix II. Mammal names follow the "Revised checklist of North American mammals north of Mexico, 1997" cited in Appendix II. Scientific names for birds and mammals are presented in Appendix II.

THREATENED AND ENDANGERED SPECIES

BALD EAGLE
COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS – Threatened Species
Bald Eagle

PERIOD COVERED: 15 April 2002 – 14 April 2003

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INTRODUCTION

Bald Eagles are currently classified as a threatened species. The Wyoming Game and Fish Department (Department) initiated statewide surveys in 1978. Significant numbers of nesting and wintering eagles were located and crucial habitat was delineated with appropriate management recommendations.

POPULATION TRENDS - NESTING

The distribution of nesting Bald Eagles in Wyoming was presented in previous Annual Completion Reports. Bald Eagles nesting in northwestern Wyoming are part of a significant nesting population in the Rocky Mountain west. The population extends into Idaho and Montana. A Bald Eagle Working Team for the Greater Yellowstone Ecosystem (GYE) was formed to aid in coordinating management and data collection.

Statewide results are presented in Tables 1 and 2. Objectives have been exceeded since 1987 and the population has continued to increase. In 2002, 95 pairs produced 98 young in Wyoming.

LITERATURE CITED

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Table 1. Production of Bald Eagles in Wyoming, 2002.

Population Index	Wyoming Portion of GYE[a]	North Platte (S of I-80)	Other Areas[b]	Statewide Total
Territories Checked	69	5	31	105
Number Occupied	66	4	25	95
Number of Young Fledged	59	6	33	98
Percent Occupied	--	--	--	90.5
Young Fledged/Occupied Territory	--	--	--	1.03

[a] Includes 31 pairs that fledged 24 young in Yellowstone National Park (McEneaney 2003).

[b] Includes Green River, Wind River, Popo Agie River, Big Horn Basin, Casper, Sheridan, Cody, and Lusk areas.

Table 2. Bald Eagle production trends in Wyoming, 1978 – 2002.

Year Fledged	Number of Pairs Attempting to Nest[a]	Number of Young
1978	20	13
1979	23	13
1980	19	20
1981	26	25
1982	23	12
1983[b]	16	19
1984[b]	23	28
1985	35	28
1986	32	36
1987	43	50
1988	42	53
1989	47	34
1990	49	57
1991	52	51
1992	53	57
1993	62	64
1994	74	69
1995	73	62
1996	70	64
1997	76	75
1998	78	91
1999	97	85
2000	89	83
2001	89	86
2002	95	98

[a] Does not include pairs that were documented early in the year and production surveys that were not adequate to determine nesting success or young fledged.

[b] Surveys were not completed in Yellowstone National Park in 1983 and 1984, which artificially decreases the production count by 10-14 pairs and 1-8 young fledged.

BLACK-FOOTED FERRET HABITAT EVALUATION ON WHITE-TAILED PRAIRIE DOG COMPLEXES IN WYOMING COMPLETION REPORT

STATE OF WYOMING NONGAME MAMMALS – Species of Special Concern
White-tailed Prairie Dog

PERIOD COVERED: 15 April 2002 – 14 April 2003

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INTRODUCTION

Recent concern over the petition to list the white-tailed prairie dog (WTPD) (*Cynomys leucurus*) under the Endangered Species Act has prompted the Wyoming Game and Fish Department (Department) to investigate and inventory historical WTPD complexes in Wyoming. Additionally a black-footed ferret skull was located and reported east of Kinney Rim. During the late 1980s, the Department identified several prairie dog complexes as quality potential black-footed ferret habitat. Since that time sylvatic plague has affected many of the complexes. There have been not been any previous attempts made by the Department to quantify the impacts. During the summer of 2002, the Department investigated parts of three historical WTPD complexes (Dad, Moxa, and Sweetwater) and followed up on the reported black-footed ferret skull.

Evaluation of white-tailed prairie dog colonies was completed in June and July 2002. Prairie dog inventory data were collected, using methods similar to those used since 1991 in the Shirley Basin/Medicine Bow Black-footed Ferret Management Area, to monitor the amount and quality of black-footed ferret habitat present and changes to the habitat between years.

METHODS

Habitat evaluations were conducted in three phases: Phase 1) Locate all prairie dog towns that are accessible within each complex; Phase 2) For complexes with significant prairie dog occupied acreage, map and identify all prairie dog towns that were located during phase1; and Phase 3) Transect prairie dog towns mapped during phase 2.

Habitat evaluation for complexes with significant prairie dog occupied acreage was completed following the standard technique developed by the Black-footed Ferret Interstate Coordinating Committee (Biggins et al. 1989). Prairie dog towns were transected using parallel transects 1 km (0.6 mi) long by 3 m (9.8 ft) wide and spaced 200 m (656 ft) apart. Distances were measured with a Rolotape. Total number of burrows $\geq$10 cm (3.9 in.) in diameter and total number of active burrows, as determined by fresh scat within 1 m (3.3 ft) of the burrow entrance, were recorded.

Transects were drawn and numbered on 7.5-minute topographical maps. Transecting data were entered into field books and later transferred to a computer database for interaction with a habitat model which estimates prairie dog numbers and black-footed ferret family rating (Biggins et al. 1989).

Transecting was conducted between 13 June and 3 July 2002. All prairie dog towns transected were mapped and/or re-mapped, utilizing a handheld GPS unit (Garmin GPS 12XL). Coordinates were then downloaded and imported into GIS software.

During the late 1980s, the Department identified complexes during previous mapping efforts. Those historical maps provided the baseline data for the 2002 ground surveys. Activity status was determined following protocol outlined in (Oakleaf et al. 2003). Prairie dogs were considered absent if mounds and burrows had vegetation growing in them and fresh diggings or prairie dogs were not observed. The colony was considered inactive if these conditions persist over 50% of the colony. The presence of prairie dogs was indicated by fresh diggings, lack of vegetation in mounds and burrows and over extensive areas within the colony, and actual observations of prairie dogs. The colony was classified as active if prairie dogs or indicators of their presence were distributed over 50% of the colony.

RESULTS

DAD

Ground surveys were conducted on 16 and 25 July 2002. Only the western most part (west of HWY 789) of the complex was surveyed. Approximately a dozen active prairie dog towns were identified during the July surveys. Hectareage ranged from approximately a few hectares to several hundred hectares in size. No other significant prairie dog hectareage was identified during the surveys.

KINNEY RIM AREA

Ground surveys were conducted between 16 and 25 July 2002 as a follow up to the reported black-footed ferret skull. Only two prairie dog towns of approximately a few hundred hectares were located east of the Kinney Rim landmark. Both prairie dog towns were active. No other significant prairie dog hectareage was identified during the

surveys. No attempts were made to survey the historical Kinney Rim complex west of the Kinney Rim landmark.

MOXA AREA

Ground surveys were conducted between 30 July and 8 August 2002. Portions of four counties – Lincoln, Sweetwater, Sublette and Uinta – were covered, including parts of the Moxa Complex. A total of 47 prairie dog towns were located, ranging in size from approximately 4 hectares (10 ac) to 1200 hectares (2,965 ac). Results of the survey indicated that 22 of the 47 (47%) towns were active and 25 of the 47 (53%) were inactive.

SWEETWATER

Ground surveys were conducted between 20 May and 12 June 2002. Approximately 44 prairie dog towns were identified (Fig. 1). Prairie dog towns were then stratified, and those that had the highest potential as ferret habitat were selected for transecting. Approximately 14 of the 44 (32%) prairie dog towns were inactive and 30 of 44 (68%) were active. However, many of the prairie dog towns that were identified as active had low densities of prairie dogs. Hectareage for the prairie dog towns identified ranged from approximately a few hectares to well over 1000 ha (2,471 ac).

Thirteen of the 30 (43%) active prairie dog towns were transected. Corrected hectareage for all transecting surveys in 2002, including only that area with eight or more total burrows per transect, was 4,544 ha (11,228 ac) (Table 1). The corrected hectareage for all prairie dog towns transected was 1,994 ha (4,927 ac). The estimated black-footed ferret family rating for the hectareage transected was 0.30 ferret families (a ferret family represents 3.3 young, 1.0 adult females, and 0.5 males).

DISCUSSION

Ground surveys were relatively straight forward and readily classified the activity status of white-tailed prairie dog colonies during spring and summer months. However, access limitations precluded observations of many towns within the Moxa and Dad Complexes. Therefore, surveys were heavily biased toward public lands and associated management, especially in Lincoln; Sweetwater; and Uinta counties, and are not be a true representation of complex-wide declines.

Impacts of sylvatic plague on white-tailed prairie dog colonies in the Shirley Basin/Medicine Bow Black-footed Ferret Management Area in Wyoming are highly variable and well documented for small portions of WTPD complexes (Luce and Steiner 1994, Staley and Luce 1995 and 1996, Luce et al. 1997, Luce 1998 and 2000, Van Fleet et al. 2001, and Grenier et al. 2002). However, complex wide trends have been more difficult to ascertain.

Sylvatic plague epizootics were suspected and reported in at least one of the three complexes (Sweetwater) during the same time period as in the Shirley Basin Complex (mid-1990s). Many of the prairie dog towns identified during the 1980s were no longer present; however, the 2002 surveys located many prairie dog towns in new locations within the complex. Interestingly enough, similar results were observed in Shirley Basin in 2001, where prairie dog towns were mapped in 2002 that were not present in 1990 (Grenier et al. 2002). A comparison of the historical and recent mapping conducted in 2002 on the Sweetwater complex revealed a similar shift in prairie dog town distribution. Although no comparison can be made regarding prairie dog densities, the 2002 survey results for the Sweetwater complex indicate an net increase in prairie dog hectareage from 1980s to 2002, 2,428 ha (6,000 ac) and 4,856 ha (12,000 ac), respectively. The shift in prairie dog town distribution in the Sweetwater Complex can be attributed directly to impacts of sylvatic plague (B. Oakleaf, Wyoming Game and Fish Department, personal communication).

We evaluated parts of two additional historical complexes within the occupied white-tailed prairie dog range in Wyoming as a preliminary evaluation of existing black-footed ferret reintroduction sites. Recent reports of abundant white-tailed prairie dog towns made these complexes of interest to the Department. Survey results are nearly impossible to correlate to previous surveys because of logistic constraints. However, though existing potential on the Moxa and Dad complexes is unclear, it may be clarified in the future following a thorough inventory utilizing other methods similar to those outlined in Oakleaf et al. (2002). Additionally, the Bureau of Land Management is planning to re-map several of the historic complexes in 2003 (Carter, Cumberland, Moxa, and Pathfinder) to address Area of Critical Environmental Concern nominations.

Estimated historical hectareage for each of the three complexes varied between approximately 2,428 ha (6,000 ac) and 17,402 ha (43,000 ac). Collectively, these three complexes comprised approximately 23,877 ha (59,976 ac). However, because of the following reasons, results from 2002 cannot be directly compared to historical hectareage: 1) Only the Sweetwater complex was entirely remapped; 2) Surveys were limited to public lands on the Dad and Moxa complexes, and 3) Survey efforts on the Dad complex were restricted to the public lands west of HWY 789.

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Table 1. Summary of prairie dog habitat evaluation data for the Sweetwater Complex, Wyoming 2002.

Year = 2002													
Prairie Dog Town	Number Uncorrected Transects	Number Corrected Transects[a]	Uncorrected Hectares	Corrected Hectares[b]	Transects >25 Active Burrows	Proportion of Good Transects	Hectares of Good Habitat	Average # Active Burrows	Average # Active Burrows per Hectare	Prairie Dog Count	Prairie Dogs per Hectare	Prairie Dog Estimate	BFF Family Rating[c]
100	12	9	188.5	142	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
103	16	4	278	70	1	0.25	18	27.00	90.00	6.57	13.27	232.23	0.30
104	4	3	103	78	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
105	48	27	1100	619	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
106	21	6	354	102	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
107	26	13	906	453	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
108	24	6	607	152	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
109	17	9	415	220	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
111	6	2	111	37	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
113	18	6	271	91	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
114	5	1	70	14	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
115	6	1	93	16	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
116	1	0	47	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
Total	204	87	4544	1994	1	0.01	18	2.08	6.92	0.51	1.02	232.23	0.30

[a] Does not include transects with <8 total burrows.

[b] Corrected area was calculated by proportionally discounting area attributed to transects with <8 total burrows in uncorrected area.

[c] Prairie dog towns with a prairie dog estimate of <273 received a black-footed ferret family (BFF) rating of zero (0).

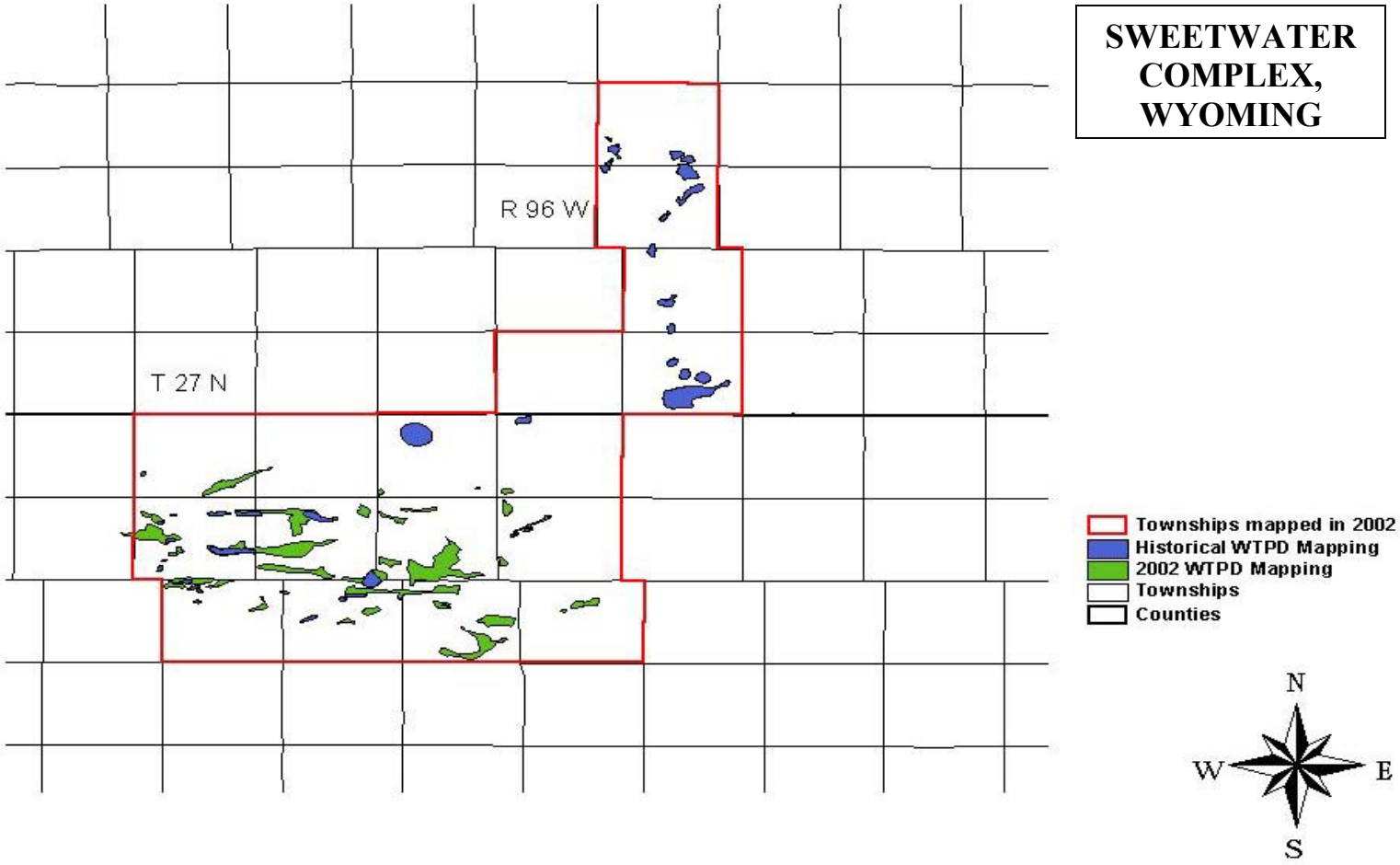

Figure 1. Comparison of white-tailed prairie dog towns mapped in the 1980s (blue) and in 2003 (green) in the Sweetwater complex.

HABITAT EVALUATION OF THE THUNDER BASIN NATIONAL GRASSLAND BLACK-FOOTED FERRET MANAGEMENT AREA, WYOMING COMPLETION REPORT

STATE OF WYOMING NONGAME MAMMALS – Species of Special Concern
Black-Footed Ferret

PERIOD COVERED: 15 April 2002 – 14 April 2003

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ABSTRACT

Black-footed ferret (*Mustela nigripes*) habitat in the Thunder Basin National Grasslands (TBNG) Black-footed Ferret Management Area has been evaluated twice previously in 1990 and 1997. Quantification of black-tailed prairie dogs (*Cynomys ludovicianus)* and relative density in each colony allows for the black-footed ferret family rating to be calculated on an annual basis and for comparison between years. A family includes 3.3 young, 1.0 adult females, and 0.5 males. Inventories indicate that the calculated black-footed ferret family rating has increased from 1990 through 1997 (64.24 and 95.00, respectively). However, a sylvatic plague epizootic was documented on the TBNG during the early spring of 2001. The resulting ferret family rating for the 2002 inventory is 7.41.

INTRODUCTION

Evaluation of black-tailed prairie dog colonies was completed in June and July of 2002. Prairie dog inventory data were collected using methods similar to those used since 1990 in the TBNG and those used in the Shirley Basin/Medicine Bow Black-footed Ferret Management Area since 1991 to monitor the amount and quality of black-footed ferret habitat present and changes to the habitat between years. Results of past studies are presented in previous Annual Completion Reports. A complete description of the Management Area is available by contacting the Medicine Bow-Routt National Forest in Douglas, Wyoming.

METHODS

Habitat evaluation was completed following the standard technique developed by the Black-footed Ferret Interstate Coordinating Committee (Biggins et al. 1989). Prairie dog towns were transected using parallel transects 1 km (0.6 mi) long by 3 m (9.8 ft) wide and spaced 200 m (656 ft) apart. Distances were measured with a Rolotape. Total number of burrows ≥10 cm (3.9 in.) in diameter and total number of active burrows, as determined by fresh scat within 1 m (3.3 ft) of the burrow entrance, were recorded.

Transects were drawn and numbered on 7.5-minute topographical maps. Transecting data were entered into field books and later transferred to a computer database for interaction with a habitat model which estimates prairie dog numbers and black-footed ferret family rating (Biggins et al. 1989).

RESULTS

Transecting was conducted between 13 June and 2 July 2002. No significant remapping was conducted and the Department mapped no new prairie dog colonies in 2002. The Medicine Bow-Routt National Forest has completed all mapping of prairie dog towns during the summers of 2000 and 2001. Corrected hectareage for all transecting surveys in 2002, including only that area with six or more total burrows per transect, was 2,817 ha (6,961 ac) (Table 1). The total uncorrected prairie dog hectarage in 2002 was 2,962 ha (7,319 ac).

The estimated black-footed ferret family rating for the hectarage transected was 7.41 ferret families (a ferret family represents 3.3 young, 1.0 adult females, and 0.5 males). The combined black-footed ferret family rating of three colonies still active in 2002 varied from 20.03 in 1990 to a high of 24.9 in 1997 and a low of 7.41 in 2002 (Fig. 1). During that time period, the black-footed ferret family rating of the entire Rosecrans complex varied from 69.48 in 1990 to a high of 95.00 in 1997 and a low of 7.41 in 2002. Sylvatic Plague had impacted all but three of the prairie dog towns (231-1+,231-16+, and 231-11) during the survey of 2002 (Table 2). Comparison of black-footed ferret family rating and prairie dog density estimates for all prairie dog towns surveyed in TBNG in 1990 and 1997 are presented in Tables 3 and 4 and summarized in Figure 1.

An overall downward trend in active prairie dog burrows was detected for the Management Area in 2002 resulting from a sylvatic plague epizootic documented during the early spring of 2001 (T. Byer, U. S. Forest Service, personal communication). Current estimates suggest that 16,000 of an original 21,000 acres (6,475 of 8,498 ha) of active prairie dogs have been lost as a result the sylvatic plague epizootic with continued declines through the fall of 2002 (C. Lockman, U. S. Forest Service, personal communication).

DISCUSSION

Similar to previous years (1990 and 1997), transecting efforts were focused on the Rosecrans Black-footed Ferret Management Area 3.63 (Rosecrans Complex). In previous years in which surveys were conducted, Rosecrans Complex contained adequate habitat to support a viable population of free-ranging black-footed ferrets. The 2002 survey results indicate that it may be several years before Rosecrans Complex will once again be viable black-footed ferret habitat.

Prairie dog population monitoring in Shirley Basin, Wyoming has shown that the population in individual colonies can differ significantly between years (Parish and Luce 1991, Hnilicka and Luce 1992, Luce and Steiner 1994, Staley and Luce 1995 and 1996, Luce et al. 1997, Luce 1998 and 2000, Van Fleet et al. 2001, and Grenier et al. 2002). The combined black-footed ferret family rating of three colonies still active in 2002 varied between the three survey years. During that time period, the black-footed ferret family rating of the entire Rosecrans complex also varied.

Population fluctuation in individual colonies can also be tracked. Colony 231-16+ increased from 1.74 ferret families in 1990 to 5.43 in 1997, then decreased to 0.58 in 2002. Another, Colony 231-1+, increased steadily from 16.22 in 1990 to 18.19 in 1997, then decreased to 0.62 in 2002. Trends observed in these two colonies are indicative of significant decreases observed throughout the Rosecrans complex in 2002.

The overall downward trend in active prairie dog burrows and resulting ferret family rating for the Rosecrans Complex between 1997 and 2002 may have been a combination of several factors. It has been suggested that sylvatic plague first documented in the TBNG during the spring of 2001 may have begun as early as early spring of 2000 when inactive towns were first noticed (T. Byer, U. S. Forest Service, personal communication). The USFS Douglas Ranger Station has contracted with Kansas State University to monitor the occurrence and distribution of sylvatic plague in the TBNG by monitoring seroprevalence of sylvatic plague in mice populations (T. Byer, U. S. Forest Service, personal communication).

Prairie dog population monitoring in Shirley Basin, Wyoming has shown that the population in individual colonies can differ significantly between years (Parish and Luce 1991, Hnilicka and Luce 1992, Luce and Steiner 1994, Staley and Luce 1995 and 1996, Luce et al. 1997, Luce 1998 and 2000, Van Fleet et al. 2001, and Grenier et al. 2002). Therefore, precise comparisons of prairie dog numbers between 1990, 1997, and 2002 should be viewed cautiously for several reasons: 1) due to manpower, weather, and other constraints, not all known prairie dog hectareage within the management area has been sampled each year; 2) identical transects were not replicated between years; 3) different personnel conducted transecting each year and may have recorded and evaluated data slightly differently; and 4) remapping of prairie dog towns may have resulted in changes in the survey area.

ACKNOWLEDGMENTS

Thanks to the Douglas Ranger District of the Medicine Bow-Routt National Forest for allowing access to the Thunder Basin National Grassland and Work Center during the prairie dog habitat surveys.

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Table 1. Summary of prairie dog evaluations for the Thunder Basin National Grassland, Wyoming in 1990, 1997, and 2002.

Year [a]	Total Corrected Hectares	Hectares >12 Active Burrows/ha	Prairie Dogs/ ha	Prairie Dog Estimate	BFF Family Rating
1990	2,334	2,160	28.72	51,883	64.24
1997	4,106	3,469	23.14	72,486	95.00
2002	2,962	144	7.91	5,651	7.41

[a] Prairie dog towns 231-17 and 231-18 were not surveyed in 1990.

Table 2. Summary of prairie dog habitat evaluation data for Thunder Basin National Grassland, 2002.

Year = 2002													
Prairie Dog Town	Number Uncorrected Transects	Number Corrected Transects[a]	Uncorrected Hectares	Corrected Hectares[b]	Transects >12 Active Burrows	Proportion of Good Transects	Hectares of Good Habitat	Average # Active Burrows	Average # Active Burrows per Hectare	Prairie Dog Count	Prairie Dogs per Hectare	Prairie Dog Estimate	BFF Family Rating[c]
249-8	4	4	28	28	0	0.00	0		0.00	0.00	0.00	0.00	0.00
299-6	9	8	178	159	0	0.00	0		0.00	0.00	0.00	0.00	0.00
288-1	3	3	33	33	0	0.00	0		0.00	0.00	0.00	0.00	0.00
231-26	2	1	13	7	0	0.00	0		0.00	0.00	0.00	0.00	0.00
231-1+	60	60	1046	1046	2	0.03	31	12.5	41.67	7.46	15.07	472.90	0.62
299-2	17	16	778	733	0	0.00	0		0.00	0.00	0.00	0.00	0.00
231-16+	18	17	402	380	1	0.06	23	16	53.33	9.55	19.29	439.81	0.58
222-3	4	4	44	44	0	0.00	0		0.00	0.00	0.00	0.00	0.00
231-11	7	6	105	90	6	1.00	90	43.67	145.57	26.06	52.65	4738.50	6.21
299-4	10	9	301	271	0	0.00	0		0.00	0.00	0.00	0.00	0.00
249-3	4	3	34	26	0	0.00	0		0.00	0.00	0.00	0.00	0.00
Total	138	131	2962	2817	9	0.07	144	24.06	21.87	3.92	7.91	5651.21	7.41

[a] Does not include transects with <6 total burrows.

[b] Corrected area was calculated by proportionally discounting area attributed to transects with <6 total burrows in uncorrected area.

[c] Prairie dog towns with a prairie dog estimate of <273 received a black-footed ferret (BFF) family rating of zero (0).

Table 3. Summary of prairie dog habitat evaluation data for Thunder Basin National Grassland, 1990.

Year = 1990													
Prairie Dog Town[a]	Number Uncorrected Transects	Number Corrected Transects[b]	Uncorrected Hectares	Corrected Hectares[c]	Transects >12 Active Burrows	Good Transects	Hectares Good Habitat	Average # Active Burrows	Average # Active Burrows per Hectare	Prairie Dog Count	Prairie Dogs per Hectare	Prairie Dog Estimate	BFF Family Rating[d]
222-3	8	8	20	20	6	0.75	15	16	53.33	2.90	5.86	87.83	0.00
231-1&2	56	54	994	959	49	0.91	870	26.41	88.03	7.05	14.23	12378.68	16.22
231-11	21	21	75	75	18	0.86	64	35.55	118.50	12.18	24.61	1581.79	2.07
231-16+	6	6	58	58	6	1.00	58	34.17	113.90	11.31	22.86	1325.80	1.74
231-26	1	1	35	35	1	1.00	35	61.50	205.00	36.70	74.14	2594.95	0.00
249-3	6	6	41	41	6	1.00	41	24.50	81.67	14.62	29.54	1210.95	1.59
249-8	4	4	17	17	2	0.50	9	18.00	60.00	10.74	21.70	184.42	0.00
288-1	6	6	43	43	6	1.00	43	22.67	75.57	13.53	27.33	1175.33	1.54
299-2+	119	116	721	703	105	0.91	636	25.50	85.00	15.22	30.75	19560.82	25.64
299-4	36	36	209	209	35	0.97	203	32.77	109.23	19.55	39.49	8025.15	10.52
249-5,6	12	12	127	127	11	0.92	116	29.54	98.47	17.63	35.62	4146.31	5.43
299-6	26	26	139	139	25	0.96	134	22.40	74.67	13.37	27.01	3610.00	4.73
Sub-total	301	296	2479	2425	270	0.91	2212.29	29.08	96.95	14.57	29.43	55882.04	69.48
272-1	2	2	7	7	2	1.00	7	39.00	130.00	23.27	47.01	329.07	0.43
299-1	4	4	42	42	4	1.00	42	18.50	61.67	11.04	22.30	936.73	1.23
212-5	12	11	154	141	11	1.00	141	30.82	102.73	18.39	37.15	5244.56	6.87
215-1	7	7	72	72	7	1.00	72	23.00	76.67	13.72	27.72	1995.64	2.62
231-14	9	9	55	55	9	1.00	55	45.67	152.23	27.25	55.05	3027.78	3.97
212-6	3	3	28	28	3	1.00	28	26.00	86.67	15.51	31.33	877.33	1.15
Total	338	332	2837	2770	306	0.92	2553.52	30.30	100.99	17.68	35.71	68293.14	85.75

[a] Prairie dog towns 231-17 and 231-18 were not surveyed in 1990.

[b] Does not include transects with <6 total burrows.

[c] Corrected area was calculated by proportionally discounting area attributed to transects with <6 total burrows in uncorrected area.

[d] Prairie dog towns with a prairie dog estimate of <273 received a black-footed ferret (BFF) family rating of zero (0).

Table 3. (Continued) Summary of prairie dog habitat evaluation data for Thunder Basin National Grassland, 1997.

Year = 1997													
Prairie Dog Town	Number Uncorrected Transects	Number Corrected Transects[a]	Uncorrected Hectares	Corrected Hectares[b]	Transects >12 Active Burrows	Good Transects	Hectares Good Habitat	Average # Active Burrows	Average # Active Burrows Per Hectare	Prairie Dog Count	Prairie Dogs per Hectare	Prairie Dog Estimate	BFF Family Rating[c]
222-3	7	7	44	44	7	1.00	44	19.71	65.70	4.17	8.42	370.52	0.49
231 1&2	75	75	1046	1046	75	1.00	1046	25.41	84.70	6.57	13.27	13879.16	18.19
231-11	10	10	105	105	9	0.90	95	22.11	73.70	5.11	10.33	976.03	1.28
231-16+	43	43	402	402	39	0.91	365	23.33	77.77	5.63	11.37	4146.49	5.43
231-26	2	2	13	13	2	1.00	13	21.50	71.67	12.83	25.92	336.95	0.00
249-3	6	6	34	34	6	1.00	34	24.83	82.77	14.82	29.94	1017.94	1.33
249-8	5	5	28	28	5	1.00	28	31.20	104.00	18.62	37.62	1053.25	1.38
288-1	6	6	33	33	6	1.00	33	20.00	66.67	11.93	24.10	795.33	1.04
299-2+	98	98	1922	1922	71	0.72	1392	20.04	66.80	11.96	24.16	33644.31	44.09
299-4	9	9	301	301	9	1.00	301	36.56	121.87	21.81	44.06	13262.24	17.38
299-6	12	12	178	178	8	0.67	119	21.00	70.00	12.53	25.31	3003.82	3.94
Total	273	273	4106	4106	237	10.20	3469.24	24.15	80.51	11.45	23.14	72486.05	95.00

[a] Does not include transects with <6 total burrows.

[b] Corrected area was calculated by proportionally discounting area attributed to transects with <6 total burrows in uncorrected area.

[c] Prairie dog towns with a prairie dog estimate of <273 received a black-footed ferret family rating of zero (0).

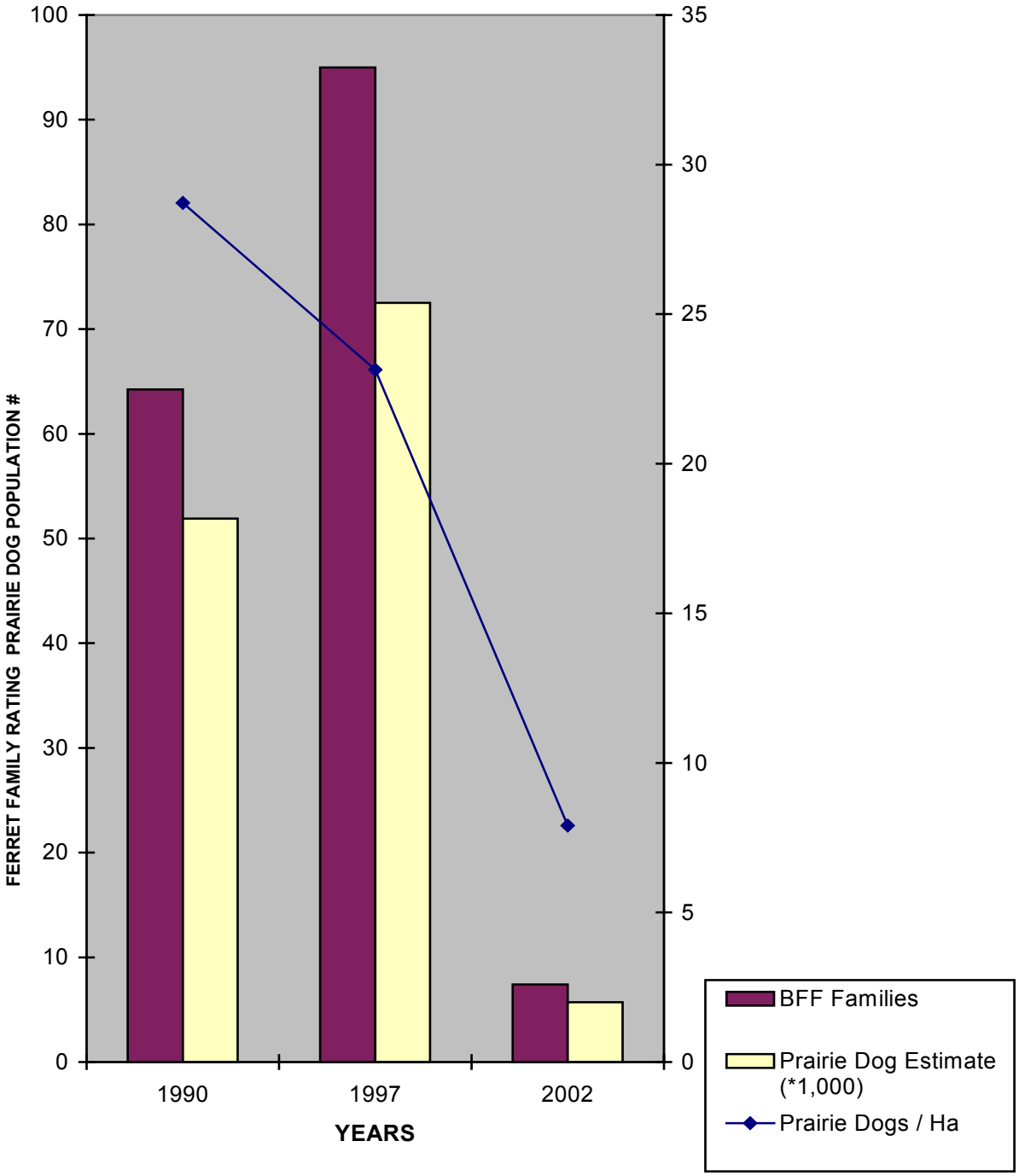

Figure 1. Comparison of black-footed ferret family rating and prairie dog density estimates for prairie dog towns surveyed in Thunder Basin National Grassland, Wyoming in 1990, 1997, and 2002.

BLACK-FOOTED FERRET HABITAT EVALUATION ON THE FENCE CREEK RANCH COMPLEX, WYOMING COMPLETION REPORT

STATE OF WYOMING NONGAME MAMMALS – Species of Special Concern
Black-footed Ferret

PERIOD COVERED: 15 April 2002 – 14 April 2003

PREPARED BY: Martin Grenier, Nongame Mammal Biologist
Anna Carpenter, Nongame Biological Aide
Matt Martin, Nongame Biological Aide
Melanie Purcell, Nongame Biological Aide
Jonathan Stephens, Nongame Biological Aide

ABSTRACT

Black-footed ferret (*Mustela nigripes*) habitat on the Fence Creek Ranch has not been previously evaluated. Quantification of black-tailed prairie dogs (*Cynomys ludovicianus)* and relative density in each colony allows for the black-footed ferret family rating to be calculated on an annual basis and for comparison between years. A ferret family includes 3.3 young, 1.0 adult females, and 0.5 males. The resulting ferret family rating for the 2002 inventory is 8.45.

INTRODUCTION

Evaluation of black-tailed prairie dog (BTPD) colonies was completed in August 2002. Prairie dog inventory data were collected using methods similar to those used since 1990 in the Thunder Basin National Grassland and in the Shirley Basin/Medicine Bow Black-footed Ferret Management Areas to monitor the amount and quality of black-footed ferret habitat present and changes to the habitat between years. Results of past studies are presented in previous Annual Completion Reports.

METHODS

Habitat evaluation was completed following the standard technique developed by the Black-footed Ferret Interstate Coordinating Committee (Biggins et al. 1989). Prairie dog towns were transected using parallel transects 1 km (0.6 mi) long by 3 m (9.8 ft) wide and spaced 200 m (656 ft) apart. Distances were measured with a Rolotape. Total

number of burrows ≥10 cm (3.9 in.) in diameter and total number of active burrows, as determined by fresh scat within 1 m (3.3 ft) of the burrow entrance, were recorded.

Prairie dog towns that were located were mapped by walking the perimeter of the prairie dog town while utilizing a handheld GPS unit (Garmin GPS 12XL). Coordinates were then downloaded and imported into GIS software. Transects were then drawn and numbered on 7.5-minute topographical maps. Transecting data were entered into field books and later transferred to a computer database for interaction with a habitat model which estimates prairie dog numbers and black-footed ferret family rating (Biggins et al. 1989).

RESULTS

Transecting occurred on those towns that were located on and adjacent to the Fence Creek Ranch (FCR), while mapping efforts also included the larger surrounding area. Corrected hectareage for all transecting surveys in 2002, including only that area with six or more total burrows per transect, was 158 ha (382 ac) (Table 1). The total uncorrected prairie dog hectareage in 2002 was 171 ha (413 ac). The estimated black-footed ferret family rating for the hectareage transected was 8.45 ferret families (a ferret family represents 3.3 young, 1.0 adult females, and 0.5 males).

The uncorrected occupied BTPD hectareage for the FCR is approximately 97 ha (234 ac). It is estimated that an additional 10+ ha (25 ac) may have recently been occupied but was not occupied during the 2002 surveys.

A comparison of the black-footed ferret habitat potential on the FCR and the Thunder Basin National Grassland is presented in Table 2.

DISCUSSION

The objective of this survey effort was to determine if the Fence Creek Ranch Complex could potentially serve as a future black-footed ferret reintroduction site. The occupied acreage that occurs on the Fence Creek Ranch is a subset of the larger surrounding complex. The complex lies on the border of Montana and Wyoming. It is estimated that the occupied acreage on the complex that occurs in Wyoming is a minimum of 300+ ha (725 ac). Additionally, at least another 50+ ha (124 ac) is believed to have recently been occupied but was not occupied during the surveys.

Although the prairie dog densities on the FCR are nearly double the densities on the Thunder Basin National Grassland black footed ferret management area (Grenier et al. 2002), currently the occupied hectareage that occurs on the Fence Creek Ranch is insufficient to support a viable, long term, self-sustaining black-footed ferret population. The occupied hectareage transected on the FCR is only approximately 1/20th the size of

the Thunder Basin National Grasslands black-footed ferret management area a proposed reintroduction site.

However, the Wyoming Game and Fish Department is currently involved in a statewide remote inventory of black-tailed prairie dogs. It is possible that the complex is much larger than the 2002 ground surveys revealed.

No effort was made to quantify prairie dog acreage that occurred outside of Wyoming during the 2002 surveys. However, C. Repsis (Wyoming Game and Fish Department, personal communication) estimates that a significant portion of the complex may occur in Montana.

ACKNOWLEDGMENTS

Thanks to the Fence Creek Ranch for allowing access to the ranch for completion of the prairie dog habitat surveys.

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Table 1. Summary of prairie dog habitat evaluation data for the Fence Creek Ranch, Wyoming, 2002.

Year = 2002													
Prairie Dog Town	Number Uncorrected Transects	Number Corrected Transects[a]	Uncorrected Hectares	Corrected Hectares[b]	Transects >12 Active Burrows	Proportion of Good Transects	Hectares of Good Habitat	Average # Active Burrows	Average # Active Burrows per Hectare	Prairie Dog Count	Prairie Dogs per Hectare	Prairie Dog Estimate	BFF Family Rating[c]
103	2	2	16	16	2	1.00	16	32	106.67	19.09	38.57	617.12	0.81
105	1	1	8	8	1	1.00	8	34	113.33	20.29	40.99	327.92	0.43
107	2	2	15	15	2	1.00	15	43	143.33	25.66	51.84	777.60	1.02
108	2	2	14	14	2	1.00	14	43.5	145.00	25.96	52.44	734.16	0.96
110	1	1	8	8	1	1.00	8	35	116.67	20.88	42.18	337.44	0.44
111	2	2	20	20	2	1.00	20	29.5	98.33	17.60	35.56	711.20	0.93
112	1	1	7	7	0	0.00	0	50	166.67	29.83	60.26	0.00	0.00
117	2	2	17	17	2	1.00	17	67.5	225.00	40.28	81.37	1383.29	1.81
118	1	1	12	12	1	1.00	12	47	156.67	28.04	56.65	679.80	0.89
119	1	1	7	7	1	1.00	7	37	123.33	22.08	44.61	312.27	0.41
120	2	2	6	6	2	1.00	6	48	160.00	28.64	57.86	347.16	0.45
125	6	4	41	28	2	0.50	14	13.5	45.00	8.06	16.28	227.92	0.30
Total	23	21	171	158	18	0.86	137	40.00	133.33	23.87	48.22	6455.88	8.45

[a] Does not include transects with <6 total burrows.

[b] Corrected area was calculated by proportionally discounting area attributed to transects with <6 total burrows in uncorrected area.

[c] Prairie dog towns with a prairie dog estimate of <273 received a black-footed ferret (BFF) family rating of zero (0).

Table 2. Comparison of black-footed ferret (BFF) habitat potential for the Fence Creek Ranch (FCR) in 2002, and Thunder Basin National Grassland (TBNG), Wyoming in 1990, 1997, and 2002.

Year	Total Corrected Hectares	Hectares >12 Active Burrows/ha	Prairie Dogs/ ha	Prairie Dog Estimate	BFF Family Rating
FCR 2002	158	137	48.22	6,456	8.45
TBNG 1990	2,334	2,160	28.72	51,883	64.24
TBNG 1997	4,106	3,469	23.14	72,486	95.00
TBNG 2002	2,962	144	7.91	5,651	7.41

SPECIES OF SPECIAL CONCERN

PEREGRINE FALCON NEST SURVEYS
COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS – Species of Special Concern
Peregrine Falcon

PERIOD COVERED: 15 April 2002 – 14 April 2003

PREPARED BY: Bob Oakleaf, Nongame Coordinator
Terry McEneaney, Yellowstone National Park
Susan Patla, Nongame Biologist
Laurie Van Fleet, Nongame Biologist

INTRODUCTION

Plans to establish a nesting population of Peregrine Falcons were developed from analysis of historical distribution and evaluation of potential habitat during survey work (1978-1980). The goal of reintroduction was to establish and maintain a self-sustaining breeding nucleus in the wild. Objectives were to annually release approximately 15 peregrines and establish 30 breeding pairs in Wyoming by 1996. The program was coordinated with Idaho and Montana to ensure maximum results to reestablish this species. During 2002, Peregrine Falcon surveys were assisted with funding from a cooperative agreement with the US Fish and Wildlife Service.

