INVENTORY AND MONITORING OF BALD EAGLES AND OTHER RAPTORIAL BIRDS OF THE SNAKE RIVER, IDAHO

1998 Bald Eagle Territory Descriptions and Raptor Surveys
Bald Eagle Productivity, 1998-2000

Michael B. Whitfield
Research Associate
Northern Rockies Conservation Cooperative
Jackson, WY
and
P.O. Box 241, Tetonia, ID 83452

TABLES AND FIGURES

Executive Summary

The Snake River Bald Eagle and Raptor Project, a five-year effort, was initiated in 1994 with two primary objectives: 1) to monitor bald eagle productivity in Southeast Idaho, and 2) to develop a monitoring program for raptorial birds in the Snake River study area. The South Fork Snake River study area in Southeast Idaho, including the lower Henrys Fork, is recognized for its highly productive bald eagle breeding pairs and diversity of raptors. This report covers work completed in the final year of the project, 1998. It also summarizes bald eagle productivity observations from 1998-2000.

In 1998, there were 47 known bald eagle breeding areas within the Southeast Idaho portion of the Greater Yellowstone Ecosystem, up from 39 breeding areas in 1994. In 2000, there are 51 known breeding areas and more are suspected.

Even though young bald eagle pairs are occupying new nests, we are witnessing the gradual loss of historically productive bald eagle nesting areas, primarily on private lands now being developed. This is particularly troubling because the newer territories are generally in the less productive habitat. Ironically, the nesting areas at greatest threat have historically been the most productive breeding areas on the South Fork. This loss of preferred bald eagle nesting habitat is most apparent in the South Fork reach from Palisades Dam to Conant Valley, and highlights the importance of protected habitats.

In 1998, we focused our raptor surveys on location of nesting raptors, both diurnal and nocturnal, on the upper South Fork from Palisades Dam to the Heise area. We have documented the high value of riparian cottonwood forests and nearby Douglas-fir forests for many nesting birds of prey. Of less noted but perhaps equal value, the cottonwood bottoms provide high quality winter habitat for several of the raptor species studied here.

Introduction

This progress report documents the fifth year of a five-year project to monitor raptorial birds within the Snake River ecosystem of southeastern Idaho. The project goal is to develop monitoring tools that can be applied to conservation at several levels: nesting bald eagle productivity, raptorial birds as a guild or trophic level, and biological communities generally (see discussion in Whitfield et al. 1995).

Objectives

I. Determine bald eagle productivity and document habitat observations for bald eagle breeding areas within the Idaho portion of the Greater Yellowstone Ecosystem (GYE). Specific 1998 tasks within this objective are:

a. Complete bald eagle nesting area surveys for each breeding area.
b. Monitor and assess the effects of human disturbance to each breeding area as noted during activity and productivity surveys.
c. Provide preliminary identification of key habitat use areas for the following bald eagle breeding areas: Cress Creek, Menan Buttes, Cartier Slough, and Annis Slough.

II. An overall goal of this five-year project is to develop an inventory and monitoring program for all raptorial birds of the Snake River study area (Species listed in Table 1) In 1998, we completed the following objectives:

a. Intensified efforts to locate nesting raptors in the upper South Fork reaches from Palisades Dam to Heise. Described habitats used by these nesting birds.

Study Area

The 119 mile reach of Snake River corridor identified in the Bureau of Land Management (BLM) and Forest Service 1991 Snake River Activity/Operations Plan is the core of the study area. This area includes the South Fork Snake River from Palisades Dam beyond the confluence to Market Lake Canal, and Henrys Fork from St. Anthony to its confluence with the mainstem Snake. The study area is expanded to include upland habitats within one mile on each side of the river. In preliminary studies, the investigators located breeding raptors which nest within this expanded area and rely in part upon the riparian bottom for foraging habitat.

The upper section of the South Fork below Palisades Dam flows through a mountain valley, Swan Valley, Idaho. It then flows into a rugged, deeply incised canyon approximately 26 miles in length. The lower South Fork and the Henrys Fork below St. Anthony meander across broad, braided flood plains. Most of the South Fork in these lower reaches is contained by a dike system.

The South Fork Snake River is bordered by cottonwood gallery forests recognized as among the largest and most intact in the western United States. Beyond the floodplain, landscapes on each side of the river include a rich diversity of vegetative cover and topographic relief: conifer and aspen covered foothills, park-like pasture lands and cultivated crop lands; precipitous canyon walls; sage, mountain mahogany, and juniper covered slopes; and steep, rocky mountains. The lower reaches feature biologically rich sloughs and wetlands. The South Fork and lower reach of the Henrys Fork are recognized as a primary biological asset of the GYE, primarily because of the diversity of species supported within the cottonwood forests.

Bald eagles are monitored within a larger region, the Idaho portion of the GYE. This area includes Southeast Idaho west to Interstate 15 from the Montana border to Idaho Falls, and the Snake River watershed south to the Wyoming border at the upper end of Palisades Reservoir. This larger region includes the Snake River study area plus the upper Henrys Fork in Island Park, outlying lakes like Sheridan Reservoir, and Henrys Fork tributaries such as the Falls and Teton River watersheds.

Methods

Bald Eagle Productivity Monitoring

All known and suspected bald eagle breeding areas are surveyed to collect the following data: nest occupancy, breeding activity, breeding success, and number of advanced young produced. All nest sites are visited a minimum of twice: early for an activity (incubation) check and later for a productivity check. In most cases, additional activity checks are necessary to more clearly document activity or to locate new alternate nest sites. Nesting chronology is monitored where reliable data can be obtained.

Activity checks are completed by a combination of aerial and ground or boat surveys. Most early ground checks are from long distance with spotting scopes to avoid disturbance to adults. Later visits are made to measure productivity at active nest sites.

Within the Idaho portion of the GYE, two geographic breeding units have been designated, the Snake Idaho Unit, and the Continental Idaho Unit. In 1988, all territories within each unit were numbered consecutively by geographic location, beginning at the most southerly site on Palisades Reservoir and proceeding to the north end of the Continental Unit. New territories found since 1988 have been numbered chronologically.

Definitions used for bald eagle reproductive terminology are as follows:
Breeding area. This refers to the area used by one nesting pair of adult bald eagles and containing one or more nest sites.

Occupied breeding area or nest. A breeding area or nest within a breeding area, with evidence of bald eagle use during part of the breeding season. Occupancy occurs if a) two adults are seen at or near an empty nest within the breeding season, b) one adult and one subadult are seen at or near a nest during the breeding season and there are displays of reproductive behavior, c) there is clear evidence of recent nest repairs or new nest construction, or d) observations that identify the nest as active as defined below.

Active breeding area or nest. Incubating pair. A breeding area or nest within a breeding area, with clear evidence of bald eagle reproductive effort during the breeding season. An active nest is one where incubation, eggs, or nestlings are observed. Incubation posture does not necessarily infer incubation, and actual incubation should be assumed only if an adult remains in the posture for several hours or an exchange of incubation duty by adults is observed. (Revised GYE Bald Eagle Working Group 1995 guidelines substitute Active with the term "Incubating Pair".)

Successful breeding area or nest. A breeding area, or nest within a breeding area, where advanced young are produced. Advanced young are young of the year at or near fledging age.

Bald Eagle Breeding Area Key Habitat Identification

At selected bald eagle breeding areas, breeding adult and nestling behavior are monitored to learn area specific habitat needs. In earlier years, this monitoring effort was much more intensive, with radio telemetry sometimes used to aid observations (Whitfield et al. 1991, Whitfield 1993). For this project, our observations are limited to approximately six observation periods (four hours each) at each breeding area during the nesting season to provide preliminary delineation of primary use areas, nest site management zone II (GYE Bald Eagle Working Group 1996). These preliminary observations are typically centered at the nest site, and do not provide a complete picture of a breeding pair's habitat use. Observers monitor from a distance with spotting scopes.

Raptor Monitoring Program

Our raptor inventory has been iterative over the five years of the project, with an additive progression through phases as the data is collected and analyzed. We include here a summary of the methods to be used over the life of the project to provide perspective for each year s work (see Whitfield et al. 1995). Sampling methods, including raptor species detection and estimation of relative abundance and breeding

productivity, must be species specific. Once our inventory has provided a reliable baseline, we will develop a long-term monitoring program for the raptors of the South Fork study area.

Breeding Raptor Detection.

We apply species-specific raptor detection methods. We provided a literature review of raptor detection methods in Whitfield et al. (1995).

Raptor Inventory.

Our raptor inventory occurred in two phases as follows:

Phase 1. Presence/Absence Sampling. Sample sites are selected to cover a broad array of biological and physical attributes; such coverage will help assure adequate representation of species composition and distribution over the study area. Sampling must be exhaustive enough to minimize under-sampling effects on patterns while allowing true patterns or gradients across the study area to be identified, described and predicted. With respect to monitoring, sampling must also ensure that study-wide trends and change can be distinguished from localized fluctuations (McKenzie et al. 1991). Hence the number, placement, and size of the sample sites will require careful consideration from both the biological and statistical perspectives.

In 1995-96, we entered all potential samples, all square mile sections within the study area, into a Latin Square table with samples containing similar habitats grouped within the table. We then randomly selected samples according to a Latin Square plus 1 design. We used mapped legal sections because there are often section markers on the ground that aid in sample location. We selected from all square mile sections that were at least 50 percent within one mile of the river. We then individually sampled all 40-acre quadrats (16 per square mile section) within selected sections.

In 1996-97, we deviated from our intended schedule to learn more habitat specificity for nesting habitat selection. We sampled from a larger sample group than visited in 1995, and described more specific vegetative features than described earlier.

Habitat description.

For Phase 1 surveys (presence/absence) completed in 1995 and reported in Whitfield and Maj (1996), we characterized each 40 acre sample quadrat by general vegetation cover type according to the system developed by Ulliman et al. (1991), which includes 30 cover types. We indicated the dominant cover type found within each quadrat, with recognition that many quadrats feature a complex mosaic of vegetative cover types.

In 1996-97, our habitat measures were more refined to characterize features selected by individual raptor species. In 1998 we focused intensive searches for nesting raptors, both diurnal and nocturnal, in the upper South Fork above Heise. Nest searches on the lower river in the prior years of this project were greatly complicated by flooding of many habitats. Access was only sporadically available to many areas, and in many situations, became hazardous during critical observation periods.

Results and Discussion

I. 1998 Bald Eagle Nesting Activity and Productivity

We report 1998 results of activity and productivity surveys at each of the 47 currently known bald eagle breeding areas within the Southeast Idaho portion of the GYE. Data were collected through aerial, ground, and float surveys.

Another wet spring appeared to influence bald eagle productivity at Southeast Idaho nest sites, with relatively low productivity ratios. In 1998, March and early April were relatively mild and dry, but late April and most of May were very wet and cold. Of 29 known breeding areas in the Snake Idaho unit, 27 were occupied and 25 were active. (Market Lake was active, but success was unknown. This area was excluded from ratios.) In the Snake Idaho population unit, for sites with known productivity, a total of 23 young were produced at 27 occupied, 25 active, and 17 successful sites, for productivity ratios of 0.85 advanced young/occupied site, 0.92 advanced young/active site, and 1.35 advanced young/successful site.

In the Continental Idaho unit in 1998, 16 of 18 known breeding areas were occupied, and 12 were active. Nine young were produced at 9 successful sites, for productivity ratios of 0.56 advanced young/occupied site, 0.75 advanced young/active site, and 1.00 advanced young/successful site.

On Palisades Reservoir, only one of what appeared to be five independent breeding areas was successful. None of the three known sites on Island Park Reservoir produced young. These data suggest some connection to water levels at reservoirs, but this connection has not been fully evaluated. No other clear trends emerge, as productivity was spotty throughout the remainder of the study area.

J. Naderman and J. Copeland of Idaho Department of Fish and Game (IDFG) completed a flight survey over the lower Snake River and Island Park in May 1998. J. Gardetto and K. Rice of the BLM monitored the lower river and South Fork nests. M. Whitfield, S. Austin, G. Amlong, L. Stickle and A. Whitfield conducted ground and float surveys at most Idaho sites for the Idaho Bald Eagle Research Project. R. McFarling of the BLM managed productivity data. D. Trochta, B. Aber, and R. Welch of Targhee National Forest monitored several Island Park and Ashton Ranger District nests.

In 1998 we observed nesting adults that were banded as nestlings in the GYE, and determined the natal nest of three of these adults. We also saw two immature bald eagles that were banded at known Idaho sites in prior years.

II. 1999 Bald Eagle Nesting Activity and Productivity

We report results of 1999 activity and productivity surveys at each of the 48 currently known bald eagle breeding areas within the Southeast Idaho portion of the GYE. Data were collected through aerial, ground, and float surveys.

In 1999, yet another wet spring appeared to influence bald eagle productivity at Southeast Idaho nest sites. Of 30 breeding areas in the Snake Idaho unit with known success, 27 were occupied and 23 were active. Ririe Reservoir was active, but success was unknown. This area was excluded from ratios. Similarly, a newly discovered site at Spring Hollow on the Teton River was thought to be active, but the nesting outcome was unknown. In the Snake Idaho population unit, for sites with known productivity, a total of 23 young were produced at 27 occupied, 23 active, and 15 successful sites, for productivity ratios of .85 advanced young/occupied site, 1.00 advanced young/active site, and 1.53 advanced young/successful site.

In the Continental Idaho unit in 1999, 16 of 18 breeding areas with known success were occupied, and 10 were active. The Moonshine Mountain pair may have nested on a new alternate that was not located during the productivity checks. Eight young were produced at 5 successful sites, for productivity ratios of 0.50 advanced young/occupied site, 0.80 advanced young/active site, and 1.60 advanced young/successful site.

Successful sites produced a high average number of young, but nesting success was very spotty. In lower elevation areas (Snake Unit), only 53 percent of the occupied nests with known outcome were successful, although nearly 80 percent of the nests were active. Lower river nests in the Confluence area uniformly only produced one young. At higher elevations in the Continental Unit, 61 percent of occupied nests with known outcome were active. It appeared that more of the higher elevation pairs did not attempt to nest in the wet spring conditions.

M. Whitfield and A. Whitfield conducted ground and float surveys at most Idaho sites for the Idaho Bald Eagle Research Project in 1999. J. Copeland of IDFG completed a flight survey over lower Snake River and Island Park in April 1999. J. Gardetto and K. Rice of the BLM monitored the lower river and South Fork nests. R. McFarling of the BLM managed productivity data. D. Trochta and R. Welch of Targhee National Forest monitored several Island Park and Ashton Ranger District nests.

III. 2000 Bald Eagle Nesting Activity and Productivity

We report results of calendar year 2000 activity and productivity surveys at each of the 51 currently known bald eagle breeding areas within the Southeast Idaho portion of the GYE. Data were collected through aerial, ground, and float surveys.

In striking contrast to the past two years, spring 2000 was warm and dry. These conditions appeared to strongly enhance bald eagle productivity at Southeast Idaho nest sites. Of 32 breeding areas in the Snake Idaho unit with known success, 30 were occupied and 28 were active. A newly discovered breeding area in the Teton River Canyon above the Felt Dam, the Danford breeding area, was thought to be active but success was unknown. This area was excluded from ratios. In the Snake Idaho population unit, for sites with known productivity, a total of 34 young were produced at 30 occupied, 28 active, and 22 successful sites, for productivity ratios of 1.13 advanced young/occupied site, 1.21 advanced young/active site, and 1.54 advanced young/successful site.

Three new Snake Unit bald eagle nesting territories were discovered in 2000, and at least two more are suspected. The Great Feeder Island territory near Heise in Jefferson County is apparently new this year. Two newly discovered breeding areas on the Teton River, one in the headwaters near Trail Creek, and another in the canyon above the Felt Dam, appear to have been active in earlier years. Other territories are suspected on the South Fork Snake River in the area below Sunnydell and on the Henrys Fork near

the South Fork Teton River confluence.

In the Continental Idaho unit, 17 of 18 breeding areas with known success were occupied, and 15 were active. Twelve young were produced at 10 successful sites, for productivity ratios of 0.71 advanced young/occupied site, 0.80 advanced young/active site, and 1.20 advanced young/successful site.

No bald eagles were banded in 2000. Banded adults were noted at Market Lake and Singleton Pond.

M. Whitfield conducted ground and float surveys at most of the Idaho sites for the Idaho Bald Eagle Research Project in 2000. J. Copeland of IDFG completed a flight survey over lower Snake River and Island Park in April 2000. T. Thomas of IDFG monitored the Ririe Reservoir breeding area. K. Rice and J. Gardetto of the BLM monitored the lower river and South Fork nests. R. McFarling of the BLM managed productivity data. R. Welch of Targhee National Forest monitored several Island Park Ranger District nests.

