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HISTORICAL AND CURRENT DISTRIBUTIONS OF SWAINSON'S AND FERRUGINOUS HAWKS IN SOUTHERN IDAHO

by

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ABSTRACT

This study was undertaken to document historical and current distributions of Swainson's and ferruginous hawk nests in southern Idaho. Its primary goal was to use this documentation to determine if the ranges of these hawks have decreased since the state was first settled. The study also established 10 nesting platforms and collected nest productivity data to begin studying nest site management in areas of high disturbance.

The 1985 survey yielded a total of 109 and 72 active nests for Swainson's and ferruginous hawks, respectively. All Swainson's hawk nests were built in trees and most trees were situated either on privately owned land or at the boundary between publicly and privately owned lands. The most common form of habitat surrounding nests was irrigated pasture and hayland. Ferruginous hawks nested on a variety of substrates ranging from trees to cliffs. These nests were most often situated on public land administered by the BLM and the principal habitat type surrounding them was uncultivated sagebrush.

Few historical records were found for ferruginous hawk nests in Idaho. Nevertheless, the data obtained over the past 15 years indicated that the population has maintained its distribution across the state in recent time. Nest records for the Swainson's hawk in Idaho began to be made during the 1880s, and since then it has been documented as a nesting species in both northern and southern regions of the state. A comparison of historical and current records indicated that the Swainson's hawk continues to be found in many of its traditional nesting areas in southern Idaho and it is unlikely that it ever experienced a widespread decline in this state similar to declines reported elsewhere in the West. Historical evidence did show that local declines probably occurred in areas of the state where agricultural development

has been most extensive and the habitat now consists predominantly of cultivated cropland. In other locations, however, where the habitat is dominated by hay farming, there may have actually been local increases in the nesting density of this species since the time of first settlement. In these areas, nests are no longer closely associated with riparian areas as they were when the first records were made. Now, they are more typically found in and around irrigated haylands which support large numbers of nest trees and rodent prey.

Because nest sites of both species were judged to be in highly vulnerable surroundings which experienced high levels of agricultural, grazing, and human disturbances, it was concluded that the BLM and the Idaho Department of Fish and Game should undertake management measures to protect the nest sites of both hawks. The BLM should attempt to minimize damage to ferruginous hawk nests resulting from livestock grazing and limit human activities in the vicinity of nest sites during the breeding season. The Idaho Department of Fish and Game should institute an educational program designed to alert the agricultural community of the habitat requirements of the Swainson's hawk and the need for suitable nest trees if this species is going to maintain its widespread distribution across the state in years to come.

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INTRODUCTION

Ferruginous (Buteo regalis) and Swainson's (B. swainsoni) hawks have traditionally inhabited much of western North America (Brown and Amadon 1968). They breed in arid, semi-arid, and grassland regions and prey on a variety of small mammals such as rabbits (Lepus spp.), ground squirrels (Spermophilus spp.), prairie dogs (Cynomys spp.), voles (Microtus spp.), and some birds and insects (Cameron 1913, 1914, Bent 1937, Weston 1969, Smith and Murphy 1973, Olendorff 1973). Through the years, considerable speculation over reported declining populations of these hawks has resulted in one or both being included on the Blue List, the BLM Sensitive Species List, the California Department of Fish and Game Endangered Species List, the Illinois Department of Natural Resources Endangered Species List, the Iowa Department of Natural Resources List of Species of Special Concern, and the U.S. Fish and Wildlife Service has given them Category 2 status. Since being listed, populations reported in decline have been studied more thoroughly and it now appears that losses were actually minimal in the heart of the breeding range, in states such as Colorado, Utah, Wyoming, North Dakota, and Oklahoma (Clark 1985). In Nebraska, Swainson's hawks continue to be common nesters and it is estimated that there has been less than a 25% decrease in the species' statewide range (Lock 1985). Areas where severe declines did occur are located at the boundary of the historical range. Reports of long-term declines in California, Oregon, Washington, Nevada, Alberta, Saskatchewan, and Manitoba indicate that, in these border areas, one or both species either declined in numbers and range or were totally eliminated (Marshall 1969, Dyrness et al. 1975, Herron and Lucas 1978, Bechard 1980, 1981, Bloom 1980, Fitzner, 1980, Tate and Tate 1982, Schmutz 1984a, Houston and Bechard 1984). With this new and somewhat contradictory

evidence, the exact rangewide status of ferruginous and Swainson's hawks has been placed in question and further research is necessary before listing them as threatened or endangered species can be justified.

The widespread decline of the Swainson's hawk, that began when Washington, Oregon, California, and Nevada were first settled and reached a climax sometime between 1940 and 1960, is well documented. The Swainson's hawk was first described by Bonaparte in 1838 from a specimen taken near Fort Vancouver, Washington in 1834 (AOU 1983). As late as the early 1900s it was one of the most common nesters across eastern and central portions of Oregon and Washington and it was found west of the Cascade mountains in both states (Baird et al. 1858, Bendire 1877, Edson 1980, Rathbun 1902, Dawson and Bowles 1909, Shelton 1917, Jewett et al. 1953). To the south, the range extended into western Nevada and California as far south as San Diego county where the Swainson's Hawk was one of the most common breeding hawks (Sharp 1902). By the 1930s, Gabrielson and Jewett (1940) found that Swainson's hawks no longer nested west of the Cascades in Oregon and that a noticeable decline had occurred throughout its range. Today, it is still a common nesting species in northeastern Oregon (Cottrell 1981), but in the southeastern portion of the state it is present only in limited numbers (Littlefield et al. 1984). In California and Nevada, similar declines culminated during the 1950s with the disappearance of active nests from all but the northern portions of both states (Herron and Lucas 1978, Bloom 1980). In Washington, the Swainson's hawk is no longer found nesting in the lower portion of the Columbia River Valley nor is it found in the previously occupied western areas. Its nests are currently restricted to only the southcentral and southeastern regions of the state (Bechard 1980, Fitzner 1980).

The suspected decline of the ferruginous hawk in the western U.S. has not been as completely documented but the species does appear to have undergone a decline similar to that of the Swainson's hawk. The ferruginous hawk was once a breeding species in southern California and a rare, but widely distributed species east of the Cascade mountains in Oregon and Washington (Bendire 1892, Dawson and Bowles 1909, Bowles and Decker 1934, Jewett et al. 1953, AOU 1983). Today, it has been completely eliminated from California and its current distribution appears to be reduced in Washington where perhaps only 62 active nesting territories remain in the southeastern region of the state (Allen 1985). Likewise, studies showing active nests to be currently restricted to northeastern and southeastern portions of Oregon indicate a similar decline may have also occurred there (Lardy 1980, Cottrell 1981).

Both ferruginous and Swainson's hawks are breeding species in Idaho. At the time this state was first settled, Swainson's hawks appear to have been common nesters in northern areas in Latah, Clearwater, and Nez Perce counties; in the south, nests were apparently widespread from southeastern Oregon to Utah and Wyoming (Larrison et al. 1967, Burleigh 1972). The population appears to have declined since then and its current status is unknown (M. Nelson pers. comm.). The ferruginous hawk has always been limited to the southern portion of the state, but with an estimated 200 to 250 active nests in the late 1970s (Call 1979), it too appears to be less widespread since the time of first settlement. Coincident with the suspected declines, there has been an intensification of land use and increased crop cultivation and livestock grazing have altered much of the native nesting habitat. Elsewhere, these same land use practices have contributed to declines in hawk populations by limiting the availability of prey and the number of nest sites (Bechard 1980, 1982,

Bloom 1980, Fitzner 1980). Land development may also have contributed to the suspected declines in Idaho, but no attempt has been made to document them using historical records of active nesting territories.

Public lands in the western U.S. offer suitable habitat where hawks might continue breeding in the future. Habitats administered by the Bureau of Land Management (BLM) in Idaho support the necessary prey populations, but in many of these areas hawks do not presently nest because of a lack of suitable nesting substrates. For example, the Swainson's hawk nests solely in trees and, because much of the BLM land in Idaho is arid and treeless, it is excluded from large areas of potential nesting habitat. Elsewhere, artificial nesting platforms have been found to be useful in attracting Swainson's and ferruginous hawks to areas with limited numbers of trees (Schmutz 1984b). It is anticipated, therefore, that nest platforms would be useful in establishing nesting populations of both species of hawks in previously unused habitats of southern Idaho.