RESULTS AND DISCUSSION

Results of Peregrine Falcon reintroduction and monitoring efforts are detailed in previous Nongame Annual Completion Reports and annual reports completed by The Peregrine Fund, Inc. In Wyoming, 384 Peregrine Falcons were released (1980-1995) with at least 325 (85%) surviving to dispersal (one month post release). No peregrines have been released since 1995 because objectives were attained in 1994-1995.

Nesting was first documented in 1984. Between 1984 and 2002, 475 nesting attempts were observed at 63 sites in Wyoming. Over 789 young were produced with a minimum of 1.7 young fledged per nesting attempt. Survey results during 2002 recorded 60 pairs fledging at least 97 young (1.6 young/pair). This statewide total includes results from 20 pairs in Yellowstone National Park that fledged 35 young. (McEneaney 2003).

LITERATURE CITED

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SURVEYS OF THE COMMON LOON IN WYOMING
COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS – Species of Special Concern
Common Loon

PERIOD COVERED: 15 April 2002 – 14 April 2003

PREPARED BY: Andrea Cerovski, Nongame Bird Biologist

INTRODUCTION

The Common Loon is classified as a Department Native Species Status 1 because of its public appeal, vulnerability to human disturbance and environmental degradation, and its limited abundance and restricted distribution in Wyoming. Loons can be observed statewide during spring and fall migration and nonbreeding loons can be found throughout the state during the summer. However, suitable breeding habitat is restricted to the northwest corner of Wyoming and is easily lost or degraded due to human disturbance and habitat changes. In 2002, known nesting areas were surveyed to document loon nesting, production, and recruitment, and potential nesting lakes in the Pinedale area were surveyed to determine presence and use by nesting Common Loons.

Since 1996, Common Loon surveys have been more intensive than in past years to better determine the success of nesting loons in producing young. The timeline for Common Loon surveys is as follows: nest initiation and status surveys are conducted in early to mid-June, production surveys are conducted in mid- to late July, and follow up recruitment surveys are conducted in late August to early September. These surveys are scheduled to coincide with similar surveys conducted in Yellowstone National Park so data can be directly compared (McEneaney 2003).

SURVEYS OF KNOWN NESTING AREAS

Seven lakes outside of Yellowstone National Park with a past history of Common Loon nesting were surveyed for nesting, production, and recruitment in 2002 by Wyoming Game and Fish Department (Department) personnel (Table 1). During the June nesting survey, a single adult loon was observed on one of the seven lakes; the other six lakes could not be surveyed due to area road closures. During the July production survey, single adult loons or loon pairs were observed on six of the seven lakes (although one pair that was observed on two different lakes was likely the same pair), and a total of two loonlets were observed on two of the seven lakes. During the August recruitment

survey, one loonlet was observed on one of the seven lakes. Summary data for previous years are also presented in Table 1.

In Yellowstone National Park, 40 Common Loon adults were observed in 2002; nine pairs attempted to nest, fledging five young on four different lakes (McEneaney 2003) (Table 2).

Common Loon nesting, productivity, and recruitment data for Wyoming are presented in Table 2.

ACKNOWLEDGEMENTS

The Department would like to acknowledge the following individuals for their valuable contributions to the 2002 Common Loon monitoring effort: Laurie Van Fleet (Department), Evette Meyer (Department), Sharon Nicholoff (Department), and Eva Crane (volunteer).

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Table 1. Summary of Common Loon nesting (June), productivity (July), and recruitment (August) surveys from 1987 through 2002. Excludes Yellowstone National Park. Adult loons are depicted by the letter A and loonlets are depicted by the letter Y.

	Arizona Lake		Bergman Res		Fish Lake		Indian Lake		Junco Lake		Loon Lake		Moose Lake		Total Observ.	
Year	A	Y	A	Y	A	Y	A	Y	A	Y	A	Y	A	Y	A	Y
1987	1	2	2	1	0	0	2	2	1	1	2	1	2	2	10	9
1988	2	1	2	2	0	0	2	1	2	2	2	2	2	2	12	10
1989	2	-[a]	2	-	NS[b]	NS	4	1	2	1	2	2	2	-	14	4
1990	4	-	2	-	NS	NS	2	2	2	1	2	1	2	2	14	6
1991	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1992	2	-	0	0	2	-	2	egg[c]	2	-	2	?[d]	2	?	12	?
1993	2	?	0	0	1	?	3	?	2	?	2	1	2	?	12	?
1994	2	1	2	-	2	-	0	0	0	0	2	1	2	1	10	3
1995	2	1	2	-	0	0	2	-	0	0	1	2	0	0	7	3
1996	2	-	1	-	2	-	2	1	2	-	2	2	2	-	13	3
1997	2	1	0	0	1	-	2	2	0	0	2	2	2	1	9	6
1998	0	0	0	0	0	0	1	2	0	0	1	-	2	1	4	3
1999	2	2	0	0	2	-	2	2	0	0	1	-	2	-	9	4
2000	2	1	1	0	2	-	2	2	2	1	2	1	2	-	13	5
2001	0	0	0	0	2[e]	-	2	1	2	-	2[e]	1	2	1	10	3
2002	1	0	1	0	1	0	2	1	2	-	2	1	1	-	10	2

[a] A "-" indicates that loonlets were not observed during the survey; however, due to the secretive nature of loons, young may have been present but hidden from view.

[b] NS = not surveyed.

[c] A nest with 1 egg was observed; it is unknown if the egg hatched and the young loon survived.

[d] A "?" indicates that a June nesting status survey was conducted only; these lakes were not surveyed in July so productivity was unknown.

[e] Most likely the same pair that had recently flown from Loon Lake toward Fish Lake. Both pairs are included in the total number of adult loons observed, however.

Table 2. Common Loon nesting, productivity, and recruitment data for Wyoming, 1987-2002.

Year	Non-Yellowstone N.P.			Yellowstone Nat. Park			Wyoming Total		
	# Pairs	# Young	# Lakes	# Pairs	# Young	# Lakes	# Pairs	# Young	# Lakes
1987	6	9	6	NA[a]	NA	NA	IN[b]	IN	IN
1988	6	10	6	NA	NA	NA	IN	IN	IN
1989	6	4	3	NA	NA	NA	IN	IN	IN
1990	6	6	4	11	9	9	17	15	13
1991	NS[c]	NS	NS	9	NA	NA	IN	IN	IN
1992	6	NS	NS	11	6	4	17	IN	IN
1993	5	NS	NS	12	6	4	17	IN	IN
1994	5	3	3	12	12	8	17	15	11
1995	4	3	2	13[d]	8	12	17	11	14
1996	6	3	2	5	4	4	11	7	6
1997	4	6	4	5	6	5	9	12	9
1998	2	3	2	12	8	6	14	11	8
1999	4	4	2	14	2	2	18	6	4
2000	6	5	4	9	8	9	15	13	13
2001	4	3	3	9	7	9	13	10	12
2002	3	2	2	9	5	4	12	7	6

[a] NA = data are not available.
[b] IN = state totals are incomplete.
[c] NS = not surveyed.
[d] Two pairs nested on the same lake.

COLONIAL WATERBIRD SURVEYS
COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS – Species of Special Concern
Colonial Waterbirds

PERIOD COVERED: 15 April 2002 – 14 April 2003

PREPARED BY: Andrea Cerovski, Nongame Bird Biologist
Laurie Van Fleet, Nongame Biologist

SUMMARY

Ritter and Cerovski (1990) summarized all known information on colonial nesting waterbirds in Wyoming. In 2002, an intensive survey was conducted at previously occupied breeding sites considered to be the most important colonial nesting waterbird breeding sites in the state. Data collected during the 2002 surveys are presented in Table 1. Yellowstone National Park is included (McEneaney 2003), but data on Great Blue Heron rookeries are excluded because they were not intensively surveyed during 2002.

ACKNOWLEDGEMENTS

The Department would like to acknowledge the following individuals for their valuable contributions to the 2002 colonial waterbird monitoring effort: Ron Lockwood (Department), John McCleary [Seedskadee National Wildlife Refuge (NWR)], Steve Brinkley (Seedskadee NWR), Brett Lynch (Seedskadee NWR), and Quinn Cerovski (volunteer).

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Table 1. Summary of colonial nesting waterbird surveys in Wyoming, 2002.

Location Survey Date Observer(s) Survey Technique Water Level Condition	Colonial Nesting Waterbird Species	Total Number Adults	Nest Estimate	Number Young
Aurora Lake				
21 June 2002	Black-crowned Night-Heron	44	22	
A. Cerovski / Q. Cerovski	White-faced Ibis	14	7	
Canoe	Forster's Tern	24	12	
Water level normal (spring-fed lake)	Snowy Egret	1	1	
Bamforth Lake				
Aerial survey not conducted due to low water level from prolonged drought conditions				
Cokeville Meadows NWR[a]				
27 June 2002	American Bittern	8	2	
A. Cerovski / R. Lockwood /	Black Tern	100+	50	
J. McCleary / S. Brinkley / B. Lynch	Forster's Tern	5	3	
Foot	White-faced Ibis	0	0	
Water level low due to drought				
Bucklin Reservoir				
24 June 2002	Black-crowned Night-Heron	5	3	
A. Cerovski / E. Crane	Western Grebe	5	0	
Canoe				
Water level 10" low due to drought				
Caldwell Lake				
20 June 2002	White-faced Ibis	3	0	
A. Cerovski / A. Lyon	Forster's Tern	1	0	
Foot	American White Pelican	50	0	
Water level is low and emergents are completely dry due to drought				
Kay Ranch Lake				
20 June 2002				
A. Cerovski / A. Lyon				
Foot				
Lake is nearly dry and emergents are completely dry due to drought				

Table 1. Continued.

Location Survey Date Observer(s) Survey Technique Water Level Condition	Colonial Nesting Waterbird Species	Total Number Adults	Nest Estimate	Number Young
Molly Islands, Yellowstone NP				
May, June, Aug., Sept. 2002	American White Pelican		355	180
T. McEneaney	Caspian Tern		5	3
Motorboat, Aerial Survey				
Water level is low due to drought				
Old Eden Reservoir				
22 June 2002	American White Pelican	7	0	
L. Van Fleet				
Foot				
Lake is nearly dry and emergents are completely dry due to				
Bird Island, Pathfinder Res.				
Aerial survey not conducted due to low water level from prolonged drought conditions				
Pilger Lake				
20 July 2002	Black-crowned Night-Heron	4	2	
A. Cerovski / A. Lyon	Western Grebe	2	0	
Foot				
Water level is low and emergents are nearly dry due to drought				
Rush Lake, Hutton NWR				
20 June 2002				
A. Cerovski / A. Lyon				
Foot				
Lake and emergents are completely dry due to drought				
Soda Lake (Yant's Puddle)				
24 June 2002	Black-crowned Night-Heron	25	13	4
A. Cerovski / A. Lyon / M. Rozmajzl	Caspian Tern	38	19	5
Canoe				
Water level is low due to draw-down				

Table 1. Continued.

Location Survey Date Observer(s) Survey Technique Water Level Condition	Colonial Nesting Waterbird Species	Total Number Adults	Nest Estimate	Number Young
Webb Lake 20 June 2002 A. Cerovski / A. Lyon Foot Lake level is very low and emergents are completely dry due to drought				

[a] Formerly Bear River Marshes.

ROCKY MOUNTAIN POPULATION OF TRUMPETER SWANS – WYOMING FLOCK COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS – Species of Special Concern
Trumpeter Swan

PERIOD COVERED: 15 April 2002 – 14 April 2003

PREPARED BY: Susan Patla, Nongame Biologist

INTRODUCTION

The purpose of this report is to summarize: 1) monitoring results for Trumpeter Swans (*Cygnus buccinator*) in the Rocky Mountain Population (RMP) including Wyoming in winter 2002/2003, 2) nesting success and population trends of resident Trumpeter Swans in the RMP and Wyoming in 2002, 3) site-specific productivity data and mortality in western Wyoming outside of Yellowstone National Park, 4) nest-site enhancements and other management goals accomplished, and 5) results of range restoration efforts in the Upper Green River Basin. Monitoring swans in western Wyoming requires the coordination and effort of many area biologists.

ROCKY MOUNTAIN POPULATION WINTER SURVEY RESULTS 2002/2003

An annual mid-winter aerial survey is conducted at known swan wintering areas to determine the total number of swans in the RMP. In the Greater Yellowstone area, Red Rock Lakes National Wildlife Refuge coordinates the survey effort, and the U.S. Fish and Wildlife Service (USFWS) publishes a report annually (Dubovsky 2003b). The survey takes place during February through a cooperative effort between the Department; Red Rock Lakes National Wildlife Refuge; Southeast Idaho Refuge Complex; Idaho Fish and Game Department; Montana Department of Fish, Wildlife, and Parks; Harriman State Park; and Yellowstone National Park (YNP). The portion of the population that winters in the Tri-State Area in western Wyoming, southwestern Montana, and eastern Idaho consists of two breeding segments: the non-migratory RMP/Tri-State Area Flocks that summer in Wyoming, Idaho, and Montana, and the migratory interior RMP/Canadian Flocks. The Canadian Flocks nest in Alberta, British Columbia, Saskatchewan, Yukon, and the Northwest Territories, but share wintering habitat with U.S. swans in the Tri-state Region. Terminology used in this report for the RMP is taken from the RMP Trumpeter Swan Implementation Plan (Pacific Flyway Study Committee 2002).

Temperatures were normal in the Tri-State Area in winter 2002/2003 but the area remained in drought condition with snowpack as of 1 February at 70-89% of normal, and water levels at area reservoirs only at 41% of storage capacity (Dubovsky 2003b). Tri-State Area aerial surveys in 2003 were completed during 11-15 February (Dubovsky 2003b). Bob Oakleaf flew the survey in Wyoming outside of Yellowstone National Park on 15 February 2003. In the Tri-State area, including southeast Idaho, southwest Montana, and northwest Wyoming, a total of 3,897 Trumpeter Swans were counted: 3,365 white birds (yearlings and older age classes) and 532 cygnets (Table 1). This represents a 10.6% decrease in white birds, and a 2.6 % decrease in cygnets compared to the previous year (Table 1). Considering distribution of wintering swans within the three-state area: 73.7% were counted in Idaho (n=2,872), 15.2% in Wyoming including YNP (n=592), and 11.1% in Montana (n=433).

Although there were fewer swans overall in Wyoming in 2003 compared to the previous year (n=663 in 2002), a larger proportion remained in YNP and fewer in the Jackson area, indicating that swans likely responded to the mild winter weather by staying further north. Of the total swans counted in Wyoming (n=592), 30.4% were in YNP (n=180), 50.5% were along the Snake River and in the vicinity of Jackson, WY (n=299), 7% were on the Salt River (n=42), 8.9% were on the Green River and Seedskadee National Wildlife Refuge (NWR) (n=53), and 3% on Dinwoody Lake near Dubois (n=18). Cygnets comprised 15.5% of the total number of swans counted in Wyoming (Table 1). The percentage of cygnets found in YNP was higher (18.9%) compared to the Snake River (15.0%) and "Other Wyoming" (13.0%) (Table 1).

Outside of the Tri-state Area in winter 2003, 77 additional Trumpeter Swans were counted in the U.S. restoration flocks: 41 in Nevada and 36 in Oregon (Dubovsky 2003b). The total count for the entire RMP (including Nevada and Oregon) equaled 3,974 (3,427 adults and 547 cygnets). Compared to 2002, this represents an 11% decrease in white birds and a 1% decrease in cygnets. It is assumed that these totals do not include swans from the Alaskan population that winters along the Pacific west coast. If the U.S. Breeding Segment (determined from fall surveys) is subtracted from the total RMP, Canadian Flocks (n=3,603) made up 90.7% of the RMP population in winter 2002/2003 compared to only 13% (n=85) of the RMP in 1972 (Dubovsky 2003b). Overall, the RMP has increased 6% annually between 1972 and 2002, but this increase has resulted from growth in the Canadian Flocks and not the US. Breeding Segment. Even though overall numbers were higher, for the third consecutive year, the proportion of cygnets in the RMP was below average (13.6% in 2003 compared to 19.1% average 1974-2002) (Dubovsky 2003b).

Dubovsky (2003b) calculated a growth rate in the number of swans wintering in Wyoming between 1972-2002 of 7.8% per year. Over the past decade, the percentage of the RMP wintering in Wyoming has ranged from 11% to 19%, but total numbers and percentage varies annually depending on winter conditions.

WYOMING WINTER SURVEY DATA 2002/2003

In addition to the annual mid-winter swan aerial survey, swans were also counted in western Wyoming outside of Yellowstone NP during the state's Pacific Flyway Mid-Winter Waterfowl Survey, 7-8 January 2003 (S. Patla, observer, Wyoming Game and Fish Department). Swan numbers were higher in January along the Snake, Salt, and Green River drainages compared to the February Mid-Winter swan survey, indicating a movement of swans out of western Wyoming (or losses due to mortality) between 8 January and 15 February 2003. Total number of swans counted in January equaled 443 (388 white birds and 55 cygnets) compared to 394 swans (338 white birds and 56 cygnets) in February. This represents an 11.1% decrease within a month's time. The change was not uniform across all age classes, however. The total number of white birds decreased 12.9% but the number of cygnets was similar (increase of one in February). This suggests that family groups were less likely to leave Wyoming during the middle of winter compared to subadults or adults without cygnets. This same trend was similar to results in winter 2002 where January white birds were 25% higher compared to February totals (Patla 2002).

Patla conducted additional ground surveys during winter 2002/2003 to monitor swans along the Snake, Salt, and Green Rivers and also recorded observations reported by other Department personnel and the public. A database of all sightings is maintained at the Department's Jackson Regional Office including number, age, and any markings. Few Tundra Swans (*Cygnus columbianus*) were reported this winter.

No Trumpeter or Tundra Swans were observed at Flaming Gorge Reservoir on either aerial or ground surveys in winter 2002/2003. The Department did not receive any reports of marked swans from Wyoming wintering farther south in Utah, Colorado, or Arizona even though effort was made to contact observers in these areas. Some Trumpeter Swans were seen in Arizona but except for a few green collared swans from Idaho, none were identified as to state of origin. Observations from Arizona included four swans at the Pine Springs Ranch in Camp Verde on 30 December 2002 (three unmarked plus one yearling that was a cygnet translocated from Harriman to southwestern Idaho in winter 2001/2002), and two or three at Cibola NWR on the Colorado River south of Ox Bow Bridge on 1 January 2003 (Idaho cygnets translocated winter 2002/2003).

TRI-STATE FALL SURVEY RESULTS AND PRODUCTIVITY TRENDS - 2002

Using both aerial and ground surveys to locate and count swans, a cooperative inter-agency survey effort is conducted annually in September to obtain a total count of Trumpeter Swans from the Rocky Mountain Population that summer in the United States. Results are published by the USFWS (Dubovsky 2003a). Aerial surveys in 2002 were conducted during 15-19 September. Patla flew the Wyoming portion outside of YNP on 15 September. Summarized here are the results from the Tri-State Area Flocks in Wyoming, Montana, and Idaho.

Compared to the previous year, the total number of resident swans counted in the Tri-state Area Flocks declined by 23% in 2002: 273 white birds and 53 cygnets (326 total) were reported in 2003 compared to 362 white birds and 59 cygnets (421 total) in 2002 (Table 2). Total number of birds in Wyoming including YNP, however, was down only slightly (-4.2%) from 120 in 2001 to 115 in 2002. The largest decline in 2002 was seen in Montana (-36.9%) followed by Idaho with (-20.4%). Survey results in 2002 represent the lowest number of swans observed in the Tri-State Area since 1993 (the year after winter feedings was halted at Red Rock Lakes NWR) when total number observed equaled 277 (Table 2). There is no clear explanation for the large drop observed in white birds in fall 2002 (39 birds below the 5-year average 1995-2000), although the region remained in extreme drought conditions (Dubovsky 2003a). Whether the drop represents a temporary aberration or an actual decrease in the Tri-State Area swans can only be determined through future surveys.

The 326 swans within the Tri-State area in 2002 were distributed as follows among the three states: 35.3% in Wyoming (n=115), 35.9% in Idaho (n=117), and 28.8% in Montana (n=94). Wyoming produced a higher proportion of cygnets (41.5%, n=22) compared to Montana (34.0%, n=18) and Idaho (26.4%, n=14) (Table 2).

WYOMING FLOCK PRODUCTION OUTSIDE YELLOWSTONE NATIONAL PARK

A total of 72 adults/subadults and 17 cygnets were counted in Wyoming outside of Yellowstone National Park in September 2002**.** This represents an 11% decrease in white birds and a 23% decrease in cygnets compared to 2001 (81 white birds/22cygnets) (Table 2). The 2002 totals do not include five captive-bred yearlings released in the Pinedale area in July.

In 2002, pairs occupied 24 sites, 10 pairs initiated incubation, nine hatched young, and eight fledged at least one young (Table 3). Although number of nesting pairs (n=10) was slightly below the 13 year mean (13.6), both the number of young hatched (n=23) and the number fledged (n=17) was slightly higher than average (Table 3). Productivity per successful nest (those that hatched at least one egg) was 1.9 fledglings per pair.

Table 4 lists occupancy and productivity data for nesting territories in Wyoming over the last decade, 1993-2002. Following are site-specific notes for some of the 2002 nesting territories:

Indian Lake, TNF – The lake was used again for nesting after a three-year hiatus. From 1999-2001, a pair nested on nearby Bergman marsh and then walked their cygnets over to Indian Lake shortly after hatch. The pair in 2002 nested on a floating sedge island on Indian; in high water years this nest site may be too wet to provide a secure nesting platform (R. Shea, private contractor, U.S. Forest Service Targhee National Forest, personal communication).

Steamboat, GTNP – This new site was discovered during an aerial survey for nesting eagles in May 2002. The pair nested on a beaver complex on an unnamed stream on the northwest side of Steamboat Mountain, east of the Snake River. A pair had been observed along the Snake River close to this location the previous year. The location is secure from human disturbance and is difficult to see, except from the air. It is north of the Glade Creek South nest site.

Glade Creek South, GTNP – The pair did not appear to initiate nesting this year. The traditional nest site is in a dense willow flat in a river slough north of Tusker Island. It is often difficult to determine nest status due to the density of willow growth.

Christian Pond, GTNP – This was the first time in the past decade when a pair did not occupy the pond. Only one adult was seen early in the season. No apparent changes in water depth or aquatic vegetation growth could be detected. A review of recreation use, and a trail management plan may be needed if swans are to reoccupy this site.

Two Ocean Lake, GTNP – The nest site is located in the willow bottoms along the outlet channel, east of the lake. After hatching, the pair moved to the far west end of the lake, away from the boat launch site at the east end. There appeared to be an increase in recreation use (both boaters and hikers) at the lake this year.

Elk Ranch Reservoir, GTNP – The pair has not nested successfully at this site since 1998. Water management has been discussed with park personnel and the dam needs repair. In past years this site was rarely visited early in the season, but in 2002 many people parked near the dam and hiked a trail above the north shore of the lake to view wolves in April and May. It is unknown if visitors caused disturbance to the pair.

Hedrick Pond, GTNP – GTNP biologists reported that a pair occupied this site early, but one of the adults died in April likely from predation. The other adult disappeared in May and may have been the lone swan observed at Spread Creek pond on 26 May.

Highway Pond, NER – This pond lays adjacent to State Hwy. 89 and can be seen from the busy highway but a high fence, 55mph speed zone, and lack of a viewing pull-out seems to prevent most disturbance. The adults become very alert if vehicles stop by the fence. Once the cygnet developed, the family group could often be viewed along the creek from the Flat Creek viewing pullout.

Main Marsh Flat Creek, NER – Three additional nest sites in addition to the Highway Pond have been occupied in the interior of the main marsh since 2001. These sites are not visible from the highway; NER personnel monitor the nests from the west end of Miller Butte.

Pierre Pond, NER – One cygnet was produced at this site; this is the first successful hatch since 1996. The pair nested on a small floating sedge mat on the west pond. The best location to monitor this site is from the bluff to the south but adults leave the nest if they

detect an observer on the bluff. NER observers used a great deal of caution when monitoring this site so as not to disturb the nesting pair.

Puzzleface Pond (formerly Skyline) – This is a Nature Conservancy easement located on a private horse ranch. One of the pair hit a high-tension power line along Hwy. 22 northeast of the pond in April and died. Another pair began to use the site and molted on-site; the single adult remaining from the original pair was not seen after June. Water became quite low in this pond during hay harvest in July when adjacent fields were dried off.

Kibby Pond, Alpine – This is the only known nest site in the Salt River drainage; it is located in a dense willow marsh in a hay meadow on the east side of the Salt River. The property is currently up for sale; the Department asked The Nature Conservancy to consider an easement here but the property did not meet their criteria for an acquisition site. Monitoring is difficult as there are no vantage points that permit observation of the nest site once vegetation develops by early June.

Lily Lake, BTNF – An artificial nest platform was put out in April in the northeast corner of the lake but the pair was observed nest building at least one day on a beaver lodge close to the viewing pull-out. They did not attempt to nest, however. The previous year the pair also was observed nest building for a short time on a low sedge island on the northwest end of the lake. The female swan is double leg banded; Bill Long read the USFWS band number (619-11822). The Department released this captive-raised swan as a cygnet in 1997 in the Pinedale area. The male had a single band; the number was not read on this band.

Atlantic Creek, BTNF – This was the first year since 1995 that a pair of swans did not occupy sloughs near Hawks Rest or Bridger Lake in the Teton Wilderness.

Upper Slide Lake, BTNF – Only one swan was observed in May. A pair occupied the site by 14 June but did not attempt to nest.

Mosquito Lake, BTNF – A pair occupied the lake, but the sedge nest site used last year appeared to be flooded in early June and no other nest building was observed. Both adults had a single leg band but numbers could not be read.

Mud Lake, BTNF – Two young were hatched at this site but disappeared. Water level appeared low so predation is likely. Funding has been requested for an engineering survey and review of water rights to determine how the site can be improved.

Kitchen Reservoir, CL Bar Ranch – A pair produced young on their own this year after two years of taking their eggs and grafting day-old young to the pair. Young were hatched out by 6 June (flight survey). Three yearling swans molted on the reservoir just to the north; these were likely siblings produced the previous year on the ranch.

Kendall Wetland – A pair of unmarked swans occupied the site in June and remained throughout the summer. The patagial marked swan #8 (Wyoming Game and Fish Department 2000 release) that occupied the site the previous summer was not one of the pair.

This marked swan was seen on the Green River in June with another swan, but molted by itself on Dollar Lake in 2002.

Barden (Oliver) Slough – The pair was not seen this year on this oxbow pond near the New Fork River south of Boulder, but a pair was observed on nearby Swift Reservoir in June and July. The landowner reported that the pair has often attempted to nest in the past but never produced any young.

Shafer Ranch, Big Piney – A pair was seen in the Green River earlier in the year but was not found again. The owner reports that a pair has been using an old beaver pond/slough on the ranch for the past few years, but no young have been observed.

La Barge, Exon Road pond – A pair was observed on this pond in 1999-2000 but since 2001, after some wetland work was done on the ranch, the pond has been muddy and no waterfowl have been seen on it.

Seedskadee NWR – The Hawley wetland unit was drained for repair work in 2002 so no pairs attempted to nest on the refuge this year. An artificial nest platform was put out in a channel in May where a pair of swans was frequently seen, but they did not use the structure. Swans remained on the refuge using adjacent wetlands and the river corridor throughout the summer.

MORTALITIES

Between 15 April 2002 and 14 April 2003, 12 Trumpeter Swan mortalities were documented in Wyoming: 5 adults (42%), 2 yearlings (17%), and 5 cygnets (42%) (Table 5). Over the past eight years, an average of 13 swan mortalities per year (range 5-34) have been documented in western Wyoming outside of YNP. Based on a total of 137 mortalities, 26% resulted from collisions with power lines, bridges, or fences; 11% each from predation and shooting; and 1% from infection. Cause could not be determined in 48% of the cases, but further results may be obtained for some specimens submitted over the last few years to the state vet lab. Two swans included in this year's tally were radio-collared swans released in the Cora area (see below).

SIGHTINGS OF MARKED SWANS

Table 6 lists observations of marked Trumpeter Swans in Wyoming. Neck collar sightings are reported to Steve Bouffard at Minidoka NWR who maintains the database for USFWS or to the Canadian Wildlife Service. Band recoveries or numbers are reported to the USFWS Bird Banding Lab.

HABITAT IMPROVEMENT PROJECTS

Artificial nest platforms (constructed by Gary Hornberger, Wyoming Game and Fish Department maintenance) were put out 12 April 2002 on Lily Lake and 25 April 2002 on the Pear Intake Channel at Seedskadee NWR. Three additional platforms were put out in 2003 at Mosquito Lake (BTNF), Hedrick Pond (GTNP), and Pal Wetland Unit (Seedskadee). Nesting swans did not use any of the platforms but further work with captive swans suggests that if we add sod to lower the surface level swans will be more inclined to use these platforms (B. Long, Wyoming Game and Fish Department, personal communication). We also plan to reposition a few of the platforms in the fall of 2003.

The Department participated in the submittal of an extensive Intermountain West Joint Venture wetlands grant proposal for the Jackson area submitted by the Jackson Hole Land Trust in December of 2002. The project ranked quite well, but was not funded. The Department informed the Jackson Hole Land Trust and Green River Land Trust of other federal grants available for private landowners, and two wetland projects were funded through this, one in Jackson and one in Pinedale. Planning proceeded on the Puzzleface wetland improvement project (funded by The Nature Conservancy and Ducks Unlimited). We continued to look for funding for needed improvements at Mud Lake, BTNF. A graduate research project on waterfowl habitat funded by the Targhee National Forest should provide valuable data for developing an improvement plan for Indian Lake. Jack Doyle completed an initial site assessment for Pierre's Pond on the NER in December, 2002; the Department is working with the Teton Conservation District to obtain funding to replace the outflow structure on this pond and also Romney Pond, NER. The Pacific Flyway Council Implementation Plan for the Rocky Mountain Population of Trumpeter Swans has been completed and should guide management efforts in the years to come.

RANGE EXPANSION EFFORTS IN WYOMING - SALT RIVER

A summary of range expansion efforts over the past decade in the Salt River drainage can be found in previous annual reports. In 2002, an unmarked pair of swans occupied the nesting territory on private land located south of Palisades Reservoir that had been used since 1998 by neck-collared swans P11 and P28. The male (P11) died in 1999 from a collision with a power line adjacent to the wetland. The female adult (P28) was observed once in Thayne (January, 2001) but has not been seen again. In 2002, as in the previous year, an unmarked pair built a nest but did not produce any young. The property is currently up for sale. A single swan molted on the Alpine Wetland, Palisades Reservoir in 2002.

On 15 February 2003 (mid-winter swan survey), 42 swans were counted along the Salt River: 35 adults and 7 cygnets. This represented a 50% decrease in adults compared to last year's total (70 adults and 5 cygnets) but survey time in 2003 was somewhat limited along this drainage due to weather conditions.

RANGE EXPANSION EFFORTS IN WYOMING – GREEN RIVER

The Department, in cooperation with the Wyoming Wetland Society, has released captive-reared swans in the Green River Basin since 1994 to expand trumpeter swan breeding and wintering distribution in Wyoming. The Department's management goal is to release up to 15 swan captive-raised swans a year until 10 successful nesting pairs are established in the Green River drainage. During the 2002 nesting season in the Green River Basin, only four pairs occupied known nest sites in June: two nested, and one pair produced young. Occupied sites included: Mosquito Lake, Mud Lake, Kendall wetland, and Kitchen Reservoir (CL Bar Ranch) (Table 3). An additional pair was also seen on Swift Reservoir (this was likely the pair from the nearby Oliver (Barden) slough nest site that was not occupied in early summer). Another pair reported from near Dry Piney Creek (Shafer Ranch) south of Big Piney was never observed.

Mud Lake pair hatched two cygnets (observed from the air on 15 July), but the pair was gone by the 15 September flight and no cygnets were found. The Kitchen Reservoir pair hatched and raised four of their own cygnets. In the two previous nesting seasons, eggs were collected from this pair for the Wyoming Wetland captive-breeding flock and replaced by day-old young that the pair raised successfully. No swans nested at Seedskadee this year as the main Hawley wetland unit was drained for repair and remained dry all summer; the Hamp unit also remained drained. Fourteen white birds were counted at other wetlands or along the river at Seedskadee in early June 2002. If the refuge refills the Hawley Unit early in 2003, a rebound in nesting hopefully will occur. Dry weather and low water at wetlands as well as repair work at Seedskadee appear to be the main reasons for low number of nest attempts in the Green River restoration area in 2002.

During the fall USFWS aerial survey (15 September), 17 white swans were counted along the upper portions of the Green and New Fork Rivers from Mosquito Lake south to the Boulder area. An additional 11 swans were tallied at Seedskadee. During winter 2003, four swans wintered near the Daniel Fish Hatchery along Forty Rod Creek, and up to 50 swans were observed at Seedskadee NWR.

TRUMPETER SWAN SATELLITE AND RADIO TRACKING STUDY

The Wyoming Game and Fish Department Nongame Program initiated a satellite-tracking project in 2001 using federal funds provided through the State Wildlife Diversity Program (Patla and Oakleaf 2003). In 2002, five yearlings from Wyoming Wetland Society's captive flock were released at a BLM pothole pond near Marsh Creek, Cora (Table 7). Two were tagged with satellite neck collars, and three with VHF neck collars equipped with mortality sensors. Satellite transmitters were programmed with a duty cycle to transmit eight hours every four days throughout the year. All released swans were double leg-banded with a silver USFWS band on one leg and a bright yellow plastic band inscribed with a black alphanumeric black code on the other.

Four swans remained near the release site until near the end of October; the fifth moved 8 km (5 mi) to the Green River near Black Butte in late September. A large, cold, low front brought snow and high winds into western Wyoming at the end of October. Two

VHF collared sibling swans (2K2 and 2K3) showed up together at Seedskadee NWR, 144 km (90 mi) south of the release site, on 29 October 2002 (L. Glass, Seedskadee NWR, personal communication). They remained together on the refuge until late March. Swan 2K2 hit a power line and was killed in mid-April near Daniel as it migrated north. Swan 2K3 was observed alive by itself later in the Cora area. Two other released swans were killed (one satellite swan and one VHF swan 2K4) between 24 and 27 October near Big Piney 72 km (45 mi) south of the release site; both collars were recovered in sagebrush uplands off Alkali Flats road. The Department's investigations failed to turn up any leads and the case remains unsolved, but it appears likely that the pair was shot.

The fifth yearling remained along the Green River near Black Butte until 15 December when it moved to Forty Rod Creek near the Daniel Fish Hatchery, 21 km (13 mi) from the release site. This swan wintered with three other swans (one a collared Canadian swan J38) in this area until it returned to the Green River near Black Butte sometime between 16 March and 20 March 2003. The satellite transmitter ceased working on 1 April 2003 but visual observations confirmed that the swan was still alive.

ACKNOWLEDGEMENTS

The Department would like to acknowledge the following individuals for their valuable contributions to the monitoring effort: Sue Wolff (Grand Teton National Park), Eric Cole (National Elk Refuge), Lamont Glass (Seedskadee NWR), Sarah Dewey (Bridger-Teton NF), and Bill Long (Wyoming Wetlands Society).

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Table 1. Mid-winter Trumpeter Swan survey for the Rocky Mountain population, 1988-2003.

Year	Age Group	Yellowstone Natl. Park	Snake River	Other Wyoming	Wyoming Total	Tri-State Total
1988	Adult	67	107	8	182	1317
	Cygnet	18	25	3	46	413
	Total	85	132	11	228	1730
1989	Adult	96	182	15	293	1452
	Cygnet	21	32	7	60	291
	Total	117	214	22	353	1743
1990	Adult	78	154	15	247	1591
	Cygnet	32	42	4	78	416
	Total	110	196	19	325	2007
1991	Adult	61	187	38	286	1589
	Cygnet	14	34	13	61	342
	Total	75	221	51	347	1931
1992	Adult	108	63	141	312	1731
	Cygnet	4	17	13	34	472
	Total	112	80	154	346	2203
1993	Adult	178	222	71	471	1780
	Cygnet	39	55	9	103	455
	Total	217	277	80	574	2235
1994	Adult	137	198	55	390	1882
	Cygnet	24	60	14	98	644
	Total	161	258	69	488	2526
1995	Adult	141	256	71	468	2012
	Cygnet	41	61	30	132	668
	Total	182	317	101	600	2680
1996	Adult	130	255	89	474	2129
	Cygnet	24	72	12	108	580
	Total	154	327	101	582	2709
1997	Adult	74	224	59	420	2268
	Cygnet	3	62	16	105	431
	Total	77	286	75	525	2699
1998	Adult	NS [a]	142	124	266	1756
	Cygnet	NS	26	13	39	307
	Total	NS	168	139	305	2063

Table 1. Continued.

Year	Age Group	Yellowstone Natl. Park	Snake River	Other Wyoming	Wyoming Total	Tri-State Total
1999	Adult	291	187	131	609	2698
	Cygnet	54	44	21	119	772
	Total	345	231	152	728	3470
2000	Adult	87	161	46	294	2694
	Cygnet	13	60	5	78	746
	Total	100	221	51	372	3440
2001	Adult	53	251	117	421	3198
	Cygnet	11	38	25	74	719
	Total	64	289	142	495	3917
2002	Adult	131	337	110	578	3814
	Cygnet	13	61	11	85	546
	Total	144	398	121	663	4360
2003	Adult	146	254	100	500	3365
	Cygnet	34	45	13	92	532
	Total	180	299	113	592	3897

[a] NS = not surveyed.

Table 2. Fall Trumpeter Swan survey for the Tri-State population, 1988-2002. [a]

Year	Age Group	Montana	Idaho	Wyoming YNP	Wyoming Outside YNP	Tri-State Total
1988 [b]	Adult	268	87		109	464
	Cygnet	77	28		32	137
	Total	345	115		141	601
1989	Adult	294	101	25	85	505
	Cygnet	23	16	5	16	60
	Total	317	117	30	101	565
1990	Adult	245	92	25	70	432
	Cygnet	108	28	3	8	147
	Total	353	120	28	78	559
1991	Adult	176	138	30	70	414
	Cygnet	60	26	3	2	91
	Total	236	164	33	5	505
1992	Adult	156	109	26	99	390
	Cygnet	74	8	4	6	92
	Total	230	117	30	105	482
1993	Adult	60	94	26	68	248
	Cygnet	16	6	0	8	30
	Total	76	100	26	76	278
1994	Adult	70	79	30	60	239
	Cygnet	48	49	5	18	120
	Total	118	128	35	78	359
1995 [b]	Adult	84	118		105	307
	Cygnet	17	21		17	55
	Total	101	139		122	362
1996	Adult	95	127	20	74	316
	Cygnet	36	20	1	6	63
	Total	131	147	21	73	379
1997	Adult	90	112	18	92	312
	Cygnet	22	19	0	17	58
	Total	112	131	18	109	370
1998	Adult	105	110	20	69	304
	Cygnet	35	37	3	15	90
	Total	140	147	23	84	394

Table 2. Continued.

Year	Age Group	Montana	Idaho	Wyoming YNP	Wyoming Outside YNP	Tri-State Total
1999	Adult	120	103	20	69	312
	Cygnet	21	23	0	12	56
	Total	141	126	20	81	368
2000 [c]	Adult	127	102	20	69	318
	Cygnet	24	40	7	26	97
	Total	151	142	27	95	413
2001[d]	Adult	140	124	17	81	362
	Cygnet	9	23	0	22	54
	Total	149	147	17	103	416
2002[e]	Adult	76	103	22	72	273
	Cygnet	18	14	4	17	53
	Total	94	117	26	89	326

[a] Data from Gomez 2000 and Department Annual Completion Reports.
[b] Wyoming Outside YNP for these years includes data for entire state including YNP.
[c] Wyoming Outside YNP results do not include twelve yearlings and five cygnets (grafted to Kitchen Reservoir pair when one day old) released in summer 2000 (Wyoming Wetland Society captive flock).
[d] Wyoming Outside YNP results do not include three yearlings and five cygnets (grafted to Kitchen Reservoir pair when one day old) released in 2001 (Wyoming Wetland Society captive flock). Note: one cygnet was lost at Skyline Pond after fall survey flight.
[e] Wyoming Outside YNP results do not include five yearlings released in 2002 (Wyoming Wetland Society captive flock).

Table 3. Trumpeter Swan occupancy and production summary for Wyoming outside of Yellowstone National Park, 1989-2002. Mean and standard deviation are shown for the 13-year period 1989-2001.

Year	Sites Occupied	Nesting Pairs	Pairs with Hatchlings	Pairs with Fledglings	Number Hatched	Number Fledged
1989	22	15	10	5	32	16
1990	19	13	4	3	11	8
1991	22	8	2	2	3	2
1992	29	10	5	3	17	9
1993	24	11	7	5	15	8
1994	20	13	8	5	29	18
1995	22	12	7	5	25	15
1996	21	13	5	4	12	4
1997	26	16	3	4	22	17
1998	25	18	10	7	26	15
1999	24	15	6	6	19	12
2000	26	16	10 [a]	9 [a]	35	26 [a]
2001	28	17	10 [a]	8 [a]	29	21 [a]
1989-2001						
Mean	***23.7***	***13.6***	***6.7***	***5.1***	***21.2***	***13.2***
SD	***3.0***	***2.9***	***2.8***	***2.0***	***9.3***	***6.8***
2002	24	10	9	8	23	17

[a] Does not include Kitchen pair where eggs were collected and five-day-old young grafted to pair successfully in 2000 (four fledged) and 2001 (five fledged).

Table 4. Trumpeter Swan territorial site occupancy and production status for Wyoming outside Yellowstone National Park, 1992-2002. [a]

Site	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Targhee National Forest										
Ernest Lake	---	---	---	---	---	---	---	---	---	NB
Bergman Marsh							N51	N43	N00C	---
Indian Lake	0	N00	N00	N20	N10	N00	---	---	---	N33
Widget Lake	---	---	---	---	---	---	---	---	---	---
Loon Lake								OL	---	---
Rock Lake	---	---	---	1A	1A	---	---	---	---	---
Junco Lake	---	0	---	---	OM	---	---	---	---	---
Fish Lake	---	---	---	---	---	---	---	---	---	---
Squirrel Meadows								OL	OL	NB
Moose Lake (added 2002)										NB
Palisades (Alpine Wetland)	---	OM	OM	---	N10	---	---	---	OL	1A
Grand Teton National Park										
Steamboat (new in 2002)										N43
Glade S.	N43	N43	OM	OM	OM	0M	N11	O	N22	OM
Glade N.	OM	OM	---	---	---	---	---	---	---	---
Christian Pond	OM	OM	N43	N00	N44	N22	N42	N42	OM	1A
Arizona Lake	N11	---	OM	1A	---	---	---	---	---	---
Emma Matilda	---	---	---	---	---	---	---	---	OM	1A
2 Ocean Lake	---	---	---	---	---	---	---	N42	N53	N32
Swan Lake	0	N00	N00	N00	N00	N00	N00	O	N00	O
Hedrick Pond	N30	N00	N30	N00	N00	N00	N00	N20	N20C	O
Elk Ranch	N00	N75	N00	N00	N55	N21	OM	OM	OM	OM
Cow Lake	OM	0	OM	OM	OM	O	---	---	---	---
Spread Cr. Ponds	N11	OM	1A	1A	---	---	---	---	---	NB
Cygnet Lake	0	---	---	---	---	---	---	---	---	---
Polecat Slough	OUID	0	---	---	---	---	---	---	---	---
National Elk Refuge										
Hwy Pond	OM	OM	N00	N50	OM	N00	O	N44	N32	N11
NW Marsh	N10	N44	N55	N43	N00	N11	N00	N31	N00	N42
NE Marsh							N00	N32	OM	N00
SE Marsh									N33	N00
W. Pierre	OM	N50	OM	N11	N00	N40	---	N00	OM	N11
E. Pierre	0	0	0	0	OM	OM	N00C	---	---	---

Table 4. Continued.