IV. Trends in Bald Eagle Productivity.

Since 1987, productivity monitoring in this region has been intensive enough to suggest that almost all nesting areas were accounted for each year. Table 5 and Figure 2 provide a sense of productivity trends over this period. The number of nesting areas and total number of young produced has increased dramatically, whereas the per pair productivity rate appears to have gradually declined. Productivity since 1993 has been consistently around one young/occupied nest, a relatively low level. Six of eight recent years have featured cool, wet spring weather, which appears to strongly influence nesting success, particularly in the higher elevations. Reservoir water level fluctuations have also impacted nest sites at Palisades and Island Park Reservoirs. Several formerly productive sites, as discussed below, are no longer successful due to recreational development near nest sites. The general trend in productivity decline may also be due, in part, to saturation of available habitat by adult bald eagles as the overall nesting population continues to grow. Analysis of long-term productivity effects is ongoing.

Problem Areas

As indicated in our earlier reports, several bald eagle breeding areas with long, productive nesting histories have been generally nonproductive in recent years. Below, we provide a 1996-97 update for these identified breeding areas.

Henrys Lake, the oldest known bald eagle breeding area in Eastern Idaho, fledged 29 young bald eagles between 1976 and 1992. However, in 1993-96, we have not observed nesting attempts in the known breeding area. No adults were seen in the historic nesting area in 1996 despite a number of surveys. In 1997, the pair incubated on alternate nest #2, but apparently failed early in the nesting season. Growth in a summer home subdivision near the known nests, with ongoing summer home construction, may have

been a factor in the 1997 failure. In 1997, the team also noted well-defined human trails that pass directly below the known alternate nests.

A pair has successfully produced young in the Henrys Lake breeding area in each of the last three years, 1998-2000. However if the trends continue, the next spurt of summer home development here will again limit productivity.

Before 1992, the **Pine Haven** breeding area on the Henrys Fork was notably productive, with three young produced in several years. In 1992-97, no active nesting was detected within this breeding area. In those years, a new river-side lodge, increased summer home development in this stretch of the river, increased river traffic, and recreational activities on the river bank opposite the nests likely contributed to the pair's abandonment of the known nest sites. Following a pattern noted in recent years, single adult bald eagles were seen perched near the known nests in 1996 and 1997. The bald eagle team and Targhee National Forest volunteers intensively searched for new nest areas without success. Nesting at Pine Haven has been successful in the last three years, 1998-2000, a period without new construction on the general vicinity of the known nests. However, vacant lots in the area suggest concern for the long-term.

The **Box Canyon** and **I.P. Bill's** breeding areas on Island Park Reservoir should be monitored closely because of development of a new subdivision in their vicinity. In 1996, an adult pair thought to be the Box Canyon pair were seen several times on historically used perches near alternate nests and foraging sites, but no active nest nor young eagles were noted. The I.P. Bill's pair built a new alternate in a large Douglas-fir about 75 yards to the southwest of the historic nest site, and produced one advanced nestling in 1996. Nesting attempts were unsuccessful in both of these areas in 1997 and 1998. However, both pairs successfully produced young in 1999, a year when development was not active in the road area. Developers greatly upgraded road access into this area in late summer 1996, and paved the road in summer 2000. They are expected to soon begin development of over 80 subdivision lots. The area to be developed includes the favored foraging areas used by the Box Canyon pair. The I.P. Bill's pair forages primarily in areas further to the west, but the nest site is within approximately 500 meters of the development, and will likely be affected by increased human activity.

A nest was first built within the **Swan Valley** breeding area in 1967, the oldest reestablished breeding area on the South Fork. In 4 of 5 years from 1989 to 1993, no young were produced at the historic nest. This pair moved downriver to a less disturbed area in 1994, and produced young in 1995 and 1996. However, in mid-summer 1996, a new house and gravel pit were developed near this alternate site within a recently platted subdivision, and additional houses were built in 1997-1999 throughout the area. No nesting attempt was observed in 1997-1999, although adult bald eagles were in the breeding area. In 2000, the pair surprisingly succeeded in fledging two young from the oldest remaining alternate nest in the breeding area, alternate #4, which is near one of the new houses. It seems that the pair can accommodate intermittent use of the housing once the construction phase is completed. Further development of subdivisions near all of the historic nests in this breeding area is underway. I would expect that the level of human activity that eventually overtakes this area would force the Swan Valley pair to nest on the west side of the river if they were to produce young in this area. The long-term viability of this breeding area is in serious question.

From 1988 to 1995, the **Palisades Creek** breeding area had the highest mean productivity of any site in Eastern Idaho (18 young produced 1988-1995, annual average of 2.25 fledged young). The vicinity of the Palisades Creek nest was entirely platted for subdivision in late 1995 and early 1996. Human use of the nest area increased dramatically in late 1995 and early 1996 as surveyors and planners prepared subdivision plots. The nest failed early in the 1996 breeding season, the first failure at this site in nine years of known nesting at this site. In 1997, the pair again incubated, but failed at near hatching. The pair successfully raised young here in 1998 and 2000, but considerable future construction within subdivisions very near the nest sites is planned. In an adjacent subdivision, many of the cottonwoods have already been removed, although no houses have been built. This development activity may at best force the pair to nest away from the activity on the opposite side of the river, and may eliminate this productive breeding area entirely.

A new subdivision was approved for most of the west side of the river in 1996 in the immediate vicinity of the **Conant Valley** nest used in most years since the late 1970s (29 young produced since 1982). As at the Palisades Creek breeding area, the vicinity of the Conant Valley nest used since 1988 was frequently visited by surveyors and developers during the fall and winter of 1995. As has occasionally occurred in prior years, this pair nested successfully on the large island on the opposite side of the main channel in 1996-1999. Should this subdivision be ultimately developed, this bald eagle pair will be forced to alter its activity distribution. The area planned for subdivision features two known alternate nest sites and very important foraging habitat used by adult bald eagles in the Conant Valley breeding area. This pair is nesting on an island that is under public ownership. However, development on the private portions of this breeding area would greatly limit future options for bald eagle nesting in this area.

In sum, several of Eastern Idaho s historically most productive bald eagle breeding areas have become far less productive in recent years as residential developments have altered breeding habitats. A general trend is for the eagle pairs to not produce advanced young during construction near nests, with some pairs later adapting to new activity around seasonally used summer homes once the building phase is over. Development activities are expected to continue in these breeding areas of concern, with a parallel overall increase in ongoing human activity. At best, each of these breeding areas will be left with far less nesting habitat. Those pairs that remain will be much reduced in their ability to accommodate further loss of nest sites.

IV. Bald Eagle Breeding Areas, Preliminary Key Use Identification, 1998

We provide preliminary habitat use information collected in summer 1998 for four bald eagle breeding areas, Cress Creek (18-IS-12), Menan Buttes (18-IS-20), Cartier Slough (18-IS-14), and Annis Slough (18-IS-27). We have not completed intensive observations within these breeding areas, and do not know the complete extent of foraging area and home range use. We provide a summary of breeding area history, productivity, nesting chronology, occupied nest zones, known foraging and perching areas and breeding area habitat quality. Our maps, which are scans of 1997 aerial photos scale 1:9,748, provide a preliminary view of the key use areas.

Cress Creek 18-IS-12.

Breeding Area History. A nest was first noted in the Cress Creek Area in spring, 1988. This nest was in a highly visible cottonwood across the river from a heavily used county road near a popular fishing area. (See Whitfield 1993 for history of this breeding area, 1988-1993.)

On March 7, 1994, M. Whitfield saw an incubating adult low in the nest, with nest-side sticks built up so high that only the top half of the eagle's head was visible. However, in May 1994 the large nest broke out of the tree with the loss of young on the nest.

No bald eagles or new structures were seen in the area of the old blown-down eagle nest in February 1995. J. Naderman found what was suspected to be the new Cress Creek nest on March 30, 1995, during a survey flight. This nest was located on the southeast side of the river approximately ½ mile above Twin Bridges and one mile downstream of the historic nest. J. Naderman again saw an adult on the nest on May 1, 1995. On May 31, 1995, M. Whitfield, M. Maj, J. Gardetto and K. Rice found the nest with three large young on an island between the middle and south river channels. Both adults were perched in the nest vicinity. The male did not appear to be banded, which would indicate that this was a new male for this pair.

J. Naderman saw an incubating adult on this nest in March 1996. M. Whitfield and J. Gardetto saw both adults in the nest area on May 29, 1996, one standing on the greatly enlarged nest. There was at least one large nestling, but this bird was barely detectable on the nest on a windy, rainy day, and more young eagles may have been present. Herons were heard on the nearby nests, and a large group of pelicans were on a bar upstream of the nest with a group of cormorants. There was also a fishing osprey in the area. K. Rice and J. Gardetto observed two large nestlings on the nest edge on June 19, 1996.

In late July of 1997, J. Gardetto saw two fledged young-of-the-year perched near the nest. Flooding in this nest area prevented observations earlier in the season.

M. Whitfield saw an incubating adult on this nest from a long distance viewpoint to the east on March 31, 1998. During a closer observation of the pair's behavior on April 2, 1998, M. Whitfield noted that the male was banded on the left leg, presumably a Fish and Wildlife Service band, with no bands on the right leg. Subsequently, this breeding area was monitored in greater detail on April 7, 10, 20, 21, and May 18. Two young were fledged at this breeding area in 1998.

The research crew attempted to view this area several times in early summer, but this area was inaccessible due to construction taking place on the Twin Bridges. Adult bald eagles were seen in the area, but the nest was not observed clearly, and the construction crew did not permit observers to cross into the observation area. However, J. Gardetto of the BLM reported that the nest had failed. In a July 12 walk into the nest area, M. Whitfield did not detect any young of the year.

M. Whitfield saw a brooding adult on this nest on April 27, 2000. On June 28, 2000, M. Whitfield could see two adults at this area, but could not see the nest. After an earlier unsuccessful observation, M. Whitfield hiked into the river opposite the nest on June 28 and found a single fledgling food begging in the nest area.

Nesting Chronology. Most of the observations within this breeding area of relevance to nesting chronology were made prior to 1994. Since that year, observations have not been made early enough in

the nesting season to determine initiation dates. We assume that this pair still nests in the same time frame, judging from dates when fledged young have been seen in recent years.

Observations of this breeding area from 1989 to 1994 suggest that this adult pair begins to nest build in mid-February, to incubate around March 1, and hatch eggs in early April. Young should be on the nest for about 10-12 weeks, or until about the end of June or first week in July. They should then remain in the area, and dependent upon the adults, as late as early September.

Occupied Nesting Zone, Zone 1. In Figure 3 we indicate a zone 1 around the current nest. The only other alternate nest used by this pair was located one mile upriver of this site. This nest tree fell in 1994, and no longer exists. The old nest site was in an area of considerable human fishing activity on the opposite river bank.

Key Use Areas, Known Foraging and Perching Areas. The research team noted use of eight different key perches within this breeding area during summer 1998 observations. Most of the adult activity was near the nest, including many foraging attempts. The adults were also seen flying down the two prominent river channels below the nest, and foraging down these channels. On several occasions in the nesting season, an adult would fly from the nest area to the southwest away from the river corridor, and return with prey. On one such occasion, an adult was found perched on the Dry Beds channel, where it appeared to be fishing.

Breeding Area Habitat Quality. The entire breeding area features considerable habitat diversity, including multiple braided river channels, large backwater sloughs, and open pastures and fields to the south. Bald eagle productivity at this site suggests an abundant prey base. The heron rookery just upriver of the nest, and the flocks of pelicans that are often seen here, are further evidence of abundant fish. Immature bald eagles were often seen foraging in the general area of the nest as well.

The observers saw a number of drift boats with fisherman float through the area during observations, but the adults did not react to this activity. Human activity levels within the nest area were very low relatively. The river reach in this section is not used a great deal, and there are no easy takeouts near the nest.

Menan Buttes 18-IS-20.

Breeding Area History. When the Menan Buttes nest was first discovered in 1990, it was assumed to be an alternate nest for the Confluence breeding pair. The nest tree used by the Confluence pair in the preceding several years fell prior to the nesting season, and no new nest was located in the area of the old Confluence nests in 1990. The new nest later designated as the new Menan Buttes nest was located approximately 1.5 miles upriver of the Henrys Fork/South Fork confluence and approximately 3.5 miles upriver of the Confluence alternate nests used in prior years.

Even though this long distance indicated careful survey of what became known as the Menan Buttes breeding area in the following year, 1991, as noted in the 1990 productivity report, the site was apparently not visited in 1991. The Confluence pair was again nesting on a new alternate 3.5 miles downstream of the Henrys Fork/South Fork confluence, and the Menan nest was assumed to be an empty Confluence alternate.

The Menan Buttes nest was discovered and reported active by R. Jones and R. McFarling during a March 30, 1990 flight survey. M. Whitfield and T. Chew unsuccessfully attempted to find the nest June 5, 1990. J. Naderman observed one large, advanced nestling in this nest on June 9, 1990.

During a fight survey on March 13, 1992, J. Naderman saw an incubating adult on what had been called the 1990 Confluence nest in the SE1/4, S18, T5N, R39E. He had earlier in the day seen an incubating adult in the Confluence nest used in 1991. M. Whitfield, S. Austin, and J. Naderman visited the area by boat on June 4, 1992. A single advanced nestling was noted on the nest, but banding was not attempted owing to the small diameter of the nest tree. The Menan Buttes adult male was banded with a Snake Idaho color band on the left leg (no number).

J. Naderman saw two young nestlings on this nest on May 15, 1993. On June 9, 1993, M. Whitfield, J. Naderman, and A. Whitfield saw two large nestlings and the adult female at this site. The nest was actually in a different cottonwood about 75 feet from the 1992 nest, which had apparently broken from the nest tree in winter 1992. The old nest was on the ground. The new 1993 nest was high in an even smaller nest tree, and was expected to break out of the tree as it was so large.

An adult in incubation posture was noted on this nest on March 2, 1994 by J. Gardetto and K. Aslett. A second adult was perched in the immediate vicinity. J. Naderman saw one adult incubating and another soaring on March 25, 1994. On May 26, 1994, M. Maj, K. Aslett, and M. Whitfield noted one large nestling atop the same nest as was used in 1993. This nest tree, a live cottonwood, is of very small diameter and was not climbed.

K. Rice and J. Gardetto reported an incubating adult on this nest on March 14, 1995. A second adult later appeared at the nest. J. Naderman saw an incubating adult here on March 30, 1995. On May 25, 1995, M. Whitfield, M. Maj, J. Gardetto, and K. Rice saw two large nestlings on this nest. The nest at first appeared to be vacant, as neither nestling was detected. The nest was very large, and apparently deep enough to conceal the young. An adult female flew in and quietly perched about 50 m from the nest. This adult was not banded.

On March 28, 1996, K. Rice and J. Gardetto reported one adult incubating on the same nest as was used in 1995 in the old heron rookery. On May 29, M. Whitfield and J. Gardetto found the nest blown out of the nest tree, with egg fragments evident in the debris. No adult bald eagles were seen in the nest area. On March 27, 1997, M. Whitfield and Jeff Gardetto saw an incubating adult in a new nest (alternate #3) downriver from the heron rookery where this pair has nested in the past. This nest was near the levy in Section 13. On June 6, 1997, M. Whitfield and S. Austin hiked along the dike from the Menan Bridge area to see a single, large nestling of about eight weeks age on the nest. The unbanded adult female was perched upriver during a two hour observation. The adult male, which was banded when last seen, did not appear at the nest during the observation. High water made it impossible to approach the nest tree for banding, and may have posed a problem for the nestling when it fledged over an even higher river later in the month. We were not able to check these lower river nest sites after June 9, 1997 owing to the river flooding.

On March 18, 1998, M. Whitfield, J. Gardetto and S. Austin saw an incubating adult in alternate nest #3. Extended observations were completed at this breeding area on March 21, 25, 26, May 8, and 19. Two very large nestlings were noted here during the May 19 observation.

A. Whitfield observed a brooding adult on alternate nest #3 on April 7, 1999, and noted that a relatively small base branch supported the nest. Whitfield saw a very small, downy eaglet on April 30, 1999. On June 9, 1999, he saw one large nestling on this nest.

J. Copeland reported two large young on this nest during a May 16, 2000 flight over the area. K. Rice saw one fledgling on this nest on July 6, 2000.

Nesting Chronology. An incubating adult was seen in this territory on March 2 in 1994. In several other years, incubation was still underway in late March. It is assumed that incubation usually begins here around the first week of March, with hatching in early April, and fledging in early July.

Occupied Nesting Zone, Zone 1. Three alternate nest sites are known for this breeding pair. Nest #1 was first discovered in an old heron rookery at 43°45.63', 111°54.88', in 1990. In that year, this nest was called the Confluence nest in the productivity reports, but later year observations revealed that it was indeed a new territory separate from the Confluence pair. Nest #2 was built in a nearby cottonwood in 1993. Alternate #3 downriver of the earlier nests was first used in 1997.