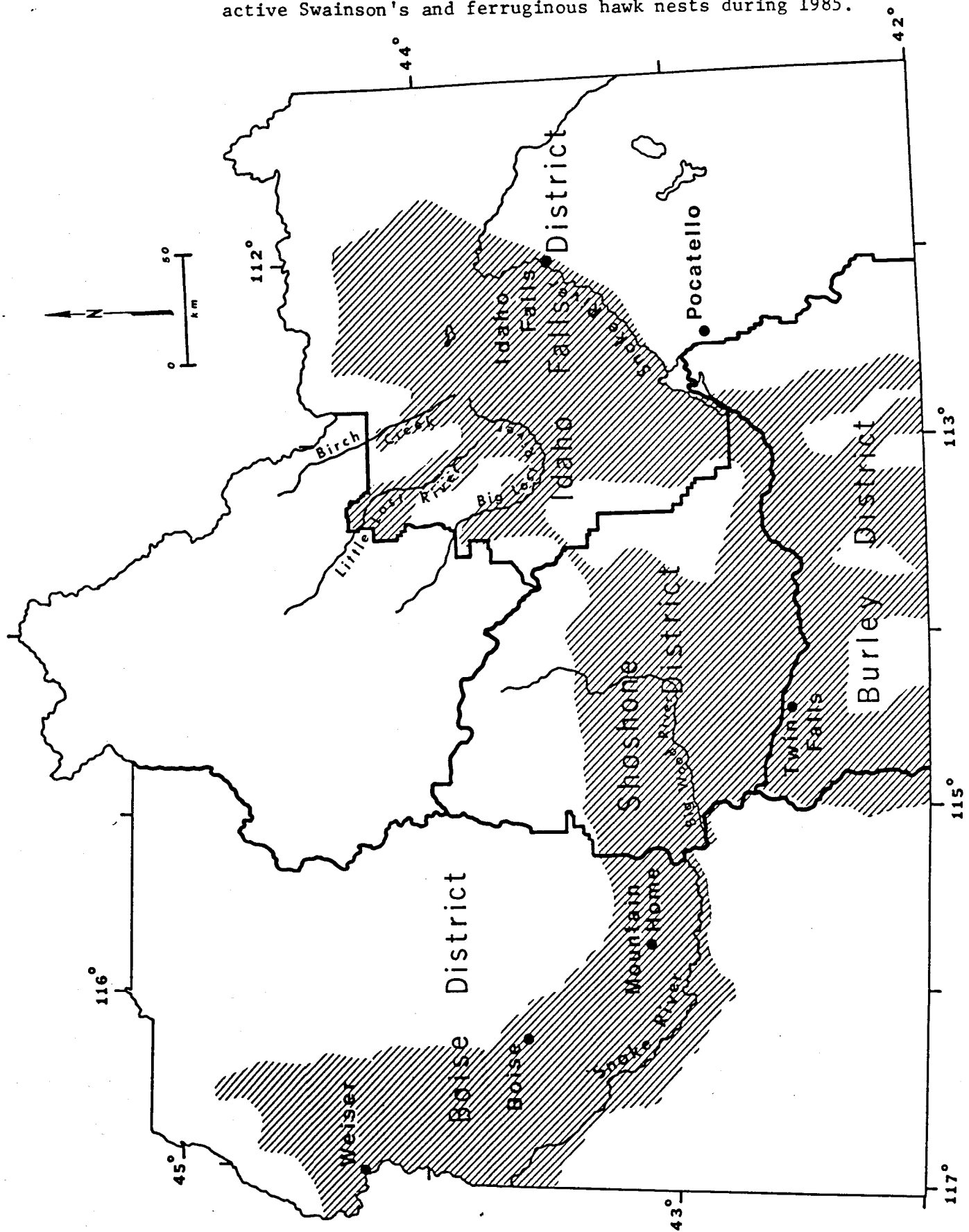
This study was undertaken to answer three questions concerning the status and future management of ferruginous and Swainson's hawks in Idaho. First, it answers the question concerning the locations where these hawks nested in presettlement time. Second, it compares the distribution of currently active nests with that of historical nests in an attempt to determine if population declines have occurred in the state of Idaho. Third, it established nesting platforms in areas of suitable but unused habitat to answer the question concerning the feasibility of using nest platforms to attract Swainson's and ferruginous hawks to unused habitats of the state.

STUDY AREA

The study area encompassed most of the Snake River Plain plus the northern extension of the Great Basin and Range Province in southcentral Idaho (Fig. 1). The Snake River Plain forms a shallow, crecentric valley about 75 miles wide extending across most of the southern portion of the state from east to west. It is drained by the Snake River which drops approximately 900 m in traversing the area. Most of the valley floor is covered with lacustroeoian materials but they are frequently interrupted by bare outcrops of basalt, and by-products of recent volcanism in the central region near the Craters of the Moon National Monument (Davis 1952). An interrupted series of small mountains, passing southward into Utah and Nevada, and westward into Oregon, establish the southern physiographic limit of the plain, at which point the Great Basin begins (Rhodenbaugh 1961). Since the plain and basin have essentially identical vegetation, the study area was extended to include the basin region of extreme, southcentral Idaho. Also, in the northeastern portion of the Snake River Plain, several mountains project southward in parallel ridges. They are interrupted by northward extensions of plain in valleys of Birch Creek, Little Lost River and Big Lost River. Due to physiographic and floral similarities of these valleys with the rest of the plain, they too were included in the study area.

All of the region is located within the Upper Sonoran life zone (Davis 1952). It is a zone characterized by an annual precipitation of 20 cm with hot, dry summers and mild, wet winters. Soils differ on the north and south sides of the Snake River. Predominant soil types to the north are shallow to deep, well-drained silts, silt loams, and silty clay loams formed by loess deposits. In contrast, soils south of the river consist mostly of

Figure 1. Areas surveyed (diagonal lines) in southern Idaho for active Swainson's and ferruginous hawk nests during 1985.



conglomerates of sand, gravel, and silt.

The Snake River Plain and valley floors which open on to it support a semi-desert type of vegetation characterized as shrub-steppe. Originally, the chief dominant of the flora on well-drained soils was big sagebrush (Artemisia tridentata), but there were also considerable amounts of A. tripartita, Purshia tridentata, Tetradymia canescens, and Eriogonum spp. Among the grasses, Agropyron spicatum appears to have been the most important single species although Poa sanbergei, Koeleria cristata, Stipa spp. Oryzopsis hymenoides, and others were rather abundant. In some areas, sagebrush was stunted by competition from Agropyron and individual bushes tended to be small in size and grew scattered in a dense herbaceous cover. At lower elevations, especially in central and western portions of the plain, there were extensive areas of saline soils. These areas supported plant communities dominated by greasewood (Sarcobatus vermiculatus), shadscale (Atriplex confertifolia), and winter fat (Cercocarpus lanata). Tree species such as Utah juniper (Juniperus osteosperma) and pinyon pine (Pinus edulis) grew on rocky hills and low mountains that project above the sagebrush plain throughout the southern and eastern regions. In the west, hackberry (Celtis douglasii) was found growing as isolated individuals on rocky outcrops immediately adjacent to the Snake River, and the banks of the numerous Snake River tributaries supported a fringe of willows (Salix spp.) and black cottonwoods (Populus deltoides).

Lands throughout the Snake River Plain are currently under both public and private ownership. Public lands are primarily used for livestock grazing and are administered by the BLM. Although range improvement projects and crested wheat grass (Agropyron desertorum) seedings have eliminated large amounts of sage habitat, much of the native vegetation still exists on publicly owned

land. Grazing has eliminated most of the grass understory, however, and the landscape is now covered by dense, monotypic stands of sagebrush beneath which few grasses other than cheat grass (Bromus tectorum) occur. Large areas of greasewood and shadscale habitat still can be found on saline soils, but they also have been reduced from presettlement time. Utah juniper continues to occur on hillsides throughout the south and east, but areas of riparian and lowland brush have largely been eliminated through stream clearing and irrigation projects. Today, creeks and rivers are largely devoid of native, riparian vegetation throughout the region. Privately owned land receives limited amounts of livestock grazing. It is mostly under cultivation with alfalfa, timothy and clover being the major crops raised south of the river, and potatoes, sugar beets, corn, grain and alfalfa raised north of the river.

METHODS

Historical Populations

Information on the historical distribution of Swainson's and ferruginous hawk nests was obtained from three sources. First, a literature survey was conducted of serials and monographs to obtain all available published data on the historical distribution of birds in Idaho. Serials searched included the Oologist, the Nidiologist, the Young Oologist, the Hawkeye Ornithologist and Oologist, the Journal of Comparative Oology, the Murrelet, the Condor, the Auk, and Northwest Science. Second, museums reporting to have specimens of birds from the state were contacted (Kiff 1979). Each was specifically requested for information on the locations and dates where any egg sets or skins of the Swainson's and ferruginous hawk in their collections were taken. Twenty museums were contacted including the National Museum of Natural History, the American Museum of Natural History, the Western Foundation of Vertebrate Zoology, the Burke Memorial Museum, the Puget Sound Museum of Natural History, the Conner Museum of Washington State University, Idaho State University, Brigham Young University, The Delaware Museum of Natural History, the Denver Museum of Natural History, the San Bernadino County Museum, the Museum of Comparative Zoology, the California Academy of Sciences, the Santa Barbara Museum of Natural Sciences, the Peabody Museum of Natural History, the Museum of Vertebrate Zoology, and the Carnegie Museum of Natural History. In addition, the American Museum of Natural History, the National Museum of Natural History, and the Philadelphia Academy of Natural Sciences were personally visited and archives of each were searched for information on hawk nest locations in Idaho. The field notes and correspondence of John Townsend were transcribed at the Philadelphia Academy of Natural Sciences and the

records and notes of Charles Bendire and C. Hart Merriam were read and summarized at the American and National Museums of Natural History.

The third source of data on nest locations was obtained through a survey of the records of the Idaho Department of Fish and Game, the Nature Conservancy and the BLM. These records provided data on nests observed during the last 15 years.