Site	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Jackson area										
Private Land										
Skyline (Puzzleface)	0	0	OM	OM	OM	OM	OM	OM	N30	OM
Jackson (H_2O) plant)	---	OM	OM	1A	1A	---	---	---	---	---
Pinto Pond	OM	OM	OM	N50	OM	OM	N00	N66	N44	N11
Fir Creek	OUID	0	---	---	---	---	---	---	---	---
KOA	0	0	---	---	---	---	---	---	---	---
Ford's	OM	OM	OM	---	---	---	---	---	---	---
Tracy Lake	---	---	---	---	---	---	---	---	---	---
Ferrin Pond	0	0	---	---	---	---	---	---	---	---
Alpine/Salt R.										
Private Land										
Kibby Pond						N22	OM	N00	N00	N00
Bridger- Teton National Forest										
North Zone										
Bridger Lake	---	---	1A	---	OM	---	OL	OL	OL	---
Atlantic Cr.	---	---	OM	OM	N33	N22	N22	O	O	---
Enos North	OM	N00	N22	N00	N00	N00	---	N22	OM	OM
Enos South	N11	N10	N43	N20	OM	---	N32	---	---	---
Lily Lake	OM	N20	OM	---	---	---	OL	OL	OM	N00
Lower Slide Lk.	OUID	---	---	---	---	---	---	---	---	---
Upper Slide Lake	N00	N11	N00	N10	N00	N66	N00C	N00C	N22	NB
Grizzly Lk. pothole	OUID	N55	N40	N00	OM	---	OL	---	---	---
Burnt Fork					N11	---	---	---	---	---
Soda Lake	---	0	---	---	---	---	---	---	---	---
Bridger- Teton National Forest										
South Zone										
Wagon Cr. Lake	---	---	---	---	---	---	---	O	O	NB
Rock Crib	---	---	OUID	OM	OM	---	---	---	---	---
Mosquito Lake	OUID	0	---	---	OM	---	OL	O	N00	OM
Roaring Fork P.	---	OM	OUID	OM	OM	---	---	OL	O	---
Mud Lake	---	OM	N32	N20	N00	N20	N00	N00	---	N20

Table 4. Continued.

Site	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Green/New Fork Rivers										
Private Land										
Kitchen Res. S							N00	C N54 grafted	C N55 grafted	N44
Kitchen Res. N									NB	NB
Kendall Wetland									OL	OM
Oliver (Barden) Slough								N00	N00	---
Swift Reservoir										OM
Shafer Slough									OM	---
LaBarge Pond										---
Seedskadee NWR										
Hawley #1 pool 6	---	---	---	---	N55	N42	N44	N44	N44	dry
Hawley #2 pool 1	---	---	---	---	1A	OM	OM	---	N11	NB
Other Wyoming										
Swamp L.	N42	N00	OM	1A	1A	---	---	1A	1A	1A
Colony Site	N11	N55	N20	N00	N00	OM	?	?	OUID	1A
Big Sandy	OM	---	OM	OM	---	---	---	---		---

[a] Key to Codes:

O = Pair occupied territory through nest period, did not attempt to nest, and did not molt on site.

OM = Pair occupied territory through nest period, did not attempt to nest, but molted on site.

OL = Pair appeared late in season (new code added 2000 - not counted as an occupied site for season).

OUID = Pair occupied the site, status of pair unidentified or status of site as a territory unidentified.

N42 = Pair nested, laid eggs, hatched 4 eggs, and fledged 2 cygnets.

--- = No occupancy of site by a pair.

C = eggs collected for captive rearing project (new code added 2000).

1A = Only 1 adult occupied the site throughout the nesting season.

? = Number or status of occupancy unknown.

NB = non breeding birds present during some portion of nesting season (new category added 2002)

Table 5. Summary of Trumpeter Swan mortalities in Wyoming.

Year [a]	Total # Died	# of Adults	# of Yearlings	# of Cygnets	Collision	Predation	Shot	Infection	Unknown
1991-1995	38	21		17	12	4	10	1	11
1995/1996	11	9		2	5		2		4
1996/1997	8	3		5	4				4
1997/1998	5	No data							
1998/1999	10	8		2	2	1		1	8
1999/2000	10	7		3	6	2	1		1
2000/2001	34	22	4	12	6	5			23
2001/2002	14	11	3	3	3	2			9
2002/2003	12	5	2	4	1	1	2		5
Total	142	79	9	49	37	15	15	2	65
Percent		56%	6%	35%	26%	11%	11%	1%	48%

[a] Mortality total for years 1991-1995 is not broken out by individual years; the following years' data are recorded for 16 April through 15 April for each period. Statistics are not available for swans killed during 1997/1998 (n=5) so proportions based on total n=137.

Table 6. Summary of Trumpeter Swan neck-collars and leg bands observed in Wyoming, April 15, 2002 through April 14, 2003. Codes for age: hy = hatch year (cygnet), ahy = after hatch year (yearling or older), sy = second year (yearling), asy = after second year (adult older than yearling). Neck collar is green unless otherwise indicated. RRL=Red Rock Lakes.

Neck Collar	Leg Band or Patagial Tag	Date	Location	Origin/Notes	Sex	Age
	Patagial #8	8/26/02	Dollar Lake	Wyoming release 2000 BLM Kendall Wetland; by itself	m	3 yr
2K2 green		10/29/02	Seedskadee NWR	Wyoming release 2002 BLM Pothole Pond, Cora	f	yrl
2K3 green		10/29/02	Seedskadee NWR	Wyoming release 2002 BLM Pothole Pond, Cora	f	yrl
36E green		Nov 02	Flat Creek Viewing Area, NER	Idaho release 2001 Harriman State Park	f	yrl
42H green		11/03/02	Valley Springs Winter Pen	Adult Dec 93 capture RRL, released Summer Lake	m	asy
	Patagial #8	11/8/02	Fontenelle Res, Fontenelle Creek	With 1 TRSW and 2 Tundra Swans		
6H3 green		11/11/02	Valley Springs Winter Pen	Adult Harriman SP Nov. 93; released Summer Lake		
2K4		11/15/02	Alkali Road, Ross Butte Big Piney	Mortality signal; collar later retrieved Wyoming release 2002 BLM Pothole Pond, Cora		yrl
AE12 green		11/26/02	WGFD access Lincoln Co Rd.109, Salt River	Adult July 90 capture RRL, released Gray's Lake	f	asy
AE04 green		11/26/02	Jackknife Bridge, Salt River	Adult July 90 RRl; released Gray's Lake	m	asy
5V1 green		11/26/02	WGFD access Lincoln Co Rd.109, Salt River	Adult Harriman SP April 96; released Bear Lake	M	asy
55H green		12/5/02	Pierre's Pond East, NER	SY Harriman SP Dec 93; released Summer Lake, OR		
Plain green		12/11/02	Boroff Pond, Daniel	Satellite tag #36746, released July 02 BLM pothole; Wintered along Forty Rod Creek	m	yrl
	619-11809	12/19/02	Valley Springs Winter Pen	Indian Lake 96 cyg salvage; released SNWR 1997; Double leg bands, blue color band now silver		asy
Aa44 red		1/10/03	Snake River, Porcupine Creek	With 2 cyg, no mate; NW Terr July 89 asy m		
J38 green		2/01/03	Boroff Pond, Daniel	Captured RRL 92; released Ft. Hall ASY	f	asy
	A23 red left	3/13/03	WGFD South Park Pond #3	With 1 cyg and mate; silver band right		
14H green		3/20/03	WGFD South Park Pond #3	By itself within large group		

Table 7. List of captive-raised yearling Trumpeter Swans released in the upper Green River Basin, July 2002 (swans obtained from Wyoming Wetland Society).

Date Released	Release Site	USFWS Band Number	Neck Collar Code/Transmitter	Color Leg Band (black on yellow)
7/25/2002	BLM Pothole Pond	1939-01406	Green/Sat 36745	F06
7/25/2002	BLM Pothole Pond	1939-01404	Green/Sat 36746	F05
7/2520/02	BLM Pothole Pond	1939-01403	Green 2K2/VHF	F07
7/25/2002	BLM Pothole Pond	1939-01402	Green 2K3/VHF	F04
7/25/2002	BLM Pothole Pond	1939-01401	Green 2K4/VHF	F08

TRUMPETER SWAN RESTORATION AND MIGRATION STUDY
COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS – Species of Special Concern
Trumpeter Swan

PERIOD COVERED DURING DATA COLLECTION: 9 July 2001-1 August 2003

PREPARED BY: Susan Patla, Nongame Biologist
Bob Oakleaf, Nongame Coordinator

INTRODUCTION

Breeding aggregations of Trumpeter Swans (*Cygnus buccinator*), the largest native waterfowl in North America, occur in only a few regions in the United States. Swans that nest in western Wyoming are considered a component of the Rocky Mountain Population (RMP) of Trumpeter Swans. The RMP includes two main breeding groups: 1) Tri-State Area Flocks that reside year-round in the Greater Yellowstone area including western Wyoming, eastern Idaho, and southwestern Montana; and 2) Canadian Flocks that nest in interior Canada and winter in the Tri-state area (U.S. Fish and Wildlife Service 1998, 2002). In the early 1900s, a small group of approximately 70 swans in the Greater Yellowstone area was thought to be the last remaining wild swans in existence after decades of market hunting nearly exterminated the species in North America, but additional breeding flocks were discovered subsequently in Canada and Alaska. Over the past decade, the number of swans in the Tri-State Area Flocks has remained relatively low compared to peak numbers in the 1950s and 1960s when the flocks exceed 550 birds. Between 1994 and 2002, the number of adult swans averaged 319 (Olsen 2001). The number of adult swans in Wyoming outside of Yellowstone National Park (YNP) averaged 73 adults during the same time period, thus comprising 23% of the Tri-State total (Patla 2002). The number of Trumpeter Swans wintering in the Tri-State region has increased dramatically over the past 20 years (from less than 1,000 in 1980 to 4,360 in 2002) due to population growth of swans nesting in interior Canada (Olsen 2002). The Canadian swans winter along with Tri-State resident swans on thermally influenced rivers and streams that remain open throughout the harsh winter months. The limited number and distribution of nesting pairs in Wyoming, combined with accelerated growth in number of wintering Canadian swans, has elevated concern and management efforts on behalf of this species by the Wyoming Game and Fish Department (Department) over the past 20 years (Lockman 1988, Oakleaf et al. 1996).

Summer and winter distribution of Trumpeter Swans in Wyoming was, until recently, limited to wetland habitats in the Jackson Hole area, and in Grand Teton and Yellowstone National Parks. Inadequate winter and early spring habitat has been

identified as one of the most critical factors limiting population growth of the Tri-State Flocks (Lockman et al. 1987). The harsh winter environment of northwestern Wyoming often results in late ice-off and delayed development of aquatic vegetation resulting in poor productivity and high cygnet mortality for Wyoming's resident pairs. Competition from migrating Canadian swans for meager resources during winter also likely increases winter mortality of resident adults and cygnets. A major objective in Wyoming's state plan is to expand both nesting and wintering distribution of resident swans to maintain a viable population of swans within the state (Oakleaf et al. 1996).

In 1992, the Department's Nongame Program initiated a Trumpeter Swan restoration project in the upper Green River basin working cooperatively with the Wyoming Wetland Society's Trumpeter Swan Fund (a non-profit organization in Jackson dedicated to raising captive-bred and salvaged swans for release in the wild). The objective of this project is to expand summer and winter distribution of Trumpeter Swans through the release of captive-raised birds into areas where swans have not nested previously, and where they are likely to develop new migratory patterns and utilize additional winter habitats outside of the core Greater Yellowstone area. The Department released 75 captive-raised swans between 1994 and 2002 (Wyoming Game and Fish Department 1994-2002). By 2002, eight nesting pairs had become established in the Upper Green River Basin, and young had been produced at four sites (Patla 2002). Expanded wintering habitat used by swans includes Seedskadee National Wildlife Refuge and Flaming Gorge Reservoir in Wyoming. We have also documented the movement of swans as far south as northern Arizona and southern Utah through band recoveries or observations of swans released with pink-dyed wings. It has proven difficult, however, to effectively track movements and survivorship of released swans without use of radio tracking technology. In 2001, the Department's Nongame Program received federal funding through a State Wildlife Diversity Grant to initiate a satellite/radio tracking study on Trumpeter Swans released in the Green River region.

STUDY OBJECTIVE

This study was implemented as a pilot project to test the use of satellite and VHF technology to document timing of migratory movements, map migratory routes, identify new wintering sites, and determine survivorship rates for captive-raised Trumpeter Swans released in the upper Green River drainage. These data are needed to refine restoration management strategies and identify wetland sites on both private and public lands that can be managed to optimize swan productivity and survivorship in the Green River drainage.

METHODS

To determine the best methods for tracking Trumpeter Swans using satellite technology, an intensive effort was made to contact swan researchers and managers throughout North America. Radio-tagging swans presents a multitude of challenges given the wet environments swans inhabit and the physical characteristics of swans:

large bodies, dense plumage, variable weight throughout the year, long necks, and strong bill and feet. Attachments have to be secure; waterproof; and, most importantly, not cause detrimental effects on swan movements, foraging, or survival. Two types of attachment methods have been used to radio-track swans: backpack harnesses and neck collars. No consensus has developed over which type is preferable; researchers contacted have used both types of attachments successfully on wild Trumpeter and Tundra Swans. Backpack harnesses allow for excellent transmissions and have been used on numerous avian species successfully including various species of waterfowl. On the downside, correctly fitting a harness requires experience and can require a long handling time. Neck collars can be attached much faster but can ice up in subzero winter conditions and result in swan mortality. Long antennas on the neck collars also might interfere with swan foraging or preening.

In 2001, we decided to use a Teflon tape backpack harness attachment with an 80 g (2.8 oz) satellite transmitter (North Star Science and Technology, LLC, Baltimore, MD). We first tested a dummy transmitter on a captive flightless swan. After one month, we removed the transmitter and examined the swan and found no obvious feather or skin wear. Three molting, captive-raised yearling swans were outfitted with backpack harnesses and transmitters the day before we released them in the wild. The three satellite transmitters deployed had a VHF transmitter [Advanced Telemetry Systems (ATS), Isanti, MN] glued to the top of the satellite unit (Fig. 1). The VHF transmitters had a separate antenna and contained a mortality sensor; this sensor would double the pulse emission rate if a swan did not move after six hours, allowing for rapid identification and recovery of mortalities. The satellite transmitters were programmed with a variable duty cycle that was set to provide eight hours of transmission every two days during fall and spring migration periods, and every four days during non-migratory periods. Battery life was estimated at approximately 1,500 hours so transmitters could potentially provide data through two fall migration periods. Tom Maechtle, an expert in avian harness attachments, provided on-site instruction on harness construction and attachment. Swans were marked with USFWS bands on the left leg and bright yellow plastic bands on the right, inscribed with black codes (Haggie Engraving, Crumpton, MD).

In 2002, we tested a neck collar attachment for transmitters in place of the backpack harness design. We wanted to test a design with both satellite and VHF transmitters placed on the same collar but a prototype could not be built in time for deployment. We released two yearling swans with an 80 g (2.8 oz) North Star satellite transmitter attached to green plastic neck collars for a total package weight of 125 g (4.4 oz) (Fig. 2). The antennas on the satellite transmitters extended in an upward angle from the transmitter and were formed to curve outward away from the face of the swan. The duty cycle was set to provide eight hours of transmissions every three days throughout the year. On three other yearlings, we deployed a 30 g (1.1 oz) ATS VHF transmitter attached to pre-engraved coded green plastic neck collars [collar package weight = 111g (3.9 oz)] with the antenna embedded around the collar, not protruding from it (Fig. 3). The VHF transmitters were equipped with six-hour mortality sensors. Neck collars were obtained

from Haggie Engraving. The five yearlings were also marked with a yellow coded plastic leg band and a FWS coded stainless steel locking leg band.

In 2003, we recaptured one of the satellite-tagged swans released in 2002 along with three molting, wild yearlings and attached VHF transmitters mounted on a lighter style plastic neck collar designed originally for use on geese [collar package weight=79 g 2.8 oz)]. These collars have embedded antennas with a 5.1 cm (2 in.) extension to obtain a longer tracking range (Fig. 4). Transmitters were equipped with mortality sensors as in the previous years.

To obtain satellite locations, a Limited Use Service account was established with Service Argos, Inc. for e-mail distribution of data files directly to our Jackson Office through their Automatic Distribution Service (ADS). A software program was purchased through North Star for processing these files into a standard database format. The data files provide date, time, and locations for each unit was well as sensor data on temperature and activity that allow a user to determine if mortality has occurred. Swans were checked visually every few days when first released, then on a weekly or biweekly schedule. Aerial flights were used if a tagged swan could not be located from the ground. In 2002, a satellite receiver/antenna unit was borrowed from North Star to locate satellite-tagged birds on the ground (frequency 401.650).

Bill Long, director of Wyoming Wetland Society (WWS), provided captive-raised yearling swans for Wyoming releases. These swans were hatched in incubators from eggs taken from captive pairs or salvaged from wild pairs. Cygnets were wing-clipped, so remained flightless until completion of molt their second summer. They were held over winter with other captive swans at the Valley Springs wintering site, a spring-fed fenced pond managed by WWS located south of Jackson adjacent to Hwy. 89. Their main food source was grain provided in feeders but swans could also feed on limited quantities of natural aquatic vegetation.

Derek Craighead of Berengia South, a nonprofit wildlife research organization in Jackson, provided valuable technical assistance and support on satellite telemetry and data analysis throughout the study.

RESULTS

2001 RELEASES

We fitted three molting, captive-raised yearling swans with backpack satellite/VHF radio transmitters on 9 July 2001 (Table 1). Swans were held overnight in large dog kennels and released the following day in the Green River basin north of Pinedale, Wyoming. Two of the yearlings were placed on a fenced wetland pond that had been designed and built specifically for cygnet releases located on the Kendall ranch 9 km (5.6 mi) north of Cora, Wyoming. This pond was rather small [approximately 0.8 ha (2 ac)] but had abundant aquatic vegetation for foraging, and was sheltered by a small ridge from the main residential/activity area on the ranch. A rough two-track passed along one side

of the pond. The third tagged yearling was placed on a 8 ha (20 ac) ranch reservoir (Sunset Reservoir) 12 km (7.5 ac) to the southwest of the first release site. A group of five wild yearlings were molting on the reservoir. This shallow reservoir had abundant submerged aquatic vegetation and a minimum of human activity. The wild swans molting on this reservoir were thought to be a sibling group that fledged the previous year from the main reservoir located directly to the south. The pair nesting on the southern reservoir was not visible to the molting swans as a dam separated the two bodies of water. We could identify this resident adult pair (female adult banded right leg) and knew they had wintered the past two winters with their cygnets of the year on Flaming Gorge Reservoir near the Utah border. We hoped that by planting a satellite-transmitted yearling with this sibling group it would enable us to track the route and timing of their migration, and determine if the sibling group would return again to the Flaming Gorge area to winter or select new wintering habitat.

Swans 22898 and 22899

The two swans released on the Kendall pond remained on that pond for approximately five weeks. Satellite transmissions were obtained every 70 hours and units appeared to be working well. The swans appeared nervous if a person or vehicle appeared on the two-track above the pond, and would seek cover immediately in the willows located on the east side of the pond. We spent limited time observing these swans to avoid disturbance. Between 14 and 18 August, satellite transmitter #22898 ceased transmitting. On 20 August, we observed the swans and antennas appeared intact on both neck collars. That day, one of the swans took flight and landed in a field a short distance from the pond and walked back. The next day, 21 August, both tagged swans were observed on the ranch's main wetland complex where they had joined a pair of subadult swans that had taken up residency earlier in the summer. This pair included #8 right-wing patagial marked swan (a captive-raised yearling the Department released in 2000 at this wetland). The ranch manager reported that during the previous few months the resident pair had vigorously driven off any other swans that attempted to land on the three ponds in the main wetland area.

On August 26, satellite #22899 also ceased transmitting. On August 29, a mortality signal was detected from the VHF transmitter on this swan from the vicinity of the Kendall wetland. The swan carcass was recovered the next day in the sage upland 15 m (49 ft) from the main wetland. The swan had been partially scavenged by a coyote or fox but appeared to have trauma to the neck and head caused by blows. We surmised that this swan had been attacked by the resident pair and injured or killed, and later scavenged. We did not pick up VHF signals from the other released yearling swan #22898 until mid-November during an aerial survey. This swan was found by itself in a willow flat along the New Fork River just east of the Pinedale golf course, 21 km (13 mi) from the release site. Even though the swan was wintering close to human residences, due to dense willow cover the swan had not been reported by anyone. The swan stayed in this location and did not migrate even when the river began to freeze up. We recaptured the swan on 20 December and returned it to the captive rearing facility in Jackson; it appeared underweight and in weak condition. The swan had a small bare

patch of calloused skin on its back where the satellite transmitter had rested but appeared to have no injuries or damage to its wings or flight feathers that would have prevented it from migrating. We suspect, however, that this swan may have been attacked at the same time swan #22899 died in August, and floated down the New Fork River until it found a secure location with substantial aquatic vegetation where it settled in.

Swan 22894

The single yearling (#22894) released on the Sunset Reservoir near Cora remained with the group of five molting wild yearlings throughout July and August. Although this swan stayed in close vicinity to the wild swans after its release, there appeared to be little direct interaction between it and the close-knit sibling group. When observed, the five remained close together, and the released swan was always a discrete distance apart. The ranch manager reported that all six swans left the reservoir near the end of August but the tagged swan returned by itself within a few days. On 4 September, I observed this swan alone on the north reservoir. On 28 September, it was still by itself on the north reservoir; the resident family group with five cygnets on the main reservoir to the south appeared ready to disperse. According to the ranch manager, the adult pair had driven off the tagged yearling more than once when it attempted to join the family group on the south reservoir. We observed #22894 on the main reservoir with one remaining cygnet on 19 October. This cygnet remained behind when the family group dispersed the previous week. I flushed both birds at that time; the cygnet and the yearling took off easily and both appeared to fly well but the two merely circled and landed on the north reservoir.

These swans remained together until early November. A group of seven wild swans landed on the reservoir on 24 October and departed the next day, but #22894 and the cygnet did not follow. On 14 November, I observed the released yearling by itself again. It remained on the reservoir throughout December even though the water froze, except for a small opening where a spring fed into the reservoir. The satellite transmitter quit working by 7 December even though the unit and antenna appeared to be intact. On 19 December, I placed a feeder on the shore to provide supplemental forage for the swan with the possibility of trapping it later at the feeder. The swan did not attempt to use the feeder. A workman reported that it walked across the ice a few times towards him where he was constructing a sauna on the west side of the reservoir near the main ranch house. On 20 January 2002, I found the swan dead. It appeared to have been killed by a fox the day before where it rested by the small remaining opening in the ice. The neck and thighs had been consumed. This bird also had a small disc of bare and calloused skin where the satellite transmitter had rested on its back similar to what we observed on the other swan recaptured in December.

The three recovered satellite transmitters were returned to North Star for analysis. The failed transmitter recovered from the first mortality had a small hole in it possibly caused by a scavenger. Soldered seams failed on the other two units allowing moisture inside and resulting in failure. No problems were encountered with VHF transmitters.

2002 RELEASES

Five molting, yearling captive-raised swans were released on 25 July 2002 on a pothole pond located on Bureau of Land Management (BLM) land located 17 km north of Cora, Wyoming in an area of numerous, natural pothole ponds (Table 1). This pond had abundant submerged vegetation and was occupied by a number of other waterfowl species. We had successfully released swans at this same pond in 2000. Swans appeared at ease on this wetland and did not move off until the last week in September. The codes on the three VHF collared swans released were 2K2, 2K3 and 2K4. The satellite collars did not have alphanumeric codes. All transmitters worked well throughout the fall and we received satellite locations approximately every 70 hours.

Satellite Collar #36745 and VHF Collar 2K4

These swans paired up almost immediately when released, and the two remained in the vicinity of the release site until 24 October. A large low-pressure system moved into the area at this time, bringing low temperatures and substantial snowfall. The next satellite locations obtained from #36745 on 27 October came from a dry sagebrush/grass upland area southeast of Big Piney and east of the Green River, almost 72 km (45 mi) south of the release site. Over the next few weeks, we got numerous satellite locations from the same vicinity indicating a likely mortality, but the scatter of locations was wide [ranging over 8 km (5 mi) horizontally and 2 km (1.2 mi) vertically]. On 15 November during an aerial search of the area, we picked up a VHF mortality signal from 2K4 approximately 9 km (5.6 mi) north of where #36745 was located. We easily found the VHF collar on 18 November just off BLM Road #5404 (Alkali Flats Road) southwest of Ross Butte [62 km 38.5 mi) from the release site]. No feathers or leg bands were found near the collar. It appeared to have been tossed out into the sagebrush. It proved more difficult to find the missing satellite collar due to the large scatter of locations. Discussions with Argos lead to the discovery that the elevation for our satellite data collection program had been set at sea-level. By adjusting the elevation in the ARGOS data program for this exact location, precision of locations improved greatly. On 4 December, we found the collar in sagebrush habitat off the south end of Alkali Flat Road, just north of Reardon Draw Road. The collar was within 112 m (367 ft) of the last high quality ARGOS location obtained on 1 December. There were many feathers lying next to the collar indicating that the swan had been scavenged with the collar still on its neck. Another pile of feathers was found about 30 m (100 ft) away from the collar suggesting that two swan carcasses were scavenged here. Due to rain and snow, no fresh tracks or other clues could be found to indicate if the swans had been killed at this location or dropped there. The fact that the collar for 2K4 was found by itself 9 km (5.6 mi) to the north along the same jeep road suggests that someone had likely killed the swans when they flew over this location or killed them elsewhere and dumped them in the upland habitat, and discarded the VHF collar at a different location. A mortality report was turned over to the Department's investigative officers and the local newspaper printed a story requesting information, but no evidence was reported and the case remains unsolved.

Satellite Collar #36746

The other satellite-transmitted swan in 2002 remained near its release site until mid-September when it moved 8 km (5 mi) west to the Green River north of Black Butte. It remained on the Green in the vicinity of Black Butte until 15 December, and then moved south to winter along Forty Rod Creek near the Department's Daniel Fish Hatchery, 21 km 13 mi) south of the release site. A few swans have wintered along this open, spring-fed creek for the past five years including at least one collared swan from Canada (Department records). It is one of few locations with suitable foraging habitat available along the Green River north of Seedskadee National Wildlife Refuge (NWR) that remains open throughout the winter. Between 16 and 20 March 2003, swan #36746 moved 31 km (19 mi) north to the Green River north of Black Butte. Satellite transmission ceased on 1 April 2003; visible observations confirmed that the swan was still alive and remained along the Green River near Black Butte. On 24 July 2003, we recaptured this swan on the Sunset Reservoir and replaced its satellite collar with a new collar and VHF transmitter; hopefully we will be able to track it through another season. At the same time, we also captured and placed collars on three wild yearling swans, likely the sibling group produced the previous year on the main reservoir (Table 1). A week later we also released an additional captive-raised yearling with a similar radio collar at the same reservoir (Table 1).

VHF Collars 2K2 and 2K3

These two sibling swans remained together throughout the fall and winter. The pair remained near the release site until late October when a major winter storm moved into the area. They were reported from Seedskadee NWR [144 km 89.5 mi) south of release site] on 29 October and remained on the refuge until late March, 2003. On 15 April 2003, 2K2 hit a wire near Daniel, Wyoming and the carcass was turned in by a local resident. It has been sent to the Wyoming State Wildlife Lab for disease and lead analysis. Swan 2K3 was observed alone in July of 2003 on a private pond a few km from the original release site, but we have not been able to pick up a radio signal and believe the VHF transmitter has ceased functioning.

DISCUSSION

Due to a limited number of swans available for release in 2001 and 2002 (n=8), our sample size for this study was small, making it difficult to thoroughly evaluate the usefulness and reliability of satellite and VHF technology for tracking captive-released swans. Despite instrument failures and swan mortalities, we were able to collect information on released captive-raised swans, which increased our knowledge of migration behavior and causes of mortality that we would not have gained without the use of satellite and VHF technology. In past years, many released swans have disappeared and we usually could not determine whether they had died or moved to another area. Timing of migratory movements is also difficult to determine precisely,

given limited resources for monitoring. Swans that choose to winter in obscure or remote locations are also likely to go undetected.

DISPERSION AND MORTALITY OF CAPTIVE-RAISED YEARLINGS

Yearling swans released in this study remained at or near release sites from 1.5 to 3 months, often making short, localized movements between wetland ponds. Four of the five swans released in 2002 made major migratory movements just prior to the onset of the first winter storm at the end of October. Two swans moved over 100 km (62 mi) in the course of a few days and then settled quickly into wintering habitat. The fifth swan employed a more sedentary strategy in 2002, however. It remained on the Green River close to its release site until available foraging areas froze over and then moved and settled in the first available wintering habitat it encountered. All three swans we tracked through the winter in 2002 selected wintering sites where other swans occurred, and none made pioneering movements farther south as released cygnets had done in previous years.

Data collected indicate a higher mortality rate for yearling releases than we anticipated. Of the eight swans released over two years, 38% survived the first winter, and two out of eight (25%) survived until the following summer. This compares to a 67% survival rate estimated for wild resident yearling swans in Wyoming (Lockman et al. 1987). Causes of mortality varied: two swans (25%) likely died from vandalistic shooting, one (12.5%) from a collision with a wire, one (12.5%) from predation, and one likely from an aggressive encounter with a pair of wild swans. High mortality in 2001 (two mortalities and one taken back into captivity) may have been due to the effects of carrying a backpack harness (see next section).

These low survivorship rates indicate the importance of releasing an adequate number of captive-raised swans for any range expansion project to insure that enough birds survive over time to establish a viable nesting population. In addition, data from this study suggest that captive-raised yearling swans that remain flightless their first winter at a captive facility may tend to be more sedentary compared to cygnets released into new habitats the same year they are hatched. The Department decided to release yearlings rather than cygnets starting in 2000 based on the assumption that yearlings would have a higher survivorship rate. Given the high mortality rate measured in this study, it may be more advantageous to return to using cygnet releases given the greater dispersion shown by cygnets.

Results from 2001 also indicate the need to release captive-raised swans on wetlands that are large enough to provide a sense of security so swans do not leave before becoming strong and accomplished fliers. The two swans released on a small pond in 2001 appeared nervous and left the pond as soon as they could fly (the third week of August) in contrast to swans in 2002 that did not move off their release site until the last week of September and, even then, remained in the general area until the end of October.

SATELLITE ATTACHMENT TYPES

Although backpack harnesses attachments have been used successfully on wild swans, it appears that use on captive-raised yearlings that have not previously flown is questionable. We suspect the harness attachment may have encumbered flight in these yearlings, making them more vulnerable to predators or attacks by wild swans, and also may have inhibited longer migratory movements. Two swans recovered from the 2001 release showed feather wear and skin callusing on the back from contact with the transmitter, indicating that the swans may have experienced some discomfort. Although one of these tagged swans could fly and take off with apparent ease by early November, it did not migrate and remained at its release site past freeze-up. Whether the harness or behavioral factors associated with captive-rearing resulted in this sedentary behavior cannot be determined, but enough questions were raised by our 2001 trial that we decided to discontinue use of backpack harnesses on released swans.

Satellite transmitters attached with neck collars in 2002 proved much easier to deploy and provided good results for a time. We were concerned about the protrusion of the antenna towards the bill and face of the swans but swans appeared to forage and preen normally, although they frequently pulled on the antennas during the first few days. In 2002, satellite transmitter data allowed us to obtain precise data on timing of migratory movements, locate a mortality, and identify wintering and early spring habitat for one swan until its transmitter failed the following April. When recovered in July of 2003, this transmitter was missing its antenna and had cracks along its upper edges. It is clear that further improvements in satellite transmitter technology and packaging are needed before satellite transmitters can provide long-term data sets for swans. The number of location records and the overall cost per location, however, make this technology attractive, and we hope to be able to test new configurations and types of transmitters in the future as they are developed.

QUALITY OF SATELLITE TRANSMISSIONS, 2001-2002

Individual satellite locations received from Argos are rated for accuracy based on the quality of the satellite location. The following is a list of codes and the associated error estimates:

Code	Estimated Range of Distance from Actual Location (m)
3	<150
2	150-349
1	350-999
0	>1000
A	no estimate
B	no estimate
Z	no location

The transmitters attached with backpack harnesses in 2001 provided, as expected, a higher percentage of high quality locations compared to the neck collar transmitters which can be shielded by the neck or submerged when the swan is foraging or bathing.

The percentage of type 3 locations for #22894 (the longest lasting backpack unit in 2001) was 28.7% compared to only 11.5% and 7.6% for the two neck collar units deployed in 2002. Percentage of location types 1,2, and 3 overall for #22894 totaled 74.1% compared to 49-52% for the collar units. The percentage of Z type transmissions, which provide no location data, averaged 17.2% for the collar units compared to only 7.5% for the backpack unit. The neck collar units provided at least one to three high quality locations (i.e. type 2 or 3) for almost every eight-hour transmission session, however, so enough high quality data points were provided to locate swans regularly.

A factor that greatly influenced the quality of locations obtained from satellites turned out to be the altitude setting in the Argos software data collection program for each unit. For high elevation satellite tracking work, this parameter needs to be set as closely as possible to actual on the ground location of transmitters to obtain high quality data points. Once we set this parameter for the transmitter lost in 2002, the scatter of points greatly decreased and we were able to find the unit with ease using type 3 location points. We had submitted an estimated elevation when setting up our account with Argos but this apparently was overlooked when our automatic data collection program was originally set up. By using high quality data points that are corrected for elevation, satellite data can be accurate enough to pinpoint wetland habitats used by swans in western Wyoming.

VHF TRANSMITTERS

The VHF transmitters deployed in 2001 and 2002 provided a valuable means for recovering mortalities and for locating missing swans, especially from the air. The range of VHF transmitters was somewhat limited, especially from those mounted on neck collars with embedded antennas used in 2002. For these collars, we estimated a range between 1.5 to 5 km (0.9 to 3.1 mi) from the air, and less than 1 km (0.6 mi) on the ground. Any topographical barrier effectively blocked the signal when ground tracking.

The prominent alphanumeric codes on these collars provided an additional means of identification and allowed us to locate an individual even after its transmitters failed. Mortality sensors proved extremely useful for locating dead swans and determining cause of death in a timely fashion. Until further improvements in satellite technology take place, we recommend using VHF collars to track released swans, as well as a component of molting wild subadult swans, to provide additional information on swan mortality, movements, and habitat use in the Green River expansion area. We do not recommend using neck collars on cygnets, whether wild or captive-raised, due to the lower body weight and inexperience of cygnets.

SUMMARY AND SUGGESTIONS FOR FUTURE WORK

In 2001 and 2002, the Department tested backpack and neck collar attachments for satellite-tracking of captive-raised Trumpeter Swans released in the Green River drainage near Pinedale, Wyoming. Department personnel gained expertise in the use of satellite technology and attachment types that can be used successfully on swans, and obtained a better understanding of timing of migration movements and causes of mortality for

captive-raised swans released in the wild. Results in 2001 using backpack attachments on three swans indicated that such attachments should not be used on captive-raised swans that have not developed flying skills, as two of three swans released that survived until the onset of winter did not leave the Pinedale area. One swan was recaptured in a weakened condition and the other one died from predation. Data collected in 2002 from swans released with neck collar transmitters (two satellite units and three VHF) provided important information on mortalities resulting from accidents (vandalistic shooting), timing of migratory movements both fall and spring, and wintering habitat. We recommend the use of a limited number of radio collars in future years on captive-raised swans released in the Green River drainage as well as on molting subadults to provide additional data on Trumpeter Swan habitat use, migration behavior, and mortality in this newly established range expansion area. We do not recommend using radio collars on cygnets or on nesting pairs with young to avoid disturbance and possible abandonment of nest sites.

Based on results from these trials, the Department worked with ATS the past year to develop a new, lightweight VFH neck collar that we deployed on five swans in July of 2003 (Fig. 4). The new design should allow us to track known individuals with less risk to the swans compared to backpack attachments or heavier neck collars. These lighter collars are more flexible so the potential to build up dangerous amounts of ice on the collar should be reduced. The Department will continue to explore and encourage developments in satellite technology for use on swans, as it has the potential for providing in-depth insights into swan behavior and survivorship that cannot be obtained through other means. We view the use of radio and satellite technology as a means of providing data that will lead to an increased understanding of swan habitat needs in the Green River drainage to help us reach our goal of establishing a viable breeding component of swans in this expansion area. Continued work on habitat assessments, and wetland restoration and development projects is of utmost importance as swan numbers increase in the area. Monitoring and radio tracking will help us identify and prioritize habitat projects for nesting, wintering, and molting sites, as well as migratory corridors.

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Table 1. Transmitters deployed on captive-raised and wild swans in Wyoming, 2001-2003 (State Wildlife Diversity Grant Project). Shown are transmitter and attachment type, date of swan release and collar recovery, and farthest migration distance.

Number	Transmitter Type	Attachment Type	Date Released	Date Recovered	Distance Moved (km)	Notes
2001						
22894	Satellite/VHF	Backpack	7/9/01	1/20/02	12	Stayed at reservoir release site; killed by fox
22898	Satellite/VHF	Backpack	7/9/01	8/30/01	0.5	Released with 22899; killed and scavenged; probable swan attack by resident pair in wetland near release site
22899	Satellite/VHF	Backpack	7/9/01	12/20/01	29	Recaptured in weaken condition; returned to captivity; may have been injured by swans in August (see above)
2002						
36745	Satellite	Neck Collar green	7/25/02	12/4/03	72	Paired with 2K4; died Oct. 27 east of Big Piney; likely human caused mortality
36746	Satellite	Neck Collar green	7/25/02	7/25/03	21	Wintered in Daniel; transmitted failed April 1, 2003; recaptured summer 2003 (see below 2003 records)
2K2green	VHF	Neck Collar green	7/25/02	4/15/03	144	Wintered Seedskadee NWR; with 2K3; collided with wire near Daniel on migration north and died
2K3green	VHF	Neck Collar green	7/25/02	Still out	144	Wintered Seedskadee NWR; observed summer 2003 near release site
2K4green	VHF	Neck Collar green	7/25/02	11/18/03	68	Collar found in upland sage habitat; likely human caused mortality; paired with #36745 (see above)
2003						
F11	VHF	Neck Collar green	7/24/03			Sat Swan #36746—replaced green collar with yellow; molting with yearling sibling group on Sunset Reservoir
F12	VHF	Neck Collar green	7/24/03			Wild yearling; molting sibling group Sunset Reservoir
F13	VHF	Neck Collar green	7/24/03			Wild yearling; molting sibling group Sunset Reservoir
F14	VHF	Neck Collar green	7/24/03			Wild yearling; molting sibling group Sunset Reservoir
F15	VHF	Neck Collar green	8/1/03			Captive-raised yearling from WY Wetland Society; released with above; could fly when released

Figure 1. Satellite and VHF transmitter, backpack attachment, 2001.

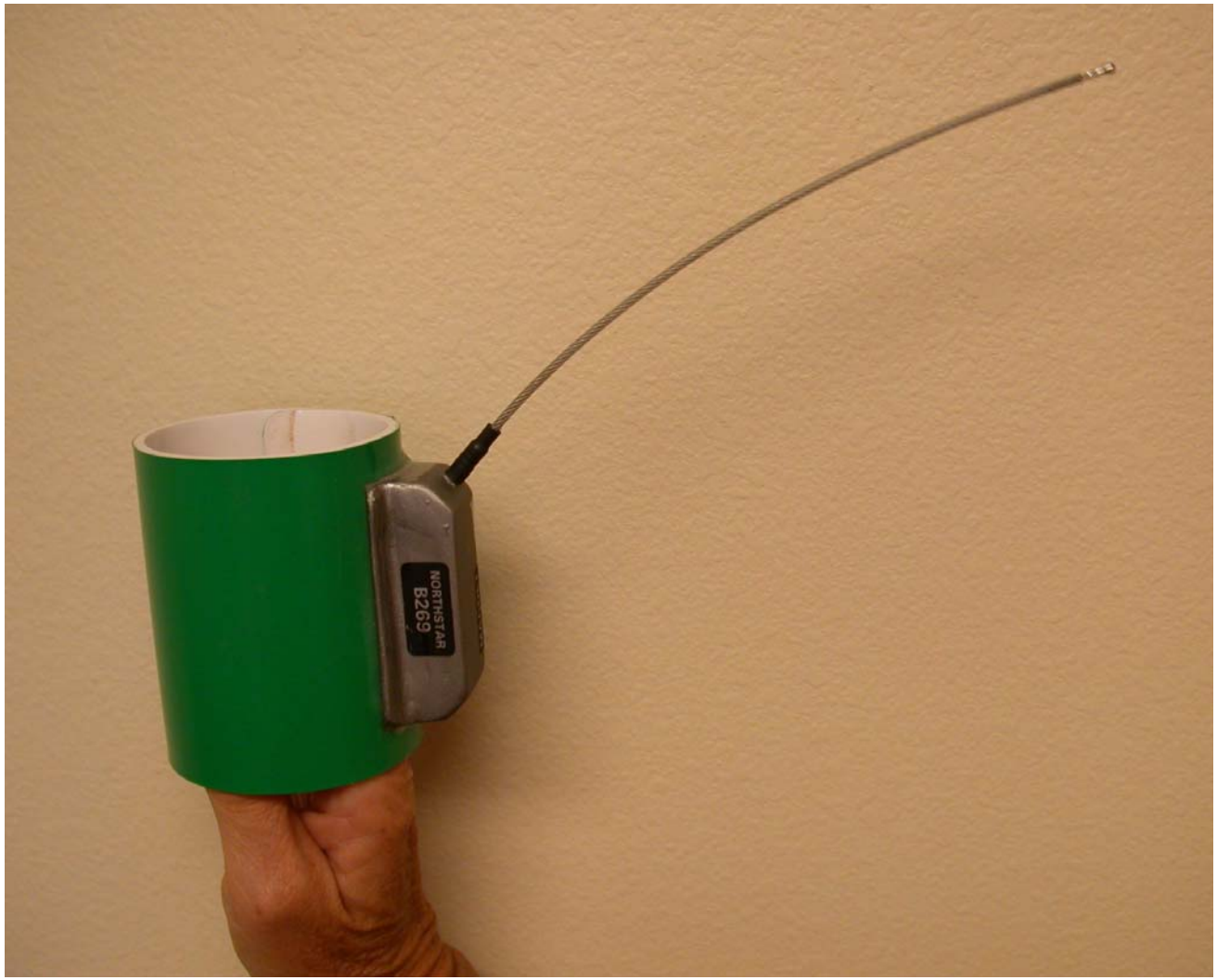

Figure 2. Satellite transmitter attached to plastic neck collar, 2002.