Key Use Areas, Known Foraging and Perching Areas. During intensive observations in the 1998 breeding season, observers noted adult use of seven foraging perches within view of the nest tree, on both sides of the river and both upstream and downstream. The adults frequently took fish from the river upstream of the nest. The observers also noted frequent foraging forays into the Bannock Jim Slough area north and east of the nest about 3/4 mile. On three occasions the pair also captured small mammals from the fields to the south of the nest.

Breeding Area Habitat Quality. The entire breeding area features considerable habitat diversity, including braided river channels, backwater sloughs, and open fields which apparently support lots of rodents. The adults did not respond to jet boats and jet skiers in the area, which were seen during several observations. Recreational use of this general area is not as great as it is in the far upriver reaches of the South Fork, and does not appear to influence these nesting bald eagles to any great degree.

Many bald eagles were seen here early in the nesting season, including other adults assumed to be winter migrants. This eagle use of the area is further evidence of the habitat richness found here.

Cartier Slough 18-IS-14.

Breeding Area History. The Cartier nest in a large cottonwood was first discovered with an incubating adult during an April 7, 1987 flight survey conducted by BLM biologists R. Jones and R. McFarling. An incubating adult was on the nest. Adult bald eagles had been noted in the area since 1983, but no nesting was detected until 1987.

During their survey flight on May 5, 1988, R. Jones and R. McFarling saw a brooding adult on the Cartier Slough nest. Jones later reported two young on this nest.

R. Jones and R. McFarling saw an incubating adult on this nest during a March 20, 1989 flight survey. M. Whitfield and crew banded one youngster of approximately seven weeks age on June 2, 1989.

This nest was reported active (incubating adult) by BLM flight survey by R. Jones and R. McFarling on March 30, 1990. M. Whitfield and crew banded one eaglet on June 5, 1990. J. Naderman saw the fledgling with both adults on August 8, 1990.

J. Naderman and J. Gardetto noted an incubating adult on a new alternate for this breeding area during a April 2, 1991 flight survey. One small nestling was seen here during a second flight on May 7, 1991. M. Whitfield, J. Naderman, and G. Tomb banded one nestling of estimated age 4.5 weeks on May 19, 1991. R. Holmquist saw a fledgling in the company of an adult at this site in mid-August, 1991.

J. Naderman reported an incubating adult on alternate nest #2 during an aerial survey on March 3, 1992. M. Whitfield, S. Austin, and J. Naderman banded a single large nestling at this nest on June 4, 1992.

K. Aslett saw an adult sitting on this nest on April 20, 1993. On his May 15, 1993 flight, J. Naderman noted an adult and a nestling on alternate #2, and a goose on alternate nest #1. On June 10, 1993, J. Naderman and M. Whitfield saw the single nestling, now large and about eight weeks of age. Both adults were present. The nest tree appeared to be considerably more decadent than last year, with a rotting section below the nest. For this reason, banding was not attempted.

J. Gardetto and K. Aslett saw an incubating adult on the Cartier Slough nest (alternate #2) on March 2, 1994, with a second adult perched in the nest tree. On May 26, 1994 K. Aslett, M. Maj, and M. Whitfield entered the nest area and noted a single, large nestling. The cottonwood nest tree was very decadent and was not climbed.

M. Whitfield saw an adult perched on alternate nest #2 for the territory on February 24, 1995, with a second adult perched nearby in the nest tree. K. Rice and J. Gardetto saw an incubating adult on this nest on March 14, 1995. J. Naderman saw an adult on this nest on March 30, 1995 and May 1, 1995 during flights. However, on May 26, 1995, the nest was empty. Two adults were seen in the breeding area, but there were no juveniles.

M. Whitfield saw an incubating adult on this nest on April 6, 1996. However, no eagles were seen in the area on May 29, 1996, and M. Maj did not detect any eagles at this nest during surveys of the site on June 13, 1996 and June 14, 1996.

On March 27, 1997, M. Whitfield and J. Gardetto saw an incubating adult on a new nest (alternate #3) downstream and around the bend from the most downriver alternate nest previously used in this breeding area. Alternate nest #2 appeared to be falling down. On April 16, 1997, J. Naderman and J. Copeland saw an incubating adult on the new nest during their flight. M. Whitfield and S. Austin attempted to view the active nest from vantage points all around the area on June 6, 1997, but were unsuccessful. There was very high water in the nest vicinity, and the new nest could not be seen from a long distance due to thick foliage. A single adult was seen perched in the nest area.

On March 18, 1998, M. Whitfield, J. Gardetto and S. Austin saw an incubating adult on the nest first used last year. We observed adult habitat use within this breeding area during five observation periods in March-May. L. Stickle and G. Amlong noted a single nestling flapping its wings on this nest on May 20. On July 5, no bald eagles were seen at this nest site.

A. Whitfield observed an incubating adult on alternate nest #3 on April 7, 1999. A very small, downy eaglet was seen on the nest on April 30, 1999. On June 9, 1999, one large nestling was seen on this nest.

During his April 25, 2000 flight, J. Copeland saw an incubating adult on the Cartier Slough nest, with a second eagle perched nearby. This nest was located off the south end of Cartier wildlife management area at: e424587 n4849359. Copeland checked this nest from the air on May 16, and found no birds or eggs present. On June 22, 2000 M. Whitfield noted that Cartier Slough had one large nestling on the old nest, alternate #1. This nest is upriver of the site observed by J. Copeland.

Nesting Chronology. The earliest reported incubation in this territory was March 2 in 1994. In other years, it appears that incubation was initiated a week or so later, given the relative maturity of nestlings found here. These dates would suggest hatching in mid-April, and fledging around the second week of July.

Occupied Nesting Zone, Zone 1. We have noted three alternate nests within this breeding area. All are located in an area of wetlands and river oxbows where there is relatively little human activity, other than boaters on the water. Much of the uncultivated land in this area is densely covered in shrubs, which also discourages human travel overland.

Key Use Areas, Known Foraging and Perching Areas. Most of this pair s foraging and perching activity was within 1/2 mile of the nest. However, both adults occasionally flew to more distant areas to perch and forage. Perch #1, not shown in Figure 5 of the PMA, was approximately 1.5 miles south southeast of the current nest in a cottonwood south of silos on the Golds farm. Perch #2 was far upriver only 1/4 mile from Highway 33 on the slough west 1/4 mile from Beaver Dick Park picnic area. The nesting adults were detected foraging and perching in these areas. Perch #12, a tall cottonwood approximately 100 meters north of the nest in a group of similar trees, was used as a night roost by the adults during nesting.

Breeding Area Habitat Quality. The adults were observed foraging on fish, waterfowl, and small mammals during intensive observations in spring 1998. The Cartier area s many sloughs, braided channels, meanders, and oxbows support an abundant prey base, including a year-around abundance of waterfowl. Human disturbance in this area is relatively low, particularly during much of the nesting season when much of area is flooded by spring runoff.

Annis Slough 18-IS-27

Breeding Area History. On March 28, 1996, K. Rice and J. Gardetto reported a new nest on the river edge 1/4 mile downriver of the confluence of the Henrys Fork and the South Fork. An incubating adult was on this new nest. On May 29, 1996, M. Whitfield and J. Gardetto saw a large nestling on the nest with the adult female perched nearby (female not banded). The adult male, which seemed particularly small, was perched on the west side of the river.

On March 27, 1997, M. Whitfield and J. Gardetto saw an incubating adult on a new alternate nest in the same area with the male perched nearby. Gardetto reported that this pair built this new nest last fall, and were seen in the vicinity several times this winter. The new nest (alternate #2) was in the tree nearest to last year's nest tree, which lost its top late in the 1996 breeding season. M. Whitfield and S. Austin saw two large nestlings on this nest on June 6, 1997 during an observation from the Butte on the opposite side of the river. The unbanded adult female was perched near the nest.

On March 18, 1998, M. Whitfield, J. Gardetto and S. Austin saw an incubating adult on alternate nest number two, with a second adult perched nearby. During the 1998 breeding season, S. Austin, G. Amlong, and L. Stickle completed extended observations of habitat use within this breeding area on March 20, 25, 27, April 23, May 4 and 5. Two nestlings were observed on the nest in the April-May observations, and two advanced nestlings were seen on this nest on June 21, 1998.

A. Whitfield viewed an incubating adult in this nest on April 7, 1999. J. Copeland reported a pair of eagles at the site on April 27, 1999, with one adult brooding on the nest. On April 30, A. Whitfield saw an adult perched on a branch that hangs over the river and extends out of the nest. A single eaglet was clearly visible on the nest. On June 9, 1999, M. Whitfield saw the adult perched on the same branch and one large nestling in the nest.

J. Copeland reported seeing three eggs and an attendant adult at this nest on April 25, 2000. M. Whitfield saw one advanced nestling on the Annis Slough nest on June 22, 2000.

Nesting Chronology. We do not have definitive chronological data for this breeding area. However, the nestlings produced here appear to be hatched and fledged at about the same time as on nearby nests. Incubation is expected to begin here near March 1, with hatching in early April, and fledging around July 1.

Occupied Nesting Zone, Zone 1. We have only documented use of two alternate nests in the history of this pair, and these alternates are within 30 meters of one another. We base our recommendation for zone 1 on observations of adult bald eagle reactions to human activity.

The Annis Slough pair is relatively tolerant of activity on the open land on the opposite side of the river. The adults did not react to observers or a house approximately 550 meters from the nest downstream and on the opposite side of the river. However, a key fishing perch is located immediately opposite the nest, and the pair does react to observers who approach that area, which is only about 75 meters from the nest. The pair is reactive to boats that stop to land within 1/4 mile of the nest.

The recommended zone 1 would include the entire river bottom within 1/4 mile of the nest. This zone 1 includes all of the island area between the river and the South Fork back channel south of the nest.

Housing development on the opposite side of the river should also be discouraged within 1/4 mile of the nest.

Key Use Areas, Known Foraging and Perching Areas. We documented the Annis breeding adults use of seven prominent foraging perches, most in the nest vicinity. This nest s close proximity to the river allowed the adults to fish from a nest tree perch. They were also observed catching fish from a snag perch on the opposite bank, a cottonwood perch 500 meters downriver of the nest on the small island next to the levee, and another cottonwood perch about 50 meters above the main channel of the South Fork.

Occasionally these adults flew to a perch and forage approximately ½ mile downstream of the Snake River bridge below the Buttes. This foraging perch is roughly a straight line distance of 1.7 miles downstream of the nest.

Breeding Area Habitat Quality. The Annis Slough bald eagle breeding area is located in an area of many braided channels and considerable habitat variability. This habitat in turn supports a diversity of prey, including abundant fish, many waterfowl, small mammals, and larger animals that may become available as carrion in winter. Many non-nesting eagles frequent the general area during migration and winter, further evidence of its abundant prey base.

VI. Raptor presence and habitat use

In prior years, we searched randomly selected quadrats to detect the presence or absence of raptor species (Whitfield and Maj 1996). Habitat associations in these searches were derived from general vegetation cover type as developed by Ulliman et al. (1991), which includes 30 general types. However, as indicated in our reports, most of the quadrats sampled actually feature a complex mosaic of vegetative cover.

Our presence/absence surveys did not differentiate raptor habitat use by type of use, foraging, roosting or nesting. Most of the raptor species observed here appear to use different habitats for these different types of use. Our observations, and literature accounts for raptor species which use forested habitats, indicate that stand structure, as indicated by tree height, diameter, canopy cover and density, is often a more important determinant of raptor presence than tree species.

In 1994 and 1995, we recorded presence/absence surveys in 437 randomly selected sample quadrats, with at least one raptor detected in 179 sample quadrats, and no birds seen in 258 sample quadrats (Whitfield et al. 1995, Whitfield and Maj 1996). We detected 20 raptor species within the study area, and summarized the raptor occurrences by general vegetative cover type.

In 1996 and 1997, we continued to record raptor occurrences as we refined our habitat descriptions (Whitfield and Maj 1998). We revisited previously sampled quadrats to refine our descriptions of habitat features selected by individual raptor species.

In 1998, we focused raptor observation efforts on the South Fork above Heise. As noted above, spring flooding compromised detection of nesting raptors in the lower reaches of the river over the past four years. For this reason, we intensified our attempts to detect nesting raptors in the upper river.

The most notable observation in 1998 was the location of multiple singing pairs of flammulated owls. We found this secretive species all along the river canyon in suitable habitats. In this report, map locations are provided for all breeding raptors detected during the life of our study (Figures 7-10). Maps used are 1:1 scans of USGS 1:100,000-scale metric topographic maps. Also below is a summarization of habitat features noted in the breeding areas.

Diurnal Raptor Nesting Accounts

Bald Eagle, *Haliaeetus leucocephalus*

Bald eagles typically nest and forage along major waterbodies. Breeding areas are selected for three primary habitat features: a diverse prey base, relative freedom from human disturbance, and trees of suitable size to support very large nest structures (Swenson et al. 1986, Harmata and Oakleaf 1992, Whitfield 1993).

As of the summer 2000 nesting season, there were 18 known bald eagle breeding areas within the Snake River study area. Of this total, ten were along the upper South Fork in Swan Valley and the canyon section, where a choice of cottonwood or Douglas-fir nest trees were available.

All of known nests in the eight breeding areas on the lower South Fork, lower Henrys Fork, and main stem Snake River are in cottonwoods. Cottonwoods are the only suitably large trees available in these reaches.

Among the known alternate nests in the river reaches in the canyon and above (10 territories), 27 were in cottonwoods and seven in Douglas-fir. Even though the cottonwood sites are more prone to blow-down than are the large Douglas-fir, it appears that cottonwoods are preferred. The cottonwood nests are often close enough to the river that the adults can fish from the nest tree; this is not the case with the Douglas-fir sites.

Nest trees are usually the largest, tallest trees available within the breeding area. Nest sites are often near the mouth of a tributary stream or areas with multiple channels, both of which may contribute to a locally enhanced fishery. Nests are usually located on shorelines or islands where human activity is deterred by vegetation or topography.

Golden Eagle, *Aquila chrysaetos*

We are aware of five historic golden eagle nest sites within the study area, all on cliff ledges between Pine Creek and Heise. Several of these sites have been active during the tenure of this 5-year study. Habitats at all of these nest sites includes sagelands above the nest cliff, with cottonwood bottomlands below. Golden eagles have been seen foraging in open areas in both of these primary habitats. Golden eagles also use the South Fork habitats in winter.

Osprey, *Pandion haliaetus*

Osprey forage almost exclusively on fish (Poole 1989). Thus, nest sites and perches are most often associated with water bodies, although nest sites may be several miles from water (Swenson 1981, Van Daele et al. 1980). They may be found in greater densities around reservoirs than most streams (Swenson 1981), perhaps because of the abundance of readily available fish. Nests are built upon almost any structure that will support a large pile of stick material. Osprey nest on the top of broken topped trees, man-made structures (including telephone poles), rock pinnacles, and many other structures. Although notably tolerant of human activity and structures, osprey are disturbed by activities that are directly threatening.

The only osprey nest sites we have discovered are at the trestle below Heise, and several along the lower river below the confluence and on the lower Henrys Fork. Sporadically active nests are located in the Conant Valley area some distance from the river and near the mouth of Fall River. Prey availability appears to be the primary determinant of osprey occurrence.

Northern Goshawk, *Accipiter gentilis*

The northern goshawk is most often associated with mature and old growth forests, relatively open forests with flight alleys below the canopies (Reynolds et al. 1982). Most nest sites found on the nearby Targhee National Forest are in mature Douglas-fir, with some sites in aspen and lodgepole (Patla 1991).

This species is intolerant of human disturbance, and requires nesting areas that are relatively free of human activity. Goshawks forage in many habitats for a variety of birds and mammals, including open pastures, sagelands, and a variety of forested habitats.

One goshawk nest site is known in a large, mature cottonwood stand on the lower South Fork (not shown in our maps). Within mature aspen stands in the Rocky Canyon area above the river canyon rim, we found five old goshawk nests. Among these aspen nest trees, average tree height was 58 feet, nest height 40 feet, and dbh 12.9 inches. All five aspen nests were in areas with dense shrub understory 3 to 6 feet tall. Expansive shrublands surround these aspen stands. We have seen adult goshawks in this general area on the South Fork predating upon waterfowl in early spring.

Cooper s Hawk, *Accipiter cooperii*

The Cooper s hawk nests within deciduous and mixed forests such as those found along riparian zones, and within small woodlots or in semiarid stands (Reynolds 1989). More so than other accipiters, Cooper s hawks will utilize open, small forested stands and second growth forests (Reynolds et al. 1982, Moore and Henny 1983). When found in large continuous forests, Cooper's hawks often nest near the edge of the stand. Cooper s tend to build nests within the tree crown canopy or on mistletoe growths. Both strategies are thought to provide more cover and security from predators (Moore and Henny 1983). Cooper's hawks tend to nest in conifer stands intermediate in age and tree density to areas selected by sharp-shinned hawks and goshawks, with sharp-shinned hawks in the younger, denser stands (Reynolds 1983).