Current Populations

Much of the study area is currently administered by the Boise, Shoshone, Burley, and Idaho Falls districts of the BLM. To facilitate the census, each district was surveyed individually. The Shoshone, Burley, and Idaho Falls Districts were searched for periods of 10 days between 20 May and 3 July 1986. Because of its size, the Boise District was surveyed for the entire month of June. Searches were conducted on the ground in four-wheel drive vehicles both in habitats with a history of active nests and in habitats that the investigators and BLM biologists considered had a potential for supporting active nests. A nest was considered to be active if an adult, eggs, or young were observed in the nest, or if a completed nest cup, feathers, and droppings were found (Postupalsky 1974). In addition, when nests were located, the species of nest tree, the height of the nest above ground, and the dominant form of land use in the surrounding area were recorded.

Productivity of Nests

Nest productivity was determined for both species of hawks. Because ferruginous hawk nests were not observed during the initial stages of nesting, an estimate of brood size was obtained for this species. The Swainson's hawk nests later in the season so its nests were observed throughout the breeding season, from initiation to fledging. This enabled estimates of fledging per

active nest to be made for this species.

Nesting Platforms

Nesting platforms were constructed using a 2" x 4" pine frame measuring 3' x 3'. The bottom of the platform consisted of a 2" x 4" welded wire mesh attached to the pine frame. On the south side of the platform, two triangular pieces of pine plywood (24" high) were attached to provide a source of shade for nestlings. The platforms were nailed to used, 20 ft. utility poles using two 2" x 6" pine struts. Each pole was then buried a minimum of 45" in the ground, leaving the height of the nest platform at approximately 16'. Following erection, nesting materials were then placed in each platform and secured with wire.

RESULTS AND DISCUSSION

Historical Populations

The history of ornithology in Idaho starts with the pioneering explorations of Lewis and Clark (Burleigh 1972). The expedition crossed the northern part of the state in September 1805 and again in May and June 1806 on its return to the East. Meriweather Lewis has been variously credited with first collecting and describing the ruffed grouse (Bonasa umbellus), Franklin's grouse (Canachites canadensis), and the broad-tailed hummingbird (Selasphorus platycercus) while in Idaho (Cutright 1969, Cutright and Brodhead 1981), and with collecting the first specimens of the Clark's nutcracker (Nucifraga columbiana), Lewis' woodpecker (Asyndesmus lewis), and western tanager (Piranga ludovociana) while the expedition was camped at Kamiah (Bechard and Houston 1986). Throughout the journey, Lewis made entries in his journal pertaining to species of raptors the group encountered. For example, he noted a large number of bald eagles (Haliaeetus leucocephalus) at the mouth of the Yellowstone River in Montana and several California condors (Gymnogyps californicus) on the lower Columbia River. In Idaho, Lewis was alert to raptors and he reported first sighting the turkey vulture (Cathartes aura) and bald eagle in the state near Kamiah, Idaho (Thwaites 1904-05). Presumably, had he seen Swainson's or ferruginous hawks as well, he would have noted them in his list of new species since neither had yet been described for science.

Despite its early beginnings, there were actually few contributions furthering the development of ornithology in this state for the next 100 years. As a result, the avifauna of Idaho remained one of the least studied in the U.S. Observations on birds were not recorded again until 1834 when John Townsend was sent by the Philadelphia Academy of Natural Sciences to collect

natural history specimens west of the Rocky Mountains. He and Thomas Nuttall accompanied the John Wyeth expedition which was commissioned by the American Fur Trading Company to establish Fort Hall in southern Idaho (Young 1973). Townsend's journal contains several notations of interest including his mention of first seeing Lewis' woodpecker, Clark's nutcracker, and a large number of whooping cranes (Grus americana) and American white pelicans (Pelecanus erythrorhynchos) after entering Idaho via the Bear River Valley on 8 July 1834 (Jackson 1978). After establishing Fort Hall (named after Henry Hall, the senior member of the American Fur Trading Company), the expedition continued west across southern Idaho via Butte, Custer, and Blaine counties, ultimately following the Big Wood River to the Snake River. While Townsend made several entries in his notes referring to grizzly bears (Ursus arctos), buffalo (Bison bison), wolves (Canis lupus), and sage grouse (Centrocercus urophasianus) being abundant during this part of the journey, his notes are disappointingly vague concerning species of birds seen and locations where they were encountered. Like Lewis, Townsend made no mention in his journal of seeing hawks although we know from later entries about California condors eating dead salmon on the Columbia River that he must have been aware of these birds and he probably would have noted them if they had been seen while crossing the state.

Idaho was the destination of several fur trapping expeditions, including Hudson Bay Company expeditions led by John Work and Peter Skeen Ogdon (Haines 1971, Cline 1974), but naturalists did not revisit the state for nearly 40 years. The first raptor specimens were not collected for a museum until 1868. That year, a set of turkey vulture eggs was collected at the City of the Rocks, by Robert Ridgeway as he travelled across southern Idaho on the California Trail (Ridgeway 1901-1919). Three years later, the first of two museum

collectors began to take specimens and record observations on the birds of Idaho. The first was Charles Bendire. He was a captain in the U.S. Cavalry and his D Company was stationed at Fort Lapwai in northern Idaho during 1871. Bendire was not only an ardent ornithologist, he was also an avid oologist with a keen interest in collecting raptor eggs. His correspondence with Spencer Fullerton Baird of the Smithsonian Institution shows he was a perfectionist who prided himself with having "an egg collection unequalled by any in the U.S." While at Fort Lapwai, Bendire collected more than 50 sets of raptor eggs in the spring of 1871. The list of species is impressive and includes the northern goshawk (Accipiter gentilis), cooper's hawk (Accipiter cooperii), American kestrel (Falco sparverius), great gray owl (Strix nebulosa), burrowing owl (Speotyto cunicularia), long-eared owl (Asio otus), and short-eared owl (Asio flammeus). Bendire's journal shows that he also collected 13 sets of Swainson's hawk eggs that year from locations around the fort such as Cow Creek, Willow Creek, Coffee Pot Creek, Vincent's Canyon, Clearwater Canyon, Sweetwater Creek, and Craig's Mountain, documenting for the first time that this hawk nested in the state of Idaho (Fig. 2, Table 1). The nests he found were built in trees such as willows, cottonwoods, aspen, juniper, and hawthorne. The large number of sets taken that season indicates that the Swainson's hawk was then a fairly common nesting species in the area. Bendire was later stationed at Camp Harney in southeastern Oregon. In 1877, he crossed the southern part of Idaho to Montana in pursuit of the Nez Perce Indians. His journals contain notes on his experiences along the way but there is no mention made of any species of raptors seen. Nevertheless, he later described the Swainson's hawk to be "in sage and bunch grass districts of Nevada, Oregon, Washington, and Idaho" and that it was "especially abundant, outnumbering,

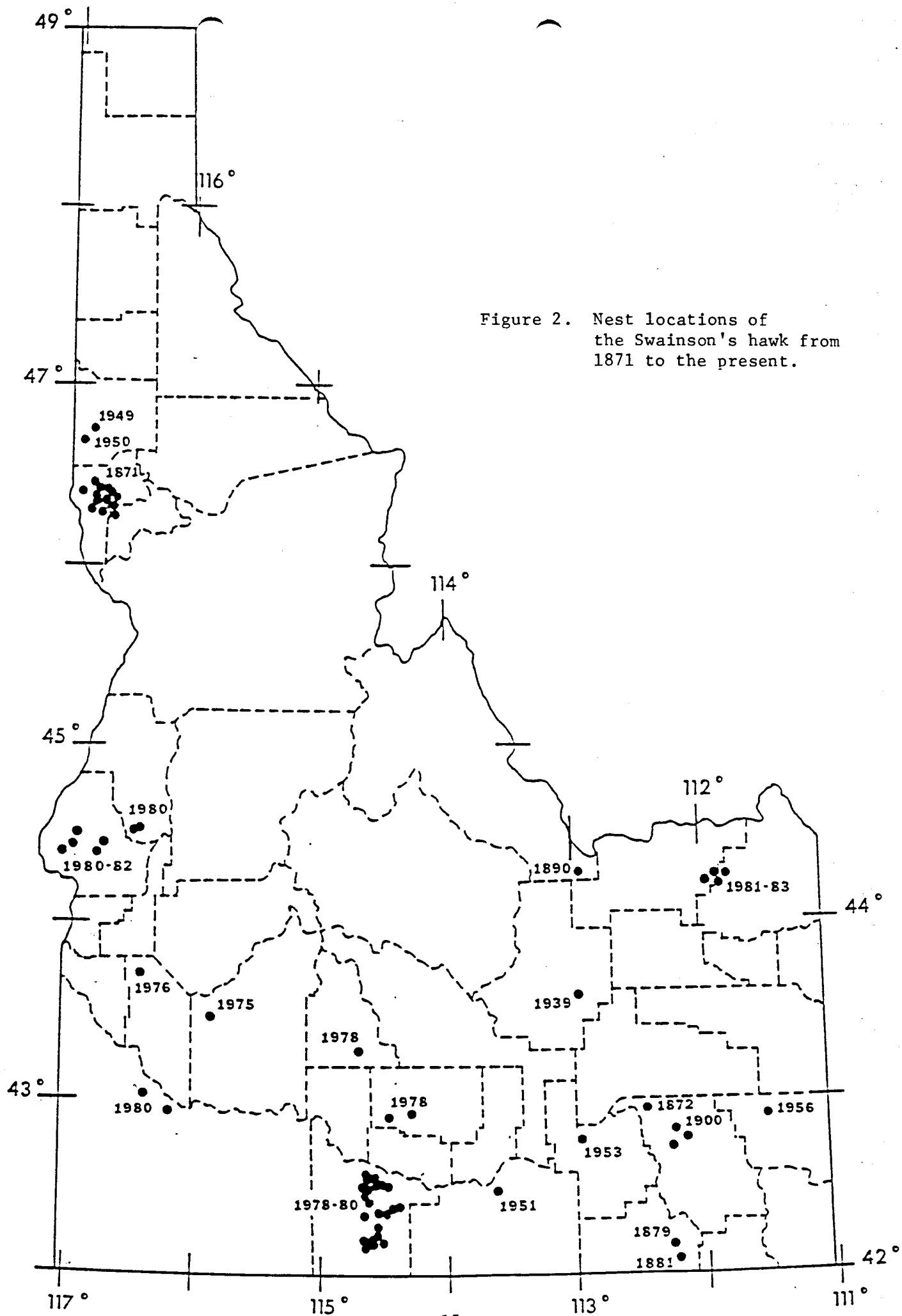


Table 1. Historical nest locations of the Swainson's hawk in Idaho.