Figure 3. Neck Collar and VHF transmitter with embedded antenna, 2002.

Figure 4. Lightweight neck collar with extended embedded antenna, 2003.

HARLEQUIN DUCK INVENTORIES AND TECHNIQUE DEVELOPMENT COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS – Species of Special Concern
Harlequin Duck

PERIOD COVERED: 15 April 2002 – 14 April 2003

PREPARED BY: Bob Oakleaf, Nongame Coordinator
Susan Patla, Nongame Biologist
Kelli Taylor, GIS Technician

INTRODUCTION

Harlequin Ducks (*Histrionicus histrionicus*) occur in disjunct populations associated with Pacific and Atlantic coastlines in North America and Asia. Harlequins winter and molt in coastal habitats and migrate inland to nest along swift flowing mountain streams. In western North America, the breeding range extends from Alaska, British Columbia, Washington, and Oregon to eastern slopes of the continental divide in Alberta and Montana, and south to northwestern Wyoming and southeastern Idaho (American Ornithologists' Union 1983).

Historically, Harlequin Ducks were recorded in Wyoming during the late 1800s and early 1900s. Coues (1879) provided records of Harlequins near the headwaters of the Gros Ventre River. Merrill (1881) reported several breeding pairs near the Wyoming/ Montana state line. McCreary (1939) also noted occurrence on streams west of Cody and reports maintained by Yellowstone National Park contain early records of Harlequin Ducks scattered throughout the Park.

Currently, breeding harlequins are widely scattered in western Wyoming and considered uncommon. The Wildlife Observation System (WOS) managed by the Wyoming Game and Fish Department contains records of Harlequin Ducks in Yellowstone and Grand Teton National Parks and along four streams on the west slope of the Teton Range. An additional four observations have been recorded south through the Snake River and Wyoming Ranges. Records in the WOS indicate the breeding range in Wyoming extends east of Yellowstone and Grand Teton Parks to Shoshone National Forest, including the Beartooth, Absaroka, and Wind River Ranges. In addition, there are several records of harlequins further east in the Bighorn Mountains, including a successful breeding pair on Shell Creek, individual birds on Tensleep Creek, and a pair (including photographs) on Pine Creek (near Buffalo, Wyoming). However, observations in the Bighorns are sporadic and probably represent the eastern extreme of the species' range that is not consistently occupied.

Inventories for breeding pairs of Harlequin Ducks have been conducted in Yellowstone National Park (McEneaney 1997), Grand Teton National Park (Wallen 1987), Targhee National Forest (Atkinson and Atkinson 1990; Atkinson 1991; B. Alford, U.S. Forest Service, personal communication) and the Shoshone National Forest (Oakleaf 1999). T. McEneaney (Yellowstone National Park, personal communication) recently upgraded previous estimates of 16 to 20 pairs (McEneaney 1997) to estimates of 20 to 24 pairs in Yellowstone National Park. Wallen (1987) estimated 9 to 17 pairs are annually associated with streams in Grand Teton National Park along the east front of the Teton Range. Recent records suggest four pairs in the Wyoming portion of the Targhee National Forest. Surveys conducted during the breeding seasons of 1995, 1996, and 1998 indicate that at least 12 breeding pairs occupy habitats in the Shoshone National Forest (Laurion and Oakleaf 1995, Laurion et al. 1997, Oakleaf 1999). Therefore, the only portion of potential harlequin breeding habitat in Wyoming that had not been adequately surveyed prior to 2002 included high potential habitat in the Bridger-Teton National Forest of Sublette and Teton Counties.

The purpose of this study was to inventory potential habitats in the Bridger-Teton National Forest for breeding Harlequin Ducks in 2002, provide a statewide estimate of the number of breeding pairs in Wyoming, refine aerial inventory techniques, and develop a statewide plan for monitoring population trends of harlequins in Wyoming. This study was possible due to cooperative funding provided by new federal legislation entitled States Wildlife Grants and administered through the U.S. Fish and Wildlife Service.

METHODS

Aerial surveys for breeding pairs of Harlequin Ducks were conducted with a Bell 206B-III with two observers during 21-26 May 2002. The helicopter was flown along potential drainages at approximately 55 km (34 mi) per hour and 20-50 m (65-164 ft). above ground. S. Patla also conducted ground surveys of approximately 13 km (8 mi) of Thorofare Creek during 18-25 August 2002 to document production of previously located pairs and compare results of the two survey methods.

We targeted watercourses with suitable habitat and excluded drainages that were obviously lacking characteristics necessary for breeding harlequins. Suitable habitat was defined as stream size of second order or greater with portions of the stream gradient averaging between 1% and 7%. Suitable streams were also required to have clear water, rocky bottoms, and some areas of riffles and shallow water. Forested bank vegetation was considered important. Hiding cover along the streams was also considered necessary. Hiding cover includes overhanging shrub vegetation, undercut banks, logjams, and woody debris.

RESULTS

We completed helicopter surveys of 35 streams and rivers in Teton and Sublette Counties, Wyoming (Fig. 1). Approximately 543 km (337 mi) of potential habitat were aerially surveyed (Table 1). Most streams had yet to start high run-off and were low and clear. We encountered high and turbid water at only Pacific, Pilgrim, and Arizona Creeks. Drainages were mostly free of snow and ice below 2,590-2,743 m (8500-9000 ft) elevation. Weather conditions were conducive for survey efforts at 21 (60%) of 35 drainages and less than optimum for 14 (40%) of 35 drainages (Table 2).

A total of 63 Harlequin Ducks were recorded (Tables 2 and 3). This total consisted of 28 male/female pairs assumed to occupy established nesting territories. However, we recorded seven of these pairs in streams with known harlequin occupancy and used these as a reference for our survey. Wallen (1987) included these streams in his study (Table 2). We located at least 21 pairs in areas that had not been previously surveyed for harlequins. Few harlequins were observed, however, in southern portions of the survey area even though habitat appeared adequate and recent records exist of breeding pairs (Fig. 1, Table 2).

August ground surveys of Thorofare Creek located at least 18 individual harlequins near locations where six pairs were documented during May surveys and probably represented five adult females with 13 young of the year.

DISCUSSION

We estimate that a statewide minimum of 70 breeding pairs of Harlequin Ducks occupy Wyoming habitats by adding results of previous surveys and results of this survey, assuming that Harlequin Duck numbers have not declined in Wyoming during the last two decades. However, the species is extremely difficult to survey. McCaffery et al. (1998) presented information indicating helicopter surveys may detect less than 50% of actual populations occupying streams. Shirato and Perfito (1998) intensively studied the detectability of harlequins along streams in Washington where 76% of the streams (n=139) have only one pair. Their data indicate ground surveys need to be repeated six times for a 90% chance of detecting the presence of harlequins on a specific stream. These repetitions need to be distributed throughout the breeding and brood rearing season since nesting is extended over a two-month period and not synchronized among individual females.

Results of these studies suggest our surveys may have detected as low as 50% or less of the actual number of nesting pairs in Wyoming. We noted, however, several variables that potentially affect detectibility during aerial surveys. Some of these variables, discussed below in approximate descending order of importance, will receive additional study prior to designing and conducting future inventories.

TIME OF YEAR

We attempted to conduct helicopter surveys following arrival of harlequins in early May but prior to mid-June when the majority of females initiate incubation and males begin leaving nesting areas (Wallen 1987). Aerial survey dates were also scheduled prior to high water of spring run-off when larger or wider channels, turbid water, and many side channels reduce visibility or probability of detection. May surveys also occur when snow and ice conditions presumably preclude the use of higher elevations by harlequins and more precisely define nesting habitat. Although aerial surveys may be effective during brood rearing seasons, difficulties of conducting surveys later in the season include: the absence of highly visible males, leaf out of deciduous vegetation that reduces visibility, secretive behavior of broods that remain close to hiding cover, and increased area requiring survey coverage as a large amount of high elevation habitat becomes available in late summer for brood rearing. May surveys also have the distinct advantage of occurring when human use of National Parks, wilderness areas, and backcountry areas are at a minimum and the potential to disrupt recreational use is minimized.

However, May surveys can be problematic as there is an extremely narrow window for optimum conditions, weather is often unpredictable and not suitable for aerial surveys; arrival of harlequins and initiation of incubation is not synchronized among individual pairs (even on the same stream), and high run-off is weather-dependant and can vary annually and even daily. We originally scheduled our surveys and the contract helicopter for 6-11 May 2002, but ran into scheduling conflicts and inclement weather. We again attempted to initiate surveys on 20 May, but weather precluded significant efforts until 23 May. Increased efforts to study arrival and incubation chronology, May weather patterns, and spring run-off data would greatly enhance the ability to predict the window of opportunity with the highest potential for survey effectiveness. In addition, ground observations at a few accessible areas could assist decisions of when to initiate surveys in any given year and perhaps mitigate potential problems associated with annual fluctuations of both harlequin arrival and spring run-off. Fixed wing surveys could also evaluate large areas for runoff relatively cheaply before initiating more expensive helicopter surveys.

OBSERVER ABILITIES, EXPERIENCE, AND DEVELOPMENT OF SEARCH IMAGES

This variable is inherent and an important consideration for aerial surveys of most wildlife species. During May surveys, most harlequins were observed as paired and loafing in pools and eddies with a few pairs observed in runs or perched on in stream boulders. Although we have observed harlequins in riffles and faster water during ground surveys, the species is probably not readily apparent in faster flowing waters from the air. Most harlequins did not flush from the approach of the helicopter. Escape behavior, when it did occur, was most often in the form of diving and swimming under water or drifting casually towards hiding cover. We noted that a second observer was especially helpful for tracking diving birds and later identification upon resurfacing while

the other observer continued to search in front of the helicopter for additional birds. Searching for flushing waterfowl appeared to be of little value during harlequin surveys. Territories occupied by harlequins often included in-stream boulders that were very noticeably marked with whitewash. A search pattern for harlequins perched on such boulders is useful and certainly an intensified or repeat search effort in sections of streams with whitewashed boulders is warranted. The only other species that we observed associated with such boulders was the Common Merganser, and they tended to occupy much slower stretches of the drainages and be readily apparent. It is so important that observers develop a search pattern and image for harlequins that inexperienced observers would clearly benefit by developing a search image in habitat known to be occupied before attempting to document the presence of harlequins in habitats that have not been previously surveyed.

TIME OF DAY AND WEATHER

Behavior and activity patterns of most wildlife species vary with time of day and weather conditions, and we have no reason to suspect harlequins are any different. Since harlequins are most visible when loafing in pools or eddies, it should be useful to determine if there is a time of day or particular weather condition when they are most likely using this habitat type as opposed to riffles, terrestrial vegetation, or hiding cover. Aerial surveys are naturally not exposed to the full range and extremes of these variables. Surveys are restricted to daylight hours and moderate or better weather conditions. Although early morning hours are typically calm and conducive for aerial work, we did not initiate our surveys until after 0700, as we desired to avoid heavy shadows and marginal light conditions. We did, however, complete surveys of 63 km (39 mi) of five drainages (#s 1, 2, 23, 31, and 32) between 0700 and 0800. Even though these drainages all have previous records of harlequins, we only located one pair during this time period. Especially noticeable were the results of surveys on the reference streams in Grand Teton National Park. We recorded six pairs, one single male and female, each during surveys of Moose and Owl Creek on 25 May (1535-1600) with marginal weather conditions. On 26 May we recorded only one pair during surveys (0705-0730) of Berry Creek and a repeat survey of Owl Creek during excellent weather conditions. Wallen (1987) recorded up to seven pairs on these drainages during his study. Although all other harlequin observations were from 0800 to 1600 and under a wide range of weather conditions, these results could be strongly biased by survey design or other causal factors not evaluated, especially habitat variables. Results are only suggestive but certainly point out the need for additional study and evaluations.

HEIGHT AND SPEED OF HELICOPTER

Most of our surveys were flown as low and slow as conditions would allow. However, we noted potential disadvantages with this approach. The low angle of observation that results from flying close to the ground [<15 m (49 ft)] limits the distance of observer coverage ahead of the survey direction and prevents thorough coverage to the sides where stream channels become braided or wide. During a return flight after surveying portions of Thoroughfare Creek, a strong tail wind resulted in an air speed and

elevation almost double the original effort. In addition to observing pairs previously located, we detected two additional pairs that were missed on the first pass. Two factors were obvious: visibility to the sides and forward was noticeably greater, and birds were not reacting to the disturbance by diving. Although we did not attempt repeat coverage on other drainages, conditions did sometimes require surveys at the upper range of air speeds and survey elevations. Under such conditions, we continued to locate harlequins and continued to notice a lack of reaction to the helicopter. Perhaps the most thorough approach would be to first survey the drainage at an elevation and speed where the helicopter is high and fast enough to reduce disturbance but low enough for detecting a significant portion of waterfowl and identifying species, especially harlequins, goldeneyes, and Buffleheads. A repeat survey should then be conducted at low and slow extremes to allow for closer looks at sections of the drainage in shadows, log jams, faster water, or any portions of the stream where visibility is more difficult. Observers would need to pay close attention to locations and avoid duplications of pairs.

Aerial surveys for Harlequin Ducks in 2002 greatly increased the portion of habitat in Wyoming inventoried. Previous surveys and the 2002 survey, however, located few harlequins on some streams and rivers where greater numbers were expected and some potential habitat has not been adequately surveyed (Table 4). A systematic approach to inventory these drainages would increase our understanding of the harlequin population in Wyoming. Certainly a quantification and statistical comparison of occupied habitat with non-occupied habitat would be valuable.

Historical data on Harlequin Ducks are not adequate to determine changes in population numbers. However, we speculate that some changes in habitat have been detrimental for harlequins. Historically, tie hack logging degraded habitat that potentially would be important to harlequins early in the breeding and nesting seasons. Some detrimental steps associated with tie hack activities included damming of drainages such as the DuNoir and Warm Springs, over-winter storage of timber behind the dams, and a sudden release of stored water and timber during spring run-off. Extensive forest fires in 1988 may have temporarily increased sediment loads in early spring and eliminated streamside cover in some drainages. Development has occurred in harlequin habitat to a limited extent. Examples include highways and commercial lodges, cabins, and campgrounds associated with the Clarks Fork River and the North Fork of the Shoshone River. Most harlequin habitat, however, occurs in designated wilderness areas and future impacts should be minimal unless streamside recreational activity increases greatly in the future.

RECOMMENDATIONS

Variables that may influence inventory results (especially time of year, time of day, and weather) should receive additional study during May, 2004. Increased effort to quantify arrival dates should continue for another five years, especially in cooperation with Yellowstone National Park. Results of this study will assist design and scheduling monitoring efforts, which should be initiated in 2005 and repeated every five years.

Table 5 presents areas and alternatives for designing a program to monitor population trends of Harlequin Ducks. We recommend that the first four survey areas in Table 5, Figure 2 be used for long-term monitoring (Thorofare – Buffalo Forks, Berry Creek – Snake and Bechler Rivers, Yellowstone – Lamar Rivers and occupied tributaries, and the Crandall areas). This recommendation, however, assumes active participation in funding and monitoring effort by Yellowstone and Grand Teton National Park personnel. Details of the cooperative effort need to be drafted by August of 2004 and finalized by January of 2005. This monitoring approach should provide trend data for approximately 80% of the Harlequin Duck population in Wyoming. We recommend budgeting for 25 hours of air charter (~ $ 15,000). If Yellowstone National Park cannot participate and Yellowstone habitats are dropped from each survey area of the above recommendation, approximately 50% of the population could be monitored for trend with approximately $ 10,000). These cost estimates were based on $600 per hour and will need to be adjusted for inflation in future years. Extra flight time was allowed to cover additional ferry time that is difficult to predict. If the delineated survey routes are completed under budget, addition surveys should be completed in drainages listed in Table 4.

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Table 1. Drainages included in helicopter surveys for Harlequin Ducks during May, 2002.

ID#[a]	Drainage Name	Date	Time [b]	Start UTM	End UTM	Km
1	Boulder Creek	5/23	0719	626894-4747125	611453-4745965	20.6
2	Burnt Creek [c]	5/21&23	0700,0756	615969-4753511	610759-4749385	11.3
3	Pole Creek	5/23	0808	605100-4753736	609803-4758659	10.1
4	Sweeney Creek	5/23	0851	604779-4758361	600928-4754248	7.7
5	Fremont Creek [c]	5/21&23	0730,0851	600747-4765349	607163-4769092	13.2
6	Pine Creek [c]	5/21&23	0800,0908	602209-4774978	599526-4763800	14.1
7	Lake Creek	5/23	0933	595605-4769650	594326-4762291	9.9
8	New Fork River	5/23	1045	594754-4780541	588443-4773100	12.8
9	Boulder Creek	5/23	1113	590440-4780027	583317-4779138	10.0
10	Upper Green River	5/23	1138	602887-4782542	594934-4792279	16.5
11	Slide Lake/Creek	5/23	1203	598581-4791627	596620-4793798	4.1
12	Clear Lake/Creek	5/23	1206	601332-4795753	594934-4792279	11.1
13	Green River Lakes	5/23	1218	594535-4793528	593214-4796100	4.2
14	Green River	5/23	1223	593214-4796100	589632-4802171	14.0
15	Roaring Fork	5/23	1240	599139-4800944	589632-4802171	12.4
16	Tosi Creek	5/23	1455	564331-4797768	580395-4795588	21.5
17	Rock Creek	5/23	1542	570219-4790919	579421-4786119	13.5
18	Flat Creek	5/24	1455	533896-4811601	537292-4818034	9.5
19	Crystal Creek	5/24	1520	548134-4808608	548186-4822804	18.7
20	Clear Creek	5/24	1707	561395-4801017	567523-4806903	17.0
21	Bear Cabin Creek	5/24	1735	560771-4808130	557188-4809756	5.1
22	Gros Ventre River	5/24	1725	567523-4806903	553767-4806038	19.0
23	Atlantic Creek	5/25	0713	566759-4876270	572079-4883040	11.4
24	Thorofare Creek	5/25	0810	570223-4889829	594863-4877854	41.7
25	Yellowstone River	5/25	1149	570223-4889829	586734-4870733	29.0
26	Senecio Creek	5/25	1127	571281-4878695	570163-4879717	2.0
27	Pacific Creek	5/25	1256	565707-4875199	593140-4869872	51.9
28	Pilgrim Creek	5/25	1325	539223-4872858	535137-4863623	15.0
29	Arizona Creek	5/25	1343	529063-4876371	528607-4868834	10.2
30	Moose Creek	5/25	1535	517328-4867528	523334-4871067	8.8
31	Owl Creek [c]	5/25&26	1557,0716	518747-4872867	515239-4871702	4.3
32	Berry Creek	5/26	0705	512605-4874876	523334-4871067	15.3
33	NF Buffalo Creek	5/26	0801	574369-4868898	564106-4855136	31.9
34	Soda Fork	5/26	0846	574905-4863388	564263-4861624	14.5
35	SF Buffalo Creek	5/26	0920	581094-4860274	561730-4855300	30.8
					Total km surveyed	543.1

Table 1. Continued.

[a] Identification numbers correspond with Figure 1.

[b] Times listed are for the start of surveys for each drainage and are Daylight Savings, Mountain Standard.

[c] Portions of these drainages were surveyed on two consecutive days because inclement flying conditions precluded complete surveys of the drainage. Repeated Kms are not added to the length of the drainage surveyed.

Table 2. Observations during helicopter surveys for Harlequin Ducks, 21-26 May 2002.

ID # [a]	Drainage Name	Number of HADU Observed			Comments
		Pairs	Not Paired	Total	
1	Boulder Creek			0	Many scattered records of HADU observations
2	Burnt Creek			0	In drainages 1–6, including 4 males & 3 females
3	Pole Creek			0	On 5/16/97 and a pair on 5/15/03 near Fremont Lake
4	Sweeney Creek			0	
5	Fremont Creek			0	
6	Pine Creek		1 male	1	Observed on 5/21/02 survey attempt but not on 5/23/02
7	Lake Creek			0	Excellent survey conditions for above drainages
8	New Fork River			0	#s 1-8 on 5/23/03
9	Boulder Creek			0	
10	Upper Green River			0	Poor light and wind for 9-15
11	Slide Lake/Creek			0	
12	Clear Lake/Creek			0	
13	Green River Lakes			0	
14	Green River			0	
15	Roaring Fork			0	
16	Tosi Creek			0	
17	Rock Creek			0	
18	Flat Creek			0	
19	Crystal Creek			0	Excellent habitat in upper portions
20	Clear Creek			0	Cloudy and snow squalls for #s 20-22
21	Bear Cabin Creek			0	
22	Gros Ventre River			0	Excellent potential near headwaters
23	Atlantic Creek			0	
24	Thorofare Creek	6		12	Follow up ground surveys for broods later in summer
25	Yellowstone River	7		14	Weather conditions excellent for #s 23-29
26	Senecio Creek			0	Previous HADU record; creek mostly snow covered
27	Pacific Creek			0	Water was high and muddy on #s 27-29
28	Pilgrim Creek			0	
29	Arizona Creek			0	Cloudy and strong winds for #s 30-31
30	Moose Creek	6	1 male	13	Wallen (1987) reported 6 pairs
31	Owl Creek		1 female	1	Observed On 5/25/02 but not 5/26/02
32	Berry Creek	1		2	Wallen (1987) reported 7 pairs
33	NF Buffalo Creek	6	1 male	13	No previous records of HADU for drainage #s 33-35
34	Soda Fork			0	Cloudy and snow for #s 34 and 35
35	SF Buffalo Creek	1	3 males	5	Includes portions of the main river below forks

[a] Identification numbers correspond with Figure 1.

Table 3. Summary of Harlequin Ducks observed during helicopter surveys, 23-26 May 2002.

Date	Drainage	Total Km	# HADU pairs	singles	Total HADU
5/21/02	Pine Creek	14.1		1 male	1
5/25/02	Thorofare Creek	41.7	6		12
5/25/02	Yellowstone River	29.0	7		14
5/25/02	Moose Creek	8.0	6	1 male	13
5/25/02	Owl Creek	4.3		1 female	1
5/26/02	Berry Creek	15.3	1		2
5/26/02	N. Fork Buffalo Fork	31.9	6	1 male	13
5/26/02	S. Fork Buffalo Fork	30.8	1	3 males	5
Total		*175.1*	*28*	*5 males, 1 female*	*61*

Table 4. Wyoming drainages that should receive baseline or additional surveys for Harlequin Ducks.

ID # [a]	Drainage Name	Date of Last Survey [b]	Previous HADU Records ?	Potential for HADU Occupancy
1	Boulder Creek	2002	Yes	Good
5	Fremont Creek	2002	Yes	Excellent
6	Pine Creek	2002	Yes	Excellent
8	New Fork River	2002	No	Good
9	Green River headwaters	2002	No	Unknown
18	Flat Creek	2002	Yes	Unknown
22	Gros Ventre River	2002	Yes	Unknown
23	Atlantic Creek	20002	Yes	Good
36	Fish Creek	NS	No	Unknown
37	Snake River, YNP	NS	Yes	Unknown
38	Spread Creek	NS	No	Unknown
39	Blackrock Creek	NS	No	Unknown
40	Greys River	NS	Yes	Unknown
41	Hoback River headwaters	NS	No	Unknown
42	Bull Lake Creek	NS	Yes	Unknown
43	Wiggins Fork	NS	Yes	Good
44	East Fork	NS	Yes	Unknown
45	South Fork of Shoshone River	1998	Yes	Good
46	North Fork of Shoshone River	1998	Yes	Excellent
47	Grinnell Creek	1998	No	Good
48	Fishhawk Creek	1998	No	Good
49	Sunlight Creek	1998	Yes	Good
50	North Fork Crandall Creek	1998	No	Good

[a] Identification numbers correspond with Figure 1.

[b] NS = not surveyed.

Table 5. Wyoming streams and rivers recommended for monitoring Harlequin Ducks.

Streams and Rivers in Survey Area [a]	% Known Population	Cumulative %	Estimated Time (Hours) [b]	Potential Contributors [c]
Upper Yellowstone River and tributaries, Thorofare Creek & Buffalo Forks (56, 24, 25, 33, 34, 35)	32	32	7	YNP, BTNF
Moose, Owl, and Berry Creeks; Snake and Bechler Rivers (30, 31, 32, 37, 59)	22	54	4	YNP, GTNP
Yellowstone and Lamar Rivers and occupied tributaries (55, 54)	21	75	4	YNP
Clarks Fork; Crandall, Lake, and Sunlight Creeks (50, 51, 52, 53)	7	82	4	SNF
Boulder, Fremont, Pine Torrey, Jakeys Fork, and Dinwoody Creeks (1, 5, 6, 59, 60)	7	89	6	BTNF, SNF
Streams and Rivers on the West Slope of the Tetons (58)	5	94	4	BTNF

[a] Identification numbers correspond with Figures 1 and 2.

[b] Estimated flight time includes ferry time to the nearest airport but assumes the use of a gas truck at Blackrock Ranger Station for the Thorofare area. Does not include ferry time to and from home station of air service. \

[c] YNP = Yellowstone National Park, BTNF = Bridger-Teton National Forest, GTNP = Grand Teton National Park, SNF = Shoshone National Forest.

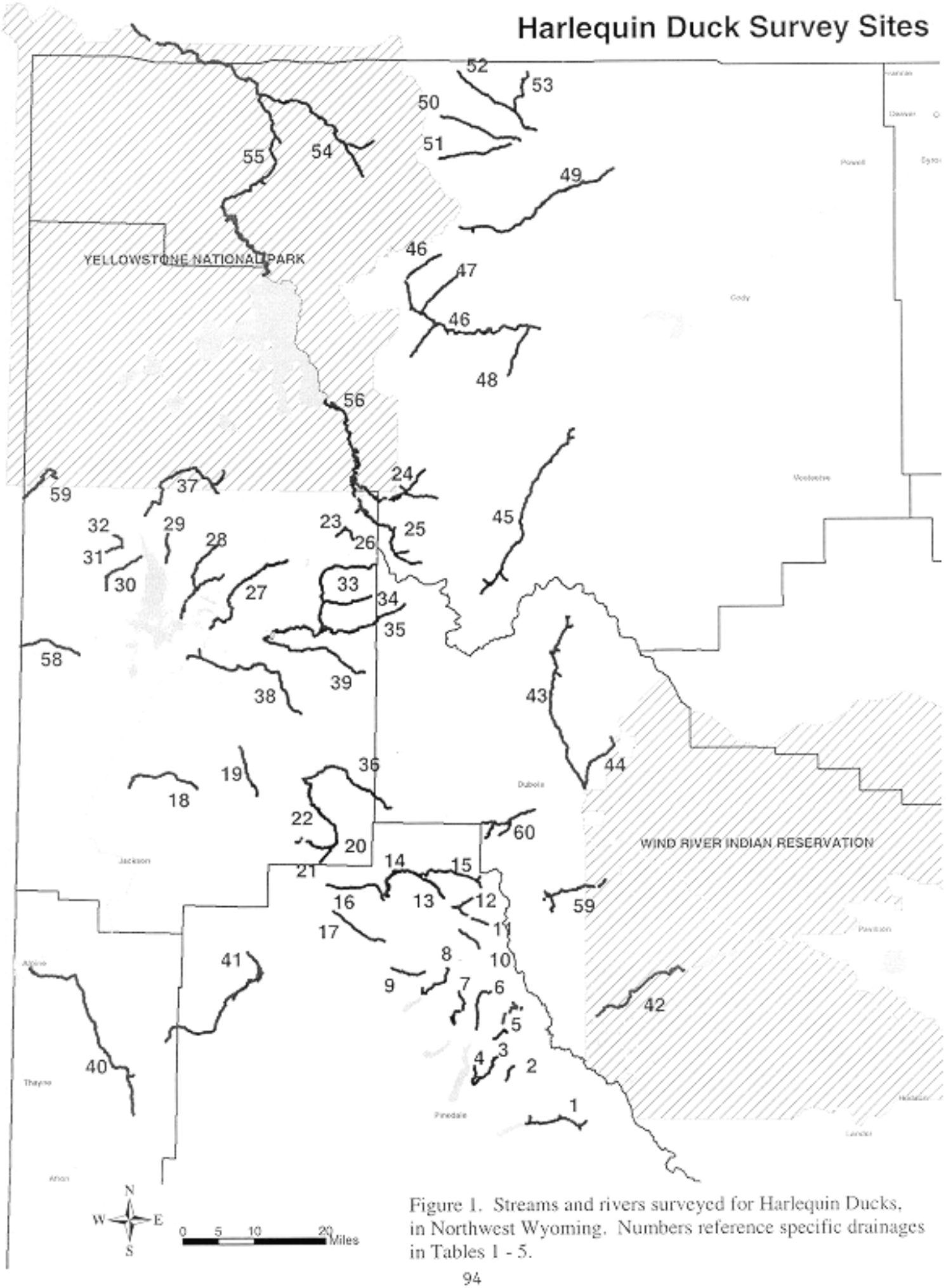

Figure 1. Streams and rivers surveyed for Harlequin Ducks, in Northwest Wyoming. Numbers reference specific drainages in Tables 1 - 5.

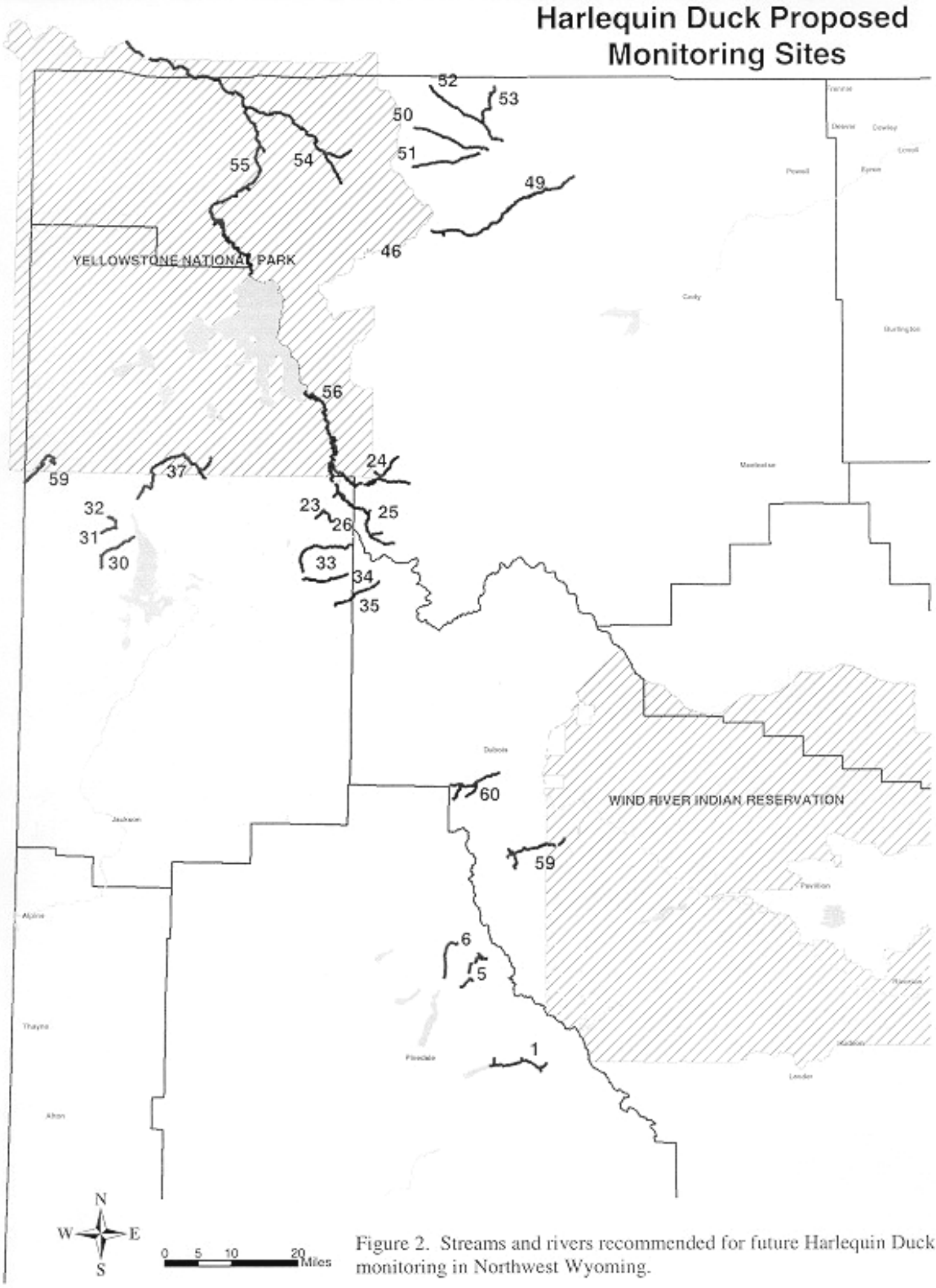

Figure 2. Streams and rivers recommended for future Harlequin Duck monitoring in Northwest Wyoming.

RAPTOR NEST SURVEY COST-SHARE AGREEMENT
COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS – Species of Special Concern
Raptors

PERIOD COVERED: 15 April 2002 – 15 September 2003

PREPARED BY: Tom Maechtle, Nongame Biologists
Bob Oakleaf, Nongame Coordinator

INTRODUCTION

The purpose of this study is to provide baseline data on raptor nesting activity associated with lands administered by the Bureau of Land Management (BLM). Due to the recent focus on black-tailed prairie dogs (BTPD), we also recorded centroids of colonies observed during surveys, including travel to and from and along transects of survey areas. A raptor nesting survey was conducted in 1996 on BLM-administered lands within the Casper District that had not been previously surveyed. In 1997, 1998, and 1999, and 2001 the cost-share agreement included areas of the BLM Platte River, Buffalo, and Newcastle Resource Areas that had not been previously surveyed, including lands proposed for coal bed methane production. Surveys during 2002 focused on areas in the BLM Buffalo Resource Area. Funding for the 2002 cooperative effort was provided by the BLM and Wyoming Game and Fish Department (Department).

METHODS

The 2002 survey followed similar study parameters detailed in previous reports. BLM survey areas were flown from 21 April through 31 May, with transects established at 1-mile (1.6-km) intervals. Transect lines were delineated before each flight using the mapping program "All Topo". A laptop computer integrated with a Geographic Positioning System (GPS) ensured the aircraft maintained the proper course. Each located nest was recorded by GPS in Universal Transverse Mercator (UTM) (Datum NAD 27) and observed for evidence of nesting activity and the presence of adult birds, young, or eggs. The physical condition of each observed nest was also noted. All raptor nests encountered, regardless of activity or condition, were recorded. Observations were recorded at each nest using the field names and codes as presented below.

Species

BAEA	=	Bald Eagle
FEHA	=	Ferruginous Hawk
GHOW	=	Great Horned Owl
GOEA	=	Golden Eagle
PRFA	=	Prairie Falcon
RTHA	=	Red-tailed Hawk
SWHA	=	Swainson's Hawk

Nest Structure

CLF	=	CLifF
CKB	=	CreeK Bank
CTL	=	CoTtonwood (Live)
CTD	=	CoTtonwood (Dead)
ELL	=	ELm (Live)
GHS	=	Ground/HillSide
MMS	=	ManMade Structure (e.g. nest platform, windmill, etc.)
POL	=	POnderosa pine (Live)
POD	=	POnderosa pine (Dead)
ROC	=	Rock OutCrop
WIL	=	WIllow (Live)

Date = Date of observation in Day-Month-Year format.

Nest Status (4 characters) = Nest status on the observation date.

ACTI	=	ACTIve nest	A nest in which a breeding attempt was made, indicated by: 1) Eggs in nest, or 2) Young in nest, or 3) Fledged young near nest, or 4) Incubating/brooding adult.
ACFA	=	ACtive FAiled	An active nest that did not fledge young.
OCCU	=	OCCUpied	A nest with one or more of the following: 1) Fresh lining material. 2) Adult presence at or near the nest. 3) Recent and well-used perch site near the nest.
OCAL	=	OCcupied ALternate	A tended nest within the boundaries of a territory housing an ACTIve nest.
INAC	=	INACtive	A nest with no apparent recent use or adult presence at the time of observation, but in good condition.
INAL	=	INactive ALternate	An INACtive nest within a territory that contains an ACTIve nest.

INDI	=	INactive DIlapidated	An INACtive nest in a state of ruin due to weather, natural aging, and/or neglect.
INDE	=	INactive DEstroyed	A nest showing no sign of raptor activity that is destroyed to the point that it is no longer useable without major reconstruction. These nests, for all practical purposes, purposes, have disappeared.
GONE	=	nest was GONE	A nest that was located during a previous study but was completely destroyed with no sign of any nest material in a subsequent study.
?	=	unknown	A nest whose status was undetermined during subsequent surveys in the same nesting season.

YNG (1 character) = The number of YouNG in the nest at the time of observation and, presumably, the productivity of the nest if the survey was conducted when the young were near fledging. If eggs were present in the nest, this was denoted by the number followed by the word "egg(s)".

COMMENTS = Any pertinent information regarding a specific nest site. During the production portion of the survey, the growth stage of young birds was denoted using the following classes: Class I (all downy, no feathers), Class II (feathers visible, downy patches on body or head), Class III (completely feathered), or Class IV (fledged).

RESULTS AND DISCUSSION

Inventories were flown in three of the BLM survey areas during April and May 2002 (Table 1). However, it is important to note shortcomings of surveys in several of the areas. Area B-3 was not completely surveyed due to aircraft malfunction and because expenditures were approaching budget limitations.

Results of nesting surveys are summarized in Table 1. Specific nest locations are detailed in Appendices and provided to funding agencies in electronic data files. Appendices or data files are not intended for general distribution and should be limited to management purposes.

Surveys located 112 occupied and/or active diurnal raptor nests including Bald Eagle (n=7), Swainson's Hawk (n=4), Red-tailed Hawk (n=71), Ferruginous Hawk (n=4), Golden Eagle (n=23) and Osprey (n=2). In addition, numerous (n=170) unoccupied nests were recorded. Unoccupied nest structures are listed in the comments column as "raptor nest". The majority of unoccupied nests were built by Red-tailed Hawks. A notation was made if an unoccupied nest appeared to be built by a Golden Eagle.

We also recorded locations of BTPD colonies (a significant raptor prey base) to assist future cooperative efforts to monitor prairie dog abundance and distribution. A

total of 181 BTPD colonies were recorded and located during raptor nest surveys. These locations are included with raptor nest locations in the Appendices.

As in past years, biases were noted during surveys that should receive consideration during future efforts or evaluations of results. Swainson's Hawk nests often deteriorate during the winter, and late arrival means that this species may be missed during surveys in late April or early May. Falcons cannot be adequately detected with fixed-wing aircraft surveys, and the absence of records for the four falcon species known to occupy habitats in northeast Wyoming should not be considered documentation that they do not occur in the survey areas. Adequate ground or helicopter surveys would be required for documentation of falcon nesting.

Table 1. Summary of 2002 raptor nest survey data on lands administered by the Bureau of Land Management.

Species Nest Status	Area B-1	Area B-2	Area B-3	Total
Bald Eagle				
INAC	3			3
OCCU/ACTI	7			7
Osprey				
INAC				
OCCU/ACTI	2			2
Swainson's Hawk				
INAC				
OCCU/ACTI		4		4
Red-tailed Hawk				
INAC				
OCCU/ACTI	56	15		71
Ferruginous Hawk				
INAC		8	2	10
OCCU/ACTI	1	3		4
Golden Eagle				
INAC	12	6	1	19
OCCU/ACTI	15	8		23
Prairie Falcon				
ACTI				
Great Horned Owl				
ACTI	3			3
Unknown				
INAC	134	34	2	170

LONG-BILLED CURLEW SURVEYS IN WESTERN WYOMING
COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS – Species of Special Concern
Long-billed Curlew

PERIOD COVERED: 15 April 2002 – 14 April 2003

PREPARED BY: Andrea Cerovski, Nongame Bird Biologist

INTRODUCTION

The purpose of the Long-billed Curlew surveys in 2002 was to provide an indication of curlew population trends in portions of their breeding range in Wyoming. Surveys were conducted along the same routes as in previous years so long-term monitoring of Long-billed Curlew populations can be accomplished in the Pinedale/Merna, Cody, and Jackson areas. Additional routes may be added if the need arises.

METHODS

Cochrane (1983) conducted roadside curlew surveys from 8 May to 19 July 1982, modifying the Breeding Bird Survey (BBS) technique (Robbins and VanVelzen 1967) to sample the greatest number of birds over the greatest distance (Cochrane and Oakleaf 1982). Surveys began 20 minutes before sunrise, with visual counts made every 0.8 km (0.5 mi) along the survey route using nine power binoculars. Curlews that were heard calling but that could not be located during the five-minute stop were excluded from the count, whereas those observed while driving between stops were included. Flocks were defined as groups of five or more individuals observed together.

In 1987, Cochrane's survey routes and methods were replicated. Since 1991, however, Long-billed Curlew survey methodology was modified to include both the number of curlews seen and heard to better represent the total number of curlews present along each route.

The number of stops on each route conducted in 2002 depended on the amount of suitable curlew habitat available to survey. As in past years, the Horse Creek survey route contained 17 stops, the New Fork route contained 9 stops, and the Chapman Bench route contained 10 stops. The Grand Teton National Park (GTNP) Hayfields route contained 23 stops; however, in past years, this route contained 20 stops but was modified in 1997 due to a washout of the Mormon Row Road and the likelihood that the

Ditch Creek crossing may never be repaired. The three additional stops were added to ensure that the route ended in the same place. Curlew surveys on the National Elk Refuge were discontinued due to lack of curlews on the survey route. Locations of each survey route have been reported in previous Nongame Completion Reports and are maintained in the Nongame files at the Department's Lander Regional Office.

Typically, two Long-billed Curlew surveys are conducted along the same routes that Cochrane surveyed in 1981 and 1982. During 2002, the Horse Creek survey was conducted on 30 May and 4 June, the New Fork survey on 31 May and 5 June, the Chapman Bench survey on 14 and 20 May, and the GTNP Hayfields survey on 28 and 30 May. The timing of all surveys was scheduled to coincide with the peak in curlew concentrations noted by Cochrane (1983). Surveys at the four sites were conducted in a similar manner to that of Cochrane (1983). The number of curlews seen at each stop, those that were heard but could not be seen, and those that were both seen and heard was all recorded. For each survey, results were converted to number of curlews seen per kilometer of road surveyed so data could be compared between-years for each route.