Two Cooper's hawk nest sites were recorded in cottonwoods within the lower river portion of the study area. Those nest sites were in relatively large, mature cottonwood stands with canopy closure averaging 70 percent and moderate shrub understory. Two nest sites were located in Douglas-fir forests where nests were located were of mixed age, with interspersed aspen. Both of these sites were in north exposure Douglas-fir above the river bottom. Canopy coverage around the nests was 100 percent, but varied greatly in the near vicinity.

Sharp-shinned Hawk, *Accipiter striatus*

Sharp-shinned hawks use the youngest, most dense forests stands of the three accipiter species. Cover from predatory raptors is important to this small accipiter. Sharp-shinned hawks nest in the thick foliage of dense conifer stands and some mixed deciduous forests (Reynolds et al. 1982, Moore and Henny 1983,

Reynolds 1989). The combination of a conifer patch within a larger deciduous stand is thought to provide preferred nesting habitat (Platt 1976, Reynolds 1989, Joy et al. 1994). Sharp-shinned hawks may prefer north facing conifer stands thought to represent more mesic habitat (Reynolds and Wight 1978). Foraging occurs in a variety of habitats, including shrub communities, deciduous and conifer forests and open habitats adjacent to nesting habitat. Conifer stands are identified as important in providing a diversity of passerine bird species, the primary prey of this highly specialized, bird-catching predator (Joy et al. 1994).

All of our sharp-shinned hawk nest observations within the Snake River study area were in Douglas-fir habitats well above the river bottom. The Douglas-fir stands were mature but stagnant with relatively small diameter, densely-grown trees. Slopes were relatively steep, about 40 percent, and north exposed.

Canopy closure averaged 75 percent. Shrub understory was dense, with lots of ninebark in several locations.

Red-tailed Hawk, *Buteo jamaicensis*

Red-tailed hawks are diverse in nest site selection; conifers and hardwoods or on cliffs or other elevated sites where trees are lacking (Smith and Murphy 1973, Johnson 1975). In forested areas, nests are typically in the crowns of tall trees or in trees on high points (Titus and Mosher 1981). Nests are usually at the edge of dense stands or within open canopy forests in tall trees, not in the interior of dense forest (Gates 1972), although they will occasionally nest in large tracts of unbroken forest. Red-tailed are associated with grasslands that feature more tall trees (perch sites) than are sympatric Swainson's and rough-legged hawks (Cottrell 1981, Janes 1985). In forested settings, red-tailed hawks nest and perch in forest edges near open areas. Red-tailed hawks are often found in upland hardwood forests, aspen and cottonwoods in the northern Rocky Mountains, and grass dominated cover types. Most of the hunting is in short grass areas (Peterson 1979). Howell et al. (1978) noted that breeding areas with high proportions of fallow pasture relative to crop pasture had greater productivity. Roosting is most commonly in groups of trees with dense foliage.

We detected nesting by red-tailed hawks in seven cottonwoods, one aspen and six Douglas-fir habitats. All of the cottonwood nests were in tall, prominent cottonwoods in lower river areas, with dense shrub understory in the nest stands, and open areas nearby. The aspen nest was in a small, stunted aspen stand in the middle of cultivated fields. The Douglas-fir nest was in a prominent old-growth tree at the edge of a large stand of mature and old-growth trees.

Swainson s Hawk, *Buteo swainsoni*

Swainson s hawk nesting areas are usually in broken grasslands and cultivated areas with scattered trees (Dunkle 1977). These hawks return to old nests, and also use old magpie nests, or old crow or raven nests (Fitzner 1978). Swainson's hawks commonly forage over hayfields and meadows. Woodbridge (1987) reported that Swainson s hawks in California strongly preferred irrigated alfalfa fields over drier rangelands, probably because of the greater prey base. Bechard (1982) found that cultivated fields were not highly used for foraging until after crop harvest had reduced plant cover. He suggested that vegetative cover may have been more important in foraging habitat selection than relative prey density.

Most of our Swainson s hawk observations were in lower river habitats. Swainson's hawk nests were found in cottonwood (2), aspen (1), and Douglas-fir (1). Nests were within the canopies of sub-dominant trees, and, with the exception of one cottonwood nest on the river edge, were difficult to detect.

Ferruginous Hawk, *Buteo regalis*

Ferruginous hawks are typically resident of wide-open grassland habitats (Thurow and White 1983). This species generally avoids forested or cultivated areas.

We did not observe ferruginous hawks in the study area, although we have seen ferruginous hawks in the region.

Northern Harrier, *Circus cyaneus*

The northern harrier nests and forages in marshlands, fields, open shrublands, and dry shrublands. The harrier is specifically associated with mesic grasslands and wetland habitats for nesting. Harriers nest on the ground, where their nests and young are vulnerable to predation. Harriers forage in a diversity of habitats, but use mesic sites and cultivated areas disproportionate to their occurrence. Harriers may also be found in dry shrub steppe habitats, including sage and grassland habitats (Martin 1987). The northern harrier relies on hearing to locate prey to a much greater degree than other diurnal raptors, and thus is able to hunt in habitats with greater ground cover (Johnsgard 1990).

We found three nesting marsh hawk nests in CRP seeded grasslands on the river rim. We detected this species only in open habitats, but in a wide range of habitats from wetlands in the river bottom to dry grasslands above the river rim.

Peregrine Falcon, *Falco peregrinus*

Peregrine falcons typically nest on large, dominant cliffs over 150 feet high with prominent views of the surrounding area (Cade 1992). Prey are usually shorebirds, waterfowl, or pigeons, with foraging over a wide variety of habitats (Sherrod 1978).

Three known peregrine aeries occur within the study area, all on cliff ledges, two on large cliff systems overlooking the river bottomlands and adjacent sage and juniper habitats, and the other on a small cliff between a Douglas-fir forest and cottonwood bottoms. (We do not show these sites on the study maps.) The great variety of habitats found along the South Fork corridor provides an abundant and diverse prey base for this species.

Prairie Falcon, *Falco mexicanus*

Prairie falcons select nesting aeries in cliffs or escarpments. The landscapes surrounding their nests sites are often semi-arid open lands, sagebrush basins or grasslands (Marti and Braun 1975). They also nest at higher elevations on large cliff systems within montane to sub-alpine forest. Nests are usually in rock cavities in sheer cliffs with overhanging ledges and a broad vista. Most nests are within pothole-like cavities in cliffs about 30 m high (Runde and Anderson 1986). Prairie falcons also nest in rock crevices and old stick nests used by other species.

We are aware of three prairie falcon aeries within the study area, all within cliffs overlooking the river bottomlands.

Merlin, *Falco columbarius*

Merlins typically nest in mixed grasslands and deciduous woodlands, and sometimes in dry conifer sites (Sieg and Becker 1990). Foraging occurs in mixed sage and grassland.

We have not seen any merlins in our observations during this study, although we have seen merlins in the study area on two earlier occasions. The observed birds were hunting in open shrublands. We are not aware of any nesting by merlins within the project area.

American Kestrel, *Falco sparverius*

The American kestrel is a secondary cavity nester; it uses nesting cavities which were excavated by other species. As such, the kestrel is dependent on the northern flicker over much of its distribution (Balgooyen 1976). Kestrels often displace woodpeckers, and compete with screech owls and other species for suitable cavities (Balgooyen 1976). Highly valued cavity trees are aspen and cottonwood.

Kestrels have a wide ecological tolerance relative to elevation, tree species and type of forested environment. Kestrel distribution is strongly influenced by the availability of adequate nesting cavities and perches (Sedgwick and Knopf 1990). Since over 95 percent of forages are initiated from a perch, and prey is usually taken at ground level, perches within open areas are important habitat features (Balgooyen 1976). Hunting usually occurs over open terrain, with a preference for open, exposed ground in vegetated areas.

We frequently saw kestrels in cottonwood habitats and less often in aspen, lodgepole stands, and Douglas- fir. Nest sites were in cavities in older-aged trees at the edge of large stands or in small stands in the middle of openings. We did not find kestrel nests in forest interiors. Kestrels nest in many locations throughout the project area, and are not shown on maps in this report.

Turkey Vulture, *Cathartes aura*

Turkey vulture nesting habitat includes arid western plains and mountains, temperate forests and tropical lowlands (Pattee and Wilbur 1989). Nests are located on rock ledges in caves, down trees and buildings. (Jackson 1983, Coleman and Fraser 1989). These ledges are not necessarily high or large in area. Nest material is not brought in, but a scrape may be made in the ledge substrate. Turkey vultures appear to usually select nest sites that are within a forested environment and that have few roads and no buildings (Coleman and Fraser 1989). They also tend to perch and soar near their roosts and perch near nest sites.

Turkey vultures were detected in many times during our observations. However, we did not detect any nest sites.

Nocturnal Raptor Nesting Accounts

Great Horned Owl, *Bubo virginianus*

The great horned owl is found in a broad range of habitats (Austing and Holt 1966, Petersen 1979, Johnsgaard 1988, Rohner and Doyle 1992). The great horned owl is probably the most common nocturnal raptor within our study area. Basic habitat needs are a nest site, roost site, and hunting area. Nests are usually stick nests built by other birds, such as red-tailed hawks or herons; great horned owls also use cliff nests, ledges, and caves. Roosts are selected for maximum daytime concealment, conifers are favored. Hunting areas are usually relatively open areas, but woodlands or areas with scattered trees are also used.

We found 13 great horned owl nest sites in the upper river sections studied in 1998, and five more in downriver sites. Habitats used were as follows: 11 in large cottonwoods in a red-tailed or Swainson's hawk nest, four in a large Douglas-fir in a red-tailed hawk nest, and three on cliff ledges. Nest sites are typically in prominent trees, sites that may more directly reflect the habitat preferences of the primary nest builders, buteo hawks. The nest vicinities were generally mixed habitats, with dense shrub

understory in nest stands, and open areas nearby. Cottonwood canopy cover in nest stands averaged 40 percent, and the Douglas-fir nest was in a forest with almost 100 percent closure. This later nest was only 50 m from the forest edge adjacent to an open field.

Long-eared Owl, *Asio otus*

During the breeding season, long-eared owls are associated with coniferous, deciduous, or mixed composition forests (Johnsgard 1988), usually in areas adjacent to open grasslands or shrublands. In western Idaho, long-eared owls are found nesting in cottonwood, willow and juniper habitats (Marks 1986), and use old corvid nests almost exclusively. In eastern Idaho, nest sites have been noted in dense aspen stands, in mixed lodgepole pine/Douglas-fir forests, and in juniper woodlands, usually at the edge of large open areas (Craig et al. 1988). In other areas, nesting has been noted in old red-tailed hawk and accipiter nests. Long-eared owls will also nest on platforms formed by mistletoe clumps.

During winter, dense conifer forests may be very important as roosting cover (Craighead and Craighead 1956). Large numbers of these owls will sometimes congregate at favored winter roosts in dense willow thickets within riparian bottoms (Bent 1938, D. Holt pers. comm.). Roosts may be used repeatedly over the years.

Singing male long-eared owls were found in old growth cottonwood and in Douglas-fir; one nest was located in a cottonwood. Fledged broods were seen on four occasions in Douglas fir-forests at the forest edge. In two cases where nests were presumably located, the Douglas-fir stands featured mature but stagnant trees with dbh of 7 to 9 inches and tree canopy coverage of 60-75 percent, with a dense shrub understory. The third stand featured Douglas-fir of mixed age, old-growth to mature, interspersed with aspen and some lodgepole, and with dense shrub understory. The Douglas-fir habitats were on dry slopes of 13 percent to 30 percent.

Short-eared Owl, *Asio flammeus*

The short-eared owl is primarily associated with open habitats such as prairie, tundra and wetlands, and agricultural areas such as hay meadows, pastures, and old fields (Clark 1975, Johnsgard 1988). This owl forages on small mammals which are found in these habitats. Winter roosts may be found in conifers or cottonwoods with similar characteristics to those used by long-eared owls, and may even be shared with long-eared owls (Clark 1975). The short-eared owl is on the Audubon Society s blue list of declining species. This species is susceptible to the suite of ecological changes that can threaten many ground nesting birds, such as habitat alteration by factors such as fire or agricultural clearing and destruction by increased populations of foxes, skunks, ravens and other predators.

Short-eared owls were not detected in our samples, although we believe that they occur in open areas in the lower reaches of the study area. They are also likely to occur in some of the open upland habitats where we found nesting harrier hawks. Population fluctuations may make this owl hard to find in some years.

Northern Saw-Whet Owl, *Aegolius acadicus*

The northern saw-whet owl uses forests and woodlands of all types (Cannings 1987, Palmer 1987). In the northern Rocky Mountains, nesting habitats include low elevation riparian habitats which are dominated by deciduous forests, mixed spruce-fir and Douglas-fir communities in the montane zone, and

high elevation spruce-fir forests into the subalpine zone at elevations approaching 2300 m (Hayward and Garton 1988). As with other small, mostly nocturnal, cavity nesting owls, there is a notable lack of information on the population status of this species. The northern saw-whet owl nests in cavities excavated by northern flickers, hairy woodpeckers, man-made boxes and natural cavities. These owls often nest in aspen or cottonwoods.

The northern saw-whet was the most commonly detected of the small owls within our study area. This species was heard singing in upper elevations of the study area in forested stands adjacent to the riparian corridor, three records in mature aspen, and seven records in Douglas-fir. The fir stands were mixed-age on northern exposed slopes in tributary canyons, with canopy closures of 60-90 percent. Shrub understory was generally dense.

Northern Pygmy-Owl, *Glaucidium gnoma*

The northern pygmy-owl is a resident of forested habitat from the foothills to higher elevations (Reynolds et al. 1989). The diminutive size of this species and its nocturnal habitats have resulted in few nests being found and thus, little information on this species exists (Holt and Norton 1986). Nests have been found in dead and live Douglas-fir, ponderosa pine, aspen, grand fir and Western red cedar. Nest cavities used by pygmy-owls have been excavated by sapsuckers and northern flickers. Nests may be found near openings such as meadows, partially timbered sites or wetlands (Reynolds et al. 1989). Such locations are thought to be associated with foraging habitat. They are typically not found in continuous forests, but near clearings, meadows, open water or other such openings (Verner and Boss 1980). This owl is associated with low elevation habitat but does range into higher elevation mountain areas (Reynolds et al. 1989). Breeding territories are thought to course natural topographic features such as ridges.

During the nesting seasons, we have detected singing northern pygmy-owls within the study area on three occasions and saw adults two other times. These observations were in Douglas-fir habitats which feature large, older growth trees interspersed with aspen stands. Aspen and fir snags were located, but no occupied nesting cavities were found. In one case, a singing pygmy-owl in Dry Canyon was seen in the same area several times in the breeding season, and appeared to be territorial. However, no nest cavity was located.

The northern pygmy-owl is not thought to be migratory, although they may undergo an elevational shift in habitat between summer and winter. We have seen pygmy-owls in cottonwood bottoms along the Snake River during winter.

Western Screech Owl, *Otus kennicottii*

The western screech owl is generally associated with deciduous tree stands in open country, especially riparian hardwoods (cottonwood) bottoms. In central Idaho, Hayward (1983) noted a strong preference for cottonwood river bottoms. Nearby open grassland habitats were used for foraging. These small owls nest in cavities, in woodpecker holes or natural cavities. They sometimes use flicker holes in deciduous trees along stream sides. They also roost against the boles of cottonwoods where their gray coloration is an effective disguise. They often roost in conifers within cottonwood forests. Johnson et al. (1979) reported that western screech owl pairs nesting in riparian forests may be separated by as little as 50 m (164 ft.). Territories may be separated by much greater distances.

We did heard western screech owls in mixed age and old-growth cottonwood habitats near Heise.

Flammulated Owl, *Otus flammeolus*

The flammulated owl is associated with mid-elevational open grown Douglas-fir and aspen forests, usually on dry south facing slopes, at this latitude (Reynolds and Linkhart 1987). This species is a secondary cavity nester in cavities excavated by northern flickers and sapsuckers (Bull et al. 1990). Flammulated owls forage primarily upon insects, often upon beetles and noctuid moths, prey which may be more abundant in dry sites (Goggan 1986, Howie and Ritcey 1987, Reynolds and Linkhart 1987). Open growth forests that favor aerial insect hawking are thought to be an important habitat feature.

We have recorded singing, and presumably nesting, flammulated owls in ten locations, all in Douglas-fir stands that featured mixed aspen. We found more singing males in 1998 than in prior years, with a notable concentration in isolated fir stands along the rim of the South Fork between Dry Canyon and Burns Creek. As these owls require relatively small breeding territories, it appears likely that our detection of singing birds was a minimum count of the breeding areas in this stretch of the river canyon.

These stands are dominated by mixed age Douglas-fir, with many fir snags and interspersed aspen stands. Canopy cover in these stands is highly variable owing to the interspersion of many openings, with overstory coverage in forested areas ranging from 50-100 percent. Shrub understory is generally dense with diverse species, although some slopes are grass covered. Lodgepole pine stands are also featured in the areas.