TRS	DATE	COUNTY	TRS	DATE	COUNTY	
1(Bendire-13 nests)	1871	Nez Perce	51.	011S016E, S5	1979	Twin Falls
2. (Merriam)	1872	Bannock	52.	014S016E, S9	1979	Twin Falls
3. (unknown)	1879	Oneida	53.	014S017E, S20	1979	Twin Falls
4. (unknown)	1881	Oneida	54.	012S017E, S22	1979	Twin Falls
5. (Andrews)	1900	Bannock	55.	013S016E, S3	1979	Twin Falls
6. (Appleton)	1930	Butte	56.	011S016E, S22	1979	Twin Falls
7. (Johnson)	1949	Latah	57.	013N001W, S5	1980	Adams
8. (Burleigh)	1950	Latah	58.	014N001W, S31	1980	Adams
9. (Kenagy)	1952	Cassia	59.	013N001W, S6	1980	Adams
10. (Kenagy)	1953	Power	60.	014N001W, S27	1980	Adams
11. 005N002W, S18	1976	Canyon	61.	013N002W, S8	1980	Washington
12. 013N001W, S34	1977	Washington	62.	013N003W, S21	1980	Washington
13. 002N028E, S1	1978	Butte	63.	013N001W, S34	1980	Washington
14. 004N029E, S28	1978	Butte	64.	012N002W, S12	1980	Washington
15. 003N029E, S23	1978	Butte	65.	012N002W, S26	1980	Washington
16. 003N029E, S24	1978	Butte	66.	011N003W, S13	1980	Washington
17. 003N029E, S26	1978	Butte	67.	014N002W, S33	1980	Washington
18. 004N030E, S21	1978	Butte	68.	013N002W, S6	1980	Washington
19. 003N027E, S10	1978	Butte	69.	009N038E, S36	1981	Fremont
20. 006N029E, S16	1978	Butte	70.	013N004W, S29	1981	Washington
21. 006N030E, S35	1978	Butte	71.	009N038E, S36	1982	Fremont
22. 006N031E, S8	1978	Butte	72.	011N039E, S12	1982	Fremont
23. 005N029E, S12	1978	Butte	73.	011N040E, S27	1982	Fremont
24. 002S004E, S11	1978	Elmore	74.	011N039E, S12	1982	Fremont
25. 011S017E, S21	1978	Twin Falls	75.	011N040E, S27	1982	Fremont
26. 013S016E, S20	1978	Twin Falls	76.	012N004W, S5	1982	Washington
27. 013S016E, S27	1978	Twin Falls	77.	011N040E, S23	1983	Fremont
28. 012S016E, S9	1978	Twin Falls				
29. 013S016E, S5	1978	Twin Falls				
30. 011S016E, S19	1978	Twin Falls				
31. 012S016E, S36	1978	Twin Falls				
32. 012S016E, S12	1978	Twin Falls				
33. 011S016E, S33	1978	Twin Falls				
34. 011S016E, S23	1978	Twin Falls				
35. 011S016E, S27	1978	Twin Falls				
36. 012S017E, S30	1978	Twin Falls				
37. 011S016E, S4	1978	Twin Falls				
38. 012S016E, S35	1978	Twin Falls				
39. 012S017E, S21	1978	Twin Falls				
40. 013S016E, S10	1978	Twin Falls				
41. 013S016E, S16	1978	Twin Falls				
42. 012S016E, S34	1978	Twin Falls				
43. 011S016E, S16	1979	Twin Falls				
44. 012S016E, S4	1979	Twin Falls				
45. 011S017E, S34	1979	Twin Falls				
46. 012S017E, S30	1979	Twin Falls				
47. 013S016E, S15	1979	Twin Falls				
48. 013S016E, S17	1979	Twin Falls				
49. 011S016E, S27	1979	Twin Falls				
50. 012S016E, S35	1979	Twin Falls				

perhaps, all the other Raptors of these regions" (Bendire 1892). Following his retirement from the army in 1884, Bendire donated all of his egg collection to the Smithsonian Institution. Today, only six of the Swainson's hawk egg sets Bendire collected at Fort Lapwai are extant in the institution's National Museum of Natural History.

The second museum collector to visit the state during the 1800s was C. Hart Merriam. He travelled through Idaho in 1872 as a boy of sixteen with the Hayden Expedition which was exploring Wyoming. While stopped at Fort Hall, Merriam found a Swainson's hawk nest in a juniper tree near the fort and collected the eggs. They are also in the collection of the Smithsonian Institution. This egg set is noteworthy since it documented for the first time the Swainson's hawk as a breeding resident of the southern part of the state. Merriam returned to collect specimens in Idaho in 1890. This time, he headed an expedition sent by the Division of Ornithology and Mammalogy of the U.S. Department of Agriculture to do a biological reconnaissance of the Snake River Plain. It was part of a project to describe the fauna of the Columbia River Plateau. The group began its survey at Blackfoot and virtually retraced the route taken by John Townsend some 50 years earlier. Initially, they travelled northwest reaching the canyons of Birch Creek, Little Lost River, and Big Lost River. They subsequently followed the main course of the Big Wood River to Shoshone Falls. Merriam noted that the sage grouse was plentiful and "it furnished fresh meat for the greater part of the trip." (Merriam 1891). His observations on raptors indicate that turkey vultures, northern harriers (Circus cyaneus), and red-tailed hawks (Buteo jamaicensis) were common as they are now. At that time, an osprey (Pandion haliaetus) nested at Shoshone Falls occupying "the summit of a pinnacle of black basalt...close to the top of the

that Merriam did not see a single short-eared owl, a species quite common now, while on route from Blackfoot to Arco. He made no mention of sighting ferruginous hawks either but he did note the Swainson's hawk as "rather rare." Merriam failed to find a Swainson's hawk nest that year but he did observe two adults with a young bird in August on Birch Creek.

By the 1890s, oology had become quite popular in the U.S. The increasing demand for eggs, especially those of rarer, western species like raptors, led to the development of a thriving business in the wholesale trade of bird eggs. Evidently, few egg collectors actually came to Idaho to practice their hobby. Only two sets of hawk eggs were taken for oological collections in Idaho prior to 1900 and both were from Swainson's hawk nests. They were taken by an unknown collector who found the nests in Oneida County near Oneida Station in 1879 and 1881. One nest was in a tree and the other is one of the few records of a Swainson's hawk nesting on the side of the cliff. Both sets of eggs were sold to F.T. Pember, a banker in Granville, New York, who kept a personal collection of over 1000 sets of bird eggs. Today, they can be found in the collection of the American Museum of Natural History. Another oologist, H.C. Johnson from American Falls, Utah, obtained hawk eggs collected in Idaho in 1900. Johnson was also a banker who, like Pember, did very little collecting himself but bought his eggs from amateur collectors. In 1900, Ray Andrews came to Bannock County in search of hawk eggs for Johnson. On 28 April he found the first nest of the ferruginous hawk ever reported in Idaho (Fig. 3, Table 2). He documented the nest by collecting all four of the eggs in the clutch. Johnson unsuccessfully tried to sell them to such well known oologists as J. Parker Norris of Philadelphia, Pennsylvania, Edward Arnold of Battle Creek, Michigan, and H.W. Carriger of Oakland, California. The eggs were later