RESULTS

All Long-billed Curlew survey data (number of curlews seen and heard, and comments made during each survey) are located in the Nongame files at the Department's Lander Regional Office. The Horse Creek, New Fork, Chapman Bench, and GTNP Hayfields routes were each surveyed twice in 2002, with totals of 36 and 25, 6 and 6, 6 and 5, and 9 and 11 curlews recorded, respectively. The mean number of curlews recorded per km on each route is presented in Table 1. This includes curlews that were observed, those that were heard but not seen, and those that were both observed and heard, but does not include duplicate detections that may have occurred.

Twenty-two Breeding Bird Survey (BBS) routes have recorded curlews since 1968 when BBS routes were initiated in Wyoming; 14 of these routes were conducted in 2002 with a total of 5 curlews observed on 4 of the 14 routes (Table 2). Counts in previous years have fluctuated from a low of 1 curlew recorded on 1 of 15 routes completed in 1998, to a high of 19 curlews recorded on 8 of the 16 routes conducted in 1999.

DISCUSSION

Several factors must be considered when comparing survey results between years. Curlew counts vary from one survey to the next due to weather conditions affecting visibility, fluctuations in noise levels, and actual fluctuations in curlew numbers. Therefore, it is beneficial to conduct a minimum of two surveys along each route per year for a better indication of the presence of curlews. Also, starting in 1991, the number of curlews that were seen only, heard only, and those that were both seen and heard have been recorded on each route. When taking audio identification data into consideration, the number of curlews per km is higher than if visual identification alone is used.

Therefore, recording both audio and visual curlew observations better represents the actual number of curlews present along each route than either observation alone.

The number of curlews detected on BBS routes in Wyoming have also fluctuated, making it difficult to determine trends. In past years, significant declines in Long-billed Curlew populations have been reported. Some speculation may offer possibilities for this apparent decline. On some routes, changes in observers may have led to fewer or no curlews being heard, depending on the experience of each observer. To help minimize observer bias, one of the goals of the BBS program is to retain the same observer on each BBS route. Uncontrollable factors that occur while running BBS routes, such as reduced visibility and birds not calling or calling outside of hearing range, may also affect the number of curlews recorded.

ACKNOWLEDGEMENTS

The Nongame Program would like to acknowledge the following Department biologists for their valuable contributions to the 2002 Long-billed Curlew monitoring effort: Doug McWhirter, Larry Roop, and Doug Brimeyer.

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Table 1. Long-billed Curlew survey route results, 1987 and 1991-2002. [a]

Year	Horse Creek Route		New Fork Route		Chapman Bench Route		Grand Teton NP Hayfields Route	
	Number of Curlews Recorded	Curlews / km (mi)	Number of Curlews Recorded	Curlews / km (mi)	Number of Curlews Recorded	Curlews / km (mi)	Number of Curlews Recorded	Curlews / km (mi)
1987	11[b]	0.9 (1.4)	13[b]	2.0 (3.3)	----	----	----	----
1991	75[b]	5.8 (9.4)	25[b]	3.9 (6.3)	----	----	----	----
1992	53	4.1 (6.6)	7	1.1 (1.8)	26[b]	2.3 (3.7)	----	----
1993	65	5.1 (8.1)	5	0.8 (1.3)	14[b]	1.2 (2.0)	10[b]	0.6 (0.9)
1994	45	3.5 (5.6)	11	1.7 (2.8)	7[b]	0.6 (1.0)	----	----
1995	53[b]	4.1 (6.6)	12[b]	1.9 (3.0)	0[b]	0.0 (0.0)	19[b]	1.2 (2.0)
1996	113	8.8 (14.1)	17	2.6 (4.3)	7	0.6 (1.0)	3	0.2 (0.3)
1997	40	3.1 (5.0)	42	6.5 (10.5)	0[b]	0.0 (0.0)	7	0.4 (0.6)
1998	43	3.3 (5.4)	10	1.6 (2.5)	5	0.4 (0.7)	14	0.8 (1.3)
1999	39	3.0 (4.9)	10	1.6 (2.5)	3	0.3 (0.4)	13	0.7 (1.2)
2000	42	3.3 (5.3)	5	0.8 (1.3)	8	0.7 (1.1)	----	----
2001	32	2.5 (4.0)	8	1.2 (2.0)	0	0.0 (0.0)	12	0.7 (1.1)
2002	31	2.4 (3.9)	6	0.9 (1.5)	6	0.5 (0.9)	10	0.6 (0.9)

[a] If more than one survey was conducted, the average number of curlews recorded was used.
[b] Only one survey was conducted.

Table 2. Breeding Bird Survey data for Long-billed Curlews, 1980-2002. A blank indicates a year when a survey was not conducted. An asterisk identifies the routes most useful for monitoring this species.

Route #	Route Name	Year 19__/20___																							Route Total
		80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	
9	Dubois	0	0	0	0	0	0		0	0	0	1	0	0	0			0	0						1
15	Fontenelle			0	0	0			0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	2	5
28	Yoder	0	0	0				0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*33	Clark											0	2	3								4	1	0	10
*36	Moose	0	0	0	0	1	0	2	0	1	2	2	2	0	0	0	2	4	4	0	4	0		0	24
45	Recluse	0		0	0			0	0	0		2	1	3	0	0	0	0	0	0	0	0	2	1	9
48	Seely											2	0	0	0	0	0	0	0	0	0	0	0		2
67	Highlight	0	0	0	0				0		0	0	0	1		0									1
69	Newcastle									1	4	0		2	0	2	0	0	0	0	1	0	0		10
71	Soda Lake	0	0	0	0	0	0			0		0	3	1	0	0	0		0				0	0	4
*74	Boulder			0	2	2							0			0	0		0	0	3				7
*75	Big Sandy		0		0				0	2	7	5		3		6		8	0	0	3	1	5	0	40
76	Farson				1												0						0		1
82	Lamont								1	0	0	1	1	1	0	0	0	1	0	0	1	2	1	1	10
83	Pathfinder			1	0	0			0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	1
*89	Meadowvale				0	13	0				0	2	0	0		0	0								15
*90	Lusk			7	9	0			0	0	0	0	0	1	0	0	0			0	5	1	0	1	24
*93	Mountain View	11	10	9	5				0		0	0	0			0					0		0	0	35
150	Gov't. Valley													0	0	0	0	0	3	0	1	0	2	0	6
173	Ryegrass	1	0	0	0	1	0			1						0		0	0	0	0	1	0		4
195	Seedskadee	0	2	0	0	0		0						0	1	0	0	0	0	0	0		0	0	3
206	Caballa Creek													4	0	0	0	0	0	1	0	0	0	0	5
Total Observed/Year		12	12	17	17	17	0	2	1	7	14	15	9	19	1	8	2	13	7	1	19	9	11	5	218

BAT INVENTORIES USING ANABAT ULTRASONIC BAT DETECTOR COMPLETION REPORT

STATE OF WYOMING NONGAME MAMMALS – Species of Special Concern Bats

PERIOD COVERED: 15 April 12002 – 14 April 2003

PREPARED BY: Martin Grenier, Nongame Mammal Biologist

INTRODUCTION

Anabat ultrasonic bat detection equipment (Titley Electronics, New South Wales, Australia) was used to conduct nine bat surveys at eight locations in 2002. Two of the surveys on The Nature Conservancy (TNC) Tensleep Preserve were conducted by the Washakie Conservation District; however, calls recorded during the surveys were analyzed by the author and will be summarized in conjunction with Wyoming Game and Fish Department surveys. Survey locations were chosen based on the likelihood of encountering several species of bats and to survey in areas infrequently sampled during the 1994 – 1996 statewide bat survey of caves and abandoned mines.

The 1996 Nongame Bird and Mammal Plan lists management and survey objectives for bat species in the state including Species of Special Concern. For most bat species, the current range is incompletely mapped; therefore, a major objective for each species is to sample areas where occurrence is suspected but not verified. Anabat is a reliable, simple method for conducting this sampling. It has the advantage of being less labor intensive in the field than mist netting, and provides the ability to detect all species, including those not easily mist netted other than at roost sites. However, call analysis and species differentiation is time intensive.

METHODS

Sample locations were chosen to include one or more of the following: 1) areas where bat surveys had not previously been conducted, 2) areas where species specific information was needed for management purposes, 3) areas where bat species not previously documented for the State were suspected to occur, or 4) areas where bat surveys could be used for educational and training purposes.

The Anabat system offers two operational modes. In the active mode, the system is manned by a person who manually points the receiver to monitor all directions within range, and manually saves calls using the save button on the Anabat receiver. In the

passive mode, the system is placed in a closed container and set up in a sample area with the receiver pointed over the area that is expected to have the highest bat use. Normally this is over a stream or pond, but may be along a tree line or within a vegetation corridor used by bats. The passive Anabat has an automatic save capability which saves each sequence of calls approximately 5 seconds after the incoming signal terminates (O'Farrell 1998).

The monitoring period at each sample site differed depending upon several factors, including weather, bat activity, and survey objectives.

Description of Sample Sites

Quien Sabe Ranch – Fremont County – [T40N, R93W, S22]

The sample site was conducted on 2 August 2002 over a 0.4-0.8 hectare (1-2 acre) pond surrounded by sagebrush shrubland and cottonwood riparian habitats. The Quien Sabe Ranch is located approximately 20 km (12.4 mi) northeast of Shoshoni. The Passive Anabat survey was conducted from the northeast bank of the pond.

Prospect Mountain – Albany County – [T13N, R81W, S1]

The sample site was located in a mountain riparian corridor at the base of Prospect Mountain, approximately 25 km (15.5 mi) east of Encampment. Passive Anabat survey occurred on the evening of 8 August 2002.

Encampment River Campground – Carbon County – [T14N, R84W, S13]

The sampling site was located along the west bank overlooking the Encampment River, approximately 5 km (3.1 mi) from Encampment. The Passive Anabat survey was conducted on 9 August 2002 from the Encampment River Campground in a cottonwood riparian corridor.

Fence Creek Ranch – Sheridan County – [T58N, R77W, S27; T58N, R77W, S29; T58N, R77W, S23]

Three different sites were sampled on the Fence Creek Ranch: 1) Uphill from a 0.4-0.8 hectare (1-2 acre) pond located southwest of the ranch headquarters on 15 August 2002; 2) Over a 0.4-0.8 hectare (1-2 acre) pond located just north of the Fence Creek Ranch Road on 19 August 2002; and 3) A water trough south of the ranch headquarters on 20 August 2002. Active Anabat surveys were conducted at the first two sampling sites, while a Passive Anabat survey was conducted at the third. All sampling sites were dominated by a grassland/sagebrush community, while juniper woodland and coniferous forests dominated the larger surrounding area. The Fence Creek Ranch is located approximately 48 km (30 mi) north of Leiter.

TNC Tensleep Preserve – Washakie County – [T47N, R87W, S7]

The sample site was located along Canyon Creek below the foot bridge. Sampling occurred on 19 August and 14 September 2002. The Anabat was operated in Active Mode during the first half of the survey, then set to record in the Passive Mode. Both surveys were conducted in conjunction with mist net surveys. The Anabat was set parallel to the creek to sample over the water and adjacent streamside vegetation. Habitat at the site is riparian with scattered deciduous trees.

Outpost Mine – Fremont County – [T29N, R100W, S13]

The sample site was located on a landing approximately 30 m (98 ft) from the open adit of the mine. The habitat is mountain riparian. Passive Anabat monitoring occurred on the evening of 28 August 2002 and was part of a training exercise. The survey was terminated after forty minutes due to poor weather conditions.

Sample site data locations are summarized in Table 1.

RESULTS

Quien Sabe Ranch

The Passive Anabat survey was conducted in conjunction with mist netting adjacent to the pond. The survey was conducted from 2025 to 2235 hours. Six species of bats were detected (Table 2). Small-footed myotis (*Myotis ciliolabrum*) was most often recorded, followed by the western long-eared myotis (*M. evotis*) and then Townsend's big-eared bat (*Corynorhinus townsendii*). Survey time was 130 minutes. An additional 58 potential bat calls were recorded; however, species could not be determined due to poor quality of the calls and were deleted from the analysis.

Prospect Mountain

The Passive Anabat survey was conducted at the base of Prospect Mountain in Carbon County. The survey was conducted from 2015 to 2200 hours. Seven potential bat calls were recorded; however, species could not be determined due to poor quality of the calls. Survey time was 105 minutes.

Encampment River Campground

The Passive Anabat survey was conducted from 1920 to 2210 hours. Four species were detected (Table 3). Little brown bat (*M. lucifugus*) was the most often recorded species. Survey time was 230 minutes. An additional 146 potential bat calls were recorded; however, species could not be determined due to poor quality of the calls and were deleted from the analysis.

Fence Creek Ranch

15 August

The Active Anabat survey was conducted from 2020 to 2130 hours. Three species were detected (Table 4). The big brown bat (*Eptesicus fuscus*) was the species most often recorded, followed by the little brown bat (*M. lucifugus*). Total survey time was 70 minutes. An additional 16 potential bat calls were recorded; however, species could not be determined due to poor quality of the calls and were deleted from the analysis.

19 August

The Active Anabat survey was conducted from 2020 to 2120 hours. Four species were detected (Table 4). The little brown bat (*M. lucifugus*) was the species most often recorded, followed by the big brown bat (*E. fuscus*). One record of the long-legged myotis (*M. volans*) was also recorded. Total survey time was 60 minutes. An additional 55 potential bat calls were recorded; however, species could not be determined due to poor quality of the calls and were deleted from the analysis.

20 August

The Passive Anabat survey was conducted in the rain from 2025 to 0800 hours. Four species were detected (Table 4). The western small-footed myotis (*M. ciliolabrum*) was the species most often recorded, followed by the western long-eared myotis (*M. evotis*). Total survey time was 695 minutes. An additional 12 potential bat calls were recorded; however, species could not be determined due to poor quality of the calls and were deleted from the analysis.

The Nature Conservancy Tensleep Preserve

August 19th

The combination Passive and Active Anabat survey was conducted from 1855 to 2025 hours. Eight species were detected (Table 5). The little brown bat (*M. lucifugus*) was the species most often recorded species, followed by the western small-footed myotis (*M. ciliolabrum*). The pallid bat (*Antrozous pallidous*) was also recorded four times. Total survey time was 90 minutes. An additional 55 potential bat calls were recorded; however, species could not be determined due to poor quality of the calls and were deleted from the analysis.

14 September

The combination Passive and Active Anabat survey was conducted from 1945 to 2110 hours. Eight species were detected (Table 5). The little brown bat (*M. lucifugus*) was the species most often recorded species, followed by the western small-footed myotis (*M. ciliolabrum*). Total survey time was 95 minutes. An additional 58 potential bat calls

were recorded; however, species could not be determined due to poor quality of the calls and were deleted from the analysis.

Outpost Mine

The Passive Anabat survey was conducted from 1925 to 2015 hours and was part of a training exercise. Seven potential bat calls were recorded; however, species could not be determined due to poor quality of the calls and were deleted from the analysis. Survey time was 45 minutes.

DISCUSSION

Due to lack of comparative data for Wyoming and potential observer bias during active surveys, few inferences can be made from the data collected in previous years. However, all eight species detected at the Tensleep Preserve along Canyon Creek during the Anabat surveys in August 1999 (Luce 2000) were also detected during the August 2002 surveys.

Anabat has proven to be an accurate and time efficient method of sampling for bats to establish presence/absence of individual species. Anabat will be used at selected locations in 2003 and subsequent years to document the bat species present. The data will be used to establish current distribution and address range and distribution objectives for the 18 bat species that are known to occur in Wyoming as listed in the 1996 Nongame Bird and Mammal Plan (Oakleaf et al. 1996).

ACKNOWLEDGMENTS

B. Luce provided training on use of the Anabat and continues to provide assistance on analysis of calls to determine bat species. C. Agee provided calls from the Tensleep Preserve. The following Wyoming Game and Fish Department personnel assisted with some of the surveys: A. Carpenter, M. Martin, M. Purcell, and J. Stephens. We would also like to thank the Fence Creek Ranch for providing access during the surveys. Thanks to H. Cooper for volunteering during many of the surveys.

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Table 1. Locations of Anabat surveys conducted in Wyoming in 2002.

Location	County	Legal Description
Encampment River	Carbon	T14N, R84W, S13
Fence Creek Ranch	Sheridan	T58N, R77W, S27
Fence Creek Ranch	Sheridan	T58N, R77W, S29
Fence Creek Ranch	Sheridan	T58N, R77W, S23
Outpost Mine	Fremont	T29N, R100W, S13
Prospect Mountain	Carbon	T13N, R81W, S1
Quien Sabe Ranch	Fremont	T40N, R93W, S22
Tensleep Preserve	Washakie	T47N, R87W, S7

Table 2. Number of calls per bat species recorded by Passive Anabat at the Quien Sabe Ranch on 2 August 2002.

Bat Species	Number of Calls
Corynorhinus townsendii	7
Eptesicus fuscus	1
Myotis ciliolabrum	22
Myotis evotis	8
Myotis lucifugus	5
Myotis volans	3
Total	48

Table 3. Number of calls per bat species recorded by Passive Anabat at the Encampment River Campground on 9 August 2002.

Bat Species	Number of Calls
Myotis ciliolabrum	2
Myotis lucifugus	39
Eptesicus fuscus	2
Myotis evotis	2
Total	45

Table 4. Number of calls per bat species recorded by Active and Passive Anabat at the Fence Creek Ranch in 2002.

Bat Species	Number of Calls		
	15 August	19 August	20 August
Eptesicus fuscus	73	34	2
Myotis ciliolabrum	14	6	7
Myotis lucifugus	28	45	5
Myotis evotis	0	0	6
Myotis volans	0	1	0
Total	115	86	20

Table 5. Number of calls per bat species recorded by Active and Passive Anabat at the Tensleep Preserve in 2002.

Bat Species	Number of Calls	
	19 August	14 September
Antrozous pallidous	4	0
Eptesicus fuscus	4	18
Lasiurus cinereus	6	4
Lasionycteris noctivagans	4	18
Myotis ciliolabrum	17	17
Myotis evotis	5	6
Myotis lucifugus	20	21
Myotis volans	2	14
Total	62	98

BLACK-TAILED PRAIRIE DOG INVENTORY AND MONITORING IN WYOMING, AND ACTIVITY STATUS OF COLONIES COMPLETION REPORT

STATE OF WYOMING NONGAME MAMMALS – Species of Special Concern
Black-tailed Prairie Dog

PERIOD COVERED: 15 April 2002 – 14 April 2003

PREPARED BY: Bob Oakleaf, Nongame Coordinator
Martin Grenier, Nongame Mammal Biologist
Tom Maechtle, Nongame Biologist

INTRODUCTION

Recent concern over the population status and trends of black-tailed prairie dogs (U.S. Fish and Wildlife Service 2000, Van Pelt 1999) has prompted the Wyoming Game and Fish Department (Department) to plan for more complete inventories and intensive monitoring programs. Oakleaf et al. (2002) provided an evaluation of available inventory techniques and approaches. Prairie dog population status and trends are commonly quantified by the number of acres or hectares occupied by mounds and burrow systems of prairie dog colonies. Such indicators, however, may persist for years following the removal of prairie dogs by control efforts or a natural event such as an epizootic of sylvatic plague. Therefore, acres or hectares of colonies are often further classified as active or inactive (Sidle et al. 2001). Corresponding with the Department's commitment to map and quantify acreage of prairie dog colonies in the state, we initiated efforts to document the percentages of colonies that are active and inactive. Currently, we are mapping prairie dog towns from color infrared aerial photographs taken at a scale of 1:40,000. Our intent is to locate, map, and quantify all of the colonies that were present during completion of the aerial infrared photography project in 2001/2002, and to sample a significant portion of the mapped colonies during 2002/2003 so that a statewide estimate of active and inactive acres of prairie dogs can be calculated.

The purpose of this report is to detail protocol to determine activity status of black-tailed prairie dog colonies and present results of preliminary sampling of known colonies. The Federal Wildlife Conservation and Recreation Program appropriations, U.S. Fish and Wildlife Service (USFWS) Section 6, and matching Department expenditures provided funding for this project. The U.S. Forest Service (USFS) and University of Wyoming Cooperative Fish and Wildlife Research Unit assisted with ground surveys during summer 2002.

METHODS

Originally, we anticipated that sampling prairie dog colonies by flying to known locations of colonies and using criteria reported in Sidle et al. (2000) would quickly and cost effectively resolve any questions relevant to activity status (e.g. colonies are active if prairie dogs, fresh excavations, a lack of vegetation on burrow mounds, or extensive bare ground was observed, and inactive if colonies consisted of burrows and adjacent mounds that were heavily vegetated). However, these characteristics were not readily apparent during evaluations of aerial transects conducted in summer 2001 (Oakleaf et al. 2002). These criteria might be of limited use during drought conditions or seasonally restricted to specific times of the year early in the growing season and prior to grazing by livestock or native ungulates. We were also concerned that such criteria might be sensitive to observer experience and training. In addition, we were quickly confronted with lack of an adequate definition for classifying a colony as active or inactive. Therefore, we initiated studies to determine the effectiveness of surveys during different seasons and weather patterns from winter through summer 2002. GPS units and UTMs (NAD 27) of known colonies were used to locate survey sites and record locations of colonies that had not been previously documented. We also established survey protocol and developed working definitions for active and inactive colonies before initiating surveys to document the activity status of colonies.

We conducted both ground and aerial observations of colonies with known activity status from January through August, 2002. Initially, we targeted days following a snow cover when prairie dog activity and fresh excavations were assumed to be readily detectable against snow cover. A Piper Super Cub and Cessna 210 were used during aerial surveys. We attempted several different flight patterns, air speeds, and elevations during aerial observations of colonies that were known to be occupied by prairie dogs and colonies known to have received control efforts or impacted by a sylvatic plague epizootic. Additional experience and locations of black-tailed prairie dog colonies were obtained during May while conducting aerial surveys for nesting raptors over much of the same areas where prairie dog inventories are scheduled. We initiated surveys to begin systematic sampling of colonies for activity status in June of 2002 with established protocol based on previous observations in May and early June.

In an effort to help explain the percentage and distribution of inactive colonies, we also contacted County Weed and Pest Districts to obtain information on the distribution of toxicants used to control prairie dogs.

RESULTS

During winter and spring of 2002, only two days (23 January and 1 February) of extensive snow cover occurred with favorable weather for aircraft operations when pilots, observers, and aircraft were available. We conducted observations from fixed wing aircraft of 65 colonies during these two days. Prairie dogs or fresh diggings were observed at 36 (55%) of the colonies, and no indication of prairie dog activity was recorded at 29 (45%) of the colonies. Twenty of these colonies that were originally recorded as not active were surveyed during the summer with 15 (75%) of the 20 inactive colonies being reclassified as active, suggesting that aerial surveys during the winter would be strongly biased toward underestimating the percentages of active colonies.

General observations of active colonies that we visited on a frequent basis indicated that prairie dog activity began increasing in late February and continued to increase through June and July as young emerged and became active above ground. We also observed daily activity patterns indicating prairie dogs were most active after 0930 and during mild weather conditions. Continued observations through May indicated inactive towns displayed specific vegetative characteristics as reported by Sidle et al. (2001) if not heavily grazed by ungulates or livestock. We also learned that low and landing like approaches caused predator avoidance behavior among prairie dogs, making them difficult to observe; while aerial observations at 100 m (328 ft) above ground and from the periphery of colonies allowed for prairie dogs to be more readily observed than more distant observations at 200-300 m (656-984 ft) flights above ground. These findings allowed us to develop survey protocol as follows and were directly applied to inventory efforts reported in this report.

Ground surveys should be conducted June through August. Observations of colonies should avoid extremes in weather and focus on hours between 1000 and 1800. A colony should be classified as active if prairie dogs are observed distributed over 50% of the colony. Conversely a colony should be considered inactive if prairie dogs are noticeably absent from over 50% of the colony. Care should be taken not to attempt classification of a colony that is actively being hunted by avian predators or receiving heavy shooting activity either during or proximate to classification efforts.

Biologists conducting aerial surveys to document the activity status of prairie dog colonies need to pay specific attention to details. Aerial surveys should not be initiated until well into the growing season but before grasses mature. Most years, this will result in surveys being conducted in June and the first half of July. Towns known to be active and inactive should be compared on a weekly basis during surveys to assure observers are familiar with phenology of plant growth and recognize the difference in appearance of vegetation on colonies that are being actively clipped by prairie dogs and towns without prairie dog activity. Aerial observations of the colony should be conducted by flying the perimeter at approximately 100 m (328 ft) above ground. Prairie dogs will be considered absent if mounds and burrows have vegetation growing in them and fresh diggings or prairie dogs are not observed. The colony will be considered inactive if these conditions persist over 50% of the colony. The presence of prairie dogs will be indicated by fresh

diggings; lack of vegetation on mounds, in burrows, and over extensive areas within the colony; and certainly, actual observations of prairie dogs. The colony will be classified as active if prairie dogs or indicators of their presence are distributed over 50% of the colony.

Results of surveys conducted after protocols were established are presented in Table 1 and Figures 1 and 2. We conducted aerial surveys of 16 different colonies in the Thunder Basin National Grassland (TBNG) on 10 June. All 16 colonies were classified as inactive. We surveyed 47 additional colonies from the ground in the TBNG area and recorded only 5 (11%) as active. Ground surveys throughout additional areas in eastern Wyoming classified 116 colonies that could be observed from public roads. At least 73 (63%) of these colonies were active. Aerial surveys were used to classify 137 colonies with known locations from 17 – 22 June. We classified 78 (57%) of these colonies as active, while 59 (43%) were determined to be inactive. In addition, we did not locate colonies at 11 previously logged locations and are not sure as to whether location data were incorrect or burrow systems had disappeared. We also flew known colony locations in Sheridan and Johnson Counties from 8 – 11 July following rain showers that allowed for fresh diggings around burrows to be readily observed from the air. We surveyed 87 colonies and determined that 57 (66%) were active and 30 (34%) colonies were inactive. The combined results of all surveys provided a total of 403 colonies surveyed with 213 (53%) classified as active. If we exclude results of surveys in TBNG where an ongoing sylvatic plague epizootic has been well documented, 208 (61%) of 340 colonies were classified as active.

Data provided by County Weed and Pest Districts are provided in Table 2. Results indicate that sales of toxicants greatly increased between 2000 and 2001, especially in counties such as Campbell, Weston, and Niobrara. Statewide sales of Zinc Phosphate increased from 8,031 to 63,007 pounds of treated oats and Aluminum Phosphine Fumotoxin sales increased from126 flasks to 713 flasks. Trends for 2002 appear to also be on the increase for most counties. However, at least two counties, Converse and Niobrara, reported a decline in sales in 2002. At least three counties have reported that toxicant application is limited to controlling prairie dog expansion. Several other counties have reported that the Weed and Pest Control within their county has authorized widespread application of toxicants to eliminate black-tailed prairie dogs. The Department plans to contact the same County Weed and Pest Districts in early 2003 for a summary of the 2002 final sales.

DISCUSSION

Ground surveys were relatively straight - forward and readily classified the activity status of black-tailed prairie dog colonies during spring and summer months. However, access limitations precluded observations of many towns. Therefore, surveys that relied entirely on ground efforts could be heavily biased toward public lands and associated management, while possibly not presenting an accurate picture of the statewide population status and trends on private lands.

Aerial surveys appeared to provide a cost effective approach to rapidly classify a wide spread and large number of colonies during preferred conditions and seasons. Flights during winter months were least informative while flights in June and July produced the most information on activity status of colonies. Originally we felt that snow cover would facilitate the detection of prairie dogs from fixed wing aircraft. However, continued drought conditions resulted in Sheridan and Johnson counties being only rarely snow covered. A pattern emerged where, on the few occasions when snowfall would accumulate [usually <5 cm (2 in.)], it was quickly followed by high wind developing into Chinooks, thus melting the snow before a flight could be safely conducted. Conditions were suitable for only two days during 2002 to test this approach and both days were during the winter when prairie dog activity was highly variable. Perhaps surveys during snow cover in March or April would have provided different results. In fact, results and conclusions of our evaluations during 2002 may vary if repeated during years with average precipitation patterns.

June through early July flights appeared preferable to other months because prairie dog young have emerged and are beginning to forage above ground. Increased numbers and the presence of naive young improve the likelihood of actually observing prairie dogs during aerial surveys. Soil conditions generally show more signs of excavation during early summer because of relative moisture in the ground. Increased growth of forbs and grasses during the peak of the growing season (especially in areas not being grazed by livestock or large numbers of pronghorn) can also be used as an indicator of whether prairie dogs are not present and foraging in high numbers. However, we believe it is absolutely essential that biologists conducting aerial surveys frequently observe colonies known as active and inactive in the vicinity of survey areas. Observers should stay familiar with soil moisture conditions, plant composition, and phenology.

During the summer of 2002, we classified the activity status of 403 black-tailed prairie dog colonies. Only 213 (53%) were classified as active. Additional colonies will be classified in 2003 and results used to establish baseline levels for comparisons in future years. However, it is important to note that percentages of active and inactive colonies cannot be compared to previous surveys due to ambiguous definitions of active colonies. For example, according to methods in Sidle et al (2001), a 40 ha (100 ac) colony could be classified as active even if only one family of prairie dogs occupied it. In this study, prairie dogs or activity indicators had to be present over 50% of the colony before it could be classified as active or conversely indicators that prairie dogs were not present had to be observed over 50% of the colony before being classified as inactive.

We chose the 50% level because most of the colonies we had observed were either far below or far above the 50% level. We felt comfortable that estimates of below or above 50% were likely to be accurate, while aerial classifications of a finer resolution may not be relevant to actual conditions. In addition, it seems likely that colonies with activity levels below 50% were likely being impacted by control efforts, an epizootic, or other natural event.

Totals including TBNG may be somewhat biased, as the ongoing sylvatic plague epizootic was well known and we did not attempt to proportionally sample known problem areas with unknown areas. Therefore, we also presented totals without TBNG, which somewhat improves results (340 colonies were surveyed and 208 (61%) were classified as active). As results show, inactive colonies may not be distributed independently of other inactive colonies and, therefore, could present a challenge for developing a statistically acceptable sampling scheme. For example, the large clumping of inactive colonies in the adjacent corners of Campbell, Weston, Converse, and Niobrara Counties are credited to an ongoing sylvatic plague epizootic. On the TBNG, the U.S. Forest Service estimates that 6,475 of an original 8,500 ha (16,000 of 21,000 ac) of prairie dogs have been lost (C. Lockman, U.S. Forest Service, personal communication). East of the TBNG clumping is another apparent clumping of inactive colonies where results in distribution of toxicants and reports of a coordinated control campaign suggest a rather wide spread and effective eradication campaign. Based on the amount of toxicant sold, standard application rates and an average burrow density of 27 burrows per acre, approximately 28,330 to 40,470 ha (70,000 to 100,000 ac) of black-tailed prairie dogs may have been the focus of recent control efforts. Although some of the toxicant may have been stockpiled for future use, we currently have no means of documenting actual application rates or effectiveness of control efforts.

We recommend that statistical evaluations of results this year and design of an adequate sampling scheme be completed prior to inventories in 2003. Future sampling and survey design especially needs to consider the nonrandom and clumped distribution of inactive colonies. Sampling schemes also need to consider that if we only monitor known colonies and do not include newly established colonies, activity ratios can only decrease. Future monitoring should also attempt to document colonies that are being impacted by sylvatic plague or control efforts. Studies to more adequately quantify peak periods of prairie dog activity would benefit survey design. Ongoing surveys should also continue to evaluate effects of precipitation on monitoring results.

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Table 1. Activity status of black-tailed prairie dog colonies in Northeastern Wyoming during 2002[a].

Survey Type	Survey Dates	Total Colonies	Active N(%)	Not Active N(%)
Ground of Thunder Basin	Aug.	47	5(11)	42(89)
Aerial Thunder Basin	10 June	16	0(0)	16(100)
Ground of Eastern WY	Aug	116	73(63)	43(37)
Aerial of Eastern WY	17-21 June	137	78(57)	59(43)
Aerial of Sheridan & Johnson Cos.	8-11 July	87	57(66)	30(34)
Total		*403*	*213(53)*	*190(47)*
Total w/o Thunder Basin		*340*	*208(61)*	*132(39)*

[a]Colonies were classified as active if prairie dogs occupied over 50% of the colony based on protocol criteria presented in the Methods section. Repeated visits to the same colony were not included in totals or calculations.

Table 2. Summary of toxicants sold by county weed and pest control districts in Wyoming during 2000 and 2001.

	2000		2001	
County	Zinc Phosphate[b] Pounds of Oats	Fumotoxin (Flasks)	Zinc Phosphate[b] Pounds of Oats	Fumotoxin (Flasks)
Campbell	3,018	N/A	17,158	N/A
Weston	<330	N/A	11,385	N/A
Sheridan	858	312[a]	885	220[a]
Johnson	combined with 2001		29,139	409
Natrona	1,750	17	1,415	25
Converse	878	33	463	82
Goshen	0	28	0	63
Niobrara	963	23	2,380	72
Platte	233	25	182	59
Total	*8,030*	*312[a] / 126[c]*	*63,007*	*220[a] / 713[c]*

[a] Sheridan County utilizes Phosfume as fumotoxin. Treatment Area: approximately 37.03 acres / 6 Cans = 1,000 BTPD holes.

[b] Zinc Phosphate Oats Treatment Area: 1 - 1 ½ lbs of bait per acre or "3 finger pinch" per hole.

[c] Aluminum Phosphine Fumotoxin. Treatment Area: 1 Flask = 4.63 - 9.26 acres / Flask (weather dependent). 1 Flask = 500 Pellets; application is 2-4 Pellets per BTPD hole.

NOTE: Literature density reports 14 - 101 burrows per acre for BTPD (Hoogland 1996). Thunder Basin National Grasslands average 27 burrows per acre (1990, 1997, 2002).

2002 Active BTPD Towns

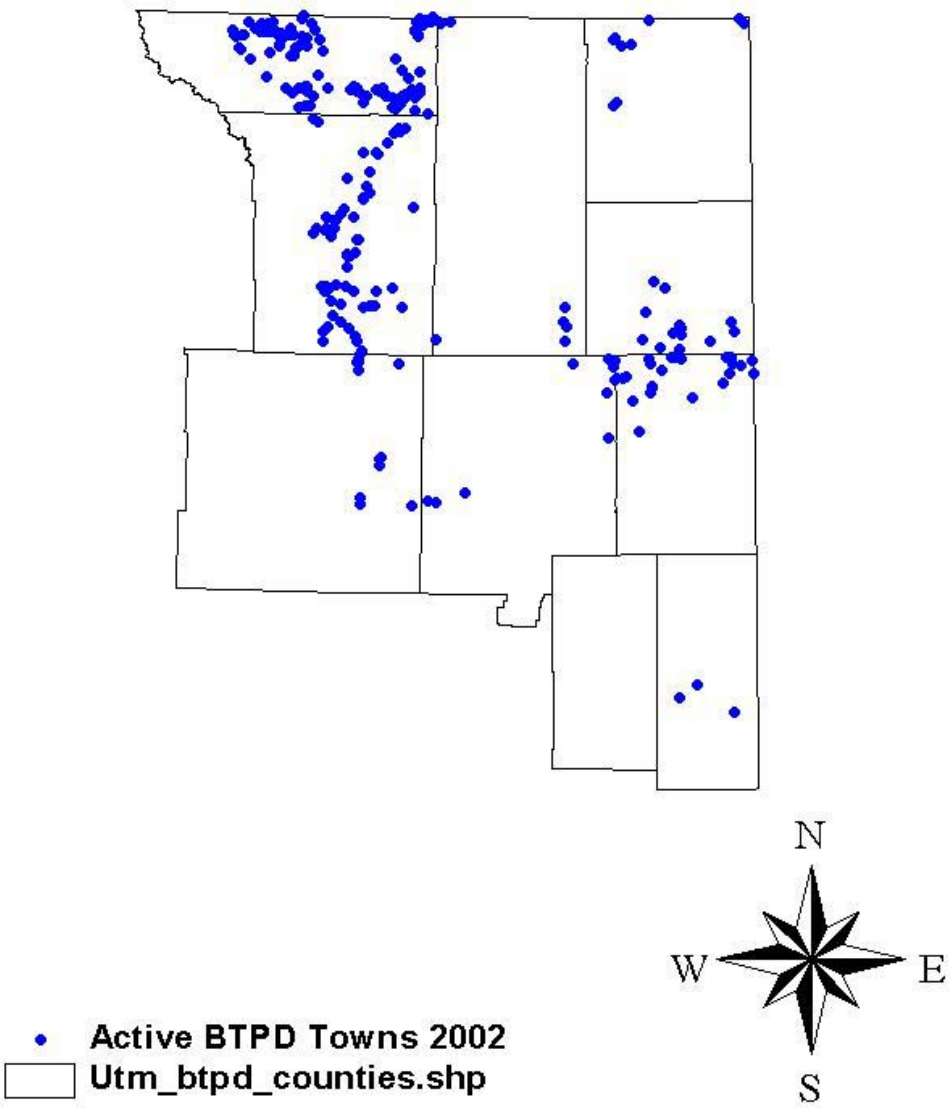

Figure 1. Black-tailed prairie dog colonies classified as active.

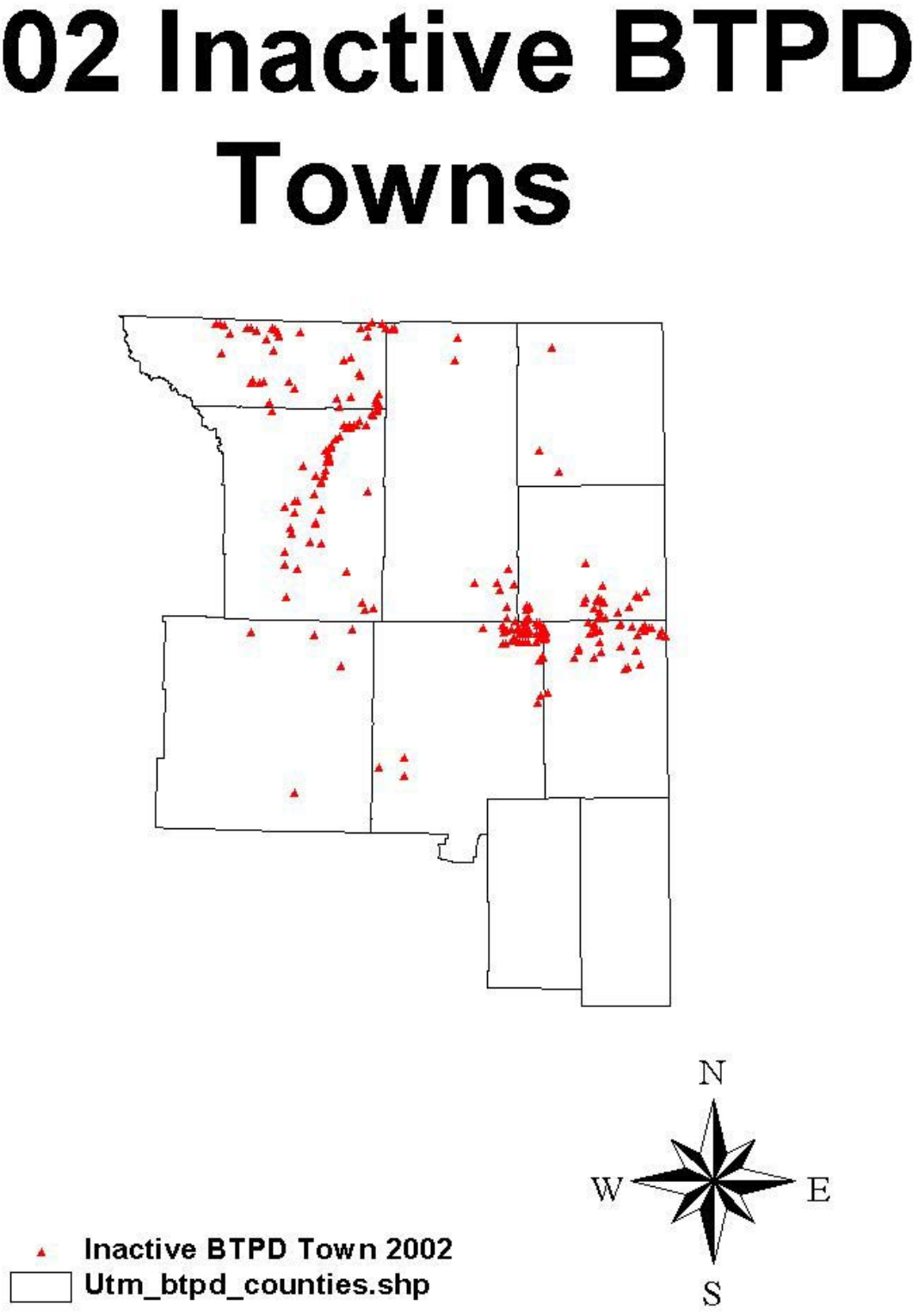

Figure 2. Black-tailed prairie dog colonies classified as inactive.

WYOM ING SWIFT FOX COMPLETION REPORT

STATE OF WYOMING NONGAME MAMMALS – Species of Special Concern
Swift Fox

PERIOD COVERED: 15 April 2002 – 14 April 2003

PREPARED BY: Martin Grenier, Nongame Mammal Biologist
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INTRODUCTION

The purpose of the distribution surveys conducted in 1999, 2000, and 2001 were to document recent locations of swift fox (*Vulpes velox*) in Wyoming**.** Baited track plates placed in a continuous transect up to several miles long with a track plate spacing of 1.6 km (1 mi) between plates was found to be the most effective method for documenting swift fox in areas with potential habitat but unknown population status (Dieni et al. 1997). To establish transect locations, suitable areas of swift fox habitat were determined and randomly selected sections [2.6 km^2 (1 mi^2)] within the areas identified (Olsen et al. 1999).

Surveys to develop baseline transects for monitoring long-term population trends were initiated in 2001. These trend surveys occurred in locations documented to have swift fox during the 1999 and 2000 distribution surveys. Survey methods previously developed were used (Olson et al. 1999). Transects for monitoring population trend utilized a more intensive survey method (five track plates at a spacing of 0.8 km (0.5mi) between plates). Approximately 20 transects will be surveyed in each of three geographic regions with each transect no closer than 7 km (5 mi) to another. The method is based on previous findings and estimates that there is an 88% probability that a swift fox will be detected if it occupies an area.

According to Woolley et al. (1995), the current population occurs primarily in three geographic regions: Region 1) Laramie Valley and Shirley Basin in Albany and Carbon counties; Region 2) Southeastern Plains – parts of Laramie, Platte, and Goshen counties; and Region 3) Powder River Basin - parts of Converse, Natrona, Weston, and Niobrara counties. Surveys were conducted in the Laramie Valley and Shirley Basin areas in 1999. The Regions 2 and 3 were surveyed in 2000 and 2001.