Great Gray Owl, *Strix nebulosa*

Over their range in the northern and middle Rocky Mountains, great gray owls nest in a variety of forested habitats. Two habitat features common to these habitats are nest sites in mature or old-growth forest stands, and nearby openings for foraging (Habeck 1994). Nesting area habitats are always found within forested stands, and usually in stands with canopy closure greater than 60% (Nero 1980, Bull and Henjum 1990). Openings vary from marshes to clearcuts. In east-central Idaho, southwestern Montana, and the Greater Yellowstone Area, most observations of great gray owls were in the lodgepole pine/Douglas- fir/aspen zone (Franklin 1987, Whitfield et al. 1995). Most of the nests reported by Franklin (1987) were in Douglas-fir forests, with nests most commonly in Douglas-fir and lodgepole pine. Aspen are occasionally used.

Great gray owls do not build nests; nest structures are usually old hawk (usually goshawk) or raven stick nests, depressions in the tops of broken-topped snags, or dwarf-mistletoe platforms (Nero 1980, Mikkola 1983, Franklin 1988). Thus, great gray owls are dependent upon habitats that support goshawks and other stick-nest builders, or feature large snags. Young great grays require forest stands with small, deformed, or leaning trees (Franklin 1987, 1988). During summer, juveniles avoid sunlight and seek shade and security cover by frequenting trees with a dense canopy (Whitfield and Gaffney 1997).

We detected one singing great gray owl on the edge of the study area in Long Gulch. Great grays are known to nest near the study area in other adjacent forested areas. Great grays are suspected to winter within the riparian cottonwood bottoms during years when snowfall is above average in higher elevations.

Barred Owl, *Strix varia*

Barred owls typically breed within dense, mature woodlands, varying from uplands to lowland swamps, but especially wetland areas in deep woods (Nicholls and Warner 1972, Elody and Sloan 1985). The barred owl is a forest-dependent owl, and in areas where forest habitats are relatively small in size, barred owls may be excluded by much larger great horned owls. Nesting territories are usually in mature and dense mixed deciduous/conifer forests, often near water (Bosakowski et al. 1987). Nests are most often in a cavity in a large tree (roughly 50 cm dbh or larger), often in a deciduous tree. The owls use natural cavities or old squirrel or hawk nests. Often nests are near forest openings, and sometimes in the tops of hollowed tree stubs. Day roosts are typically in areas of maximum daytime concealment in densely foliated trees.

We did not detect any barred owls within the study area. However, barred owl range changes in recent years make it likely that this species will appear within the Snake River corridor.

Boreal Owl, *Aegolius funereus*

Boreal owls probably do not nest within our study area. This species is usually associated with higher elevation subalpine fir forest types, or mixed conifer and aspen (Hayward et al. 1993). Boreal owls are secondary cavity nesters.

Boreal owls are known to nest near the study area corridor, but at higher elevations. We detected a boreal owl in the cottonwood bottom below Dry Canyon in late fall, and suspect that this habitat may be used by wintering boreal owls.

Burrowing Owl, *Athene cunicularia*

Within this region, burrowing owls are found in isolated colonies in open plain habitats (Olenick 1989). Burrowing owls typically nest in flat pasture or grass lands where burrows are available (Johnsgard 1988).

We did not detect burrowing owls. They might be expected in the area's drier habitats.

VII. Habitat Conservation Considerations.

Our results suggest that several river corridor habitats within the project area warrant particular consideration for conservation. Superlative habitats for nesting bald eagles are recognized within the management of the South Fork and Henrys Fork. The cottonwood gallery forest is of primary importance. The older age stands provide current nesting sites; younger stands will provide the replacement trees. The cottonwood bottoms have also proven to be very important for many other nesting birds of prey, as discussed above.

A second group of habitats of great importance are the scattered Douglas-fir stands that are found throughout the upper reaches of the South Fork. As the maps clearly indicate, some of the larger stands such as that found on the north exposure of Dry Canyon provide habitat for many nesting raptors. The juxtaposition of these forested areas adjacent to the river corridor appears to make them particularly productive for nesting birds of prey. Conservation of these nesting areas and the foraging habitat found around them is vital to the long-term viability of many local raptor populations.

REFERENCES

General

Greater Yellowstone Bald Eagle Working Group. 1996. Greater Yellowstone bald eagle managment plan: 1995 Update. Greater Yellowstone Bald Eagle Working Group, Wyoming Game and Fish Dept., Lander, WY. 47 pp.

McKenzie, N.L., A.C. Robinson, and L. Belbin. 1991. Biogeographic suvey of the Nullarbor District, Australia. Pages 109-126 *in* Margules and M.P. Austin, eds. Nature conservation: cost effective biological surveys and data analysis, Australia, CSIRO, East Melbourne.

Ulliman, J.J., R. Balice, A. Fahsi, S. Choung, and G. Navarro. 1991. Vegetation mapping and monitoring of the South Fork of the Snake River. Final report to the Boise Field Office, USDI Fish and Wild. Ser., Univ. of Idaho, Moscow, ID. 13 pp.

USDI, Bureau of Land Management and USDA Forest Service. 1991. Snake River Activity/Operations Plan. 101 pp. + append. and maps.

Whitfield, M.B. 1993. South Fork Snake River, final report. Idaho Bald Eagle Research Project. USDI Bur. of Land Manage., Idaho Falls, ID. 92 pp. + appendices.

_____, S.L. Austin, and G. Tomb. 1991. Continental Idaho Population Unit Interim Report. Idaho bald eagle research project, Greater Yellowstone Ecosystem, Bureau of Land Managment, Idaho Falls, ID. 104 pp.

_____, M.E. Maj., and P. Munholland. 1995. Inventory and monitoring of bald eagles and other raptorial birds of the Snake River. Idaho Bur. Land Manage. Tech. Bull. No. 95-12. 75 pp.

_____ and M.E. Maj. 1996. Inventory and monitoring of bald eagles and other raptorial birds of the Snake River. Idaho Bur. Land Manage. Tech. Bull. No. 96-12. 53 pp.

_____, M. Maj, J. Naderman, J. Gardetto, K. Rice, D. Trochta, R. Welch, B. Aber, and B. Alford. 1996. Annual Bald Eagle Productivity, Final Report. Idaho Portion of the Greater Yellowstone Ecosystem. Idaho/GYE Bald Eagle Research Project, U.S. Bur. of Land Manage., U.S. Forest Service, Targhee National Forest, Idaho Dept. of Fish and Game and Northern Rockies Conservation Cooperative, Idaho Falls, ID. 16 pp. + tables.

_____, S. Austin, J. Copeland, J. Naderman, J. Gardetto, K. Rice, D. Trochta, R. Welch, B. Aber, and B. Alford. 1997. Annual Bald Eagle Productivity, Final Report. Idaho Portion of the Greater Yellowstone Ecosystem. Idaho/GYE Bald Eagle Research Project, U.S. Bur. of Land Manage., U.S. Forest Service, Targhee National Forest, Idaho Dept. of Fish and Game and Northern Rockies Conservation Cooperative, Idaho Falls, ID. 19 pp. + tables.

_____, and M.E. Maj. 1998. Inventory and monitoring of bald eagles and other raptorial birds of the Snake River, Idaho. 1996-1997 Progress Report. Bur. of Land Manage. Tech. Bull. 98-2. 59 pp.

_____, J. Copeland, J. Naderman, J. Gardetto, K. Rice, D. Trochta, and R. Welch. 1998. Annual Bald Eagle Productivity, Final Report. Idaho Portion of the Greater Yellowstone Ecosystem. Idaho/GYE Bald Eagle Research Project, U.S. Bur. of Land Manage., U.S. Forest Service, Targhee National Forest, Idaho Dept. of Fish and Game and Northern Rockies Conservation Cooperative, Idaho Falls, ID. 17 pp. + tables.

_____, S. Austin, J. Copeland, J. Gardetto, K. Rice, and R. Welch. 1999. Annual Bald Eagle Productivity, Final Report. Idaho Portion of the Greater Yellowstone Ecosystem. Idaho/GYE Bald Eagle Research Project, U.S. Bur. of Land Manage., U.S. Forest Service, Targhee National Forest, Idaho Dept. of Fish and Game and Northern Rockies Conservation Cooperative, Idaho Falls, ID. 15 pp. + tables.

_____, S. Austin, J. Copeland, J. Naderman, J. Gardetto, K. Rice, D. Trochta, R. Welch, B. Aber, and B. Alford. 2000. Annual Bald Eagle Productivity, Final Report. Idaho Portion of the Greater Yellowstone Ecosystem. Idaho/GYE Bald Eagle Research Project, U.S. Bur. of Land Manage., U.S. Forest Service, Targhee National Forest, Idaho Dept. of Fish and Game and Northern Rockies Conservation Cooperative, Idaho Falls, ID. 15 pp. + tables.

Raptor Habitats, Bibliography of Key References

Austing, G.R. and J.B. Holt, Jr. 1966. The world of the great horned owl. Lippencott, Philadelphia, PA.

Balgooyen, T.G. 1976. Behavior and ecology of the American kestrel. Univ. Ca. Publ. Zool. 103:1-83.

Bechard, M.J. 1982. Effect of vegetative cover of foraging site selection by Swainson s hawk. Condor 84:153-159.

Beecham, J.J. and M.N. Kochert. 1975. Golden eagle breeding biology, Idaho. Wilson Bull. 87:506-513.

Bent, A.C. 1938. Life histories of North American birds of prey, pt. 2, U.S. Natl. Mus. Bull. No. 170.

Bosakowski, T., R. Speiser, and J. Benzinger 1987. Distribution, density, and habitat relationships of the barred owl in northern New Jersey. Pages 135-143 *in* R.W. Nero, R.J. Clark, R.J. Knapton, and R.H. Hamre, eds. Biology and conservation of northern forest owls. Symposium Proceedings. USDA Forest Ser., Gen. Tech. Report RM-142.

Bull, E.L., A.L. Wright, and M.G. Henjum. 1989. Nesting and diet of long-eared owls in conifer forests, Oregon. Condor 91:908-912.

_____, _____, and _____. 1990. Nesting habitat of flammulated owls in Oregon. J. Raptor Res. 24: 52-55.

_____, and M.G. Henjum. 1990. Ecology of the Great Gray Owl. Gen. Tech. Rep. PNW-GTR-265, USDA Forest Service, Pacific Northwest Research Sta., Portland, OR. 39 pp.

Cade, T.J. 1992. The falcons of the world. Cornell Univ. Press, Ithaca, NY. 188 pp.

Cannings, R.J. 1987. The breeding biology of the northern saw-whet owls in southern British Columbia. Pages 193-198 *in* R.W. Nero, R.J. Clark, R.J. Knapton, and R.H. Hamre., eds. Biology and conservation of northern forest owls. Symposium Proceedings. USDA Forest Service, Gen. Tech. Report RM-142.

Clark, R.J. 1975. A field study of the short-eared owl (*Otus flammeus*) (Pontoppidan) in North America. Wild. Monogr. 47:1-67.

Coleman, J.S. and J.D. Fraser. 1989. Habitat use and home ranges of black and turkey vultures. J. Wildl. Manage. 53:782-792

Cottrell, M.J. 1981. Resource partitioning and reproductive success of hawks (*Buteo* spp.) in an Oregon prairie. M.S. Thesis, Oregon St. Univ., Corvallis, OR.

Craighead, J.J. and F.C. Craighead, Jr. 1956. Hawks, owls and wildlife. Stackpole Co., Harrisburg, PA.

Craig, E.H., T.H. Craig, and L.R. Powers. 1988. Activity patterns and home-range use of nesting long-eared owls. Wilson Bull. 100:204-213.

Dunkle, S.W. 1977. Swainson s hawks in Wyoming. Auk 94:65-71.

Elody, B.I. and N.F. Sloan. 1985. Movements and habitat use of barred owls in the Huron Mountains of Marquette County, Michigan, as determined by radiotelemetry. Jack-Pine Warbler 63:3-8.

Franklin, A.B. 1987. Breeding biology of the Great Gray Owl in southeastern Idaho and northwestern Wyoming. M.S. Thesis, Humboldt State Univ., Humboldt, CA. 83 pp.

_____. 1988. Breeding biology of the Great Gray Owl in southeastern Idaho and northwestern Wyoming. Condor 90:689-696.

Fitzner, R.E. 1978. The ecology and behavior of the Swainson s hawk (*Buteo swainsoni*) in southeastern Washington. Ph.D. dis., Washington St. Univ., Pullman, WA.

Gates, J.M. 1972. Red-tailed hawk populations and ecology in east central Wisconsin. Wilson Bull. 84: 421-433.

Goggans, R. 1986. Habitat use by flammulated owls in northeastern Oregon. Thesis. Oregon State Univ., Corvallis, OR.

Habeck, J.R. 1994. Dynamics of forest communities used by Great Gray Owls. Pages 176-210 *in* G.D. Hayward and J. Verner, eds. Flammulate, boreal, and Great Gray Owls in the United States: a technical conservation assessment. Gen. Tech. Rep. RM-253. Rocky Mtn. For. and Rng. Exp. Sta. and Rocky Mtn. Region, USDA Forest Service, Fort Collins, CO. 214 pp.

Harmata, A. and B. Oakleaf. 1992. Bald eagles in the Greater Yellowstone Ecosystem: an ecological study with emphasis on the Snake River, Wyoming. Wyoming Dept. Game and Fish, Cheyenne, WY. 232 pp.

Hayward, G.D. 1983. Resource partitioning among six forest owls in the River of No Return Wilderness, Idaho. M.S. Thesis, Univ. of Idaho, Moscow, ID. 132 pp.

_____, and E.O. Garton. 1988. Resource partitioning among forest owls in the River of No Return Wilderness, Idaho. Oceoligia 75:253-265.

_____, P.H. Hayward, and E.O. Garton. 1993. Ecology of boreal owls in the northern Rocky Mountains, USA. Wildlife Monographs 124:1-59.

Hobbie, J.E., and T.J. Cade. 1962. Golden eagle breeding in Alaska. Condor 64:235-237.

Holt, D.W., and W.D. Norton. 1986. Observations of nesting northern pygmy-owls. J. Raptor Res. 20:39-41.

_____, and S.M. Leasure. 1993. Short-eared Owl. The birds of North America, No. 62. The Academy of Natural Sciences of Philadelphia. 21 pp.

Howell, J., B. Smith, J.B. Holt, and D.R. Osborne. 1978. Red-tailed hawk habitat and productivity. Bird-Banding 49:162-171.

Howie, R.R. and R. Ritcey. 1987. Distribution, habitat selection, and densities of flammulated owls in British Columbia. Pages 249-254 *in* R.W. Nero, R.J. Clark, R.J. Knapton, and R.H. Hamre, eds. Biology and conservation of northern forest owls. Symposium Proceedings. USDA For. Service, Gen. Tech. Report RM-142.

Jackson, J.A. 1983. Nesting phenology, nest site selection, and reproductive success of black and turkey vultures. Pages 245-270 *in* Vulture Biology and Management. S.R. Wilbur and J.A. Jackson, eds. Univ. California Press.

Janes, S.W. 1985. Habitat selection in raptorial birds. Pages 159-199 *in* M.L. Cody ed. Habitat selection in birds. Academic Press, New York, NY.

Johnsgard, P.A. 1988. North American owls: biology and natural history. Smithsonian Inst. Press, Washington, D.C.

_____. 1990. Hawks, eagles, and falcons of North America. Smithsonian Inst. Press, Washington, D.C. 404 pp.

Johnson, S.J. 1975. Productivity of the red-tailed hawk in southwestern Montana. Auk 92:732-736.

Johnson, R.R., L.T. Haight, and J.M. Simpson. 1979. Owl populations and species status in the southwestern United States. Pages 40-59 *in* P. Schaeffer and S. Ehlers, eds. Owls of the West: their ecology and conservation. Western Education Center, National Audubon Soc., Tiburon, CA.

Joy, S.M., R.T. Reynolds, R.L. Knight, and R.W. Hoffman. 1994. Feeding ecology of sharp-shinned hawks nesting in deciduous and coniferous forests in Colorado. Condor 96:455-467.

Marks, J.S. 1986. Nest site characteristics and reproductive success of long-eared owls in southwestern Idaho. Wilson Bull. 98:547-560.

Marti, C.D., and C.E. Braun. 1975. Prairie falcons in tundra habitats, Colorado. Condor 77:213-214.

Martin, J.W. 1987. Behavior and habitat use of breeding northern harriers in southwestern Idaho. J. Raptor Res. 21:57-66.

McGahan, J. 1968. Ecology of the golden eagle. Auk 85:1-12.

Mikkola, H. 1983. Owls of Europe. Buteo Books, Vermillion, SD. 397 pp.

Moore, K.R. and C.J. Henny. 1983. Nest site characteristics of three coexisting accipiter hawks in Northeastern Oregon. J. Raptor Res. 17:65-76.

Nero, R.W. 1980. The Great Gray Owl-phantom of the northern forest. Smithsonian Institution Press, Washington, D.C. 167 pp.