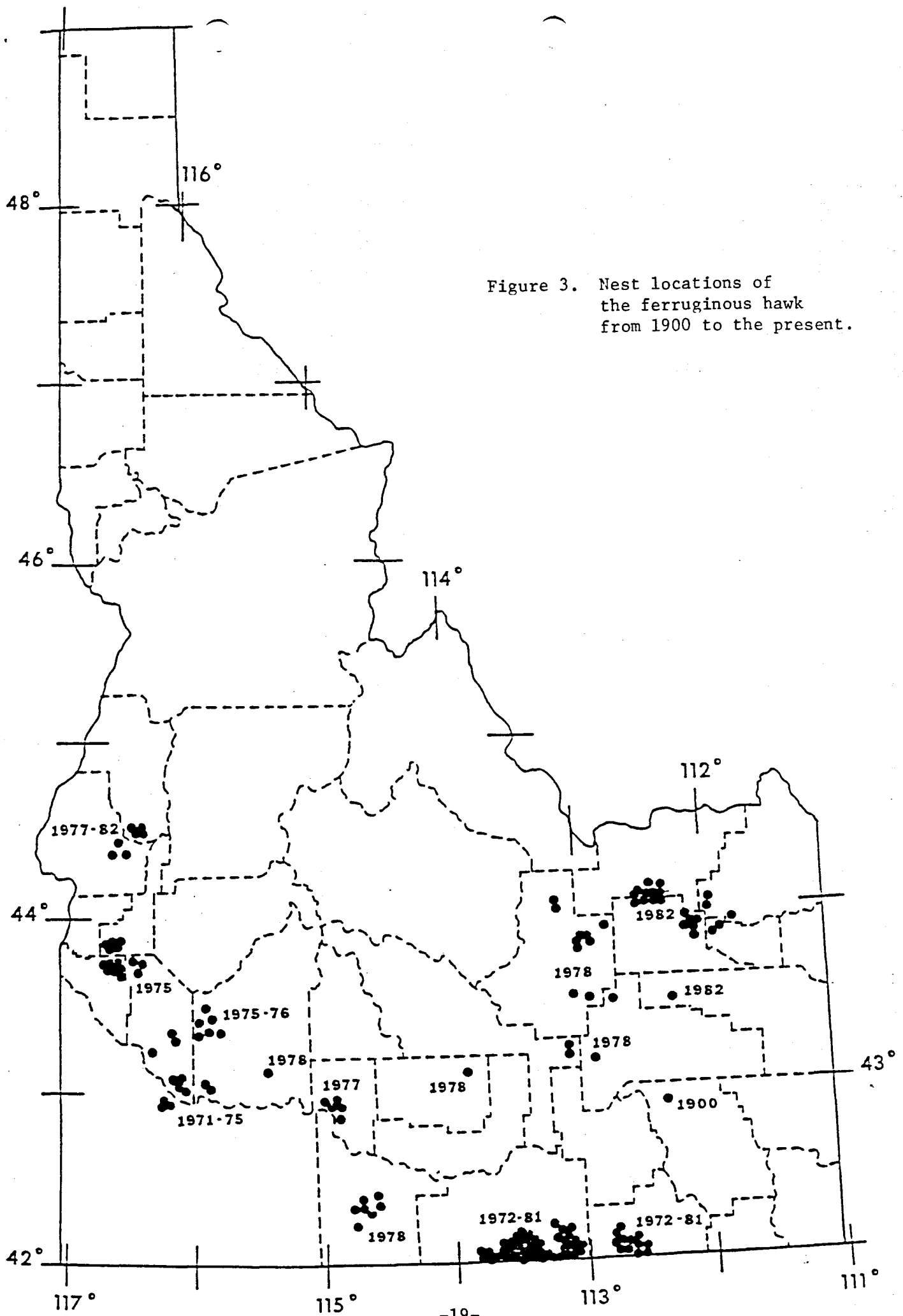


Table 2. Historical nest locations of the ferruginous hawk in Idaho.

TRS	DATE	COUNTY	TRS	DATE	COUNTY
1. (Andrews)	1900	Bannock	50. 016S033E, S19	1972	Oneida
2. 015S026E, S15	1972	Cassia	51. 015S032E, S32	1972	Oneida
3. 016S025E, S2	1972	Cassia	52. 016S032E, S8	1972	Oneida
4. 013S026E, S14	1972	Cassia	53. 016S032E, S18	1972	Oneida
5. 012S026E, S9	1972	Cassia	54. 016S030E, S12	1972	Oneida
6. 014S028E, S5	1972	Cassia	55. 016S030E, S15	1972	Oneida
7. 011S026E, S29	1972	Cassia	56. 016S030E, S4	1972	Oneida
8. 016S024E, S15	1972	Cassia	57. 016S031E, S22	1972	Oneida
9. 016S029E, S24	1972	Cassia	58. 015S030E, S26	1972	Oneida
10. 012S026E, S22	1972	Cassia	59. 016S030E, S9	1972	Oneida
11. 013S026E, S3	1972	Cassia	60. 015S030E, S19	1972	Oneida
12. 013S026E, S9	1972	Cassia	61. 005N001E, S19	1975	Ada
13. 013S026E, S16	1972	Cassia	62. 001S006E, S28	1975	Elmore
14. 013S026E, S29	1972	Cassia	63. 001N005E, S28	1976	Elmore
15. 014S026E, S10	1972	Cassia	64. 001S005E, S26	1976	Elmore
16. 015S026E, S4	1972	Cassia	65. 006N002W, S20	1976	Gem
17. 015S026E, S10	1972	Cassia	66. 006N002W, S29	1976	Gem
18. 015S026E, S10	1972	Cassia	67. 013N001W, S15	1977	Ada
19. 015S026E, S9	1972	Cassia	68. 002N004E, S25	1977	Elmore
20. 014S026E, S34	1972	Cassia	69. 002N032E, S18	1978	Bingham
21. 014S026E, S16	1972	Cassia	70. 002N031E, S36	1978	Bingham
22. 012S026E, S35	1972	Cassia	71. 002S028E, S28	1978	Blaine
23. 012S026E, S22	1972	Cassia	72. 002N035E, S3	1978	Bonneville
24. 016S024E, S25	1972	Cassia	73. 003N029E, S28	1978	Butte
25. 016S024E, S24	1972	Cassia	74. 003N029E, S33	1978	Butte
26. 016S024E, S13	1972	Cassia	75. 006N030E, S1	1978	Butte
27. 016S029E, S26	1972	Cassia	76. 006N030E, S2	1978	Butte
28. 015S028E, S8	1972	Cassia	77. 006N030E, S3	1978	Butte
29. 015S028E, S5	1972	Cassia	78. 006N030E, S35	1978	Butte
30. 015S028E, S32	1972	Cassia	79. 003S022E, S28	1978	Lincoln
31. 015S028E, S20	1972	Cassia	80. 012S016E, S19	1978	Twin Falls
32. 014S028E, S7	1972	Cassia	81. 012S016E, S5	1978	Twin Falls
33. 014S027E, S36	1972	Cassia	82. 012S016E, S27	1978	Twin Falls
34. 014S028E, S30	1972	Cassia	83. 013S016E, S5	1978	Twin Falls
35. 014S028E, S19	1972	Cassia	84. 012S016E, S36	1978	Twin Falls
36. 013S028E, S7	1972	Cassia	85. 012S016E, S32	1978	Twin Falls
37. 014S027E, S12	1972	Cassia	86. 001N003E, S9	1979	Ada
38. 014S028E, S31	1972	Cassia	87. 001N003E, S14	1979	Ada
39. 015S026E, S21	1972	Cassia	88. 003S030E, S13	1979	Bingham
40. 016S025E, S23	1972	Cassia	89. 009N027E, S29	1979	Butte
41. 015S026E, S28	1972	Cassia	90. 010N027E, S33	1979	Butte
42. 015S028E, S32	1972	Cassia	91. 012S016E, S34	1979	Twin Falls
43. 014S027E, S33	1972	Cassia	92. 013S016E, S16	1979	Twin Falls
44. 014S028E, S30	1972	Cassia	93. 003N002E, S20	1980	Ada
45. 016S025E, S26	1972	Cassia	94. 002S028E, S33	1980	Blaine
46. 014S026E, S12	1972	Cassia	95. 001S004E, S3	1980	Elmore
47. 015S026E, S14	1972	Cassia	96. 001S006E, S27	1980	Elmore
48. 015S026E, S17	1972	Cassia	97. 013N002W, S2	1980	Washington
49. 016S032E, S26	1972	Oneida	98. 010N035E, S8	1981	Clark

Table 2. Continued

	TRS	DATE	COUNTY
99.	009N035E, S28	1981	Clark
100.	009N035E, S32	1981	Clark
101.	009N035E, S30	1981	Clark
102.	009N034E, S36	1981	Clark
103.	010N039E, S32	1981	Fremont
104.	013N001W, S9	1982	Adams
105.	003N033E, S1	1982	Bingham
106.	009N034E, S24	1982	Clark
107.	009N035E, S28	1982	Clark
108.	009N034E, S11	1982	Clark
109.	009N035E, S31	1982	Clark
110.	010N035E, S23	1982	Clark
111.	005S006E, S33	1982	Elmore
112.	005S008E, S7	1982	Elmore
113.	005S008E, S5	1982	Elmore
114.	007N038E, S29	1982	Jefferson
115.	007N037E, S13	1982	Jefferson
116.	006N037E, S3	1982	Jefferson
117.	006N037E, S9	1982	Jefferson
118.	007N037E, S29	1982	Jefferson
119.	007N038E, S29	1982	Jefferson
120.	006S007E, S21	1982	Owyhee
121.	006S006E, S10	1982	Owyhee
121.	006S007E, S29	1982	Owyhee
122.	001N003E, S36	1983	Ada
123.	004S003E, S20	1983	Ada
124.	001N003E, S24	1983	Ada
125.	002S001E, S20	1983	Ada
126.	003S001E, S11	1983	Ada
127.	004S00E3, S21	1983	Elmore
128.	005S004E, S12	1983	Elmore
129.	001S005E, S8	1983	Elmore
130.	006N038E, S22	1983	Jefferson
131.	003S001E, S14	1984	Ada
132.	003S002E, S3	1984	Ada
133.	001N002E, S34	1984	Ada
134.	001N001E, S35	1984	Ada
135.	002S006E, S22	1984	Elmore
136.	003S008E, S32	1984	Elmore
137.	001S005E, S21	1984	Elmore
138.	001S004E, S1	1984	Elmore
139.	001N004E, S35	1984	Elmore

donated to the Denver Museum of Natural History where they can still be found. Ray Andrews also found three nests of the Swainson's hawk that year in Bannock county. These sets were also sold to Johnson and they can now be found in the collections of the American Museum of Natural History and the Museum of Comparative Zoology, Harvard University.