Future trend surveys will be completed on an annual basis with the cooperation of Turner Endangered Species Fund (TESF), while the swift fox translocations to Bad River

Ranch, South Dakota are on going (3-5 years). Following the translocation effort, surveys will then be scaled back to once every three years to monitor long-term swift fox trends.

METHODS

Track plates were made of 16-gauge sheet steel, measured 61 cm x 61 cm (2 ft x 2 ft) painted with two coats each of gray primer and gray paint. A one-gallon weed sprayer was used to coat the plates with talc/carpenter's chalk and ethyl alcohol mixture; the ratio used was 1 cup talc : 1.5 cups carpenter's chalk : 1 gallon 95% ethyl alcohol. This mixture will prepare 40-50 plates. Approximately 15g (0.5 oz) of stirred jack mackerel were placed in the center of the plate as an attractant. Plates were spaced 0.8 km (0.5 mi) apart within public road easements where tracks could be observed without requiring private land access. Track plates were placed along an existing fence if one was present. When a fence was not present, plates were placed 10 to 25 m (33 to 82 ft) from the centerline of the road.

Flagging marked locations of plates and a GPS location in UTM coordinates were recorded for all track plates in each transect. Transects were observed for a maximum of six days, but monitoring ceased the day after swift fox presence was confirmed. This method is designed to detect declines in the population under the assumption that there is an 88% chance that a fox will remain in or return to the same area from one year to the next (Olson et al. 1998). During periods of heavy rain and snow plates were left in place for up to two additional nights. If rain or snow persisted for more than two nights, the survey effort was abandoned and postponed until favorable weather conditions returned.

Eastern Wyoming was divided into three Study Regions encompassing 10 counties: Study Region 1 – portions of Albany and Carbon Counties; Study Region 2 – portions of Goshen and Laramie Counties; and Study Region 3 – portions of Campbell, Johnson, and Niobrara Counties (Woolley et. al 1995).

Tracks of swift fox were identified utilizing Grenier and Van Fleet (2002), recorded, and lifted for future reference and measurements with 2-inch clear packing tape. In some cases, clear contact paper was used to preserve an entire track plate for future use in identifying tracks. Plates were cleaned with a stiff brush or steel wool before reuse.

Baseline transects used during the 2001 trend monitoring survey were those locations with positive identification of a swift fox track on a track plate during the 1999 and 2000 surveys or known den sites. Recorded den sites along roads were used as center locations for baseline transects. Short and mixed grass prairies mostly devoid of heavy shrub coverage characterized areas where swift fox were most commonly found. Selection of survey routes took into account accidental swift fox observations made by USDA -Wildlife Services, Wyoming Game and Fish Department (Department), and Wyoming Cooperative Fish and Wildlife Research Unit personnel.

RESULTS

Surveys were completed in 3 Study Regions and 10 counties in eastern Wyoming (Study Region 1 – portions of Albany and Carbon Counties) (Study Region 2 – portions of Goshen and Laramie Counties) and (Study Region 3 – portions of Campbell, Johnson, and Niobrara Counties). The 2002 inventory was completed utilizing a field crew of eight personnel. The Department and the TESF each provided four personnel. The survey totals for all regions combined are as follows: 1,411 track plate nights; 150.5 miles surveyed; swift fox detections at 25 of 63 locations; and a minimum of 56.4 track plate nights required to detect swift fox (Table 1).

Study Region 1: Prior to the initiation of the survey, there existed 18 recent locations/sightings. Swift fox were detected at 16 of the 18 (89%) locations. A total of 245 track plate nights were utilized. A minimum of 15.3 track plate nights (3.1 survey nights) were required to detect swift fox.

Study Region 2: Prior to the initiation of the survey, there existed 17 recent locations/sightings. Swift fox were detected at only 5 of the 17 (29%) locations. A total of 420 track plate nights were utilized. A minimum of 84 track plate nights (16.8 survey nights) were required to detect swift fox.

Study Region 3: Due to small sample sizes of 13 locations in Study Region 3 prior to the 2002 monitoring effort, additional effort was spent on establishing new survey routes, between 2 and 7 new locations, in 2002.

A total of 13 known swift fox locations were utilized and swift fox were detected at 4 of the 13 (31%) locations. A total of 334 track plate nights were utilized. A minimum of 43 track plate nights (10.8 survey nights) were required to detect swift fox.

An additional 15 transect routes with a combined 412 track plate nights were run in Study Region 3 in 2002. The additional 87.7 km (54.5 mi) of new routes failed to detect swift fox.

DISCUSSION

Surveys for swift fox in 1999 and 2000 were designed to establish a sufficient sample size (15 to 20 locations) of occupied swift fox locations to serve as transect locations for monitoring population trends. In Study Region 3, however, we have had difficulties locating additional survey routes in all survey years 1999-2002; therefore, in future surveys only the existing 13 routes will be utilized.

Overall for 2002, the detection percentage for all regions declined from 77% (37 of 48) to 52%(25 of 48) (Fig. 1). Detections in Study Regions 2 and 3 declined in 2002 from 14 of 17 (82%) to 5 of 17 (29%) and 9 of 13 (69%) to 4 of 13 (31%), respectively,

from the 2001 survey (Fig. 2). Study Region 1, however, increased from 14 of 18 (78%) to 16 of 18 (89%) detections in 2002 (Fig. 2.).

When compared to the results of 2001 (Table 2), it is unclear if the declines recorded in 2002 in Study Regions 2 and 3 are indicative of true declines or are a one-year anomaly. For example, although in Study Region 2 we observed a decline in detections of swift fox along the survey routes, captures of swift fox by TESF in different target areas within the same Study Region indicate that swift fox are quite abundant within the study area. There exist five possible hypothesis for these observations in 2002: 1) location of survey routes may bias detection rates; 2) non-target species maybe negatively effecting swift fox detections; 3) development in Region 2 (Natural Resources) and Region 3 (Urbanization) maybe fragmenting existing swift fox habitat; 4) technique is only applicable in Study Region 1 where it was developed; and 4) any combination of the above.

Non-discreet detections for non-target species in 2002 nearly doubled from the previous year, with nearly a tri-fold increase in Region 3. The number of detections increased from 99 to 167 for all Study Regions combined (Fig. 3). In Study Regions 2 and 3 at least three non-target species comprised the bulk of those detections: stripped skunk; domestic cat; and raccoon (Table 3). These species comprised 61% and 91% of the number of non-target detections in Study Regions 2 and 3 respectively in 2002. As compared to Study Region 1 where stripped skunk, domestic cat, and raccoon comprised only 22% of non-target species. Red fox and coyote were detected most often and comprised 78% of the non-target species detections in Study Region1 as compared to 21% and 5% in Study Regions 2 and 3, respectively.

The increase in non-target species, primarily stripped skunk, domestic cat, and raccoon, detections suggest that the habitat in Study Regions 2 and 3 may be changing. Historically, stripped skunk, domestic cat, and raccoon were not associated with prairie grassland systems and are more closely associated with human disturbances. Further investigation and, possibly, alternate survey techniques are warranted to determine swift fox population trends in Study Region 2 and 3.

ACKNOWLEDGEMENTS

Special thanks to G. Graham, K. Honness, K. Kunkel, P. James, and M. Metz of Turner Endangered Species Fund, for their assistance in conducting surveys in Region 2.

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Table 1. 2002 swift fox survey results.

Study Region	County	Total # Transects Run	Total # Track Plates	Ave # of Plates/ Transect	Total # Nights Run	Total # of Track Plate Nights	Total Miles of Transects	Previous Swift Fox Locations	2002 Transect Detections
1	Albany	12	60	5	38	190	24	11	11
	Carbon	6	30	5	11	55	12	7	5
	Total	*18*	*90*	*5*	*49*	*245*	*36*	*18*	*16*
2	Goshen	8	40	5	45	225	16	8	0
	Laramie	9	45	5	39	195	18	9	5
	Total	*17*	*85*	*5*	*84*	*420*	*34*	*17*	*5*
3	Campbell	9	47	5.2	1	227	19	8	1
	Converse	8	75	9.4	31	262	33.5	0	0
	Niobrara	11	67	6.1	44	257	28	5	3
	Total	*28*	*189*	*6.75*	*76*	*746*	*80.5*	*13*	*4*
Total (all regions)		*63*	*364*	*16.75*	*209*	*1411*	*150.5*	*48*	*25*

Table 2. 2001 swift fox survey results.

Study Region	County	Total # Transects Run	Total # Track Plates	Ave # of Plates/ Transect	Total # Nights Run	Total # of Track Plate Nights	Total Miles of Transects	Previous Swift Fox Locations	2002 Transect Detections
1	Albany	12	60	5	36	180	24	12	9
	Carbon	6	30	5	17	85	12	6	5
	Total	*18*	*90*	*5*	*53*	*265*	*36*	*18*	*14*
2	Goshen	17	205	12.1	73	646	231	8	5
	Laramie	15	154	10.3	27	310	68	9	9
	Total	*32*	*359*	*11.2*	*100*	*956*	*299*	*17*	*14*
3	Campbell	10	58	5.8	40	230	24	8	4
	Converse	4	76	19.0	19	335	36	0	0
	Niobrara	6	92	15.3	15	216	43.5	5	5
	Total	*20*	*226*	*11.3*	*74*	*781*	*103.5*	*13*	*9*
Total (all regions)		*70*	*675*	*27.5*	*227*	*2002*	*438.5*	*48*	*37*

Table 3. Non-target species detection percentages in eastern Wyoming.

Species Code [a]	Region 1		Region 2		Region 3	
	2001	2002	2001	2002	2001	2002
CAFA	0	0	0	21%	0	0
CALA	32%	28%	6%	11%	0	1%
FECA	32%	22%	52%	39%	47%	35%
MEME	4%	0	36%	16%	5%	46%
PRLO	7%	0	6%	0	45%	10%
TATA	11%	0	0	16%	3%	4%
VUVU	14%	50%	0	11%	0	5%

[a] Species Code: CAFA = Domestic Dog
CALA = Coyote
FECA = Domestic Cat
MEME = Stripped Skunk
PRLO = Raccoon
TATA = Badger
VUVU = Red Fox

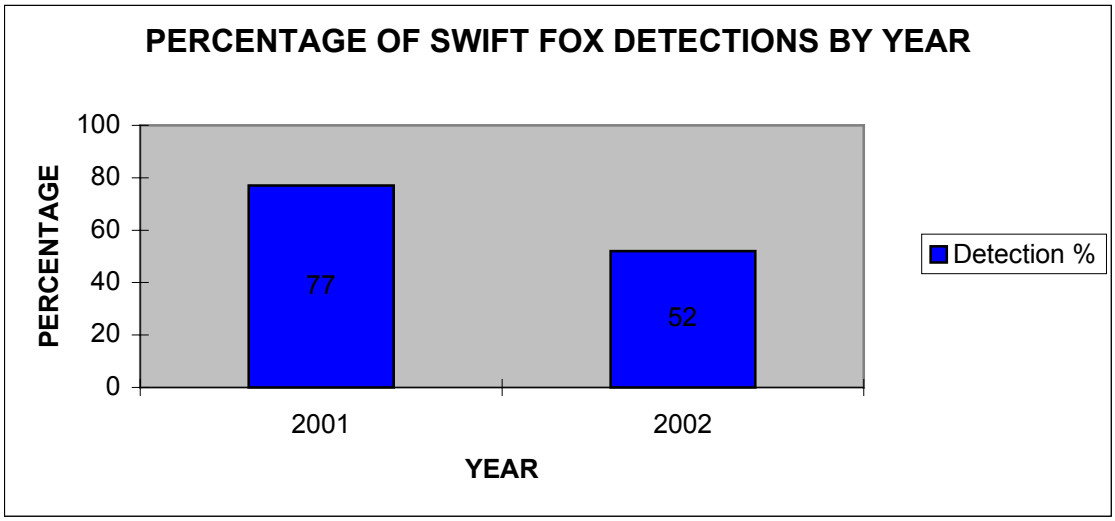

Figure 1. Comparison of swift fox detections percentage for all Study Regions by survey year in eastern Wyoming.

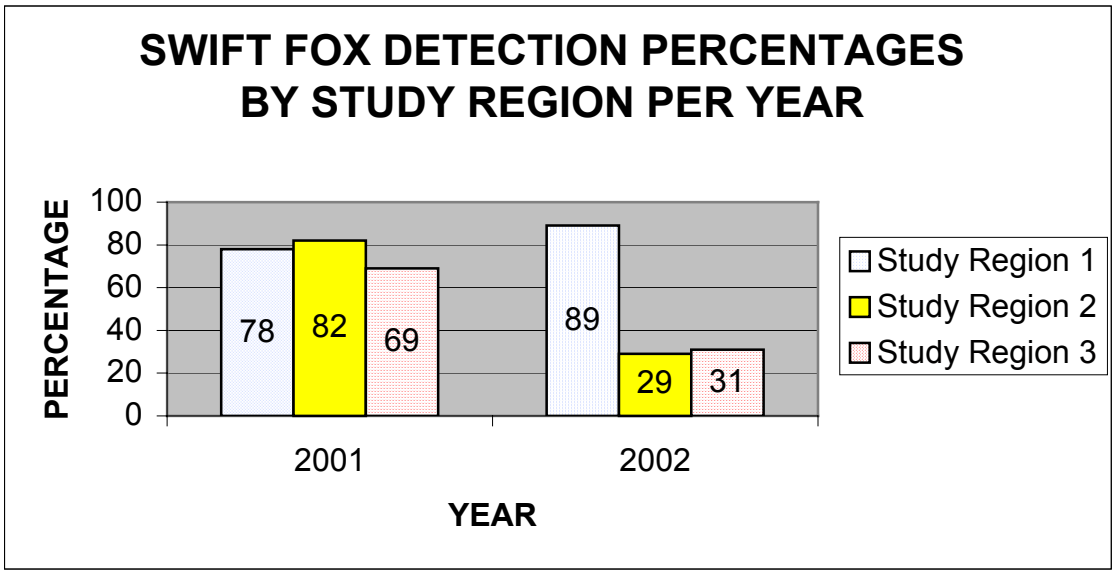

Figure 2. Comparison of swift fox detection percentages by Study Region per year in eastern Wyoming.

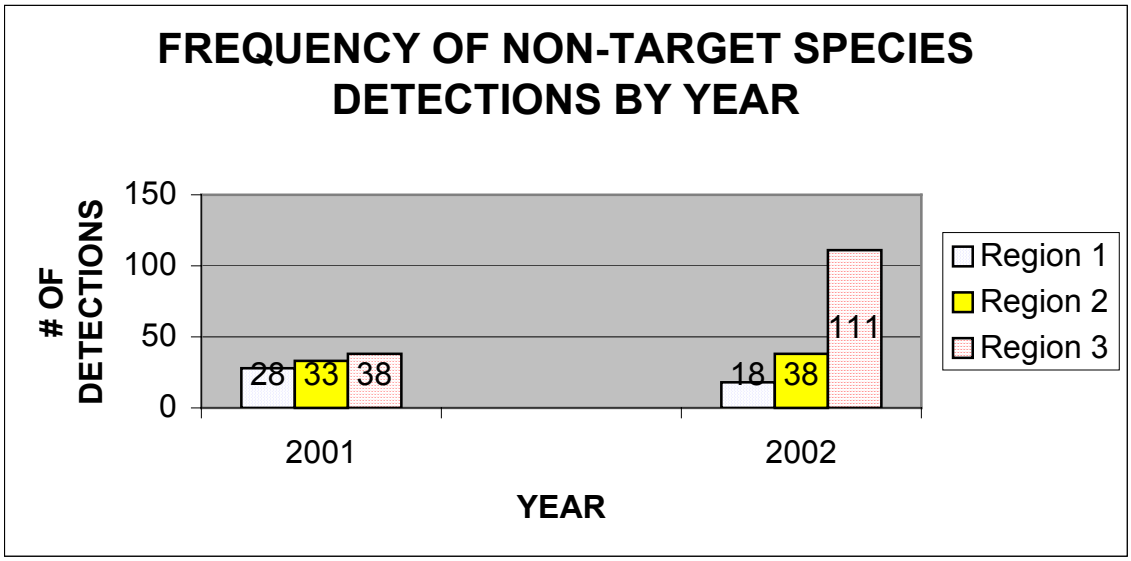

Figure 3. Frequency of non-target species detections per region by year in eastern Wyoming.

RAPTORS TAKEN FOR FALCONRY

FALCONRY
COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS – Raptors

PERIOD COVERED: 1 January 2002 – 31 December 2002

PREPARED BY: Laurie Van Fleet, Nongame Biologist
John Lund, Game Warden Trainee

In 2002, a total of 50 falconry licenses were issued. Of these 50 licenses, 29 raptors were captured in Wyoming for use in falconry (Table 1). The capture success rate was 58% (Table 2). Compared with 1981-2001, the number of birds captured and the success rate in 2002 has remained somewhat stable for the past five years with the exception of 2001 which had a slightly lower average (Table 2).

Unlike previous years, the Wyoming Game and Fish Department no longer requires falconers to list the species they desire to capture or the area in which they desire to capture when they apply for a falcon capture license.

Based on the number of falcons captured, the Merlin was in greatest demand, followed by the Prairie Falcon and Red-tailed Hawk (Table 2).

Nonresidents had a higher capture success rate than residents. Twenty-four resident licenses were issued and 12 birds were captured, for a capture success rate of 50%. Twenty-six nonresident licenses were issued and 17 birds were captured, for a capture success rate of 65%.

Data are no longer being collected on the number of falconers, species of raptors used for falconry, number of days spent training raptors, days hunting with raptors, or species of animals taken by raptors in Wyoming.

Table 1. Wyoming falcons captured by species, 2002.

Species	Resident Captures	Non-Resident Captures	Total Captures
Cooper's Hawk	0	0	0
Ferruginous Hawk	1	2	3
Golden Eagle	0	3	3
Gyrfalcon	0	0	0
Merlin	2	6	8
Northern Goshawk	1	3	4
Prairie Falcon	3	3	6
Red-tailed Hawk	5	0	5
Total Captured	12	17	29

Table 2. Between-year comparisons of the number of raptors captured and the capture rate (%) in Wyoming, 1981-2002.

Year	Number of Raptors Captured	Capture Rate (%)
1981	27	37
1982	40	52
1983	18	18
1984	25	33
1985	39	53
1986	33	35
1987	19	36
1988	28	51
1989	26	55
1990	32	68
1991	29	66
1992	22	53
1993	13	37
1994	21	33
1995	12	30
1996	25	47
1997	19	61
1998	31	63
1999	27	55
2000	24	57
2001	21	45
2002	29	58

OTHER NONGAME

BREEDING BIRD SURVEY
COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS - Other Nongame

PERIOD COVERED: 15 April 2002 - 14 April 2003

PREPARED BY: Andrea Cerovski, Nongame Bird Biologist
U.S. Geological Survey - Biological Resources Division

INTRODUCTION AND METHODS

The Breeding Bird Survey (BBS) is sponsored jointly by the U.S. Geological Survey - Biological Resources Division (USGS-BRD) (formerly the U.S. Fish and Wildlife Service) and the Canadian Wildlife Service. Surveys are used to monitor population trends of bird species that nest in North America. Survey routes are 39.4 km (24.5 mi.) long and consist of 50 stops spaced 2.1 km (0.5 mi.) apart. Beginning at sunrise, observers record every bird seen and heard at each stop during a 3 minute time period. Population trend information obtained from route analysis is especially useful if a species is adequately monitored using this survey method and if routes are conducted annually over the long term.

RESULTS AND DISCUSSION

In 2002, 2,678 BBS routes were conducted in Canada and the United States. The Wyoming Game and Fish Department (Department) Nongame Bird Biologist serves as the state BBS coordinator. The Department uses data to monitor populations of many bird species, especially terrestrial species and those for which no other means of monitoring is presently feasible.

The number (n=59) of Wyoming BBS routes completed in 2002 decreased by five from 2001 (n=64) and also decreased from 1991-2000, which varied from 63 to 77 routes completed. Observers agreed to conduct 80of the 110 available routes in 2002 but only 59 (74%) were completed (Table 1). Fifteen routes completed in 2001 were not conducted in 2002. Eight other routes were completed in 2002 that were not conducted in 2001.

Tables 2, 3, 4, and 5 summarize the history of BBS routes in Wyoming. Fewer than 20 routes have been run continuously, or with only a few scattered years missing, for 10 or more years. The majority of routes contain gaps of two or more years or have had a succession of observers. The primary purpose of the BBS is to monitor population trends of avian species. Therefore, it is important that routes be conducted consecutively, and preferably by the same observer; a primary goal of BBS coordinators.

Average number of species per route (n=39) and range in numbers of species per route (n=12-60) are similar to previous years. In 2002, 194 species were observed, which is slightly higher than total number of species observed from 1993-1998 and in 2001 (186 species in 1993, 185 in 1994, 187 in 1995, 189 in 1996, 186 in 1997, 184 in 1998, and 186 species in 2001). However, 205 species were observed in 1999 and 199 species were observed in 2000, although fewer routes were conducted during these two years than in most years past.

The USGS-BRD conducts a detailed statistical analysis of BBS data from the survey's inception in 1966 to the current year. From this analysis, population trends for individual species can be examined on a continental, western region, statewide, and physiographic region scale. For this and additional route information, contact the BBS home page at www.mbr.nbs.gov/bbs/bbs.html.

Population trend analysis data is only significant for species occurring on 14 or more separate BBS routes. Therefore, other survey methods are necessary to determine population trends for those species that are not adequately monitored by the Breeding Bird Survey.

ACKNOWLEDGEMENTS

The Department would like to thank and acknowledge the volunteers and biologists from this and other natural resources management agencies for their valuable contributions to the 2002 Breeding Bird Survey (see names in Table 1). Their continued dedication to this survey makes it possible to collect long-term population trend data on numerous avian species in Wyoming.

Table 1. 2002 Breeding Bird Survey (BBS) observers and route information.

Observer	Latilong	BBS Route Number and Name	Number of Species
T. McEneaney	1	1 - NE Entrance, YNP	53
G. Nutting	2	2 - Cody	46
T. Stephens	3	3 - Otto	40
--	4	4 - Basin	--
J. Berry	5	5 - Wyarno	39
J. Adams	7	7 - Sundance	58
G. Anderson	9	9 - Dubois	Route not conducted
A. Cerovski	10	10 - Midvale	Route not conducted
D. Walgren	11	11 - Nowood	43
S. Buckman	13	13 - Bill	Route not conducted
C. Deno	15	15 - Fontenelle	50
B. Meyer	16	16 - Elk Horn	22
A. Cerovski	17	17 - Bear Creek	Route not conducted
--	18	18 - Ervay	--
B. Walgren	19	19 - Brookhurst	59
M. Zornes	21	21 - Dwyer	--
C. Deno	22	22 - Cumberland	31
L. Van Fleet	24	24 - Patrick Draw	12
T. Woolley	25	25 - Savery	Route not conducted
S. Loose	26	26 - Riverside	47
G. Johnson	27	27 - Buford	Route not conducted
J. Lawrence	28	28 - Yoder	46
T. McEneaney	1	30 - Mammoth, YNP	60
K. Hicks	2	32 - Hunter Peak	52
K. Hicks	2	33 - Clark	53
B. Anderson	3	35 - Frannie	35
B. South	8	36 - Moose	52
J. Peters	3	37 - Lovell	36
N. Miller	3	38 - Meeteetse	Route not conducted
A. Humphrey	4	39 - Ten Sleep	Route not conducted
H. Corbett	4	40 - Dayton	Route not conducted
J. Peters	4	41 - Bald Mountain	21
G. Nutting	5	42 - Crazy Woman	45
J. Ward	5	43 - Schoonover	Route not conducted
J. Ward	5	44 - Arvada	45
O. Oedekoven	6	45 - Recluse	28
--	6	46 - Soda Well	--
--	7	49 - Upton	--

Table 1. Continued.

Observer	Latilong	BBS Route Number and Name	Number of Species
S. Patla	8	51 - Alpine	50
--	8	52 - Wilson	--
E. Crane	9	53 - Horse Creek	50
P. Hnilicka	9	55 - Crowheart	36
K. Firchow	10	56 - Ethete	43
P. Hnilicka	10	57 - Anchor	40
--	10	58 - Gebo	--
S. Harter	11	59 - Arminto	28
G. Anderson	11	60 - Lysite	23
--	11	61 - Worland	--
--	12	62 - Teapot Dome	--
D. Bjerke	12	63 - Mayoworth	47
D. Thiele	12	64 - Sussex	Route not conducted
--	13	65 - Harland Flats	--
--	13	66 - Pine Tree	--
--	13	67 - Highlight	--
--	14	68 - Riverview	--
--	14	69 - Newcastle	--
L. Snell	14	70 - Raven	Route not conducted
G. Fralick	15	71 - Soda Lake	27
G. Fralick	15	72 - Buckskin Mountain	24
L. Rawlins	16	74 - Boulder	Route not conducted
S. Smith	16	75 - Big Sandy	30
W. Cornell	16	76 - Farson	Route not conducted
E. Crane	17	77 - Fiddler Lake	45
--	17	78 - Sand Draw	--
T. Ryder	17	79 - Sweetwater	27
--	18	80 - Gas Hills	--
G. Hiatt	18	81 - Bairoil	23
G. Hiatt	18	82 - Lamont	38
L. Schwieger	19	83 - Pathfinder	28
D. Walgren	19	84 - Leo	41
A. Hines	19	85 - Shirley	17
J. Lawrence	20	86 - Warbonnet	51
G. Lawrence	20	87 - Fletcher Peak	56
B. Kroger	20	88 - Shawnee	34
--	21	89 - Meadowdale	--
G. Lawrence	21	90 - Lusk	29

Table 1. Continued.

Observer	Latilong	BBS Route Number and Name	Number of Species
--	21	91 - Lingle	--
K. Paulin	22	93 - Mountain View	50
--	23	96 - Reliance	--
--	23	97 - Rock Springs	--
W. Cornell	24	98 - Black Rock	--
T. Woolley	25	101 - Wamsutter	15
--	25	102 - Rawlins	--
T. Woolley	25	103 - Baggs	26
F. Blomquist	26	104 - Walcott	44
S. Bohle	26	105 - Fox Park	--
--	26	106 - Ryan Park	--
--	27	107 - Sybille Canyon	--
D. Young Jr.	27	108 - Rock River	Route not conducted
--	27	109 - Harmony	--
P. Deibert	28	110 - Cheyenne	21
R. Rothwell	28	111 - Chugwater	Route not conducted
D. Young Jr.	28	112 - Pine Bluff	--
C. Michelson	20	120 - Welch	37
K. Paulin	23	123 - Flaming Gorge	16
--	6	147 - Rozet	--
M. Yemington	7	148 - Seely 2	45
J. Adams	7	150 - Government Valley	40
S. Smith	15	173 - Rye Grass	--
--	23	192 - Carter	--
L. Glass	23	195 - Seedskadee	45
S. Plato	6	206 - Caballa Creek	29
S. Wolff	8	208 - Moran	47
--	12	212 - Bucknum	--
L. Snell	14	214 - Hampshire	--
J. Adams	7	250 - Moskee 2	50
T. McEneaney	1	901 - Yellowstone, YNP	56
--	1	902 - Pryor Flats	--

MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP
COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS - Other Nongame

PERIOD COVERED: 15 April 2002 - 14 April 2003

PREPARED BY: Andrea Cerovski, Nongame Bird Biologist

INTRODUCTION AND METHODS

In 1995, the Wyoming Game and Fish Department (Department), The Nature Conservancy (TNC), Wyoming Audubon, Bighorn Audubon Society, Cheyenne High Plains Audubon Society, Murie Audubon Society, Red Desert Audubon Society, and the U.S. Fish and Wildlife Service began a long-term partnership for the benefit of Neotropical migratory birds (those species that breed in the United States and Canada and winter in Mexico, Central America, South America, and the Caribbean). These groups pooled their resources to initiate a Monitoring Avian Productivity and Survivorship (MAPS) bird banding station on TNC's Red Canyon Ranch just south of Lander, Wyoming.

The objectives of this project are to: 1) obtain long-term information on avian use and relative abundance of this properly functioning riparian ecosystem, 2) determine survivorship trends of adult birds, 3) determine the success of species productivity and recruitment of young into the population, 4) determine long-term population trends for both Neotropical migrant and resident species, and 5) determine the cause(s) of population change, if any, of avian species on site.

The study area consists of 10 mist nets set up within riparian vegetation along Deep Creek in approximately a 4 ha (10 ac) area. Each net site is carefully selected in an attempt to capture as many birds as possible, and net sites remain constant throughout the life of the project.

Nets are opened once every 10 days from early June through early August to ensure that primarily breeders, and not migrants, are captured. On each banding day, nets are opened at sunrise, left open for 6 hours, and are checked every 45 minutes. Birds are removed from the mist nets and are placed in cotton bags until they can be processed. Captured birds are identified to species and leg banded. Sex is determined by plumage and the presence of either a cloacal protuberance (male) or brood patch (female). Wing chord (length of the unflattened wing), tail length, and culmen length (distance between the anterior end of the nostril and the end of the bill) are measured and the amount of body fat is determined. Flight feathers are checked for wear and molt, and body molt is determined. The amount of skull pneumatization is examined to accurately determine the bird's age.

Weight is taken, and then the bird is released. A more detailed description of MAPS station protocol and methodology is presented in the Handbook of Field Methods for Monitoring Landbirds (Ralph et al. 1993).

Bird banding data is submitted to the Institute for Bird Populations (IBP), located in Point Reyes Station, California, where a national database is maintained with all MAPS station data from across the United States and Canada. By following a standard protocol for setting up and conducting MAPS stations, data can be compared between stations across North America.

RESULTS AND DISCUSSION

Data for the 2002 field season are presented in Table 1. During the project's eighth field season, a total of 48 different bird species and 358 individual birds were captured, including 253 new individuals, 79 recaptures, and 26 birds that were unbanded. Out of the 48 species captured, 19 were known to breed on-site, 27 species were considered transients, and 2 migrant species were captured. Five new species were captured in 2001: Townsend's Solitaire, Plumbeous Vireo, Northern Parula, Indigo Bunting, and Yellow-headed Blackbird. Out of the 82 species captured during the seven-year project, 17 species were captured all seven years (Table 2).

Monitoring Avian Productivity and Survivorship capture data are summarized in Table 3 for all years of the project.

Over the eight-year period, 11 of the 12 IBP MAPS regional target species for the northwest region have been banded (Dark-eyed Junco has not been banded as yet). In 2002, 10of the 12 target species were captured and banded (Table 1).

The same MAPS station protocol and banding methodology will continue during the 2003 field season. By following this protocol, the value of the data collected at this MAPS station is increased because they can be directly compared with data from other MAPS stations across North America.

ACKNOWLEDGEMENTS

The Department would like to acknowledge and thank the following volunteers for their valuable contributions to the 2002 MAPS effort, without which this project would not be possible: Anne Allen, Byrla Carson, Ed Carter, Baylee Colton, John Colton, Mary Colton, Nancy Colton, Eva Crane, Jim Downham, Kathy Downham, Bob Hargis, Mikaila Heldt, Glen Hester, J. R. Horton, Jacob Johnson, Megan Johnson, Miriam Klingsporn, Jarren Kuipers, Donnabelle Leonhardt, Wanda Major, Del Nelson, Barb Nemick, Jessica Roberts, Jacob Shafer, Jennifer Shafer, John Smithbaker, Madeline Smithbaker, Patrick Tolton, and Jenny Woodward.

Thanks are also extended to the following U.S. Fish and Wildlife Seedskadee National Wildlife Refuge (NWR) and Department personnel for their invaluable assistance in 2002: Steve Brinklye (Seedskadee NWR), Florence Faulkner (Department), Martin Grenier (Department), Brendan Lynch (Seedskadee NWR), Joe Nemick (Department), Sharon Nicholoff (Department), and Laurie Van Fleet (Department).

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Ralph, C. J., G. R. Geupel, P. Pyle, T. E. Martin, and D. F. DeSante. 1993. Handbook of field methods for monitoring landbirds. General Technical Report PSW-GTR-144. Albany, CA, Pacific Southwest Research Station, USDA Forest Service. 41pp.

Table 1. Monitoring Avian Productivity and Survivorship (MAPS) station bird banding summary, Red Canyon Ranch, Deep Creek Station, 2002.

Species Name [a]	6/4/02	6/13/02	6/25/02	7/2/02	7/16/02	7/25/02	8/6/02	Total [b]	Status [c]
Dusky Flycatcher ***	5						1	6	T
Yellow Warbler ***	5	1	5	9	4	2	8	34	B
Common Yellowthroat	7	4		6	3	5	4	29	B
Pine Siskin	1							1	T
American Goldfinch	2	4	6	3	6		1	22	B
Bullock's Oriole	4	3	2	3	1	1	2	16	B
Spotted Towhee	2		4			1	1	8	B
Black-headed Grosbeak	2	2	2					6	T
Red-winged Blackbird	3	5	2	4	7			21	B
Yellow-breasted Chat	4	1	2	5	11	4	2	29	B
Swainson's Thrush ***	1	1			1			3	T
Blue Grosbeak	1							1	T
Lincoln's Sparrow ***	1						1	2	T
Warbling Vireo ***	2	2	1	3	1	4	2	15	B
House Wren	3		1	1	2		1	8	B
MacGillivray's Warbler ***	1			2	1		3	7	T
Lazuli Bunting	2	2			4	3	4	15	B
Indigo Bunting	1							1	T
Belted Kingfisher	1							1	T
American Redstart	1							1	T
Western Wood-Pewee		1		1	4	2	2	10	B
Willow Flycatcher		2	3		2	6	1	14	B
Green-tailed Towhee		1			1	7	5	14	B
Song Sparrow ***		3	1	2	6	7	2	21	B
American Robin ***		1			5			6	B
Northern Parula			1					1	M
Brewer's Sparrow			2		1	4	5	12	B
Gray Catbird			2	1	3	1		7	B
Townsend's Solitaire			1					1	T
Eastern Kingbird			1		2			3	T
Vesper Sparrow			1			4		5	B
European Starling			5					5	T
N. Rough-winged Swallow				1	1			2	T
Brown-headed Cowbird				1				1	T
Cliff Swallow				4	2			6	T
Black-capped Chickadee					4	1	1	6	B
Barn Swallow					1	1		2	T
Yellow-headed Blackbird					1			1	T
Violet-green Swallow					1			1	T
Rufous Hummingbird					1			1	M
Downy Woodpecker						1		1	T
Common Nighthawk						2		2	T
Cordilleran Flycatcher ***							1	1	T
Chipping Sparrow							3	3	T
Orange-crowned Warbler ***							1	1	T
Cedar Waxwing							2	2	T

Table 1. Continued.

Species Name [a]	6/4/02	6/13/02	6/25/02	7/2/02	7/16/02	7/25/02	8/6/02	Total [b]	Status [c]
Plumbeous Vireo							1	1	T
Caliope Hummingbird							1	1	T
Unknown Species							1	1	?
Total Number	*49*	*33*	*42*	*46*	*76*	*56*	*56*	*358*	~~
Total Species	*20*	*15*	*18*	*15*	*26*	*18*	*24* [d]	*48* [d]	~~

[a] *** = MAPS Regional Target Species for the Northwest Region

[b] New Captures = 253, Recaptures = 79, Unbanded = 26

[c] B = Breeder (confirmed or suspected breeding on site) = 19 species (Total captures = 292)
T = Transient (within breeding range but does not breed on site) = 27 species (Total captures = 63)
M = Migrant (not within breeding range) = 2 species (Total captures = 3)
? = Unknown (juvenile sparrow that could not be identified to species) (Total captures = 1)

[d] Unknown species are not included in the species total.

Table 2. Monitoring Avian Productivity and Survivorship (MAPS) station bird banding species and status list, Red Canyon Ranch, Deep Creek Station, 1995-2002[a].

Species Name	First Captured	1995	1996	1997	1998	1999	2000	2001	2002
Blue Grouse	8/6/1998	~	~	~	T	B	~	T	~
Sora	6/1/2001	~	~	~	~	~	~	T	~
Spotted Sandpiper	8/25/1995	T	T	T	~	~	~	~	~
Common Snipe	5/30/1995	T	T	-	T	~	~	T	B
Black-billed Cuckoo	6/6/2000	~	~	~	~	~	T	~	~
Common Nighthawk	7/24/2001	~	~	~	~	~	~	T	T
Calliope Hummingbird	7/27/1999	~	~	~	~	T	T	~	T
Broad-tailed Hummingbird	8/6/1996	~	T	~	~	~	~	T	T
Rufous Hummingbird	7/28/1995	M	M	~	M	~	M	M	M
Belted Kingfisher	7/6/2000	~	~	~	~	~	T	T	T
Red-naped Sapsucker	7/28/1995	T	~	~	T	T	T	T	~
Downy Woodpecker	8/28/1996	~	T	~	~	~	T	~	T
Northern Flicker (Red-shafted)	6/27/1997	~	~	T	~	~	T	~	T
Western Wood-Pewee	8/25/1995	T	T	T	B	B	B	B	B
Willow Flycatcher	6/5/1995	B	B	B	~	B	B	B	B
Least Flycatcher	5/30/1995	T	T	~	~	~	~	T	T
Dusky Flycatcher	8/25/1995	T	T	T	~	T	T	T	T
Gray Flycatcher	8/25/1995	T	~	~	~	~	~	~	~
Cordilleran Flycatcher	6/5/1995	T	T	T	~	T	~	~	T
Eastern Kingbird	6/5/1995	T	T	T	B	T	T	T	T
Tree Swallow	8/6/1996	~	T	T	T	~	~	T	T
Violet-green Swallow	6/23/1995	T	B	B	T	T	T	T	T
N. Rough-winged Swallow	8/3/1995	T	T	T	T	~	~	T	T
Cliff Swallow	7/18/1995	T	T	T	~	T	T	T	T
Barn Swallow	7/28/1998	~	~	~	T	T	~	T	T
Black-billed Magpie	7/14/1997	~	~	T	~	~	~	B	B
Black-capped Chickadee	8/15/1996	~	T	B	B	~	B	B	B
Mountain Chickadee	8/3/2000	~	~	~	~	~	T	~	~
House Wren	8/15/1995	T	T	T	T	T	T	T	B
American Dipper	7/12/1996	~	T	~	T	T	~	~	~
Veery	6/14/1996	~	T	~	~	~	~	~	~
Townsend's Solitaire	6/25/2002	~	~	~	~	~	~	~	T
Swainson's Thrush	5/30/1996	~	T	~	T	T	T	~	T
Hermit Thrush	7/18/1995	T	T	~	~	T	T	~	~
American Robin	7/18/1995	B	B	B	B	B	B	B	B
Gray Catbird	5/30/1996	~	B	B	B	B	B	B	B
Brown Thrasher	6/2/1998	~	~	~	T	~	~	~	~
Cedar Waxwing	7/26/1996	~	T	T	T	T	B	T	T
European Starling	6/7/1996	~	T	T	T	T	T	T	T
Plumbeous Vireo	8/6/2002	~	~	~	~	~	~	~	T
Warbling Vireo	5/30/1995	B	B	B	B	B	B	B	B
Red-eyed Vireo	5/30/1996	~	T	~	~	~	~	~	~
Tennessee Warbler	5/30/1996	~	M	~	~	~	~	~	~
Orange-crowned Warbler	5/30/1995	B	B	B	~	~	T	~	T
Virginia's Warbler	8/28/1996	~	M	~	~	M	~	~	~
Northern Parula	6/25/2002	~	~	~	~	~	~	~	M
Yellow Warbler	5/30/1995	B	B	B	B	B	B	B	B

Table 2. Continued.

Species Name	First Captured	1995	1996	1997	1998	1999	2000	2001	2002
Chestnut-sided Warbler	7/3/1996	~	M	~	~	~	~	M	~
Yellow-rumped Warbler	5/30/1996	~	T	~	~	~	~	~	~
Black-and-white Warbler	6/17/1999	~	~	~	~	M	~	~	~
American Redstart	6/13/1995	T	~	~	~	~	~	~	T
Ovenbird	7/18/2000	~	~	~	~	~	T	~	~
Northern Waterthrush	8/15/1995	M	~	M	~	~	~	~	~
MacGillivray's Warbler	5/30/1995	B	B	B	B	T	T	T	T
Common Yellowthroat	5/30/1995	B	B	B	B	B	B	B	B
Hooded Warbler	7/7/1999	~	~	~	~	M	~	~	~
Wilson's Warbler	8/15/1995	T	T	T	T	~	~	T	~
Yellow-breasted Chat	5/30/1995	B	B	B	B	B	B	B	B
Western Tanager	6/5/1995	T	T	T	T	T	T	T	~
Black-headed Grosbeak	5/30/1995	T	B	B	B	~	T	T	T
Blue Grosbeak	6/14/1996	~	T	~	~	T	T	T	T
Lazuli Bunting	7/7/1995	B	B	B	B	B	B	B	B
Indigo Bunting	6/4/2002	~	~	~	~	~	~	~	T
Green-tailed Towhee	5/30/1995	T	T	T	T	~	B	B	B
Spotted Towhee	5/30/1995	B	B	B	B	B	B	B	B
Chipping Sparrow	8/6/1996	~	T	~	~	~	T	~	T
Brewer's Sparrow	8/15/1996	~	T	T	~	T	B	B	B
Vesper Sparrow	7/7/1995	B	B	B	~	T	B	B	B
Lark Sparrow	8/7/2001	~	~	~	~	~	~	T	~
Savannah Sparrow	7/16/1998	~	~	~	T	~	T	~	T
Song Sparrow	5/30/1995	B	B	B	B	B	B	B	B
Lincoln's Sparrow	5/30/1995	T	T	~	~	~	T	T	T
White-crowned Sparrow	5/30/1995	T	T	T	~	~	T	~	~
Red-winged Blackbird	5/30/1995	B	B	B	B	B	B	B	B
Western Meadowlark	7/14/1997	~	~	T	~	B	~	T	B
Yellow-headed Blackbird	7/16/2002	~	~	~	~	~	~	~	T
Brewer's Blackbird	6/7/1996	~	T	T	~	~	T	T	~
Common Grackle	6/23/1995	T	T	T	T	T	T	~	~
Brown-headed Cowbird	6/5/1995	T	T	B	B	B	B	B	T
Bullock's Oriole	5/30/1995	T	T	T	T	T	B	B	B
Pine Siskin	6/5/1995	T	T	T	T	~	T	T	T
American Goldfinch	5/30/1995	B	B	B	B	B	B	B	B

[a] ~ = not captured
T = Transient (within breeding range but does not breed on site)
B = Breeder (confirmed or suspected breeding on site)
M = Migrant (not within breeding range)
A = Accidental (accidental, unpredictable occurrences of individuals)

Table 3. Summary of Red Canyon Ranch MAPS data, 1995-2002.