Nicholls, T.H. and D.W. Warner. 1972. Barred owl habitat use as determined by radiotelemetry. J. Wild. Manage. 36:213-224.

Olenick, B.E. 1989. Burrowing Owl. Pages 79-81 *in* T.W. Clark, ed. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Env. Services. Jackson, WY. 153 pp.

Palmer, D.A. 1987. Habitat selection, movements and activity of boreal and saw-whet owls. J. Raptor Res. 21:45.

Patla, S. 1991. Northern goshawk monitoring project report #2. Targhee National Forest, St. Anthony, ID. 43 pp. + app.

Pattee, O.H. and S.R. Wilbur. 1989. Turkey vultures and California condors. Pages 61-65 *in* Proceedings of the western raptor management symposium and workshop. National Wildlife Fed., Washington, D.C. Scientific and Technical Series No. 12.

Petersen, L. 1979. Ecology of great horned owls and red-tailed hawks in southeastern Wisconsin. Wisconsin Dept. Nat. Resour. Tech. Bull. No. 111:1-63.

Platt, J.B. 1976. Sharp-shinned hawk nesting and nest site selection in Utah. Condor 78:102-10

Poole, A.F. 1989. Ospreys: a natural and unnatural history. Cambridge University Press, New York, NY. 246 pp.

Reynolds, R.T. 1983. Management of western coniferous forest habitat for nesting accipiter hawks. USDA Forest Service Gen. Tech. Report RM-102. 7 pp.

_____. 1989. Accipiters. Pages 92-101 *in* Proc. western raptor management symposium and workshop. National Wildlife Fed., Washington, D.C.

_____, and H.M. Wight. 1978. Distribution, density, and productivity of accipiter hawks breeding in Oregon. Wilson Bull. 90:182-196.

_____, E.C. Meslow, and H.M. Wight. 1982. Nesting habitat of coexisting accipiter in Oregon. J. of Wildlife Manage. 46:124-138.

_____, and B.D. Linkhart. 1987. The nesting biology of flammulated owls in Colorado. Pages 239-248 *in* R.W. Nero, R.J. Clark, R.J. Knapton, and R.H. Hamre, eds. Biology and conservation of northern forest owls, Symposium Proceedings, USDA Forest Service, Gen. Tech. Report RM-142.

_____, R.A. Ryder, and B.D. Linkhart. 1989. Small forest owls. Pages 134-143 *in* Proc. western raptor management symposium and workshop. National Wildlife Fed., Washington D.C. 320 pp.

Rohner, C. and F.I. Doyle. 1992. Methods of locating great horned owl nests in the boreal forest. J. Raptor Res. 26:33-35.

Runde, D.E., and S.H. Anderson. 1986. Prairie falcon nest sites. Raptor Res. 20:21-28.

Sedgwick, J.A. and F.L. Knopf. 1990. Habitat relationships and nest site characteristics of cavity-nesting birds in cottonwood floodplains. J. Wild. Manage. 54:112-124.

Sherrod, S.K. 1978. Diets of North American Falconiformes. Raptor Res. 12:49-121.

Sieg, C.H., and D.M. Becker. 1990. Nest-site habitat selected by merlins in Southeastern Montana. The Condor 92:688-694.

Smith, D.G., and J.R. Murphy. 1973. Breeding ecology of raptors in Utah. Brigham Young Univ. Sci. Bull. Biol. Ser. 18:1-76.

Steenhof, K., M.N. Kochert, and R.N. Lehman. 1991. Raptor nesting densities and reproductive success in the Snake River Birds of Prey Area, 1991. Pages 13-36 in K. Steenhof, ed. Snake River Birds of Prey Research and Monitoring Annual Report, USDI Bureau of Land Manage., Boise District, Boise, ID. 261 pp.

Swenson, J.E. 1981. Status of the osprey in southeastern Montana before and after the construction of reservoirs. Western Birds 12:47-51.

_____, K.L. Alt, and R.L. Eng. 1986. Ecology of bald eagles in the Greater Yellowstone Ecosystem. Wildlife Society, Wildlife Monograph No. 95. 46 pp.

Thurow, T.L. and C.M. White. 1983. Nest site relationship between the ferruginous and Swainson's hawk. J. Field Ornith. 54:401-406.

Titus, K. and J.A. Mosher. 1981. Nest site habitat selected by woodland hawks in the central Appalachians. Auk 98:270-281.

Van Daele, L.J., H.A. Van Daele, and D.R. Johnson. 1980. The status and management of ospreys nesting in Long Valley, Idaho. U.S. Water and Power Resources Service, Proj. Report. Univ. of Idaho, Moscow, ID. 49 pp.

Verner, J. and A.S. Boss. 1980. California wildlife and their habitats: Western Sierra Nevada. USDA, Forest Service, Gen. Tech. Report PWS-37.

Whitfield, M.B., M. Gaffney, M. Gebhardt, C. Rigle, M.E. Maj, and A. Whitfield. 1996. Monitoring of Great Gray Owls, Targhee National Forest and Teton Valley Idaho/Wyoming. Targhee National Forest, St. Anthony, ID. 72 pp.

_____, and M. Gaffney. 1997. Great gray owl breeding habitat use within altered forests, eastern Idaho and northwest Wyoming. Proceedings of the Second International Symposium: Biology and Conservation of Owls of the Northern Hemisphere, Winnipeg, Manitoba.

Woodbridge, B.B. 1987. Swainson s hawks and grazing in California. Proc. Ann. Meeting, Raptor Res. Found., Boise, ID.

Table 1. Raptor species codes for raptorial birds to be inventoried and monitored in the Snake River study area.

Common Name	Scientific Name	Abbreviation	Number	Occurrence in Study Area
Bald Eagle	*Haliaeetus leucocephalus*	*Ha. le.*	1	Known, this study
Golden Eagle	*Aquila chrysaetos*	*Aq. ch.*	2	Known, this study
Osprey	*Pandion haliaetus*	*Pa. ha.*	3	Known, this study
Northern Goshawk	*Accipiter gentilis*	*Ac. ge.*	4	Known, this study
Cooper's Hawk	*Accipiter cooperii*	*Ac. co.*	5	Known, this study
Sharp-shinned Hawk	*Accipiter striatus*	*Ac. st.*	6	Known, this study
Red-tailed Hawk	*Buteo jamaicensis*	*Bu. ja.*	7	Known, this study
Swainson's Hawk	*Buteo swainsoni*	*Bu. sw.*	8	Known, this study
Ferruginous Hawk	*Buteo regalis*	*Bu. re.*	9	Potential
Northern Harrier	*Circus cyaneus*	*Ci. cy.*	10	Known, this study
Peregrine Falcon	*Falco peregrinus*	*Fa. pe.*	11	Known, this study
Prairie Falcon	*Falco mexicanus*	*Fa. me.*	12	Known, this study
Merlin	*Falco columbarius*	*Fa. co.*	13	Potential
American Kestrel	*Falco sparverius*	*Fa. sp.*	14	Known, this study
Turkey Vulture	*Cathartes aura*	*Ca. au.*	15	Known, this study
N. Saw-Whet Owl	*Aegolius acadicus*	*Ae. ac.*	16	Known, this study
Northern Pygmy-owl	*Glaucidium gnoma*	*Gl. gn.*	17	Known, reports
Western Screech Owl	*Otus kennicottii*	*Ot. as.*	18	Known, reports
Flammulated Owl	*Otus flammeolus*	*Ot. fl.*	19	Known, this study
Short-eared Owl	*Asio flammeus*	*As. fl.*	20	Suspected
Long-eared Owl	*Asio otus*	*As. ot.*	21	Known, this study
Great Horned Owl	*Bubo virginianus*	*Bu. vi.*	22	Known, this study
Great Gray Owl	*Strix nebulosa*	*St. ne.*	23	Potential
Barred Owl	*Strix varia*	*St. va.*	24	Potential
Boreal Owl	*Aegolius funereus*	*Ae. fu.*	25	Potential
Burrowing Owl	*Athene cunicularia*	*At. cu.*	26	Potential

Table 2. Activity and productivity status for bald eagle breeding territories within the Idaho portion of the Greater Yellowstone Ecosystem, 1998.

TERRITORY NAME	TERRITORY NUMBER	PRODUCTIVITY STATUS	NUMBER ADVANCED YOUNG	NUMBER YOUNG BANDED	COMMENTS
PALISADES RESERVOIR AREA					
Hoffman	18-IS-01	Active, Unsuccessful	0	0	
Hoffman West	18-IS-28	Unoccupied	0	0	Nest gone.
Williams Creek	18-IS-02	Active, Unsuccessful	0	0	
Van Point	18-IS-03	Active, Successful	1	0	Fledged by 7/14.
Van Point South	18-IS-29	Unoccupied	0	0	Possibly an Edwards Cr. alt.
Edwards Creek	18-IS-17	Active, Unsuccessful	0	0	
King Creek	18-IS-18	Active, Unsuccessful	0	0	Nest fell apart in mid-season.
SOUTH FORK SNAKE RIVER					
Palisades Creek	18-IS-04	Active, Successful	1	0	
Swan Valley	18-IS-05	Occupied, Inactive	0	0	
Conant Valley	18-IS-06	Active, Successful	1	0	Alternate 3 used.
Pine Creek	18-IS-07	Active, Unsuccessful	0	0	
Dry Canyon	18-IS-08	Active, Successful	1	0	
Gormer Canyon	18-IS-09	Active, Unsuccessful	0	0	
Wolverine	18-IS-10	Active, Successful	1	0	Alt. 2 Douglas-fir.
Antelope Creek	18-IS-11	Active, Successful	1	0	Alt. 5 Douglas-fir.
Cress Creek	18-IS-12	Active, Successful	2	0	
Five Ways	18-IS-24	Active, Successful	2	0	
Clark's Hill	18-IS-25	Active, Successful	1	0	
MAIN SNAKE RIVER					
Confluence	18-IS-13	Active, Successful	2	0	
Market Lake	18-IS-22	Active, Successful	1	0	
LOWER SOUTH FORK, HENRYS FORK, FALL RIVER					
Menan Buttes	18-IS-20	Active, Successful	2	0	
Ririe Reservoir	18-IS-26	Active, Unsuccessful	0	0	Failed early.
Annis Slough	18-IS-27	Active, Successful	2	0	
Cartier Slough	18-IS-14	Active, Successful	1	0	
St. Anthony	18-IS-15	Active, Successful	1	0	
Singleton Pond	18-IS-16	Active, Successful	1	0	Alternate two.
Lower Fall River	18-IS-19	Active, Unsuccessful	0	0	
TETON RIVER, SNAKE UNIT					
Upper Teton	18-IS-21	Active, Unsuccessful	0	0	Alternate two.
Hog Hollow	18-IS-23	Active, Successful	1	0	Alternate two.
CONTINENTAL UNIT, UPPER HENRYS FORK, SNAKE RIVER					
Kerr Canyon	18-IC-01	Active, Successful	1	0	
Pine Haven	18-IC-02	Active, Successful	1	0	
Box Canyon	18-IC-03	Occupied, Inactive	0	0	

Table 2. Activity and productivity status for bald eagle breeding territories within the Idaho portion of the Greater Yellowstone Ecosystem, 1998 (cont.).

TERRITORY NAME	TERRITORY NUMBER	PRODUCTIVITY STATUS	NUMBER ADVANCED YOUNG	NUMBER YOUNG BANDED	COMMENTS
CONTINENTAL UNIT, UPPER HENRYS FORK SNAKE RIVER (cont).					
Coffee Pot	18-IC-04	Active, Unsuccessful	0	0	Alt. 2, nest fell apart early.
Bishop Lake	18-IC-05	Occupied, Inactive	0	0	
Sheridan	18-IC-06	Active, Successful	1	0	
Lucky Dog	18-IC-07	Occupied, Inactive	0	0	
Henrys Lake	18-IC-08	Active, Successful	1	0	
Staley Springs-Targhee Creek	18-IC-09	Active, Successful	1	0	
Hale Canyon	18-IC-10	Active, Successful	1	0	One young died pre-fledging.
Moonshine	18-IC-11	Occupied, Inactive	0	0	
Last Chance	18-IC-12	Active, Successful	1	0	
IP Bills	18-IC-13	Active, Unsuccessful	0	0	
Flat Rock	18-IC-14	Active, Successful	1	0	
Riverside or Mesa Falls	18-IC-15	Active, Successful	1	0	Possibly a Riverside alternate.
Snake River Butte	18-IC-16	Unoccupied	0	0	
Buffalo River	18-IC-17	Unoccupied	0	0	
Big Bend	18-IC-18	Active, Unsuccessful	0	0	Nest blowdown, 1 injured nestling to Rehabilitator.

Summary Statistics:

Total number nesting territories: 47

Advanced young/occupied nest[1] : 0.74

Number occupied territories, success known: 43

Number active territories, success known: 37

Advanced young/active nest[1]: 0.86

Number successful territories: 26

Number advanced young: 32

Advanced young/successful nest[1]: 1.23

[1]Excludes Market Lake, 18-IS-22, an active nesting area where productivity outcome was unknown.

Table 3. Activity and productivity status for bald eagle breeding territories within the Idaho portion of the Greater Yellowstone Ecosystem, 1999.

TERRITORY NAME	TERRITORY NUMBER	PRODUCTIVITY STATUS	NUMBER ADVANCED YOUNG	NUMBER YOUNG BANDED	COMMENTS
PALISADES RESERVOIR AREA					
Hoffman East	18-IS-01	Occupied, Inactive	0	0	Nest in disrepair.
Hoffman West	18-IS-28	Unoccupied	0	0	Nest gone, May be King Cr. alternate.
Williams Creek	18-IS-02	Active, Successful	2	0	
Van Point North	18-IS-03	Active, Successful	1	0	
Van Point South	18-IS-29	Active, Successful	2	0	May be Edwards Cr. alternate.
Edwards Creek	18-IS-17	Occupied, Inactive	0	0	May be Van Point South alternate.
King Creek	18-IS-18	Active, Successful	2	0	
SOUTH FORK SNAKE RIVER					
Palisades Creek	18-IS-04	Active, Unsuccessful	0	0	Early nesting attempt failed
Swan Valley	18-IS-05	Occupied, Inactive	0	0	New housing in nest area.
Conant Valley	18-IS-06	Active, Successful	2	0	
Pine Creek	18-IS-07	Active, Successful	2	0	
Dry Canyon	18-IS-08	Active, Successful	1	0	
Gormer Canyon	18-IS-09	Active, Unsuccessful	0	0	
Wolverine	18-IS-10	Active, Successful	1	0	
Antelope Creek	18-IS-11	Active, Successful	2	0	
Cress Creek	18-IS-12	Active, Unsuccessful	0	0	
Five Ways	18-IS-24	Active, Successful	2	0	
Clark Hill	18-IS-25	Active, Unsuccessful	0	0	Advanced nestling dead on nest.
MAIN SNAKE RIVER					
Confluence	18-IS-13	Occupied, Inactive	0	0	
Market Lake	18-IS-22	Active, Successful	1	0	
LOWER SOUTH FORK, HENRYS FORK, FALL RIVER					
Menan Buttes	18-IS-20	Active, Successful	1	0	
Ririe Reservoir	18-IS-26	Active, Unknown	?	0	
Annis Slough	18-IS-27	Active, Successful	1	0	
Cartier Slough	18-IS-14	Active, Successful	1	0	
St. Anthony	18-IS-15	Active, Unsuccessful	0	0	Apparent nest blowdown.
Singleton Pond	18-IS-16	Active, Unsuccessful	0	0	Same alternate first used in 1997.
Lower Fall River	18-IS-19	Active, Unsuccessful	0	0	

Table 3. Activity and productivity status for bald eagle breeding territories within the Idaho portion of the Greater Yellowstone Ecosystem, 1999 (cont.).