Only two Idahoans were ever avid oologists. Both were physicians and both seem to have been motivated to only compile representative, single set collections of species endemic to the state. Neither ever became wholesale dealers in eggs. Dr. Charles Moody lived in Sandpoint and his collecting was concentrated in the northern panhandle of the state. Moody specialized in collecting passerine eggs and he wrote articles on his collecting activities (Moody 1903, 1904). George Mitsch Sutton of the Carnegie Museum of Natural History in Pittsburgh, visited Moody in 1903 and together they collected passerine eggs in the Sandpoint area which are currently in the museum's collection. Neither Moody's collection nor his notes contain data indicating that he ever found Swainson's or ferruginous hawks nesting in the northern part of the state.

Dr. Fayre Kenagy lived in Rupert from 1906 to 1954. He appears to have been the more avid collector of the two, amassing a collection of several hundred sets of eggs. His collection was donated to the Thomas Burke Washington State Museum in Seattle. Included in it are two sets of Swainson's hawk eggs collected at Declo in 1952 and at American Falls in 1953, but there are no specimens of the ferruginous hawk. Kenagy travelled extensively in Minnedoka county and south into the Raft River Valley. His notes and collection give no indication about the abundance of either hawk in these areas of Idaho. He did, however, publish an account of changes in the avifauna near

Rupert that suggests both species were becoming less common as the area was developed for agriculture (Kenagy 1914).

Two other oologists took eggs in Idaho that have been incorporated into museums. J.S. Appleton of Simi, California came to the state in 1935 and 1939 and collected eggs near Blackfoot. In 1939, he found a nest of the Swainson's hawk between Blackfoot and Arco where Merriam had reported Swainson's hawks in 1890. Appleton later donated his collection to the San Bernadino County Museum and the set of Swainson's hawk eggs is still kept there. The second oologist was John Hurley of Yakima, Washington. Hurley collected passerine eggs in Bear Lake and Nez Perce counties in 1926 and 1959, but he apparently never collected a set of hawk eggs while in Idaho.

There was only one major skin collection ever made in the state. It was compiled by A.C. Twomey who was sent to Idaho in 1947 to collect bird skins for the Carnegie Museum of Natural History. Twomey travelled throughout the southwestern part of the state between June and October and collected 826 skins of 121 species including three skins of red-tailed hawks and 2 skins of great-horned owls (Bubo virginiana). He did not collect nor record seeing a single specimen of either the ferruginous or Swainson's hawk.

Neither oologist nor skin collectors ever took specimens in southeastern Idaho. Nevertheless, there have been reports documenting the breeding status of the Swainson's hawk in this part of the state since 1916. Rust (1917) reported the Swainson's hawk as a "common" species in his list of 103 birds found in Fremont county, and as late as 1951, Steel and Bizeau (1956) listed the Swainson's hawk as a "common resident" nesting in the vicinity of Gray's Lake. In northern Idaho, Swainson's hawk nests were also documented through published reports but this documentation was not forthcoming until the 1950s.

Johnson (1949) first reported a nest on Paradise Ridge near Moscow and Burleigh (1972) reported nests to be found in the 1950s near Moscow and Genesee. None of these reports made any mention that the ferruginous hawk was found nesting in either the northern or southeastern sections of the state.

The most significant step in documenting the distribution of hawk nests in the state occurred in the 1970s and early 1980s during which time the BLM undertook an inventory of raptors nesting in each of the four BLM districts of southern Idaho. In the Idaho Falls District, nests of both the Swainson's and ferruginous hawks were documented in Clark, Fremont, Madison, Jefferson, and Butte counties. Most of the nests located in Butte county were situated on the Idaho National Engineering Laboratory (INEL) site and they were found through independent surveys conducted at the facility. Sixty-seven ferruginous hawk and 22 Swainson's hawk nests were documented in the Burley District giving it one of the densest concentrations of ferruginous hawk nests in the state. Most of these nests were located in the Raft River, Black Pine, and Curlew Valleys and they were found through surveys conducted in conjunction with studies of the nesting ecology of the ferruginous hawk (Howard 1975, Thurow et al. 1980). The majority of Swainson's hawk nest records came from Twin Falls county as the result of a survey conducted by M. Todd, Idaho Department of Fish and Game, during 1978 and 1979. The Shoshone District was surveyed in 1977 and 1978. Only six active ferruginous hawk nests were located in the district and the Swainson's hawk was not included in the survey. Five of the ferruginous hawk nests were built in hackberry trees growing near the Snake River. Searches for hawk nests have been ongoing in the Boise District since 1971. Eighteen ferruginous hawk nests were first located in or adjacent to the Snake River Birds of Prey Natural Area (SRBPNA) between 1971 and 1975 and 13 nests were

first located in Ada, Gem and Boise counties between 1975 and 1982. A 1982 survey of the Weiser area revealed seven ferruginous hawk nests in Washington and Adams counties. Nine nests of the Swainson's hawk were documented through the survey of the Boise District. A few nests were recorded adjacent the SRBPNA but most were found in Ada, Elmore, Washington, and Adam counties during the searches conducted between 1975 and 1982.

Museum records and published accounts do not permit quantitative estimates of historical populations, however, they do give an idea of the distribution and relative abundance of species. Data obtained through this study indicate that the Swainson's hawk traditionally nested throughout the shrub-steppe and grassland regions of northern and southern Idaho. In the north, it was probably a common nester in Latah and Nez Perce counties where it nested in trees growing in riparian areas (Bendire 1892, Larrison et al. 1967, Burleigh 1972). In the Snake River Plain of southern Idaho, records indicate that the Swainson's hawk was widely distributed from Washington and Adam counties in the southwest, through Twin Falls and Oneida counties in the southcentral region, to Butte, Jefferson, and Bonneville counties in the southeast. Here also, it was most likely a rather common resident species building its nests in junipers growing on hillsides or in willows lining creeks and rivers such as the Raft River, the Weiser River, and Medicine Lodge Creek.

Other than reports as recent as 1982, we found only one historical museum specimen of a ferruginous hawk from Idaho. Neither Bendire (1892), Merriam (1891), nor any other early naturalist made a single reference to this species being a resident of the state. With such limited documentation, little can be said about this species' past distribution in the state. There is no record indicating that it has ever occurred in the northern part of the state

in locations such as Latah or Nez Perce counties. Since the early 1970s it has been found widely distributed across the Snake River Plain and Great Basin regions of southern Idaho. The ferruginous hawk may have had a similar distribution in historical time, but it was apparently overlooked by early ornithologists because it was a rather rare species and was never found in riparian areas where the first surveys were concentrated.

Current Populations

The survey conducted in 1985 resulted in identification of 109 and 72 nest locations of Swainson's and ferruginous hawks, respectively (Table 3 and 4). In the Idaho Falls District of the BLM, 27 Swainson's hawk nests were found (Fig. 4). They were situated primarily in and around riparian areas of Clark, Jefferson, Butte, and Madison counties, such as Mud Lake National Wildlife Refuge, Medicine Lodge Creek, Birch Creek, and the Little Lost River. Eleven of these nests were built in cottonwoods, 10 were built in willows, and the remainder were built in juniper, aspen (Populus tremuloides) and box elder (Acer negundo) trees. Five nests were situated near the boundary between BLM and privately owned land, in lone trees growing on the private side of the boundary line, but most were built in lone trees completely surrounded by private land that was being used for farming. The most common type of habitat in these areas was hayfields planted primarily with alfalfa. Eighteen active nests of the ferruginous hawk were also found in Fremont, Jefferson, Clark, Butte, Madison, Bonneville, and Bingham counties. Except for one nest on private land, they were situated either completely on or at the border of BLM land, and they were built in juniper trees growing at the ecotone between sagebrush and juniper habitats. The densest concentration of ferruginous hawk nests occurred near Cedar Butte in Clark County and on the INEL site in Butte county, with the latter area supporting five active nests.

With 41 active Swainson's hawk nests and 16 active ferruginous hawk nests, the Burley District of the BLM contained one of the densest concentration of hawk nests in southern Idaho (Fig. 5). Swainson's hawks nested most frequently in cottonwoods but they also used junipers, black locusts (Robinia pseudoacacia), willows, box elders, and Russian olives (Elaeagnus angustifolia)

Table 3. Nest locations of the Swainson's hawk in southern Idaho during 1985.