Year	Number of Individuals Captured	Number of Species Captured	Total Breeding Species	Total Transient Species	Total Migrant Species	Total Accidental Species
1995	371	41	14	25	2	0
1996	441	56	16	37	3	0
1997	298	43	16	26	1	0
1998	291	38	15	23	0	0
1999	297	40	18	20	1	1
2000	398	49	20	28	1	0
2001	394	44	20	22	2	0
2002	358	48	19	27	2	0

NONGAME BIRD DISTRIBUTION AND ABUNDANCE SURVEYS COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS – General Inventories

PERIOD COVERED: 15 April 2002 – 14 April 2003

PREPARED BY: Laurie Van Fleet, Nongame Biologist
Andrea Cerovski, Nongame Bird Biologist

INTRODUCTION

The distribution, relative abundance, and population trends of nongame birds are being monitored through several different approaches. This report discusses the Avian Atlas, riparian transects, the Birds of Jackson Hole Checklist, and the Wyoming Bird Checklist. The Breeding Bird Survey is discussed elsewhere in this publication. A summary of the accomplishments of the Wyoming Bird Records Committee is also provided here.

WYOMING AVIAN ATLAS

The Wyoming Avian Atlas (Oakleaf et al. 1982) was designed to summarize available information on distribution, relative abundance, seasonal status, and habitat associations of birds in Wyoming. Data were summarized by latilong. In 1991, the format was revised, and the mammal and bird atlases were combined into a new publication, Draft Distribution and Status of Birds and Mammals in Wyoming. This publication was reviewed by wildlife observers throughout the state and was published as the Wyoming Bird and Mammal Atlas in 1992 (Oakleaf et al. 1992). In 1997, the Atlas was updated and reptile and amphibian sections were included. This was published as the Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming in November of 1997, and was reprinted with additional updates in 1999 (Luce et al. 1999). Periodic updates and changes to the Atlas are typical as new and additional information becomes available; therefore, we reprint and distribute the Atlas every five years, with updates distributed every year. Due to numerous updates and changes since 1999, however, the Atlas will again be reprinted in November of 2003 and mailed to all Atlas recipients on our mailing list. If you would like to be added to this mailing list, please send your name and address to: Nongame Coordinator, 260 Buena Vista, Lander, WY 82520. The Atlas will also soon be available on the Wyoming Game and Fish Department's web site at http://gf.state.wy.us.

RIPARIAN TRANSECTS

Point-transects are conducted by volunteers along six riparian areas in Wyoming. In the Sheridan area, Roger Hybner conducts the Ash Creek transect with assistance from Carol Ohs and Patti Ellis. The Tongue River transect was previously conducted by Hal Corbett, but a new observer is now needed. In Casper, Bruce and Donna Walgren conduct the Garden Creek and North Platte River Parkway transects. In northeastern Wyoming, the Sand Creek transect near Beulah is conducted by Mary Yemington with assistance from Jean Adams. The Belle Fourche River transect by Devils Tower was conducted by various National Monument personnel, but a permanent observer is needed.

The Sheridan area transects were first conducted in 1976 and have been run one day in each of three or four seasons every year since, with the exception of 1994-1997 during which the Ash Creek transect was not conducted and 2000-2002 when the Tongue River transect was not conducted. The Casper area transects were started in 1982 and have been run one day in each of three or four seasons every year, with the exception of 1999 and 2001-2002, when the Garden Creek survey was not conducted. The Sand Creek transect was started in 1983, and has been run one day in each of two or three seasons every year with the exception of 1997 during which the survey was not conducted. The Belle Fourche transect was first conducted in 1989, and has been run several days every spring, with the exception of 2000-2002. Results from the Belle Fourche transect were not included in riparian survey analysis until 1993 because not enough data were available to evaluate trends.

The long-term data from these transects are valuable for evaluating changes in bird populations, not only along each riparian area but also combined. Detailed data from these transects are available from the Nongame Bird Biologist, Wyoming Game and Fish Department, 260 Buena Vista, Lander, WY 82520.

The frequency that species were recorded on spring transects for all years that transects were conducted is presented in Table 1. Spring data were chosen because survey dates were more consistent than during summer surveys.

SPECIES CHECKLISTS

In 2002, seven of the 45 avian Species of Special Concern were detected by the Birds of Jackson Hole checklist participants, compared to 17 in 2001, 14 in 2000, 32 in 1999, and 14 in 1998. Interpreting trends from these checklists is difficult. Trends are influenced by the quality of the observers and the locations they visit, both of which vary annually. Also, since 1993, checklists have been on display at the Moose Visitor Center in Grand Teton National Park but were only available to visitors upon request. As a result, it is likely that fewer casual birders submitted checklists in the most recent years. Weather also affects species lists by influencing the amount of time visitors spend in the field. Still, the checklist remains valuable because it provides a way of tracking populations through incidental observations, in addition to the Breeding Bird Survey and riparian transects.

In 1991, the Wyoming Bird Checklist was published and made available to the public; in 1995 it was updated and improved. This checklist divides the state into six regions based

on latilongs, and can be stapled closed, stamped, and mailed to the Nongame Bird Biologist. This checklist may help obtain sightings from people who have not been contributing in the past. In 2002, 20 of the 45 avian Species of Special Concern were detected by the Wyoming Bird checklist participants, compared to 23 in 2001, 23 in 2000, 32 in 1999, and 28 in 1998.

WYOMING BIRD RECORDS COMMITTEE

The Wyoming Bird Records Committee (WBRC) was established in 1989 to accomplish the following goals.

1) To solicit, organize, and maintain records, documentation, photographs, tape recordings, and any other material relative to the birds of Wyoming.
2) To review records of new or rare species or species difficult to identify and offer an intelligent, unbiased opinion of the validity or thoroughness of these reports. From these reviews, the WBRC will develop and maintain an Official State List of Wyoming's Birds.
3) To disseminate useful and pertinent material concerning the field identification of Wyoming birds in order to assist Wyoming birders in increasing their knowledge and skill.

The WBRC is interested in promoting and maintaining quality and integrity in the reporting of Wyoming bird observations, and it treats all bird records as significant historical documents. The Wyoming Bird Records Committee operates under a set of bylaws approved in 1991 and updated in 1992 and 1998.

As of 2002, the WBRC has reviewed 877 documentations. Of these, 625 observations have been accepted, 189 have not been accepted, and the remainder are awaiting review.

The Wyoming Bird Records Committee Database is a dynamic document, updated on a yearly basis following the WBRC annual meeting. Rather than provide the extensive WBRC Database in paper form, with a new printing each year, the database will be available on-line (read-only) in 2003. It will be linked with the Wyoming Game and Fish Department's website, available now at http://gf.state.wy.us.

A record of the WBRC Official Wyoming State Bird List and the avian species for which documentation is requested is presented in Appendix I. How to document rare and unusual birds and a WBRC Rare Bird Form are presented below.

To improve the accuracy and breadth of Wyoming's ornithological record, the following suggestions are given to assist with documentation of sightings.

1) Read "How to Document Rare Birds", by Donna L. Dittman and Greg W. Lasley (pages 145-159 in the 1992 issue of Birding, Vol. 24, No. 3). This article is the best we have seen on the subject.

2) Acceptable documentation *must* eliminate all similar species. Bear in mind that immatures or juveniles of one species can be very similar to adults of another species. Examples that might cause confusion are gulls, jaegers, sparrows, and longspurs. Species that exhibit multiple color morphs can also be problematic.

3) Study and learn bird topography. Most field guides provide a schematic of avian body parts and feather groups. Specialized identification guides also provide specific structural and anatomical detail. A thorough grasp of this subject will heighten your general birding skill and facilitate accurate, detailed documentation.

4) Take meticulous and thorough field notes *during* or immediately after the observation. Alternatively, you can also use a tape recorder to capture identification details. If the bird is cooperative, write your notes during the observation period. Try not to consult your field guide during the observation to avoid predisposing your identification. *Do not rely on memory* to document a rare/unusual bird.

5) The subject bird's physical description is most crucial. Include everything you observe in this description. Utilizing bird topography, include all details concerning plumage, shape, relative size, eyes, legs, and bill. Note the colors, including color distribution, color density, and color contrast between different feather groups. When making field notes, consider proportional details; i.e. bill length compared to head width and/or tail length as a proportion of body length. Record plumage characteristics, such as degree of wear or signs of molt. When describing size, try to compare nearby known species or some other object of known dimensions. Avoid trying to estimate size in actual inches, feet, etc., since this is a very subjective endeavor.

6) Observe and record the subject bird's behavior. While behavior is seldom diagnostic by itself, in combination with other details it is often conclusive. Wyoming's only documented Connecticut Warbler was accepted by the WBRC, in part, because it was walking, not hopping.

7) If possible, take photographs. Lacking an actual specimen, good to fair photographs are the best back up to a thoroughly detailed written description. Do not assume that only one photograph will display diagnostic features, or that the developing lab will not ruin a single negative. Take a number of shots to ensure a complete portrait. The value of photography is immediately apparent when one is trying to differentiate the wing tip patterns of the various gulls.

8) If you do not have a camera and the bird is cooperative, you can still get a good picture. Make a sketch. You do not need the talent of Rembrandt to draw a convincing and diagnostic sketch. Utilize your knowledge of bird topography, and you will be surprised how well you do. Draw your sketch in the field, during the observation. *Do not rely on memory.*

9) Hopefully the bird will be vocalizing in some manner. In addition to a well-written description of the vocalizations, a tape recording is extremely beneficial. The recorded

song and/or calls need not be of professional quality. A hand-held cassette recorder with a built-in microphone will often provide reliable results. It is unlikely that an Alder or Yellow-bellied Flycatcher will ever be added to the Wyoming State list without recorded vocalizations to support written and/or photographic evidence.

10) Specimens that are identified and reposited at the University of Wyoming Zoological Museum are still the most convincing evidence of an occurrence. If you encounter a dead rare/unusual bird while in the field, please deliver the body to the appropriate authority; i.e. Wyoming Game and Fish Department, National Park Service, or U.S. Fish and Wildlife Service personnel. Note the exact location and date of the discovery. Freeze the specimen if delivery is to be delayed.

WYOMING BIRD RECORDS COMMITTEE
260 BUENA VISTA, LANDER, WY 82520

Common Name:		Location of observation: UTM N	UTM E
Scientific Name:		T N R W Sec.	¼ Sec. ¼ ¼ Sec.
Observation Date:	Time:	Latitude/Longitude	
Length of Observation:			
Distance from bird:		Weather at time of observation:	
Light conditions:			
Optical Equipment:			
Notes made at time of sighting:	Date report prepared:	Prior weather (how many days since last change):	
Notes made later from memory:			

GENDER	AGE	PLUMAGE		PHOTO/TAPE/DRAWING
Male:	Adult:	Breeding:	Juvenal:	Available:
Female:	Juv./Imm.:	Winter:	Dark Morph:	Enclosed:
Unknown:	2-3 yr bird:	Eclipse:	Light Morph:	Please submit a copy of your field drawings.
Total:	Unknown:	Other:		

A general description of size, shape, and other points to help place the bird in its family group._____

Detailed description of size, shape, color, and pattern of the bill, head, neck, upperparts, underparts, wings, tail, legs, and feet.

BILL

HEAD

NECK

UPPER-PARTS

UNDER-PARTS

WINGS

TAIL

LEGS & FEET

Please do not write below here! For WBRC use only!

Record No.	Category No.	Latilong	Date Received

Detailed description of the bird (continued from the previous page). _____

List similar species and describe how or why you eliminated them. _____

Describe the behavior of this bird and the interaction with others. _____

What is the habitat at this location? _____

Describe the bird's song or vocalizations. _____

Reporter's name, address, phone #, and e-mail address. _____

What is your experience with this and similar species? _____

Corroborating observers not reporting separately. _____

LITERATURE CITED

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Table 1. The number of years species were recorded on spring riparian transects through 2002. Years equals number of years transects were actually surveyed.

Species	Ash Creek Years = 22	Belle Fourche Years = 10	Garden Creek Years = 20	Platte River Years = 21	Sand Creek Years = 20	Tongue River Years = 24
Western Grebe				1		
American White Pelican				1		
Double-crested Cormorant	1		2	19		
Great Blue Heron	14	7	1	4	19	4
Great Egret				1		
Green-backed Heron		1				
Black-crowned Night Heron				3		
Canada Goose	1	3		4		
Wood Duck		3		2	5	
Mallard	16	4	9	16	16	11
Blue-winged Teal		1		3	4	
Gadwall				2		
Common Merganser		1		1	7	23
Turkey Vulture	2	5		1	3	6
Osprey	1			1		
Northern Harrier	3					
Sharp-shinned Hawk	1		1			3
Cooper's Hawk	1			1		
Northern Goshawk	1					
Broad-winged Hawk	2			1		
Swainson's Hawk			1	1		
Red-tailed Hawk	3	2	2	6	8	3
Ferruginous Hawk			1			
Golden Eagle	5				4	6
American Kestrel	16	6	1	7	7	8
Merlin	1			1		
Prairie Falcon	1	2				2
Ring-necked Pheasant	4	1				2
Wild Turkey	14	2				
Killdeer	5	3	1	18	2	
American Avocet				5		
Spotted Sandpiper		1		10	1	2
Common Snipe	2					1
California Gull			16	19		
Caspian Tern				6		
Rock Dove		4	5	7	10	13
Mourning Dove	21	10	17	19	17	9
Western Screech-Owl	2					
Great Horned Owl	1					1
White-throated Swift		1			5	23
Calliope Hummingbird						2
Broad-tailed Hummingbird						2

Table 1. Continued.

Species	Ash Creek Years = 22	Belle Fourche Years = 10	Garden Creek Years = 20	Platte River Years = 21	Sand Creek Years = 20	Tongue River Years = 24
Belted Kingfisher	9	1	2	2	18	3
Lewis' Woodpecker		3			1	
Red-headed Woodpecker	1	9		1	1	
Yellow-bellied Sapsucker					1	
Red-naped Sapsucker	1				1	
Downy Woodpecker	7	2	6	11	8	1
Hairy Woodpecker	3	7			4	2
Northern Flicker	20	10	8	17	15	9
Olive-sided Flycatcher			1	1		
Western Wood-Pewee	7	8	7		15	13
Willow Flycatcher	2					8
Least Flycatcher	6		2	1		17
Dusky Flycatcher	1					2
Cordilleran Flycatcer	2			3	9	2
Western Kingbird			1	4		
Eastern Kingbird	13	10		8	20	
Tree Swallow	5			1	4	6
Violet-green Swallow	1	5			18	15
N. Rough-winged Swallow	7		8	3	12	
Cliff Swallow		8		8	4	
Barn Swallow	2	4	5	6	1	2
Gray Jay		1				
Blue Jay		5	7	2	11	
Pinyon Jay	7	3				
Clark's Nutcracker	6					5
Black-billed Magpie	15	1		19	12	4
American Crow	1	6		2	15	1
Common Raven						4
Black-capped Chickadee	21	10	11	14	20	19
Mountain Chickadee			1			2
Red-breasted Nuthatch	5	2		2	7	1
White-breasted Nuthatch	6	4			5	1
Rock Wren	14				1	4
Canyon Wren					1	1
House Wren	20	10	9	16	15	18
American Dipper						10
Ruby-crowned Kinglet	1		2	3	1	4
Blue-gray Gnatcatcher				1		
Mountain Bluebird	13	5			2	
Townsend's Solitaire	4				5	2
Veery	1		2	2		3
Swainson's Thrush	4		6	14	1	8
Hermit Thrush			1			
American Robin	21	10	18	18	20	23
Gray Catbird	9	1	18	6	8	7
Brown Thrasher	2		4	11	1	

Table 1. Continued.

Species	Ash Creek Years= 22	Belle Fourche Years= 10	Garden Creek Years= 20	Platte River Years= 21	Sand Creek Years = 20	Tongue River Years = 24
Cedar Waxwing	2	4	11	2	5	1
European Starling	14	10	16	17	4	7
Solitary Vireo	2	2		1	2	5
Warbling Vireo		1	2	1	1	22
Red-eyed Vireo	3	1		1	13	3
Tennessee Warbler	1			2		4
Orange-crowned Warbler	2		5	7		2
Nashville Warbler						1
Northern Parula			1			
Yellow Warbler	20	10	18	15	19	22
Chestnut-sided Warbler						2
Magnolia Warbler				1		
Yellow-rumped Warbler	7	2	2	15	4	5
American Redstart					1	
Ovenbird	1				1	2
N. Waterthrush			3	1		
MacGillivray's Warbler	3		1	2		15
Common Yellowthroat	8	2	3	14	17	19
Wilson's Warbler	1		1	3		1
Yellow-breasted Chat	18	1	1	1	14	1
Western Tanager		3	6	1	4	7
Rose-breasted Grosbeak			1			
Black-headed Grosbeak	1	4	18	4	16	
Lazuli Bunting	15		4	1	16	22
Indigo Bunting					9	
Lazuli-Indigo cross					9	
Green-tailed Towhee	1		2	2		1
Spotted Towhee	21	8	4	6	20	23
American Tree Sparrow		1				
Chipping Sparrow	19	9	2	6	14	4
Brewer's Sparrow	1					
Vesper Sparrow	2			1		
Lark Sparrow	17	9			17	
Lark Bunting	1			2		
Fox Sparrow					1	
Song Sparrow	4	1	15	4	11	11
Lincoln's Sparrow	2			4		1
White-crowned Sparrow	1		1	6		
Harris' Sparrow				1		
Dark-eyed Junco					3	1
Bobolink				1	1	
Red-winged Blackbird	17	10	1	18	12	2
Western Meadowlark	19	10	2	18	20	7
Yellow-headed Blackbird	1					
Brewer's Blackbird	11		6	7	13	7
Common Grackle	15	10	18	18	10	8

Table 1. Continued.

Species	Ash Creek Years= 22	Belle Fourche Years= 10	Garden Creek Years= 20	Platte River Years= 21	Sand Creek Years = 20	Tongue River Years = 24
Brown-headed Cowbird	19	6	5	12	19	9
Orchard Oriole					3	
Bullock's Oriole	11	10	18	16	20	2
Cassin's Finch			7			2
House Finch	4		18	9		
Red Crossbill	9	3			6	
Pine Siskin	2	2	11		2	11
American Goldfinch	12	8	11	6	20	6
Evening Grosbeak			12		1	1
House Sparrow			18	13		
Total Number of Species	*95*	*65*	*68*	*92*	*80*	*83*
Average Number Species/Year	*32*	*31*	*25*	*34*	*34*	*25*
Average Number Individuals/Year	*265*	*384*	*270*	*193*	*195*	*225*

WYOMING PARTNERS IN FLIGHT
COMPLETION REPORT

STATE OF WYOMING NONGAME BIRDS - Partners In Flight

PERIOD COVERED: 1 January 2001 - 14 April 2003

PREPARED BY: Andrea Cerovski, Nongame Bird Biologist

INTRODUCTION

Analysis of long-term data indicates that population trends of many landbirds are declining due to changes in land use; habitat loss, fragmentation, and deterioration; pesticide use; and human disturbance. The international Partners In Flight program, of which Wyoming is an active participant, was initiated in 1990 to address and reverse these declines. State, regional, national, and international Bird Conservation Plans comprehensively address the issues of avian and habitat conservation on a landscape scale.

Wyoming Partners In Flight (WY-PIF) is comprised of participants from the Wyoming Game and Fish Department (Department), Bureau of Land Management (BLM), U.S. Forest Service, U.S. Fish and Wildlife Service, Bureau of Reclamation, National Park Service, Rocky Mountain Bird Observatory, Audubon Wyoming and affiliate chapters, Wyoming Natural Diversity Database, University of Wyoming, and The Nature Conservancy. The Department's Nongame Bird Biologist has served as the State's WY-PIF chairperson since its inception in 1991.

BIRD CONSERVATION PLANNING

As part of the bird conservation planning efforts, WY-PIF participants compiled the Wyoming Bird Conservation Plan, Version 1.0 (Cerovski et al. 2001) that addressed the top five priority habitats (out of 18 habitat types or groups identified in the state) and the priority avian species associated with each. However, plan completion was hampered due to existing job duties and responsibilities of all WY-PIF participants. This was especially evident when comparing WY-PIF with most other state PIF groups that had the ability to employ a part-or full-time coordinator, making these states able to accomplish PIF goals within a more judicious time frame.

To ensure that the Wyoming Bird Conservation Plan (Plan) and associated Best Management Practices (BMPs) were completed, distributed, implemented, and evaluated in a timely manner, a Wyoming Bird Conservation Plan Coordinator was needed to

continue planning, research, and writing efforts on a full-time basis. Through federal Wildlife Diversity funding, a coordinator was hired for the 2002 calendar year to work cooperatively with other PIF participants, oversee bird conservation planning efforts in the state, and compile Version 2.0 of the Plan, which addresses the remaining habitat types and their associated priority avian species that were not addressed in Version 1.0, and completes the Best Management Practices to benefit birds in Wyoming for all major habitat groups (riparian, grasslands, shrub-steppe shrublands, aspen, juniper woodlands, mountain-foothills shrublands, wetlands, aquatic areas, and forests). When finalized, the Wyoming Bird Conservation Plan, Version 2.0 will offer population objectives for birds, habitat objectives for the major habitat groups in the state, Best Management Practices to benefit birds, and recommendations to ensure that landbirds and the habitats they require remain intact and viable into the future through proactive and restorative management techniques.

Through an assistance agreement with the Bureau of Land Management, additional funding became available to extend the Wyoming Bird Conservation Plan Coordinator's position through May 2003. This will enable the Coordinator to WY-PIF to complete and produce a web-based version of the Wyoming Bird Conservation Plan, Version 2.0 and produce Best Management Practices for forests, aspen, wetlands, and aquatic areas as separate publications for distribution to landowners, land managers, biologists, and the general public.

Through the federal State Wildlife Grants program, funding became available to publish the riparian and grassland Best Management Practices from the Plan as separate publications for distribution to landowners, land managers, biologists, and the general public.

MONITORING WYOMING'S BIRDS

One of the highest priority population objectives throughout the Plan is to implement *Monitoring Wyoming's Birds: The Plan for Count-based Monitoring* (Leukering et al. 2001).

During the federal FY02 and FY03, the BLM developed a cooperative assistance agreement with the Department for $50,000 and $55,000, respectively, that provides for cooperative effort between the two agencies to establish a statewide monitoring protocol for birds, determine the distribution and abundance of selected avian species, and develop educational materials on birds in Wyoming. Through this agreement, the Department developed contract agreements with the Rocky Mountain Bird Observatory to implement the Monitoring Wyoming's Birds program in eight habitats in Wyoming, Audubon Wyoming to assist with inventory and monitoring efforts for those species that require techniques other than point-counts and for educational materials, and the Wyoming Natural Diversity Database to create a database that will act as a central repository of Monitoring Wyoming's Birds data. The Department also received some of the funds and contributed in-kind services to conduct surveys and provide data for Common Loons,

colonial nesting waterbirds, songbirds, and raptors; to train Audubon Wyoming personnel to conduct colonial nesting waterbird surveys; and to print and distribute Partners In Flight educational materials.

PUBLIC CONTACTS

The WY-PIF Chair and the WY Bird Conservation Plan Coordinator gave presentations upon request to the Wyoming Game and Fish Department, Wyoming Chapter of The Wildlife Society, and the National Society for Range Management on the Partners In Flight program, bird conservation planning, the Wyoming Bird Conservation Plan, and Best Management Practices to benefit birds.

The 4th Annual Lander Bird Festival was held on 18 May 2002 in Centennial and City Parks in Lander. The Festival Planning Committee includes representatives from the Wyoming Game and Fish Department, Popo Agie Conservation District, Wild Bird Marketplace, Red Desert Audubon Society, Wyoming Outdoor Council, and the Brunton Company. Raffle items, refreshments, and live music were donated by local businesses and musicians. Nearly 200 people enjoyed free activities and information about birds and their habitat, landscaping for birds and butterflies, shade-grown coffee, wildlife rehabilitation, and falconry.

LITERATURE CITED

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Leukering, T., M. F. Carter, A. Panjabi, D. Faulkner, and R. Levad. 2001. Monitoring Wyoming's Birds: The Plan for Count-based Monitoring. Rocky Mountain Bird Observatory, Brighton, CO.

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APPENDICES

APPENDIX I

THE OFFICIAL STATE LIST OF THE COMMON AND SCIENTIFIC NAMES OF THE BIRDS, MAMMALS, AMPHIBIANS, AND REPTILES IN WYOMING

BIRDS [a, b]

Waterfowl

Anseriformes

Anatidae

171.0	Greater White-fronted Goose (FL)	(*Anser albifrons*)
169.0	Snow Goose	(*Chen caerulescens*)
170.0	Ross's Goose (FL)	(*Chen rossii*)
172.0	Canada Goose	(*Branta canadensis*)
173.0	Brant (AS)	(*Branta bernicla*)
	includes Black Brant (174.0)	
178.2	Mute Swan (AS)	(*Cygnus olor*)
181.0	Trumpeter Swan (FL)	(*Cygnus buccinator*)
180.0	Tundra Swan	(*Cygnus columbianus*)
144.0	Wood Duck	(*Aix sponsa*)
135.0	Gadwall	(*Anas strepera*)
136.0	Eurasian Wigeon (FL)	(*Anas penelope*)
137.0	American Wigeon	(*Anas americana*)
133.0	American Black Duck (AS)	(*Anas rubripes*)
132.0	Mallard	(*Anas platyrhynchos*)
140.0	Blue-winged Teal	(*Anas discors*)
141.0	Cinnamon Teal	(*Anas cyanoptera*)
142.0	Northern Shoveler	(*Anas clypeata*)
143.0	Northern Pintail	(*Anas acuta*)
139.0	Green-winged Teal	(*Anas crecca*)
147.0	Canvasback	(*Aythya valisineria*)
146.0	Redhead	(*Aythya americana*)
150.0	Ring-necked Duck	(*Aythya collaris*)
149.1	Tufted Duck (AS)	(*Aythya fuligula*)
148.0	Greater Scaup (FL)	(*Aythya marila*)
149.0	Lesser Scaup	(*Aythya affinis*)
155.0	Harlequin Duck	(*Histrionicus histrionicus*)
166.0	Surf Scoter (FL)	(*Melanitta perspicillata*)
165.0	White-winged Scoter (FL)	(*Melanitta fusca*)
163.0	Black Scoter (AS)	(*Melanitta nigra*)
154.0	Long-tailed Duck (FL)	(*Clangula hyemalis*)
153.0	Bufflehead	(*Bucephala albeola*)
151.0	Common Goldeneye	(*Bucephala clangula*)

Appendix I. Continued.

152.0	Barrow's Goldeneye	(*Bucephala islandica*)
131.0	Hooded Merganser	(*Lophodytes cucullatus*)
129.0	Common Merganser	(*Mergus merganser*)
130.0	Red-breasted Merganser	(*Mergus serrator*)
167.0	Ruddy Duck	(*Oxyura jamaicensis*)
141.2	Ruddy Shelduck (AS)	(*Tadorna ferruginea*)
141.1	Common Shelduck (AS)	(*Tadorna tadorna*)
Gallinaceous Birds		
Galliformes		
Phasianidae		
288.2	Chukar	(*Alectoris chukar*)
288.1	Gray Partridge	(*Perdix perdix*)
309.1	Ring-necked Pheasant	(*Phasianus colchicus*)
300.0	Ruffed Grouse	(*Bonasa umbellus*)
309.0	Greater Sage-Grouse	(*Centrocercus urophasianus*)
304.0	White-tailed Ptarmigan (AS)	(*Lagopus leucurus*)
297.0	Blue Grouse	(*Dendragapus obscurus*)
308.0	Sharp-tailed Grouse	(*Tympanuchus phasianellus*)
305.0	Greater Prairie-Chicken (AS)	(*Tympanuchus cupido*)
310.0	Wild Turkey	(*Meleagris gallopavo*)
Odontophoridae		
289.0	Northern Bobwhite (AS)	(*Colinus virginianus*)
Loons		
Gaviiformes		
Gaviidae		
011.0	Red-throated Loon (AS)	(*Gavia stellata*)
010.0	Pacific Loon (FL)	(*Gavia pacifica*)
007.0	Common Loon	(*Gavia immer*)
008.0	Yellow-billed Loon (AS)	(*Gavia adamsii*)
Grebes		
Podicipediformes		
Podicipedidae		
006.0	Pied-billed Grebe	(*Podilymbus podiceps*)
003.0	Horned Grebe	(*Podiceps auritus*)
002.0	Red-necked Grebe (FL)	(*Podiceps grisegena*)
004.0	Eared Grebe	(*Podiceps nigricollis*)
001.0	Western Grebe	(*Aechmophorus occidentalis*)
001.1	Clark's Grebe	(*Aechmophorus clarkii*)
Pelicans and Cormorants		
Pelecaniformes		
Pelecanidae		
125.0	American White Pelican	(*Pelecanus erythrorhynchos*)
126.0	Brown Pelican (AS)	(*Pelecanus occidentalis*)

Appendix I. Continued.

Phalacrocoracidae
120.0 Double-crested Cormorant (*Phalacrocorax auritus*)

Wading Birds

Ciconiiformes
Ardeidae
190.0 American Bittern (FL) (*Botaurus lentiginosus*)
191.0 Least Bittern (AS) (*Ixobrychus exilis*)
194.0 Great Blue Heron (*Ardea herodias*)
196.0 Great Egret (FL) (*Ardea alba*)
197.0 Snowy Egret (*Egretta thula*)
200.0 Little Blue Heron (AS) (*Egretta caerulea*)
199.0 Tricolored Heron (AS) (*Egretta tricolor*)
200.1 Cattle Egret (FL) (*Bubulcus ibis*)
201.0 Green Heron (FL) (*Butorides virescens*)
202.0 Black-crowned Night-Heron (*Nycticorax nycticorax*)
203.0 Yellow-crowned Night-Heron (AS) (*Nyctanassa violacea*)
Threskiornithidae
184.0 White Ibis (AS) (*Eudocimus albus*)
186.0 Glossy Ibis (AS) (*Plegadis falcinellus*)
187.0 White-faced Ibis (*Plegadis chihi*)
Ciconiidae
188.0 Wood Stork (AS) (*Mycteria americana*)

Diurnal Birds of Prey

Cathartidae
325.0 Turkey Vulture (*Cathartes aura*)
Falconiformes
Accipitridae
364.0 Osprey (*Pandion haliaetus*)
328.0 White-tailed Kite (AS) (*Elanus leucurus*)
329.0 Mississippi Kite (AS) (*Ictinia mississippiensis*)
352.0 Bald Eagle (*Haliaeetus leucocephalus*)
331.0 Northern Harrier (*Circus cyaneus*)
332.0 Sharp-shinned Hawk (*Accipiter striatus*)
333.0 Cooper's Hawk (*Accipiter cooperii*)
334.0 Northern Goshawk (*Accipiter gentilis*)
343.0 Broad-winged Hawk (FL) (*Buteo platypterus*)
342.0 Swainson's Hawk (*Buteo swainsoni*)
337.0 Red-tailed Hawk (*Buteo jamaicensis*)
includes Harlan's Hawk (338.0)
348.0 Ferruginous Hawk (*Buteo regalis*)
347.0 Rough-legged Hawk (*Buteo lagopus*)
349.0 Golden Eagle (*Aquila chrysaetos*)

Appendix I. Continued.

Falconidae

362.0	Crested Caracara (AS)	(*Caracara cheriway*)
360.0	American Kestrel	(*Falco sparverius*)
357.0	Merlin	(*Falco columbarius*)
354.0	Gyrfalcon (FL)	(*Falco rusticolus*)
356.0	Peregrine Falcon	(*Falco peregrinus*)
355.0	Prairie Falcon	(*Falco mexicanus*)

Marshbirds

Gruiformes

Rallidae

215.0	Yellow Rail (AS)	(*Coturnicops noveboracensis*)
212.0	Virginia Rail	(*Rallus limicola*)
214.0	Sora	(*Porzana carolina*)
218.0	Purple Gallinule (AS)	(*Porphyrio martinica*)
219.0	Common Moorhen (AS)	(*Gallinula chloropus*)
221.0	American Coot	(*Fulica americana*)

Gruidae

206.0	Sandhill Crane	(*Grus canadensis*)
204.0	Whooping Crane (AS)	(*Grus americana*)

Shorebirds

Charadriiformes

Charadriidae

270.0	Black-bellied Plover	(*Pluvialis squatarola*)
272.0	American Golden-Plover (FL)	(*Pluvialis dominicus*)
278.0	Snowy Plover (FL)	(*Charadrius alexandrinus*)
274.0	Semipalmated Plover	(*Charadrius semipalmatus*)
277.0	Piping Plover (AS)	(*Charadrius melodus*)
273.0	Killdeer	(*Charadrius vociferus*)
281.0	Mountain Plover	(*Charadrius montanus*)

Recurvirostridae

226.0	Black-necked Stilt	(*Himantopus mexicanus*)
225.0	American Avocet	(*Recurvirostra americana*)

Scolopacidae

254.0	Greater Yellowlegs	(*Tringa melanoleuca*)
255.0	Lesser Yellowlegs	(*Tringa flavipes*)
256.0	Solitary Sandpiper	(*Tringa solitaria*)
258.0	Willet	(*Catoptrophorus semipalmatus*)
263.0	Spotted Sandpiper	(*Actitis macularia*)
261.0	Upland Sandpiper (FL)	(*Bartramia longicauda*)
265.0	Whimbrel (FL)	(*Numenius phaeopus*)
264.0	Long-billed Curlew	(*Numenius americanus*)
251.0	Hudsonian Godwit (AS)	(*Limosa haemastica*)
249.0	Marbled Godwit	(*Limosa fedoa*)

Appendix I. Continued.

283.0	Ruddy Turnstone (FL)	(*Arenaria interpres*)
234.0	Red Knot (FL)	(*Calidris canutus*)
248.0	Sanderling	(*Calidris alba*)
246.0	Semipalmated Sandpiper	(*Calidris pusilla*)
247.0	Western Sandpiper	(*Calidris mauri*)
242.0	Least Sandpiper	(*Calidris minutilla*)
240.0	White-rumped Sandpiper (FL)	(*Calidris fuscicollis*)
241.0	Baird's Sandpiper	(*Calidris bairdii*)
239.0	Pectoral Sandpiper	(*Calidris melanotos*)
243.0	Dunlin (FL)	(*Calidris alpina*)
233.0	Stilt Sandpiper	(*Calidris himantopus*)
262.0	Buff-breasted Sandpiper (AS)	(*Tryngites subruficollis*)
231.0	Short-billed Dowitcher (AS)	(*Limnodromus griseus*)
232.0	Long-billed Dowitcher	(*Limnodromus scolopaceus*)
230.0	Wilson's Snipe	(*Gallinago delicata*)
228.0	American Woodcock (AS)	(*Scolopax minor*)
224.0	Wilson's Phalarope	(*Phalaropus tricolor*)
223.0	Red-necked Phalarope	(*Phalaropus lobatus*)
222.0	Red Phalarope (AS)	(*Phalaropus fulicarius*)

Gulls and Terns

Laridae

036.0	Pomarine Jaeger (AS)	(*Stercorarius pomarinus*)
037.0	Parasitic Jaeger (AS)	(*Stercorarius parasiticus*)
058.0	Laughing Gull (AS)	(*Larus atricilla*)
059.0	Franklin's Gull	(*Larus pipixcan*)
055.1	Black-headed Gull (AS)	(*Larus ridibundus*)
060.0	Bonaparte's Gull	(*Larus philadelphia*)
057.0	Heermann's Gull (AS)	(*Larus heermanni*)
055.0	Mew Gull (AS)	(*Larus canus*)
054.0	Ring-billed Gull	(*Larus delawarensis*)
053.0	California Gull	(*Larus californicus*)
051.0	Herring Gull (FL)	(*Larus argentatus*)
042.0	Glaucous Gull (AS)	(*Larus hyperboreus*)
062.0	Sabine's Gull (FL)	(*Xema sabini*)
040.0	Black-legged Kittiwake (AS)	(*Rissa tridactyla*)
061.0	Ross's Gull (AS)	(*Rhodostethis rosea*)
064.0	Caspian Tern	(*Sterna caspia*)
070.0	Common Tern (FL)	(*Sterna hirundo*)
071.0	Arctic Tern (AS)	(*Sterna paradisaea*)
069.0	Forster's Tern	(*Sterna forsteri*)
074.0	Least Tern (AS)	(*Sterna antillarum*)
077.0	Black Tern	(*Chlidonias niger*)

Appendix I. Continued.

Seabirds

Alcidae

023.0	Marbled Murrelet (AS)	(*Brachyramphus marmoratus*)
021.0	Ancient Murrelet (AS)	(*Synthliboramphus antiquus*)

Doves and Pigeons

Columbiformes

Columbidae

313.1	Rock Pigeon	(*Columba livia*)
312.0	Band-tailed Pigeon (AS)	(*Patagioenas fasciata*)
315.2	Ringed Turtle-Dove (AS)	(*Streptopelia risoria*)
???.?	Eurasian Collard Dove (AS)	(*Streptopelia decaocto*)
319.0	White-winged Dove (AS)	(*Zenaida asiatica*)
316.0	Mourning Dove	(*Zenaida macroura*)
315.0	Passenger Pigeon - extinct	(*Ectopistes migratorius*)

Cuckoos

Cuculiformes

Cuculidae

388.0	Black-billed Cuckoo (FL)	(*Coccyzus erythropthalmus*)
387.0	Yellow-billed Cuckoo (FL)	(*Coccyzus americanus*)

Owls

Strigiformes

Tytonidae

365.0	Barn Owl (AS)	(*Tyto alba*)

Strigidae

374.0	Flammulated Owl (AS)	(*Otus flammeolus*)
373.2	Western Screech-Owl (AS)	(*Megascops kennicottii*)
373.0	Eastern Screech-Owl (FL)	(*Megascops asio*)
375.0	Great Horned Owl	(*Bubo virginianus*)
376.0	Snowy Owl (AS)	(*Bubo scandiaca*)
377.0	Northern Hawk Owl (AS)	(*Surnia ulula*)
379.0	Northern Pygmy-Owl (FL)	(*Glaucidium gnoma*)
378.0	Burrowing Owl	(*Athene cunicularia*)
368.0	Barred Owl (AS)	(*Strix varia*)
370.0	Great Gray Owl (FL)	(*Strix nebulosa*)
366.0	Long-eared Owl	(*Asio otus*)
367.0	Short-eared Owl	(*Asio flammeus*)
371.0	Boreal Owl (FL)	(*Aegolius funereus*)
372.0	Northern Saw-whet Owl (FL)	(*Aegolius acadicus*)

Goatsuckers

Caprimulgiformes

Caprimulgidae

420.0	Common Nighthawk	(*Chordeiles minor*)
418.0	Common Poorwill	(*Phalaenoptilus nuttallii*)

Appendix I. Continued.

Swifts
Apodiformes
Apodidae
423.0 Chimney Swift (FL) (*Chaetura pelagica*)
425.0 White-throated Swift (*Aeronautes saxatalis*)
Hummingbirds
Trochilidae
426.0 Magnificent Hummingbird (AS) (*Eugenes fulgens*)
428.0 Ruby-throated Hummingbird (AS) (*Archilochus colubris*)
429.0 Black-chinned Hummingbird (FL) (*Archilochus alexandri*)
431.0 Anna's Hummingbird (AS) (*Calypte anna*)
436.0 Calliope Hummingbird (*Stellula calliope*)
432.0 Broad-tailed Hummingbird (*Selasphorus platycercus*)
433.0 Rufous Hummingbird (*Selasphorus rufus*)
Kingfishers
Coraciiformes
Alcedinidae
390.0 Belted Kingfisher (*Ceryle alcyon*)
Woodpeckers
Piciformes
Picidae
408.0 Lewis' Woodpecker (*Melanerpes lewis*)
406.0 Red-headed Woodpecker (FL) (*Melanerpes erythrocephalus*)
407.0 Acorn Woodpecker (AS) (*Melanerpes formicivorus*)
409.0 Red-bellied Woodpecker (AS) (*Melanerpes carolinus*)
404.0 Williamson's Sapsucker (*Sphyrapicus thyroideus*)
402.0 Yellow-bellied Sapsucker (AS) (*Sphyrapicus varius*)
402.1 Red-naped Sapsucker (*Sphyrapicus nuchalis*)
394.0 Downy Woodpecker (*Picoides pubescens*)
393.0 Hairy Woodpecker (*Picoides villosus*)
399.0 White-headed Woodpecker (AS) (*Picoides albolarvatus*)
401.0 American Three-toed Woodpecker (*Picoides dorsalis*)
400.0 Black-backed Woodpecker (FL) (*Picoides arcticus*)
412.0 Northern Flicker (*Colaptes auratus*)
405.0 Pileated Woodpecker (AS) (*Dryocopus pileatus*)
Passerines
Passeriformes
Tyrannidae
459.0 Olive-sided Flycatcher (*Contopus cooperi*)
462.0 Western Wood-Pewee (*Contopus sordidulus*)
461.0 Eastern Wood-Pewee (AS) (*Contopus virens*)
466.0 Willow Flycatcher (*Empidonax traillii*)
467.0 Least Flycatcher (FL) (*Empidonax minimus*)

Appendix I. Continued.

468.0	Hammond's Flycatcher (FL)	(*Empidonax hammondii*)
469.1	Gray Flycatcher (FL)	(*Empidonax wrightii*)
469.0	Dusky Flycatcher	(*Empidonax oberholseri*)
464.0	Cordilleran Flycatcher	(*Empidonax occidentalis*)
456.0	Eastern Phoebe (FL)	(*Sayornis phoebe*)
457.0	Say's Phoebe	(*Sayornis saya*)
471.0	Vermilion Flycatcher (AS)	(*Pyrocephalus rubinus*)
454.0	Ash-throated Flycatcher (FL)	(*Myiarchus cinerascens*)
452.0	Great Crested Flycatcher (AS)	(*Myiarchus crinitus*)
448.0	Cassin's Kingbird (FL)	(*Tyrannus vociferans*)
447.0	Western Kingbird	(*Tyrannus verticalis*)
444.0	Eastern Kingbird	(*Tyrannus tyrannus*)
443.0	Scissor-tailed Flycatcher (AS)	(*Tyrannus forficatus*)
Laniidae		
622.0	Loggerhead Shrike	(*Lanius ludovicianus*)
621.0	Northern Shrike	(*Lanius excubitor*)
Vireonidae		
631.0	White-eyed Vireo (AS)	(*Vireo griseus*)
628.0	Yellow-throated Vireo (AS)	(*Vireo flavifrons*)
629.0	Plumbeous Vireo	(*Vireo plumbeus*)
627.0	Warbling Vireo	(*Vireo gilvus*)
626.0	Philadelphia Vireo (AS)	(*Vireo philadelphicus*)
624.0	Red-eyed Vireo	(*Vireo olivaceus*)
Corvidae		
484.0	Gray Jay	(*Perisoreus canadensis*)
478.0	Steller's Jay	(*Cyanocitta stelleri*)
477.0	Blue Jay	(*Cyanocitta cristata*)
481.0	Western Scrub-Jay (FL)	(*Aphelocoma californica*)
492.0	Pinyon Jay	(*Gymnorhinus cyanocephalus*)
491.0	Clark's Nutcracker	(*Nucifraga columbiana*)
475.0	Black-billed Magpie	(*Pica hudsonia*)
488.0	American Crow	(*Corvus brachyrhynchos*)
486.0	Common Raven	(*Corvus corax*)
Alaudidae		
474.0	Horned Lark	(*Eremophila alpestris*)
Hirundinidae		
611.0	Purple Martin (AS)	(*Progne subis*)
614.0	Tree Swallow	(*Tachycineta bicolor*)
615.0	Violet-green Swallow	(*Tachycineta thalassina*)
617.0	Northern Rough-winged Swallow	(*Stelgidopteryx serripennis*)
616.0	Bank Swallow	(*Riparia riparia*)
612.0	Cliff Swallow	(*Petrochelidon pyrrhonota*)
613.0	Barn Swallow	(*Hirundo rustica*)

Appendix I. Continued.