TERRITORY NAME	TERRITORY NUMBER	PRODUCTIVITY STATUS	NUMBER ADVANCED YOUNG	NUMBER YOUNG BANDED	COMMENTS
TETON RIVER, SNAKE UNIT					
Upper Teton	18-IS-21	Active, Successful	2	0	
Hog Hollow	18-IS-23	Active, Unsuccessful	0	0	
Spring Hollow	18-IS-30	Active, Unknown	?	0	New site, adults reported at nest.
CONTINENTAL UNIT, UPPER HENRYS FORK, SNAKE RIVER					
Kerr Canyon	18-IC-01	Active, Successful	1	0	
Pine Haven	18-IC-02	Active, Successful	2	0	
Box Canyon	18-IC-03	Active, Successful	2	0	
Coffee Pot	18-IC-04	Active, Unsuccessful	0	0	
Bishop Lake	18-IC-05	Occupied, Inactive	0	0	
Sheridan	18-IC-06	Occupied, Inactive	0	0	
Lucky Dog	18-IC-07	Occupied, Inactive	0	0	
Henrys Lake	18-IC-08	Active, Successful	1	0	
Staley Springs-/Targhee Creek	18-IC-09	Occupied, Inactive	0	0	
Hale Canyon	18-IC-10	Active, Unsuccessful	0	0	
Moonshine	18-IC-11	Active, Unknown	?	0	
Last Chance	18-IC-12	Occupied, Inactive	0	0	
IP Bills	18-IC-13	Active, Unsuccessful	0	0	
Flat Rock	18-IC-14	Occupied, Inactive	0	0	
Riverside or Mesa Falls	18-IC-15	Active, Successful	2	0	Possible Riverside alternate
Snake River Butte	18-IC-16	Active, Unsuccessful	0	0	
Buffalo River	18-IC-17	Unoccupied, Inactive	0	0	
Big Bend	18-IC-18	Active, Unsuccessful	0	0	

Summary Statistics:

Total number nesting territories: 48

Advanced young/occupied nest[1]: 0.72

Number occupied territories, success known: 43

Number active territories, success known: 33

Advanced young/active nest[1]: 0.94

Number successful territories: 20

Number advanced young known: 31

Advanced young/successful nest[1]: 1.55

[1]Excludes Ririe Reservoir, 18-IS-26; Spring Hollow, 18-IS-30; and Moonshine, 18-IC-11; active nesting areas where productivity outcome was unknown.

Table 4. Activity and productivity status for bald eagle breeding territories within the Idaho portion of the Greater Yellowstone Ecosystem, 2000.

TERRITORY NAME	TERRITORY NUMBER	PRODUCTIVITY STATUS	NUMBER ADVANCED YOUNG	NUMBER YOUNG BANDED	COMMENTS
PALISADES RESERVOIR AREA					
Hoffman East	18-IS-01	Occupied, Inactive	0	0	
Hoffman West	18-IS-28	Unoccupied	0	0	Nest gone, May be King Cr. alternate.
Williams Creek	18-IS-02	Active, Successful	2	0	
Van Point North	18-IS-03	Active, Successful	2	0	
Van Point South	18-IS-29	Active, Successful	2	0	May be Edwards Cr. alternate.
Edwards Creek	18-IS-17	Unoccupied	0	0	May be Van Point South alternate.
King Creek	18-IS-18	Active, Successful	2	0	
SOUTH FORK SNAKE RIVER					
Palisades Creek	18-IS-04	Active, Successful	2	0	Nested on alt. #2.
Swan Valley	18-IS-05	Active, Successful	2	0	Nested on alt. #4.
Conant Valley	18-IS-06	Active, Unsuccessful	0	0	
Pine Creek	18-IS-07	Active, Successful	2	0	
Dry Canyon	18-IS-08	Active, Successful	2	0	
Gormer Canyon	18-IS-09	Active, Unsuccessful	0	0	New nest Fisher Bottom.
Wolverine	18-IS-10	Active, Successful	2	0	New alt. nest in cottonwood bottom.
Antelope Creek	18-IS-11	Active, Successful	1	0	
Cress Creek	18-IS-12	Active, Successful	1	0	
Great Feeder Island	18-IS-31	Active, Successful	1	0	New breeding area.
Five Ways	18-IS-24	Active, Successful	2	0	
Clark Hill	18-IS-25	Active, Successful	2	0	
MAIN SNAKE RIVER					
Confluence	18-IS-13	Active, Unsuccessful	0	0	Alt. Known as Dry Beds nest.
Market Lake	18-IS-22	Active, Successful	1	0	
LOWER SOUTH FORK, HENRYS FORK, FALL RIVER					
Menan Buttes	18-IS-20	Active, Successful	2	0	
Ririe Reservoir	18-IS-26	Active, Unsuccessful	0	0	Incubated for prolonged period.
Annis Slough	18-IS-27	Active, Successful	1	0	
Cartier Slough	18-IS-14	Active, Unsuccessful	0	0	
St. Anthony	18-IS-15	Active, Successful	1	0	New alternate.
Singleton Pond	18-IS-16	Active, Successful	1	0	New alternate.
Lower Fall River	18-IS-19	Occupied, Inactive	0	0	

Table 4. Activity and productivity status for bald eagle breeding territories within the Idaho portion of the Greater Yellowstone Ecosystem, 2000 (cont.).

TERRITORY NAME	TERRITORY NUMBER	PRODUCTIVITY STATUS	NUMBER ADVANCED YOUNG	NUMBER YOUNG BANDED	COMMENTS
TETON RIVER, SNAKE UNIT					
Upper Teton	18-IS-21	Active, Successful	1	0	
Hog Hollow	18-IS-23	Active, Unsuccessful	0	0	
Spring Hollow	18-IS-30	Active, Unsuccessful	0	0	
Upper Teton, Trail Cr.	18-IS-32	Active, Successful	1	0	New breeding area.
Teton River, Danford	18-IS-33	Active, Unknown	?	0	New breeding area, productivity unknown.
CONTINENTAL UNIT, UPPER HENRYS FORK, SNAKE RIVER					
Kerr Canyon	18-IC-01	Active, Successful	1	0	
Pine Haven	18-IC-02	Active, Successful	1	0	
Box Canyon	18-IC-03	Active, Unsuccessful	0	0	
Coffee Pot	18-IC-04	Active, Successful	1	0	
Bishop Lake	18-IC-05	Occupied, Inactive	0	0	
Sheridan	18-IC-06	Occupied, Inactive	0	0	
Lucky Dog	18-IC-07	Active, Unsuccessful	0	0	
Henrys Lake	18-IC-08	Active, Successful	2	0	
Staley Springs-/Targhee Creek	18-IC-09	Active, Unsuccessful	0	0	
Hale Canyon	18-IC-10	Active, Successful	1	0	
Moonshine	18-IC-11	Active, Successful	1	0	Alternate nest #2.
Last Chance	18-IC-12	Active, Unsuccessful	0	0	
IP Bills	18-IC-13	Active, Successful	1	0	
Flat Rock	18-IC-14	Active, Successful	1	0	
Riverside or Mesa Falls	18-IC-15	Active, Successful	1	0	
Snake River Butte	18-IC-16	Active, Successful	2	0	
Buffalo River	18-IC-17	Unoccupied, Inactive	0	0	
Big Bend	18-IC-18	Active, Unsuccessful	0	0	

Summary Statistics:

Total number nesting territories: 51

Advanced young/occupied nest[1]: 0.96

Number occupied territories, success known: 47

Number active territories, success known: 43

Advanced young/active nest[1]: 1.05

Number successful territories: 31

Number advanced young known: 45

Advanced young/successful nest[1]: 1.45

[1]Excludes Teton River Canyon-Danford breeding area, 18-IS-33, a new, active breeding area where productivity outcome was unknown.

Table 5. Historic trends in bald eagle productivity at nesting areas in Eastern Idaho, the Idaho portion of the Greater Yellowstone Ecosystem, 1987-1997.

Year	Advanced young/occupied nest (productivity known)
1987	1.80 (n = 20)
1988	1.70 (n = 23)
1989	1.35 (n = 26)
1990	1.59 (n = 27)
1991	1.45 (n = 31)
1992	1.23 (n = 35)
1993	0.69 (n = 35)
1994	1.13 (n = 38)
1995	1.00 (n = 39)
1996	1.00 (n = 43)
1997	1.10 (n = 42)
1998	0.74 (n = 43)
1999	0.72 (n = 43)
2000	0.96 (n = 47)

Table 6. Known productivity at the Cress Creek bald eagle breeding area since re-establishment of nesting pairs.

YEAR	NESTING STATUS	NUMBER YOUNG FLEDGED	NEST NUMBER	COMMENTS
1988	Active, Successful	2	1	Nest first discovered.
1989	Active, Successful	1	1	
1990	Active, Successful	2	1	
1991	Active, Successful	2	1	
1992	Active, Successful	2	1	
1993	Active, Unsuccessful	0	2	
1994	Active, Unsuccessful	0	2	Nest #1 broke out of tree during nesting.
1995	Active, Successful	3	2	
1996	Active, Successful	2	2	
1997	Active, Successful	2	2	
1998	Active, Successful	2	2	
1999	Active, Unsuccessful	0	2	
2000	Active, Successful	1	2	

Table 7. Known productivity at the Menan Buttes bald eagle breeding area since re-establishment of nesting pairs.

YEAR	NESTING STATUS	NUMBER YOUNG FLEDGED	NEST NUMBER	COMMENTS
1990	Active, successful	1	1	Nest first discovered.
1991	Unknown	Unknown		Nest not checked, see text.
1992	Active, successful	1	1	Adult male, Snake Idaho band.
1993	Active, successful	2	2	Nest #1 broke out of tree.
1994	Active, successful	1	2	
1995	Active, successful	2	2	
1996	Active, Unsuccessful	0	2	Nest blowdown during nesting.
1997	Active, successful	1	3	New nest downriver of old area.
1998	Active, successful	2	3	
1999	Active, Successful	1	3	
2000	Active, Successful	2	3	

Table 8. Known productivity at the Cartier Slough bald eagle breeding area since re-establishment of nesting pairs.

YEAR	NESTING STATUS	NUMBER YOUNGNEST FLEDGED	NUMBER	COMMENTS
1987	Active, Unknown	Unknown	1	
1988	Active, Successful	2	1	
1989	Active, Successful	1	1	
1990	Active, Successful	1	1	One nestling banded.
1991	Active, Successful	1	2	New alternate, banded.
1992	Active, Successful	1	2	
1993	Active, Successful	1	2	
1994	Active, Successful	1	2	
1995	Active, Unsuccessful	0	2	
1996	Active, Unsuccessful	0	2	Alternate #2 blew down.
1997	Active, Unknown	Unknown	3	
1998	Active, Successful	1	3	
1999	Active, Successful	1	3	
2000	Active, Successful	1	1	

Table 9. Known productivity at the Annis Slough bald eagle breeding area since re-establishment of nesting pairs.

YEAR	NESTING STATUS	NUMBER YOUNG FLEDGED	NEST NUMBER	COMMENTS
1996	Active, Successful	1	1	New breeding area.
1997	Active, Successful	2	2	Nest #1 blew down in 1996.
1998	Active, Successful	2	2	Both alternates in same area.
1999	Active, Successful	1	2	
2000	Active, Successful	1	2	

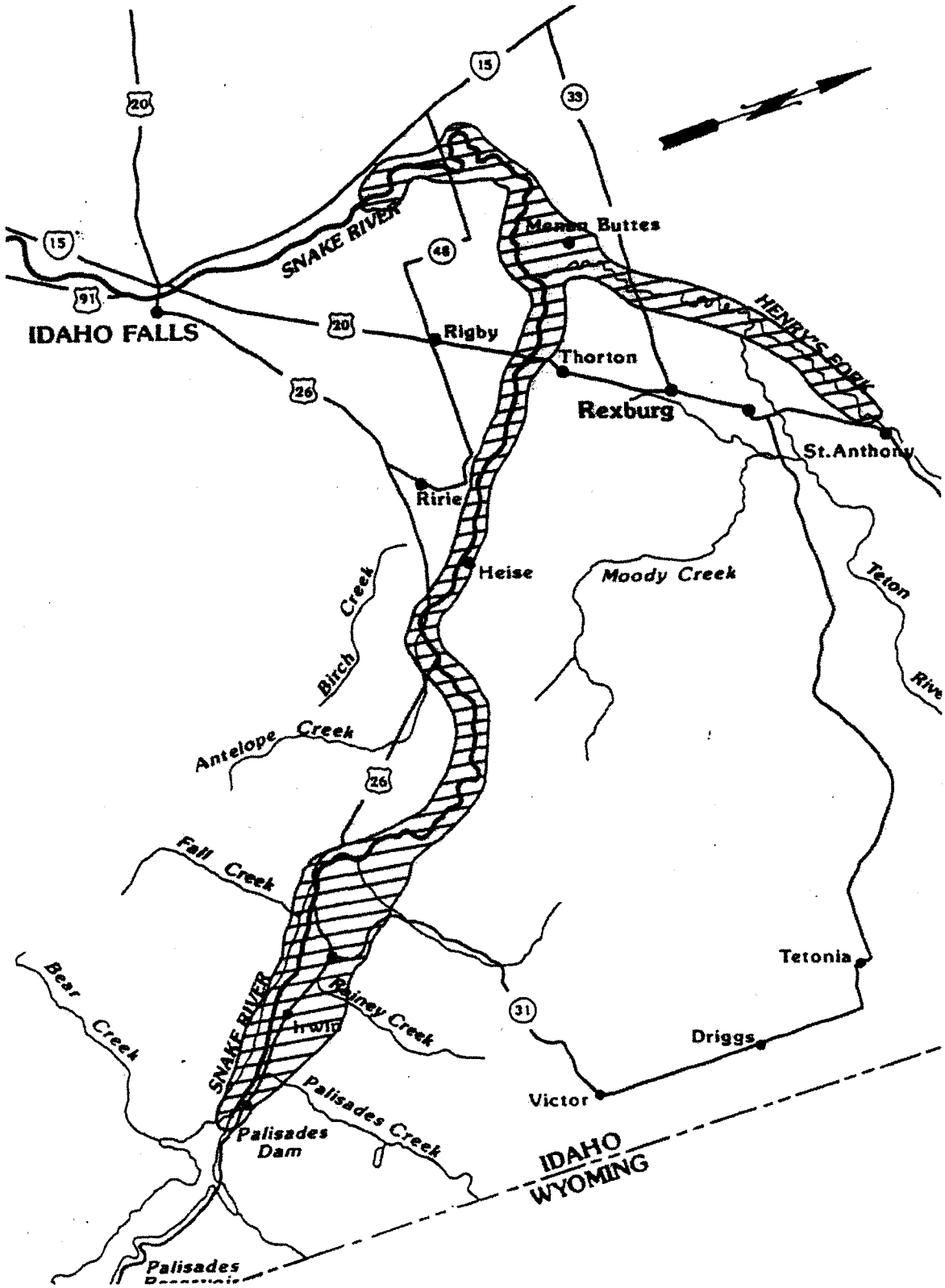


Figure 1. Snake River study area. This map is taken from the Snake River Activity/Operations Plan (USDI BLM and USDA Forest Service 1991). Scale 1:500,000.

Figure 2. Trend in bald eagle productivity at nesting areas in East Idaho, the Idaho portion of the Greater Yellowstone Ecosystem, 1987-2000.

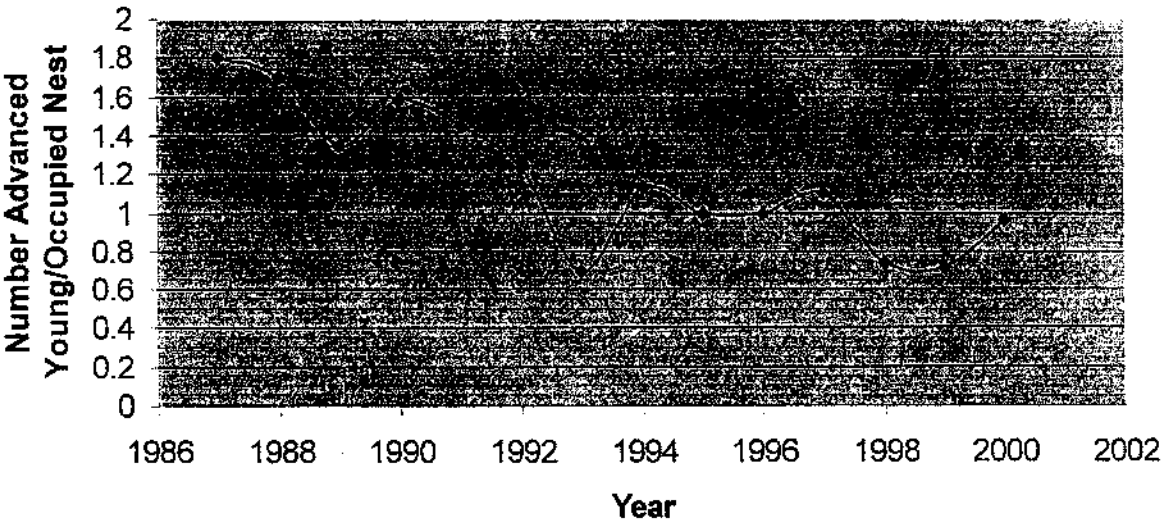


Figure 3. Known key use area within the Cress Creek bald eagle breeding area, South Fork Snake River. Intensive monitoring has not occurred at this breeding area, and the information portrayed is preliminary only. The circle encloses the Principal Management Area (PMA). The star indicates the only current nest site. Dots with numbers indicate primary foraging areas and perches. An earlier alternate nest was located 1 mile upriver of this site, and is not included within this PMA.

Figure 4. Known key use area within the Menan Buttes bald eagle breeding area, South Fork Snake River. Intensive monitoring has not occurred at this breeding area, and the information portrayed is preliminary only. The circle encloses the Principal Management Area (PMA). The star indicates the current nest site. Dots and numbers indicate prominent foraging perches/locations determined in 1998 observations. (Two historic alternate nests in an old heron rookery approximately 3/4 mile upriver of current nest are not shown within the PMA. The area of the historic alternates should also be managed as a part of the PMA.)