TRS	1/4 SECTION	SUBSTRATE	DATE OBSERVED	LAND OWNER	
<u>BURLEY DISTRICT</u>					
1.	011S017E, S34	NW4NW4	COTTONWOOD	4 JUNE 1985	PRIV/BLM
2.	011S017E, S22	NW4SW4	BLACK LOCUST	4 JUNE 1985	PRIVATE
3.	012S017E, S21	SW4NW4	COTTONWOOD	4 JUNE 1985	PRIV/BLM
4.	012S017E, S19	SW4SW4	BLACK LOCUST	4 JUNE 1985	PRIVATE
5.	012S017E, S30	NE4SW4	COTTONWOOD	4 JUNE 1985	PRIVATE
6.	012S016E, S36	NE4NW4	RUSSIAN OLIVE	4 JUNE 1985	PRIVATE
7.	012S016E, S35	NE4SW4	COTTONWOOD	4 JUNE 1985	PRIVATE
8.	011S016E, S33	SE4SW4	COTTONWOOD	4 JUNE 1985	PRIVATE
9.	011S016E, S27	SE4SW4	COTTONWOOD	4 JUNE 1985	PRIVATE
10.	011S016E, S22	SE4SW4	COTTONWOOD	4 JUNE 1985	PRIV/BLM
11.	011S018E, S30	NW4NE4	COTTONWOOD	6 JUNE 1985	PRIV/BLM
12.	011S017E, S17	NE4NW4	COTTONWOOD	6 JUNE 1985	PRIVATE
13.	011S016E, S14	NE4NW4	BOX ELDER	6 JUNE 1985	PRIVATE
14.	011S016E, S19	SW4SE4	COTTONWOOD	6 JUNE 1985	PRIV/BLM
15.	011S016E, S23	SE4SW4	COTTONWOOD	6 JUNE 1985	PRIVATE
16.	011S016E, S21	NW4NW4	BOX ELDER	6 JUNE 1985	PRIVATE
17.	012S016E, S28	SW4NW4	BOX ELDER	6 JUNE 1985	PRIVATE
18.	013S016E, S5	NE4NW4	COTTONWOOD	6 JUNE 1985	PRIVATE
19.	013S016E, S5	SW4SW4	BOX ELDER	6 JUNE 1985	PRIVATE
20.	013S016E, S10	NW4NE4	COTTONWOOD	6 JUNE 1985	PRIVATE
21.	013S016E, S16	SW4NE4	COTTONWOOD	6 JUNE 1985	PRIVATE
22.	013S016E, S20	SE4NE4	WILLOW	6 JUNE 1985	PRIV/BLM
23.	014S016E, S8	SE4NE4	BLACK LOCUST	6 JUNE 1985	PRIV/BLM
24.	014S017E, S7	SW4NW4	WILLOW	6 JUNE 1985	PRIVATE
25.	012S016E, S12	SE4SE4	COTTONWOOD	6 JUNE 1985	PRIV/BLM
26.	012S017E, S22	SW4NE4	COTTONWOOD	6 JUNE 1985	PRIV/BLM
27.	013S016E, S6	SE4SW4	BLACK LOCUST	21 JUNE 1985	PRIVATE
28.	014S016E, S7	SW4SW4	BOX ELDER	21 JUNE 1985	BLM
29.	014S015E, S11	SW4SE4	BLACK LOCUST	21 JUNE 1985	PRIVATE
30.	014S016E, S7	SE4SE4	BOX ELDER	21 JUNE 1985	PRIV/BLM
31.	015S026E, S10	SE4NW4	JUNIPER	17 JUNE 1985	PRIV/BLM
32.	015S026E, S14	NW4NW4	JUNIPER	17 JUNE 1985	BLM
33.	015S026E, S16	NW4NE4	JUNIPER	17 JUNE 1985	STATE
34.	015S026E, S16	NW4SE4	JUNIPER	17 JUNE 1985	BLM
35.	012S025E, S16	NW4NE4	BOX ELDER	20 JUNE 1985	PRIVATE
36.	012S025E, S21	NE4NE4	BOX ELDER	20 JUNE 1985	PRIVATE
37.	016S024E, S24	NE4NE4	JUNIPER	20 JUNE 1985	PRIV/BLM
38.	015S032E, S34	NE4SW4	WILLOW	19 JUNE 1985	PRIV/BLM
39.	016S032E, S17	SW4NE4	WILLOW	19 JUNE 1985	PRIV/BLM
40.	016S032E, S20	SW4SE4	COTTONWOOD	19 JUNE 1985	PRIV/BLM
41.	015S030E, S11	NE4SE4	JUNIPER	5 JUNE 1985	BLM
<u>IDAHO FALLS DISTRICT</u>					
42.	006N029E, S20	SE4NW4	COTTONWOOD	25 JUNE 1985	PRIVATE
43.	006N029E, S20	NW4SE4	COTTONWOOD	25 JUNE 1985	PRIVATE

Table 3. Continued

	TRS	1/4 SECTION	SUBSTRATE	DATE OBSERVED	LAND OWNER
44.	006N029E, S20	SE4SE4	COTTONWOOD	25 JUNE 1985	PRIVATE
45.	009N027E, S34	NW4SE4	COTTONWOOD	25 JUNE 1985	PRIVATE
46.	006N039E, S17	NW4SW4	ASPEN	1 JULY 1985	PRIV/BLM
47.	008N034E, S19	SE4SE4	COTTONWOOD	2 JULY 1985	PRIVATE
48.	010N035E, S30	NW4SE4	WILLOW	2 JULY 1985	PRIV/BLM
49.	010N035E, S8	NE4SW4	BOX ELDER	3 JULY 1985	PRIVATE
50.	011N035E, S31	SW4SE4	BOX ELDER	3 JULY 1985	PRIVATE
51.	011N034E, S12	SW4NW4	BOX ELDER	3 JULY 1985	PRIVATE
52.	010N035E, S31	NE4SW4	WILLOW	3 JULY 1985	PRIV/BLM
53.	009N035E, S18	NE4SW4	JUNIPER	3 JULY 1985	PRIV/BLM
54.	008N036E, S15	SE4SW4	BOX ELDER	3 JULY 1985	PRIVATE
55.	008N031E, S31	SW4SW4	COTTONWOOD	27 JUNE 1985	BLM (INEL)
56.	008N030E, S25	NW4SW4	COTTONWOOD	27 JUNE 1985	BLM (INEL)
57.	006N035E, S2	SE4NW4	WILLOW	28 JUNE 1985	PRIVATE
58.	007N035E, S36	NW4NW4	WILLOW	28 JUNE 1985	PRIVATE
59.	007N036E, S10	NW4NE4	COTTONWOOD	28 JUNE 1985	PRIVATE
60.	007N036E, S9	NW4SE4	COTTONWOOD	28 JUNE 1985	CAMAS NWR
61.	007N036E, S4	SW4SE4	COTTONWOOD	28 JUNE 1985	CAMAS NWR
62.	007N034E, S22	NW4SW4	WILLOW	28 JUNE 1985	MUD LAKE WMA
63.	007N034E, S27	SW4SE4	WILLOW	28 JUNE 1985	MUD LAKE WMA
64.	007N035E, S28	SE3SW3	WILLOW	28 JUNE 1985	MUD LAKE WMA
65.	005N036E, S22	NE4NE4	WILLOW	28 JUNE 1985	PRIVATE
66.	005N036E, S22	SW4SE4	WILLOW	28 JUNE 1985	PRIVATE
67.	005N036E, S25	SW4NW4	WILLOW	28 JUNE 1985	PRIVATE
68.	008N036E, S28	NW4NE4	COTTONWOOD	2 JULY 1985	PRIV/BLM/CAMAS NWR

SHOSHONE DISTRICT

69.	005S016E, S28	NW4SW4	COTTONWOOD	21 MAY 1985	PRIVATE
70.	002S014E, S1	NW4NE4	COTTONWOOD	22 MAY 1985	PRIVATE
71.	001S014E, S35	SE4SE4	COTTONWOOD	22 MAY 1985	PRIVATE
72.	002S013E, S21	SW4NE4	ASPEN	22 MAY 1985	PRIV/BLM
73.	001S018E, S14	SE4SW4	COTTONWOOD	22 MAY 1985	PRIVATE
74.	001S018E, S14	NE4NE4	LOMBARDY POPLAR	23 MAY 1985	PRIVATE
75.	001N019E, S21	SW4SW4	COTTONWOOD	23 MAY 1985	PRIV/BLM
76.	006S018E, S17	NW4SE4	COTTONWOOD	24 MAY 1985	PRIV/BLM
77.	008S019E, S4	NE4SE4	BOX ELDER	24 MAY 1985	BLM
78.	001N015E, S30	NE4SE4	COTTONWOOD	27 MAY 1985	PRIVATE
79.	004S020E, S6	NE4SW4	COTTONWOOD	31 MAY 1985	PRIVATE
80.	003S019E, S23	SE4SW4	COTTONWOOD	31 MAY 1985	PRIVATE
81.	004S019E, S14	NE4NE4	COTTONWOOD	31 MAY 1985	PRIVATE
82.	004S019E, S14	NW4NW4	COTTONWOOD	31 MAY 1985	PRIVATE
83.	004S019E, S6	SE4SE4	BLACK LOCUST	31 MAY 1985	PRIVATE
84.	007S016E, S35	NW4SE4	COTTONWOOD	28 MAY 1985	PRIVATE
85.	008S018E, S8	SE4SE4	COTTONWOOD	28 MAY 1985	PRIV/BLM
86.	008S025E, S35	SW4SW4	BLACK LOCUST	30 MAY 1985	BLM
87.	008S028E, S20	SE4SW4	JUNIPER	30 MAY 1985	BLM