Paridae		
735.0	Black-capped Chickadee	(*Poecile atricapillus*)
738.0	Mountain Chickadee	(*Poecile gambeli*)
733.0	Juniper Titmouse (FL)	(*Baeolophus ridgwayi*)
Aegithalidae		
743.0	Bushtit (FL)	(*Psaltriparus minimus*)
Sittidae		
728.0	Red-breasted Nuthatch	(*Sitta canadensis*)
727.0	White-breasted Nuthatch	(*Sitta carolinensis*)
730.0	Pygmy Nuthatch	(*Sitta pygmaea*)
Certhiidae		
726.0	Brown Creeper	(*Certhia americana*)
Troglodytidae		
715.0	Rock Wren	(*Salpinctes obsoletus*)
717.0	Canyon Wren	(*Catherpes mexicanus*)
718.0	Carolina Wren (AS)	(*Thryothorus ludovicianus*)
719.0	Bewick's Wren (FL)	(*Thryomanes bewickii*)
721.0	House Wren	(*Troglodytes aedon*)
722.0	Winter Wren (FL)	(*Troglodytes troglodytes*)
724.0	Sedge Wren (AS)	(*Cistothorus platensis*)
725.0	Marsh Wren	(*Cistothorus palustris*)
Cinclidae		
701.0	American Dipper	(*Cinclus mexicanus*)
Regulidae		
748.0	Golden-crowned Kinglet	(*Regulus satrapa*)
749.0	Ruby-crowned Kinglet	(*Regulus calendula*)
Sylviidae		
751.0	Blue-gray Gnatcatcher	(*Polioptila caerulea*)
Turdidae		
766.0	Eastern Bluebird (FL)	(*Sialia sialis*)
767.0	Western Bluebird (AS)	(*Sialia mexicana*)
768.0	Mountain Bluebird	(*Sialia currucoides*)
754.0	Townsend's Solitaire	(*Myadestes townsendi*)
756.0	Veery	(*Catharus fuscescens*)
757.0	Gray-cheeked Thrush (AS)	(*Catharus minimus*)
758.0	Swainson's Thrush	(*Catharus ustulatus*)
759.0	Hermit Thrush	(*Catharus guttatus*)
755.0	Wood Thrush (AS)	(*Hylocichla mustelina*)
761.0	American Robin	(*Turdus migratorius*)
763.0	Varied Thrush (FL)	(*Ixoreus naevius*)

Appendix I. Continued.

Mimidae		
704.0	Gray Catbird	(*Dumetella carolinensis*)
703.0	Northern Mockingbird	(*Mimus polyglottos*)
702.0	Sage Thrasher	(*Oreoscoptes montanus*)
705.0	Brown Thrasher	(*Toxostoma rufum*)
Sturnidae		
493.0	European Starling	(*Sturnus vulgaris*)
Motacillidae		
697.0	American Pipit	(*Anthus rubescens*)
700.0	Sprague's Pipit (AS)	(*Anthus spragueii*)
Bombycillidae		
618.0	Bohemian Waxwing	(*Bombycilla garrulus*)
619.0	Cedar Waxwing	(*Bombycilla cedrorum*)
Parulidae		
641.0	Blue-winged Warbler (AS)	(*Vermivora pinus*)
642.0	Golden-winged Warbler (AS)	(*Vermivora chrysoptera*)
647.0	Tennessee Warbler (FL)	(*Vermivora peregrinus*)
646.0	Orange-crowned Warbler	(*Vermivora celata*)
645.0	Nashville Warbler (FL)	(*Vermivora ruficapilla*)
644.0	Virginia's Warbler (FL)	(*Vermivora virginiae*)
648.0	Northern Parula (FL)	(*Parula americana*)
652.0	Yellow Warbler	(*Dendroica petechia*)
659.0	Chestnut-sided Warbler (FL)	(*Dendroica pensylvanica*)
657.0	Magnolia Warbler (FL)	(*Dendroica magnolia*)
650.0	Cape May Warbler (AS)	(*Dendroica tigrina*)
654.0	Black-throated Blue Warbler (FL)	(*Dendroica caerulescens*)
655.0	Yellow-rumped Warbler	(*Dendroica coronata*)
665.0	Black-throated Gray Warbler (FL)	(*Dendroica nigrescens*)
667.0	Black-throated Green Warbler (AS)	(*Dendroica virens*)
668.0	Townsend's Warbler	(*Dendroica townsendi*)
669.0	Hermit Warbler (AS)	(*Dendroica occidentalis*)
662.0	Blackburnian Warbler (FL)	(*Dendroica fusca*)
663.0	Yellow-throated Warbler (AS)	(*Dendroica dominica*)
671.0	Pine Warbler (AS)	(*Dendroica pinus*)
673.0	Prairie Warbler (AS)	(*Dendroica discolor*)
672.0	Palm Warbler (AS)	(*Dendroica palmarum*)
660.0	Bay-breasted Warbler (AS)	(*Dendroica castanea*)
661.0	Blackpoll Warbler (FL)	(*Dendroica striata*)
636.0	Black-and-white Warbler (FL)	(*Mniotilta varia*)
687.0	American Redstart	(*Setophaga ruticilla*)
637.0	Prothonotary Warbler (AS)	(*Protonotaria citrea*)
639.0	Worm-eating Warbler (AS)	(*Helmitheros vermivorus*)
674.0	Ovenbird	(*Seiurus aurocapilla*)

Appendix I. Continued.

675.0	Northern Waterthrush	(*Seiurus noveboracensis*)
677.0	Kentucky Warbler (AS)	(*Oporornis formosus*)
678.0	Connecticut Warbler (AS)	(*Oporornis agilis*)
679.0	Mourning Warbler (AS)	(*Oporornis philadelphia*)
680.0	MacGillivray's Warbler	(*Oporornis tolmiei*)
681.0	Common Yellowthroat	(*Geothlypis trichas*)
684.0	Hooded Warbler (AS)	(*Wilsonia citrina*)
685.0	Wilson's Warbler	(*Wilsonia pusilla*)
686.0	Canada Warbler (AS)	(*Wilsonia canadensis*)
690.0	Red-faced Warbler (AS)	(*Cardellina rubrifrons*)
683.0	Yellow-breasted Chat	(*Icteria virens*)
Thraupidae		
609.0	Hepatic Tanager (AS)	(*Piranga flava*)
610.0	Summer Tanager (AS)	(*Piranga rubra*)
608.0	Scarlet Tanager (AS)	(*Piranga olivacea*)
607.0	Western Tanager	(*Piranga ludoviciana*)
Emberizidae		
590.0	Green-tailed Towhee	(*Pipilo chlorurus*)
587.0	Spotted Towhee	(*Pipilo maculatus*)
591.0	Canyon Towhee (AS)	(*Pipilo fuscus*)
578.0	Cassin's Sparrow (AS)	(*Aimophila cassinii*)
559.0	American Tree Sparrow	(*Spizella arborea*)
560.0	Chipping Sparrow	(*Spizella passerina*)
561.0	Clay-colored Sparrow (FL)	(*Spizella pallida*)
562.0	Brewer's Sparrow	(*Spizella breweri*)
563.0	Field Sparrow (AS)	(*Spizella pusilla*)
540.0	Vesper Sparrow	(*Pooecetes gramineus*)
552.0	Lark Sparrow	(*Chondestes grammacus*)
573.0	Black-throated Sparrow (AS)	(*Amphispiza bilineata*)
574.0	Sage Sparrow	(*Amphispiza belli*)
605.0	Lark Bunting	(*Calamospiza melanocorys*)
542.0	Savannah Sparrow	(*Passerculus sandwichensis*)
546.0	Grasshopper Sparrow	(*Ammodramus savannarum*)
545.0	Baird's Sparrow (FL)	(*Ammodramus bairdii*)
548.0	Le Conte's Sparrow (AS)	(*Ammodramus leconteii*)
549.1	Nelson's Sharp-tailed Sparrow (AS)	(*Ammodramus nelsoni*)
585.0	Fox Sparrow	(*Passerella iliaca*)
581.0	Song Sparrow	(*Melospiza melodia*)
583.0	Lincoln's Sparrow	(*Melospiza lincolnii*)
584.0	Swamp Sparrow (AS)	(*Melospiza georgiana*)
558.0	White-throated Sparrow	(*Zonotrichia albicollis*)
553.0	Harris's Sparrow	(*Zonotrichia querula*)
554.0	White-crowned Sparrow	(*Zonotrichia leucophrys*)

Appendix I. Continued.

557.0 Golden-crowned Sparrow (AS) (*Zonotrichia atricapilla*)
567.0 Dark-eyed Junco (*Junco hyemalis*)
[includes White-winged Junco (566.0),
Slate-colored Junco(567.0) and Gray-headed Junco(569.0)]
539.0 McCown's Longspur (*Calcarius mccownii*)
536.0 Lapland Longspur (FL) (*Calcarius lapponicus*)
537.0 Smith's Longspur (AS) (*Calcarius pictus*)
538.0 Chestnut-collared Longspur (FL) (*Calcarius ornatus*)
534.0 Snow Bunting (*Plectrophenax nivalis*)

Cardinalidae
593.0 Northern Cardinal (AS) (*Cardinalis cardinalis*)
595.0 Rose-breasted Grosbeak (FL) (*Pheucticus ludovicianus*)
596.0 Black-headed Grosbeak (*Pheucticus melanocephalus*)
597.0 Blue Grosbeak (*Passerina caerulea*)
599.0 Lazuli Bunting (*Passerina amoena*)
598.0 Indigo Bunting (FL) (*Passerina cyanea*)
601.0 Painted Bunting (AS) (*Passerina ciris*)
604.0 Dickcissel (FL) (*Spiza americana*)

Icteridae
494.0 Bobolink (*Dolichonyx oryzivorus*)
498.0 Red-winged Blackbird (*Agelaius phoeniceus*)
501.1 Western Meadowlark (*Sturnella neglecta*)
497.0 Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)
509.0 Rusty Blackbird (FL) (*Euphagus carolinus*)
510.0 Brewer's Blackbird (*Euphagus cyanocephalus*)
511.0 Common Grackle (*Quiscalus quiscula*)
512.0 Great-tailed Grackle (AS) (*Quiscalus mexicanus*)
495.0 Brown-headed Cowbird (*Molothrus ater*)
506.0 Orchard Oriole (FL) (*Icterus spurius*)
508.0 Bullock's Oriole (*Icterus bullockii*)
507.0 Baltimore Oriole (FL) (*Icterus galbula*)
504.0 Scott's Oriole (FL) (*Icterus parisorum*)

Fringillidae
514.1 Brambling (AS) (*Fringilla montifringilla*)
524.0 Gray-crowned Rosy-Finch (*Leucosticte tephrocotis*)
525.0 Black Rosy-Finch (*Leucosticte atrata*)
526.0 Brown-capped Rosy Finch (AS) (*Leucosticte australis*)
515.0 Pine Grosbeak (*Pinicola enucleator*)
517.0 Purple Finch (FL) (*Carpodacus purpureus*)
518.0 Cassin's Finch (*Carpodacus cassinii*)
519.0 House Finch (*Carpodacus mexicanus*)
521.0 Red Crossbill (*Loxia curvirostra*)
522.0 White-winged Crossbill (FL) (*Loxia leucoptera*)

Appendix I. Continued.

528.0	Common Redpoll	(*Carduelis flammea*)
527.0	Hoary Redpoll (AS)	(*Carduelis hornemanni*)
533.0	Pine Siskin	(*Carduelis pinus*)
530.0	Lesser Goldfinch (FL)	(*Carduelis psaltria*)
531.0	Lawrence's Goldfinch (AS)	(*Carduelis lawrencei*)
529.0	American Goldfinch	(*Carduelis tristis*)
514.0	Evening Grosbeak	(*Coccothraustes vespertinus*)
Passeridae		
688.2	House Sparrow	(*Passer domesticus*)

MAMMALS [c, d]

Marsupials

Marsupialia		
Didelphidae		
800.0	Virginia Opossum	(*Didelphis virginiana*)

Insectivores

Insectivora		
Soricidae		
801.0	Masked Shrew	(*Sorex cinereus*)
801.1	Hayden's Shrew	(*Sorex haydeni*)
806.0	Pygmy Shrew	(*Sorex hoyi*)
805.0	Merriam's Shrew	(*Sorex merriami*)
807.0	Dusky Shrew	(*Sorex monticolus*)
803.0	Dwarf Shrew	(*Sorex nanus*)
804.0	Water Shrew	(*Sorex palustris*)
804.1	Preble's Shrew	(*Sorex preblei*)
802.0	Vagrant Shrew	(*Sorex vagrans*)
Talpidae		
810.0	Eastern Mole	(*Scalopus aquaticus*)

Bats

Chiroptera		
Vespertilionidae		
815.1	California Myotis	(*Myotis californicus*)
816.0	Western Small-footed Myotis	(*Myotis ciliolabrum*)
818.0	Long-eared Myotis	(*Myotis evotis*)
819.0	Northern Myotis	(*Myotis septentrionalis*)
815.0	Little Brown Myotis	(*Myotis lucifugus*)
826.0	Fringed Myotis	(*Myotis thysanodes*)
817.0	Long-legged Myotis	(*Myotis volans*)
817.1	Yuma Myotis	(*Myotis yumanensis*)
821.0	Eastern Red Bat	(*Lasiurus borealis*)

Appendix I. Continued.

822.0 Hoary Bat	(*Lasiurus cinereus*)
820.0 Silver-haired Bat	(*Lasionycteris noctivagans*)
820.1 Eastern Pipistrelle	(*Pipistrellus subflavus*)
825.0 Big Brown Bat	(*Eptesicus fuscus*)
824.0 Spotted Bat	(*Euderma maculatum*)
823.0 Townsend's Big-eared Bat	(*Corynorhinus townsendii*)
827.0 Pallid Bat	(*Antrozous pallidus*)
Molossidae	
828.0 Brazilian Free-tailed Bat	(*Tadarida brasiliensis*)
828.1 Big Free-tailed Bat	(*Nyctinomops macrotis*)
Lagomorphs	
Lagomorpha	
Ochotonidae	
Pika	(*Ochotona princeps*)
Leporidae	
***837.0 Pygmy Rabbit	(*Brachylagus idahoensis*)
***833.0 Desert Cottontail	(*Sylvilagus audubonii*)
***834.0 Eastern Cottontail	(*Sylvilagus floridanus*)
***835.0 Mountain (Nuttall's) Cottontail	(*Sylvilagus nuttallii*)
***836.0 Snowshoe Hare	(*Lepus americanus*)
***832.0 Black-tailed Jackrabbit	(*Lepus californicus*)
***831.0 White-tailed Jackrabbit	(*Lepus townsendii*)
Rodents	
Rodentia	
Sciuridae	
841.0 Yellow-pine Chipmunk	(*Tamias amoenus*)
842.0 Cliff Chipmunk	(*Tamias dorsalis*)
840.0 Least Chipmunk	(*Tamias minimum*)
843.0 Uinta Chipmunk	(*Tamias umbrinus*)
844.0 Yellow-bellied Marmot	(*Marmota flaviventris*)
846.0 Uinta Ground Squirrel	(*Spermophilus armatus*)
845.0 Wyoming Ground Squirrel	(*Spermophilus elegans*)
849.9 Golden-mantled Ground Squirrel	(*Spermophilus lateralis*)
847.0 Spotted Ground Squirrel	(*Spermophilus spilosoma*)
848.0 Thirteen-lined Ground Squirrel	(*Spermophilus tridecemlineatus*)
851.0 White-tailed Prairie Dog	(*Cynomys leucurus*)
850.0 Black-tailed Prairie Dog	(*Cynomys ludovicianus*)
855.0 Abert's Squirrel	(*Sciurus aberti*)
***856.0 Eastern Gray Squirrel	(*Sciurus carolinenisis*)
***852.0 Fox Squirrel	(*Sciurus niger*)
***854.0 Red Squirrel	(*Tamiasciurus hudsonicus*)
853.0 Northern Flying Squirrel	(*Glaucomys sabrinus*)

Appendix I. Continued.

Geomyidae		
	862.0 Wyoming Pocket Gopher	(*Thomomys clusius*)
	863.0 Idaho Pocket Gopher	(*Thomomys idahoensis*)
	860.0 Northern Pocket Gopher	(*Thomomys talpoides*)
	861.0 Plains Pocket Gopher	(*Geomys bursarius*)
Heteromyidae		
	865.0 Olive-backed Pocket Mouse	(*Perognathus fasciatus*)
	893.0 Plains Pocket Mouse	(*Perognathus flavescens*)
	866.0 Silky Pocket Mouse	(*Perognathus flavus*)
	867.0 Great Basin Pocket Mouse	(*Perognathus parvus*)
	868.0 Hispid Pocket Mouse	(*Chaetodipus hispidus*)
	869.0 Ord's Kanagroo Rat	(*Dipodomys ordii*)
Castoridae		
	***875.0 Beaver	(*Castor canadensis*)
Muridae		
	877.0 Western Harvest Mouse	(*Reithrodontomys megalotis*)
	876.0 Plains Harvest Mouse	(*Reithrodontomys montanus*)
	878.0 Canyon Mouse	(*Peromyscus crinitus*)
	881.0 White-footed Mouse	(*Peromyscus leucopus*)
	880.0 Deer Mouse	(*Peromyscus maniculatus*)
	879.0 Piñon Mouse	(*Peromyscus truei*)
	882.0 Northern Grasshopper Mouse	(*Onychomys leucogaster*)
	883.0 Bushy-tailed Woodrat	(*Neotoma cinerea*)
	884.0 Southern Red-backed Vole	(*Clethrionomys gapperi*)
	885.0 Heather Vole	(*Phenacomys intermedius*)
	888.0 Long-tailed Vole	(*Microtus longicaudus*)
	887.0 Montane Vole	(*Microtus montanus*)
	890.0 Prairie Vole	(*Microtus ochrogaster*)
	886.0 Meadow Vole	(*Microtus pennsylvanicus*)
	889.0 Water Vole	(*Microtus richardsoni*)
	891.0 Sagebrush Vole	(*Lemmiscus curtatus*)
	892.0 Muskrat	(*Ondatra zibethicus*)
	894.2 Norway Rat	(*Rattus norvegicus*)
	894.1 House Mouse	(*Mus musculus*)
Zapodidae		
	895.0 Meadow Jumping Mouse	(*Zapus hudsonius*)
	896.0 Western Jumping Mouse	(*Zapus princeps*)
Erethizontidae		
	***900.0 Porcupine	(*Erethizon dorsatum*)

Appendix I. Continued.

<u>Carnivores</u>

Carnivora

- Canidae
  - ***901.0 Coyote (*Canis latrans*)
  - ***902.0 Gray Wolf (*Canis lupus*)
  - 904.0 Swift Fox (*Vulpes velox*)
  - ***903.0 Red Fox (*Vulpes vulpes*)
  - ***905.0 Gray Fox (*Urocyon cinereoargenteus*)
- Ursidae
  - ***940.0 Black Bear (*Ursus americanus*)
  - ***941.0 Grizzly Bear (*Ursus arctos*)
- Procyonidae
  - 906.0 Ringtail (*Bassariscus astutus*)
  - ***907.0 Raccoon (*Procyon lotor*)
- Mustelidae
  - ***908.0 Marten (*Martes americana*)
  - 909.0 Fisher (*Martes pennanti*)
  - ***910.0 Ermine (*Mustela erminea*)
  - ***911.0 Long-tailed Weasel (*Mustela frenata*)
  - 913.0 Black-footed Ferret (*Mustela nigripes*)
  - ***919.0 Least Weasel (*Mustela nivalis*)
  - ***912.0 Mink (*Mustela vison*)
  - 914.0 Wolverine (*Gulo gulo*)
  - ***915.0 Badger (*Taxidea taxus*)
  - ***916.1 Western Spotted Skunk (*Spilogale gracilis*)
  - ***916.0 Eastern Spotted Skunk (*Spilogale putorius*)
  - ***917.0 Striped Skunk (*Mephitis mephitis*)
  - 918.0 River Otter (*Lutra canadensis*)
- Felidae
  - ***922.0 Mountain Lion (*Puma concolor*)
  - 920.0 Canada Lynx (*Lynx canadensis*)
  - ***921.0 Bobcat (*Lynx rufus*)

<u>Ungulates</u>

Artiodactyla

- Cervidae
  - ***930.0 Elk (*Cervus elaphus*)
  - ***932.0 Mule Deer (*Odocoileus hemionus*)
  - ***933.0 White-tailed Deer (*Odocoileus virginianus*)
  - ***931.0 Moose (*Alces alces*)
- Antilocapridae
  - ***935.0 Pronghorn (*Antilocapra americana*)

Appendix I. Continued.

Bovidae

***925.0	Bison	(*Bos bison*)
***926.0	Mountain Goat	(*Oreamnos americanus*)
***927.0	Bighorn Sheep	(*Ovis canadensis*)

AMPHIBIANS [e]

Salamanders

Caudata

Ambystomatidae

950.0	Tiger Salamander	(*Ambystoma tigrinum*)

Toads and Frogs

Salientia

Pelobatidae

951.0	Plains Spadefoot	(*Scaphiopus bombifrons*)
951.1	Great Basin Spadefoot	(*Scaphiopus intermontanus*)

Bufonidae

951.2	Boreal Toad	(*Bufo boreas boreas*)
951.3	Great Plains Toad	(*Bufo cognatus*)
951.4	Woodhouse's Toad	(*Bufo woodhousei woodhousei*)
951.5	Wyoming Toad	(*Bufo hemiophrys baxteri*)

Ranidae

952.1	Bullfrog	(*Rana catesbeiana*)
952.2	Northern Leopard Frog	(*Rana pipiens*)
952.3	Spotted Frog	(*Rana pretiosa*)
952.4	Wood Frog	(*Rana sylvatica*)

Hylidae

952.0	Boreal Chorus Frog	(*Pseudacris triseriata maculata*)

REPTILES

Turtles

Testudines

Trionychidae

953.0	Western Spiny Softshell	(*Trionyx spiniferus hartwegi*)

Testudinidae

953.2	Ornate Box Turtle	(*Terrapene ornata ornata*)
953.3	Western Painted Turtle	(*Chrysemys picta belli*)

Chelydridae

953.1	Common Snapping Turtle	(*Chelydra serpentina serpentina*)

Appendix I. Continued.

Lizards

Anguidae

Teiidae

954.0 Prairie-lined Racerunner (*Cnemidophorus sexlineatus viridis*)

Scincidae

954.1 Many-lined Skink (*Eumeces multivirgatus*)

Iguanidae

954.3 Northern Sagebrush Lizard (*Sceloporus graciosus graciosus*)
954.4 Northern Plateau Lizard (*Sceloporus undulatus elongatus*)
954.5 Red-lipped Prairie Lizard (*Sceloporus undulatus erythrocheilus*)
954.6 Northern Prairie Lizard (*Sceloporus undulatus garmani*)
954.8 Northern Tree Lizard (*Urosaurus ornata wrighti*)
954.2 Eastern Short-horned Lizard (*Phrynosoma douglassi brevirostre*)
954.7 Northern Earless Lizard (*Holbrookia maculata maculata*)

Snakes

Squamata

Boidae

955.2 Rubber Boa (*Charina bottae*)

Colubridae

955.3 Plains Hognose Snake (*Heterodon nasicus nasicus*)
956.2 Eastern Yellowbelly Racer (*Coluber constrictor flaviventris*)
956.3 Eastern Smooth Green Snake (*Opheodrys vernalis vernalis*)
956.4 Western Smooth Green Snake (*Opheodrys vernalis blanchardi*)
955.4 Black Hills Redbelly Snake (*Storeria occipitomaculata pahasapae*)
956.1 Pale Milk Snake (*Lampropeltis triangulum multistrata*)
955.6 Great Basin Gopher Snake (*Pituophis melanoleucas deserticola*)
955.5 Bullsnake (*Pituophis melanoleucas sayi*)
955.8 Wandering Garter Snake (*Thamnophis elegans vagrans*)
955.9 Red-sided Garter Snake (*Thamnophis sirtalis parietalis*)
956.0 Valley Garter Snake (*Thamnophis sirtalis fitchi*)
955.7 Western Plains Garter Snake (*Thamnophis radix haydeni*)

Crotalidae

955.0 Prairie Rattlesnake (*Crotalus viridis viridis*)
955.1 Midget Faded Rattlesnake (*Crotalus viridis concolor*)

Appendix I. Continued.

[a] Common and scientific names are from American Ornithologists' Union (1983, 2003).
[b] An "(AS)" indicates species for which full written documentation of all sightings is requested by the Wyoming Bird Records Committee; an "(FL)" indicates species for which documentation is only requested for the first sighting in each latilong. In addition, full documentation is required for any species not listed here and for observations of breeding attempts.
[c] *** indicates mammals classified as game, predator, or furbearer by state statute or Wyoming Game and Fish Commission Regulation.
[d] Common and scientific names (except *C. townsendii*) are from Jones et al. (1997).
[e] Common and scientific names are from Baxter and Stone (1992).

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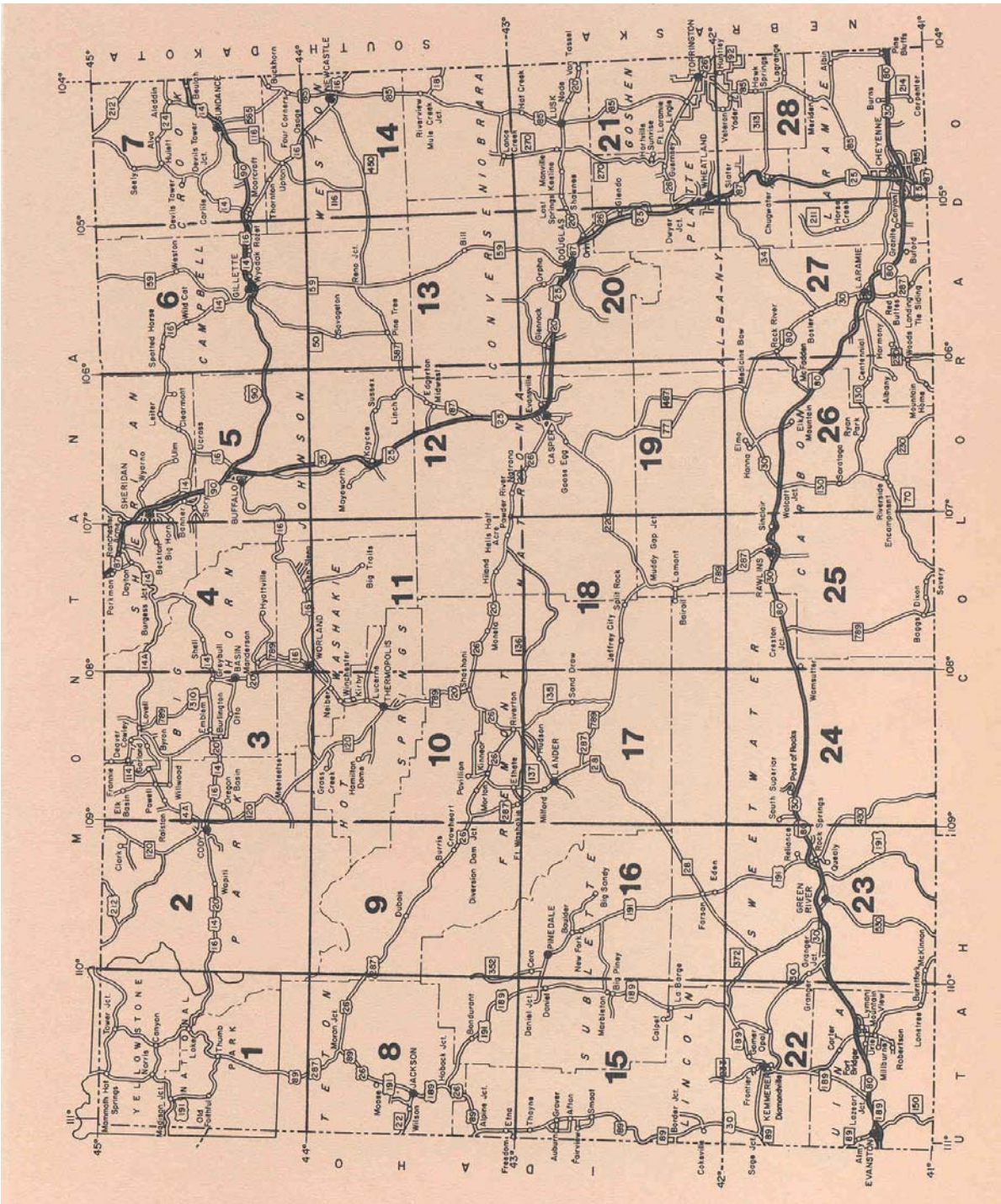
Jones, C., R. S. Hoffman, D. W. Rice, M. D. Engstrom, R. D.Bradley, D. J. Schmidly, C. A. Jones, and R. J. Baker. 1997. Revised checklist of North American mammals north of Mexico, 1997. Occasional Papers, Museum of Texas Tech University, Number 173. 19pp.

APPENDIX II

DEGREE BLOCKS (LATILONGS) IN WYOMING

From: Dorn, J. L., and R. D. Dorn. 1990. Wyoming birds. Mountain West Publishing, Cheyenne, Wyoming. 138pp.



APPENDIX III

NATIVE SPECIES STATUS MATRIX - NONGAME BIRD SPECIES OF SPECIAL CONCERN

HABITAT VARIABLES

POPULATION VARIABLES	A On-going **significant** loss of habitat	B Habitat is restricted or vulnerable but no recent or on-going **significant** loss; species may be sensitive to human disturbance	C Habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance	D Habitat is stable and not restricted
1 Populations are greatly restricted or declining - extirpation appears possible	NSS1 Common Loon	NSS2	NSS3	NSS4
2 Populations are declining or restricted in numbers and/or distribution - extirpation is not imminent	NSS2 Trumpeter Swan Bald Eagle Yellow-billed Cuckoo	NSS3 American White Pelican American Bittern Snowy Egret Black-crowned Night-Heron White-faced Ibis Caspian Tern Forster's Tern Black Tern Harlequin Duck Merlin Peregrine Falcon Long-billed Curlew Lewis' Woodpecker Ash-throated Flycatcher Western Scrub-Jay Juniper Titmouse Bushtit Scott's Oriole	NSS4 Grasshopper Sparrow Baird's Sparrow McCown's Longspur Chestnut-collared Longspur Bobolink	NSS5
3 Species is widely distributed; population status and trends are unknown but are suspected to be stable	NSS3 Ferruginous Hawk	NSS4 Clark's Grebe Western Grebe Great Blue Heron Mountain Plover Upland Sandpiper Northern Goshawk Northern Pygmy-Owl Great Gray Owl Boreal Owl Burrowing Owl Black-backed Woodpecker Common Yellowthroat Veery American Redstart Orange-crowned Warbler Indigo Bunting Pygmy Nuthatch	NSS5	NSS6
4 Populations are stable or increasing and not restricted in numbers and/or distribution	NSS4	NSS5	NSS6	NSS7

APPENDIX III
NATIVE SPECIES STATUS MATRIX - NONGAME MAMMAL SPECIES OF SPECIAL CONCERN

HABITAT VARIABLES

POPULATION VARIABLES	**A** On-going **significant** loss of habitat	**B** Habitat is restricted or vulnerable but no recent or on-going **significant** loss; species may be sensitive to human disturbance	**C** Habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance	**D** Habitat is stable and not restricted
1 Populations are greatly restricted or declining - extirpation appears possible	NSS1 Black-footed Ferret Lynx	NSS2 Pygmy Shrew	NSS3 Preble's Shrew	NSS4
2 Populations are declining or restricted in numbers and/or distribution - extirpation is not imminent	NSS2 Spotted Bat Long-eared Myotis Northern Myotis Long-legged Myotis Townsend's Big-eared Bat Pallid Bat Fringed Myotis	NSS3 Black-tailed Prairie Dog White-tailed Prairie Dog Dwarf Shrew Pygmy Rabbit Water Vole Cliff Chipmunk Pinyon Mouse Canyon Mouse Swift Fox Vagrant Shrew Idaho Pocket Gopher Great Basin Pocket Mouse Plains Harvest Mouse Plains Pocket Mouse Silky Pocket Mouse Olive-backed Pocket Mouse Hispid Pocket Mouse Spotted Ground Squirrel Western Heather Vole Prairie Vole Least Weasel	NSS4	NSS5
3 Species is widely distributed; population status and trends are unknown but are suspected to be stable	NSS3 Little Brown Myotis Big Brown Bat Western Small-footed Myotis Wolverine	NSS4	NSS5	NSS6
4 Populations are stable or increasing and not restricted in numbers and/or distribution	NSS4	NSS5	NSS6	NSS7

APPENDIX III
DEFINITIONS OF NATIVE SPECIES STATUS CATEGORIES

NSS1 Native Species Status 1 - Populations are greatly restricted or declining, extirpation appears possible and on-going significant loss of habitat (cell 1A).

NSS2 Native Species Status 2 - Populations are declining, extirpation appears possible; habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance (cell 1B).

~OR~

Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; ongoing significant loss of habitat (cell 2A).

NSS3 Native Species Status 3 - Populations are greatly restricted or declining, extirpation appears possible; habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance (cell 1C).

~OR~

Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance (cell 2B).

~OR~

Species is widely distributed; population status or trends are unknown but are suspected to be stable; on-going significant loss of habitat (cell 3A).

NSS4 Native Species Status 4 - Populations are greatly restricted or declining, extirpation appears possible; habitat is stable and not restricted (cell 1D).

~OR~

Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance (cell 2C).

~OR~

Species is widely distributed, population status or trends are unknown but are suspected to be stable; habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance (cell 3B).

~OR~

Populations are stable or increasing and not restricted in numbers and/or distribution; on-going significant loss of habitat (cell 4A).

APPENDIX III
JUSTIFICATION FOR INCLUDING SPECIES AS WGFD NATIVE SPECIES STATUS SPECIES OF SPECIAL CONCERN

Birds

Includes all nongame birds listed as abundance rare, uncommon, or unknown in the Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming (Wyoming Game and Fish Department 1999). Also includes the following common species: Western Grebe, American White Pelican, Northern Goshawk, Mountain Plover, Forster's Tern, Black Tern, Common Yellowthroat, Grasshopper Sparrow, and McCown's Longspur due to threatened habitat, unstable breeding status, population declines, and/or high public concern; Great Blue Heron due to restricted breeding habitat; and Ferruginous Hawk due to lack of population data. Excludes all migrant and accidental species that occur in the state. Excludes winter residents unless the ability to make significant contributions to other states' management programs where the species breed is present. The number and letter that appear in parenthesis after each species' name is its rank in the Habitat/Population Variables Matrix.

Also takes into consideration U.S. Forest Service Region 2 Sensitive Species List, U.S. Fish and Wildlife Service threatened or endangered species, U.S. Fish and Wildlife Service candidate species for threatened and endangered listing, and The Nature Conservancy rank of S1 (critically imperiled because of extreme rarity) or S2 (imperiled because of extreme rarity) in Wyoming.

Mammals

Only the 35 mammalian species in categories NSS1 – NSS3 are shown. There are 84 nongame and a total of 120 mammalian species in Wyoming. This matrix includes all nongame mammals listed with abundance as rare, uncommon, or unknown in the Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming (Wyoming Game and Fish Department 1999). Also includes the following common species: Big Brown Bat, Black-tailed Prairie Dog, Little Brown Myotis, Swift Fox, Western Heather Vole, and White-tailed Prairie dog. Excludes all species listed with residency as unknown or accidental.

Justification for changing the status of a species in the matrix, adding additional species to the matrix or removing species from the matrix - Nongame Mammals in the Wyoming Game and Fish Department 1996 Nongame Bird and Mammal Plan are described below.

Lynx – NSS2 to NSS1

Lynx have continued to decline during the last six years (1996-2002) of surveying throughout its historic range in Wyoming. Documented declines and continued significant loss of habitat make extirpation of lynx in Wyoming possible.

Appendix III. Continued.

White-tailed Prairie Dog -- NSS7 to NSS3

The white-tailed prairie dog is the only one of five prairie dog species in the western U.S. which is not currently federally listed or petitioned, yet it appears to meet most of the listing criteria that were used for the other species. The species occurs in Wyoming, Utah, Colorado, and a very small part of Montana. Wyoming has over 60% of the range of this species and should take a major role in population and habitat preservation. This species appears on the Bureau of Land Management Sensitive Species List. It is believed that the Wyoming Game and Fish Department will be forced to deal with the issues for this species, possibly including a management plan to prevent federal listing, within a few years.

Idaho Pocket Gopher -- NSS5 to NSS3

The 1998 Status Survey and Conservation Action Plan of the IUCN (The World Conservation Union) lists this species as a "North American Rodent of Conservation Concern - IUCN Red List Category LR(nt) - Lower Risk, Near Threatened". The known range of the species is western Montana, eastern Idaho, western Wyoming, and northern Utah. Pocket gophers are negatively viewed by the agricultural community and may suffer the same risk of population impacts as prairie dogs. No population or distribution data exist for the species in Wyoming.

Least Weasel – NSS5 to NSS3

Species is restricted in range the Sheridan area in Wyoming. Habitats include meadows, riparian willow, and cottonwood in basin sagebrush-grasslands. Although all habitats identified are vulnerable, there appears to be no significant or on-going loss. Population is believed to be isolated from other known least weasel populations in the surrounding states. Additional surveys are warranted to determine baseline population trends and the distribution of the species in Wyoming.

Small mammal surveys were conducted in the historical range of each of the following species between 1989 and 1992. The number of applicable surveys varied for individual species. The small number of surveys that confirmed presence of the species indicates that all are rare or, possibly in some cases, extirpated from Wyoming.

Great Basin Pocket Mouse - NSS4 to NSS3

Fifteen surveys in the range of this species documented occurrence at only one location (7% of sample sites). The expected range is extreme southwestern Wyoming.

Appendix III. Continued.

Plains Harvest Mouse - NSS7 to NSS3

Twenty-nine surveys in the range of this species documented no occurrences. The expected range is the eastern one-third of Wyoming.

Silky Pocket Mouse - NSS4 to NSS3

Fifty surveys in the range of this species documented occurrence at only one location (2% of sample sites). The expected range is the eastern one-third of Wyoming.

Olive-backed Pocket Mouse - NSS4 to NSS3

One hundred eighteen surveys in the range of this species documented occurrence at only three locations (3% of sample sites). The expected range is the eastern two-thirds of Wyoming.

Hispid Pocket Mouse - NSS4 to NSS3

Thirty-three surveys in the range of this species documented no occurrences. The expected range is the eastern one-third of Wyoming.

Spotted Ground Squirrel - NSS5 to NSS3

Fifteen surveys in the range of this species documented no occurrences. The expected range is extreme southeastern Wyoming.

Heather Vole - NSS6 to NSS3

Seventy-six surveys in the range of this species documented no occurrences. The expected range is mountainous regions of northwestern and southeastern Wyoming.

Prairie Vole - NSS7 to NSS3

Ninety surveys in the range of this species documented occurrence at only six locations (6% of sample sites). The expected range is the eastern one-half of Wyoming.

APPENDIX IV
KEY TO MAMMAL TRACKS ON CHALK/TALC COVERED TRACK PLATES IN EASTERN WYOMING

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Laurie Van Fleet, Nongame Biologist

The criteria listed are based on evaluation of tracks collected in Wyoming during past survey years (Luce et al. 2000, Van Fleet and Spivey 2001) as well as Taylor and Raphael (1988), Orloff et al. (1993), and Halfpenny et al. (1998).

1a. Four toes on fore feet (FF) and four toes on hind feet (HF). 2
1b. Four toes on FF and five toes on HF or five toes on FF and HF. 8

2a. General shape is square and/or longer than wide in appearance. 3
2b. General shape is round and/or wider than long in appearance with a 3-1 toe arrangement (three outer toes are closer than the inside toe). Also, generally one toe is slightly more forward than the other three. Heel pad anterior end is bi-lobed and posterior end is tri-lobed. (Felidae) 7

3a. If a line is drawn down the center of the track, approximately 2 ¼ toes are on one side and ¾ are on the other side of the line. Track appears smudged and distorted, similar to pressing a cotton ball on the surface of the track plate. White-tailed Jackrabbit (*Lepus townsendii)*
3b. If a line is drawn down the center of the track, the toes are evenly split. Track has a 1-2-1 toe arrangement (middle two toes approximately evenly spaced). Heel pad is generally triangular shape. (Canidae) 4

4a. Track Length >64 mm and/or Track Width >54 mm. Domestic Dog (*Canis familiarus*)
4b. Track Length <64 mm and/or Track Width <54 mm. 5

5a. Track Length >52 mm and/or Track Width >42 mm. Coyote (*Canis latrans*)
5b. Track Length <52 mm and/or Track Width <42 mm. 6

6a. Track Length >35 mm and/or Track Width >31 mm. Red Fox (*Vulpes vulpes*)
6b. Track Length <34 mm and/or Track Width <30 mm. Swift Fox (*Vulpes velox*)

Appendix IV. Continued.

7a. Track Length and Width >38 mm.

Bobcat (*Felis rufus*)

7b. Track Length and Width <38 mm.

Domestic Cat (*Felis catus*)

8a. Five toes on FF and HF. General shape is wider than long. Toes appear crowded with a 1-3-1 toe arrangement. Heel pad appears generally longer on one side. Commonly registers only four toes. (Mustelidae) 9

8b. Toes and/or heel pad appears elongated. FF resembles a human hand. HF resembles the foot of a small child.

Raccoon (*Procyon lotor*)

9a. Track Length >48 mm and/or Track Width >32 mm. Track appears to be pigeon-toed.

Badger (*Taxidea taxus*)

9b. Track Length ≤48 mm and/or Track Width ≤32 mm. Track does not appear to be pigeon-toed. 10

10a. Track Length is approximately 38 mm. Track Width is approximately 32 mm. FF has large heel pad that is wider than long. HF may register a secondary heel pad.

Striped Skunk (*Mephitis mephitis*)

10b. Track Length is approximately 19 mm. Track Width is approximately 19 mm. Track generally appears an organized collection of small dots.

Long-tailed Weasel (*Mustela frenata*)

Appendix IV. Continued.

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