Figure 5. Known key use area within the Cartier Slough bald eagle breeding area, Henry's Fork Snake River. Intensive monitoring has not occurred at this breeding area, and the information portrayed is preliminary only. The circle encloses the Principal Management Area. The three stars indicate the known nest sites, the highest and lowest of which are still intact. (The 1998 nest was the lowest star.) The numbers refer to primary foraging perches and locations. Perch 1 is 1.5 miles southeast of the photo; perch 2 is 2.2 miles to the northeast.

Figure 6. Known key use area within the Annis Slough bald eagle breeding area, Henry's Fork Snake River. Intensive monitoring has not occurred at this breeding area, and the information portrayed is preliminary only. The circle encloses the Principal Management Area. The star indicates the only known nest site. The numbers indicate primary foraging perches used by the adults during the nesting season. One primary perch not shown in this figure is located downstream below the Menan Bridge over the Snake River in a small cottonwood stand on the south side of the river.

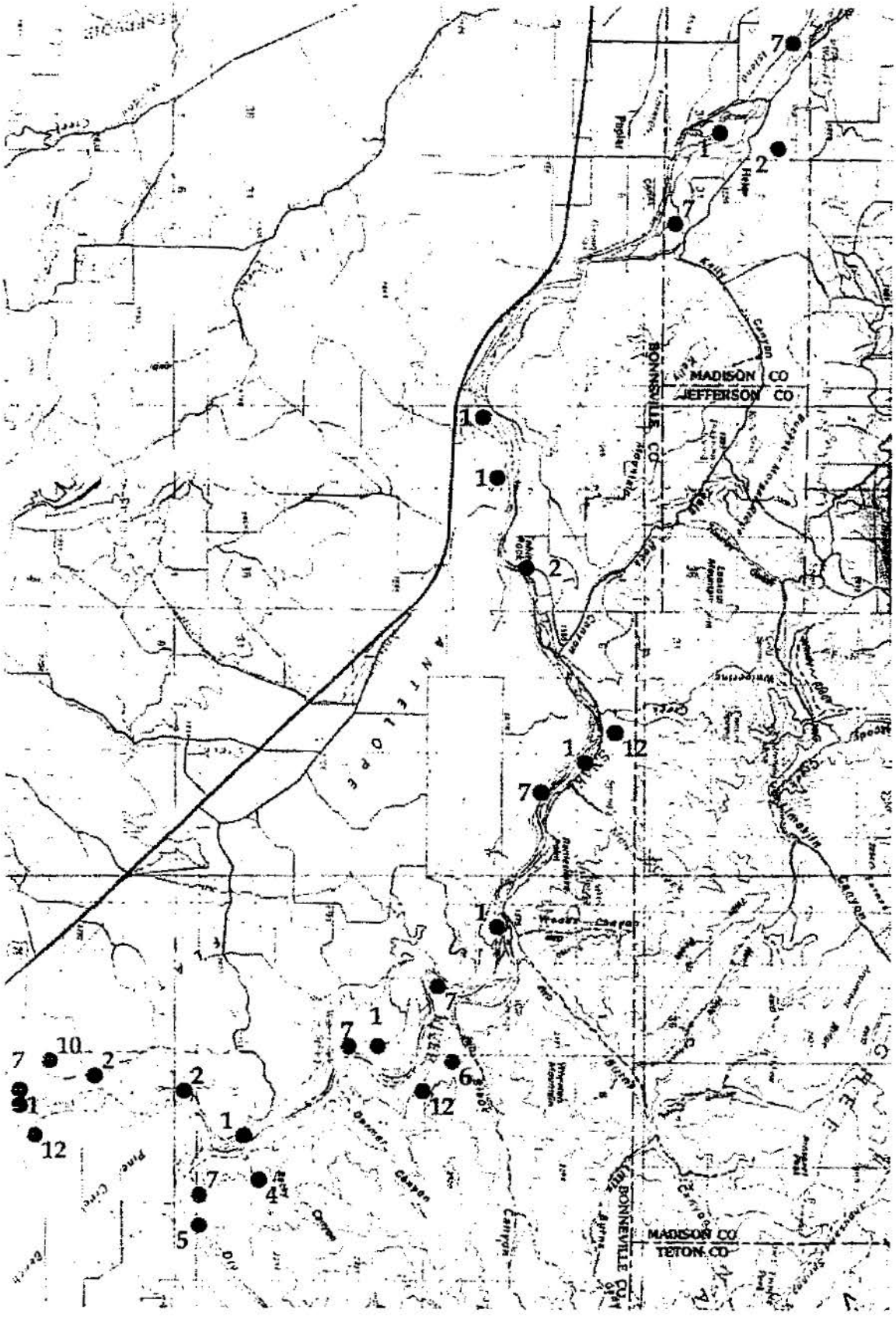
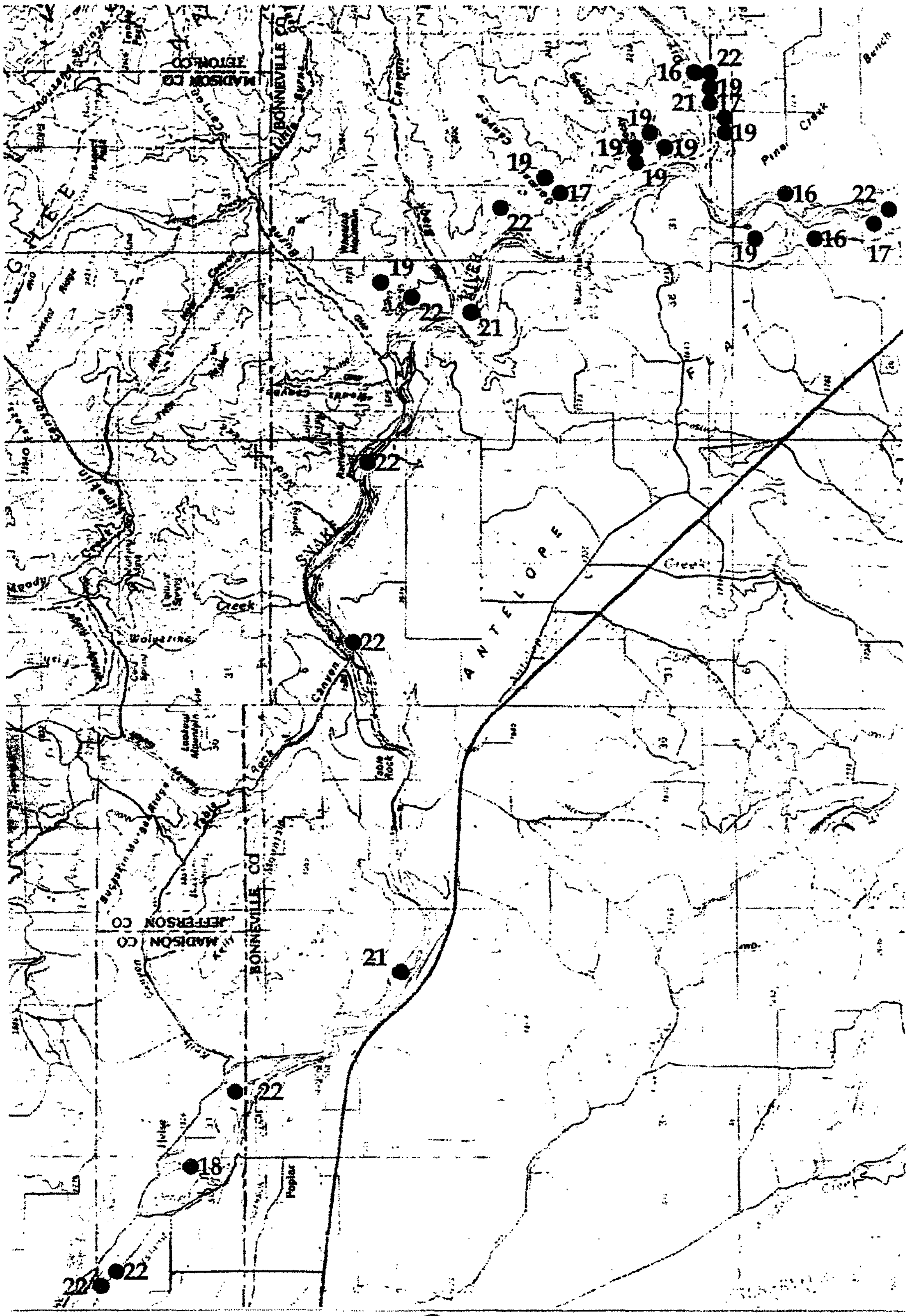

MADISON CO
JEFFERSON CO
BONNEVILLE CO
MADISON CO
TETON CO
BONNEVILLE CO

Figure 8



MADISON CO
TETON CO
BONNEVILLE CO
Pine Creek
Bench
Creek
Creek
ANTELOPE
Wolverine
Table Rock
JEFFERSON CO
MADISON CO
BONNEVILLE CO
Poplar
22
16
19
21
17
19
19
19
19
19
19
17
22
16
22
19
16
17
19
22
21
22
22
21
22
18
22
22

Figure 9

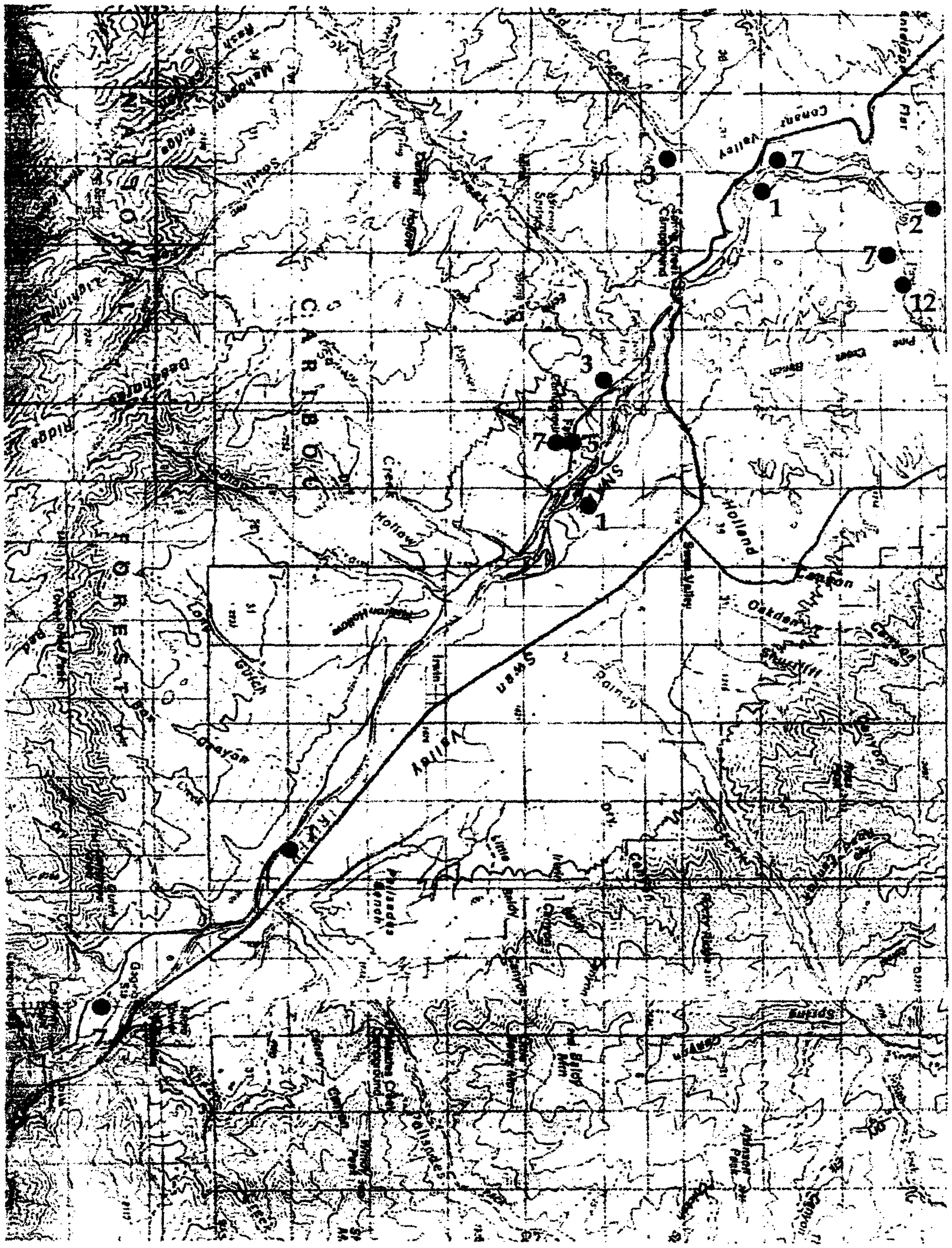
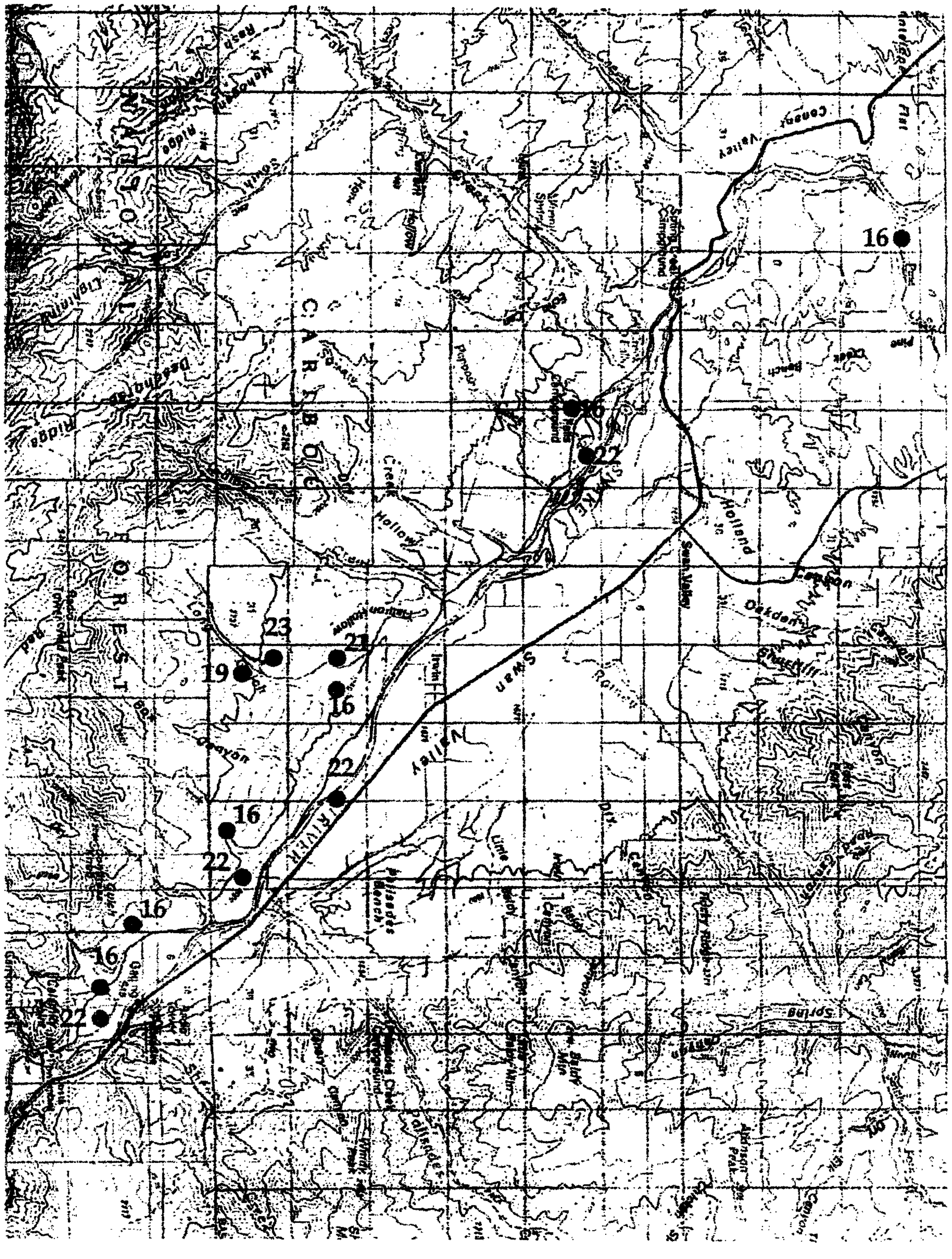

3
7
1
2
7
12
3
7
5
1
Holland
Creek
Hollow
Swan
Valley
Gulch
Canyon
Oakden

Figure 10


16
22
23
21
19
16
22
16
22
16
16
22
Swan
Valley
RIVER
Holland
Oakden