Table 3. Continued

TRS	1/4 SECTION	SUBSTRATE	DATE OBSERVED	LAND OWNER	
<u>BOISE DISTRICT</u>					
88.	001N001W, S14	SE4NE4	COTTONWOOD	28 MAY 1985	PRIV/BLM
89.	005N002W, S26	SE4NE4	COTTONWOOD	30 MAY 1985	PRIVATE
90.	012N005W, S34	NE4SE4	WILLOW	4 JUNE 1985	PRIVATE
91.	013N005W, S24	SE4SE4	COTTONWOOD	5 JUNE 1985	PRIVATE
92.	013N001W, S9	NE4NW4	COTTONWOOD	5 JUNE 1985	PRIVATE
93.	007N004W, S33	NE4SW4	COTTONWOOD	4 JUNE 1985	PRIV/BLM
94.	002N001E, S34	SW4SE4	COTTONWOOD	5 JUNE 1985	PRIV/BLM
95.	013N002W, S11	NW4SW4	WILLOW	6 JUNE 1985	PRIVATE
96.	011N003W, S13	NW4NE4	<u>PERSIA</u>	10 JUNE 1985	PRIVATE
97.	012N002W, S11	SE4SE4	HAWTHORNE	10 JUNE 1985	PRIVATE
98.	001N005E, S33	NW4NW4	BLACK LOCUST	11 JUNE 1985	PRIVATE
99.	013N003W, S10	NE4NE4	WILLOW	13 JUNE 1985	PRIVATE
100.	014N001W, S31	NE4NE4	WILLOW	13 JUNE 1985	PRIVATE
101.	001N005E, S17	SE4SE4	BLACK LOCUST	17 JUNE 1985	PRIVATE
102.	002N003E, S33	SE4SE4	BOX ELDER	20 JUNE 1985	PRIVATE
103.	002N003E, S31	SE4SE4	WILLOW	20 JUNE 1985	PRIV/BLM
104.	002N002E, S31	SE4SW4	COTTONWOOD	20 JUNE 1985	PRIVATE
105.	010N004W, S11	SE4NW4	WILLOW	23 JULY 1985	PRIVATE
106.	013N003W, S2	NW4SE4	WILLOW	23 JULY 1985	PRIVATE
107.	005S003E, S7	NE4NW4	COTTONWOOD	21 JULY 1985	PRIVATE
108.	005N001W, S19	NE4NW4	LOMBARDY POPLAR	25 JULY 1985	PRIVATE
109.	002N005W, S4	SW4NW4	WILLOW	25 JULY 1985	PRIVATE

Table 4. Nest locations of the ferruginous hawk in southern Idaho during 1985.

TRS	1/4 SECTION	# YOUNG	SUBSTRATE	DATE OBSERVED	LAND OWNER
<u>SHOSHONE DISTRICT</u>					
1. 003S022E, S28	SW4SE4	unk	CLIFF	21 MAY 1985	BLM
<u>BURLEY DISTRICT</u>					
2. 012S016E, S32	NE4NE4	4	BOX ELDER	6 JUNE 1985	PRIVATE
3. 013S016E, S5	NW4SW4	4	BOX ELDER	6 JUNE 1985	PRIVATE
4. 014S015E, S12	NW4SW4	2	COTTONWOOD	6 JUNE 1985	PRIV/BLM
5. 012S026E, S23	NE4SW4	3	RUSS. OLIVE	21 JUNE 1985	PRIV/BLM
6. 014S026E, S2	SE4SE4	2	JUNIPER	17 JUNE 1985	PRIV/BLM
7. 015S027E, S1	NE4NW4	3	JUNIPER	18 JUNE 1985	PRIVATE
8. 011S024E, S23	SE4SW4	3	JUNIPER	20 JUNE 1985	PRIV/BLM
9. 016S025E, S18	SW4SW4	3	JUNIPER	20 JUNE 1985	PRIV/BLM
10. 016S033E, S19	NW4SE4	3	JUNIPER	19 JUNE 1985	BLM
11. 016S024E, S15	SE4NW4	3	JUNIPER	20 JUNE 1985	PRIV/BLM
12. 015S026E, S10	SW4SE4	3	JUNIPER	17 JUNE 1985	PRIV/BLM
13. 014S028E, S5	SW4NW4	2	JUNIPER	18 JUNE 1985	PRIVATE
14. 015S026E, S15	SW4NE4	2	JUNIPER	17 JUNE 1985	BLM
15. 015S032E, S32	SE4NW4	3	JUNIPER	19 JUNE 1985	BLM
16. 016S032E, S18	SW4NE4	3	JUNIPER	19 JUNE 1985	BLM
17. 016S030E, S12	NW4SW4	3	JUNIPER	7 JUNE 1985	BLM
<u>IDAHO FALLS DISTRICT</u>					
18. 004N029E, S19	SE4NW4	1	JUNIPER	25 JUNE 1985	BLM
19. 007N028E, S11	NW4SE4	3	POWERPOLE	25 JUNE 1985	BLM
20. 007N028E, S22	SW4SW4	unk	GROUND	25 JUNE 1985	BLM
21. 006N030E, S34	SE4NE4	4	JUNIPER	25 JUNE 1985	BLM (INEL)
22. 006N030E, S26	SE4SW4	4	JUNIPER	25 JUNE 1985	BLM (INEL)
23. 006N030E, S25	NW4NE4	4	JUNIPER	25 JUNE 1985	BLM (INEL)
24. 006N030E, S13	NE4SW4	3	JUNIPER	25 JUNE 1985	BLM (INEL)
25. 003N034E, S25	NW4SE4	4	JUNIPER	26 JUNE 1985	PRIVATE
26. 003S030E, S26	NE4NE4	3	JUNIPER	26 JUNE 1985	BLM
27. 007N031E, S5	SE4SE4	1	JUNIPER	27 JUNE 1985	BLM
28. 007N038E, S14	SW4SE4	1	JUNIPER	1 JULY 1985	BLM
29. 007N038E, S19	SE4SE4	2	JUNIPER	1 JULY 1985	BLM
30. 006N038E, S22	NE4NW4	1	JUNIPER	1 JULY 1985	BLM
31. 006N036E, S15	NW4NE4	4	JUNIPER	2 JULY 1985	BLM
32. 008N035E, S1	SW4SW4	2	JUNIPER	2 JULY 1985	BLM
33. 003N029E, S28	NE4SW4	4	JUNIPER	26 JUNE 1985	BLM (INEL)
34. 010N033E, S28	SW4SE4	3	JUNIPER	3 JULY 1985	PRIV/BLM
35. 009N035E, S18	SE4SW4	1	JUNIPER	3 JULY 1985	PRIV/BLM
<u>BOISE DISTRICT</u>					
36. 001N005E, S32	SW4NE4	unk	BLACK LOCUST	1985	PRIV/BLM
37. 001S004E, S1	NW4NE4	unk	POWERLINE	1985	PRIV/BLM
38. 005N001W, S24	NE4SW4	3	GROUND	1985	PRIV/BLM

unk - unknown

Table 4. Continued

TRS	NAME OF NEST
<u>BIRDS OF PREY NATURAL AREA</u>	
39. 003S001E, S24	HENDERSON BASIN NEST
40. 003S001E, S23	HENDERSON DRAW NEST
41. 003S001E, S15	MASSACRE DRAW NEST
42. 003S001E, S23	NAHAS RANCH NEST
43. 003S001E, S34	WILDHORSE NEST
44. 003S001E, S15	TOM DRAW NEST
45. 003S001E, S25	HENDERSON BASIN RED CLIFF NEST
46. 003S002E, S28	CABIN PLATFORM NEST
47. 004S003E, S20	BEERCASE NEST
48. 003S002E, S32	UPPER BIGFOOT NEST
49. 004S003E, S23	BLACK BUTTE NEST
50. 004S003E, S19	CSJ NEST
51. 004S002E, S15	JACKASS BUTTE NEST
52. 004S002E, S33	POWERLINE NEST
53. 005S005E, S22	BIG CLIFF NEST
54. 006S005E, S35	HOT SPRINGS CREEK RD NEST
55. 001N003E, S9	BRYANS RUN NEST
56. 001N003E, S24	INDIAN CREEK NEST
57. 001N003E, S14	SLATERS FLAT NEST
58. 002S001W, S8	CON SHEA NEST
59. 001S001E, S31	TRIANGLE CORNER NEST
60. 003S005E, S4	CRATER RINGS NEST
61. 003S005E, S10	AFB POWERLINE 134 NEST
62. 003S005E, S16	AFB POWERLINE 113 NEST
63. 005S004E, S11	STRIKE CABIN RD NEST
64. 004S004E, S32	STRIKE DAM ROAD NEST
65. 003S004E, S35	AFB POWERLINE 76 NEST
66. 003S005E, S30	AFB POWERLINE 87 NEST
67. 005S008E, S7	MM 106 NEST
68. 004S003E, S26	SPRING DRAW NEST
69. 003S001E, S31	NAHAS CORRAL NEST
70. 001S004E, S2	SIMCO RR NEST
71. 001S005E, S9	SOLES REST CREEK NEST
72. 007S003E, S10	HALFWAY GULCH

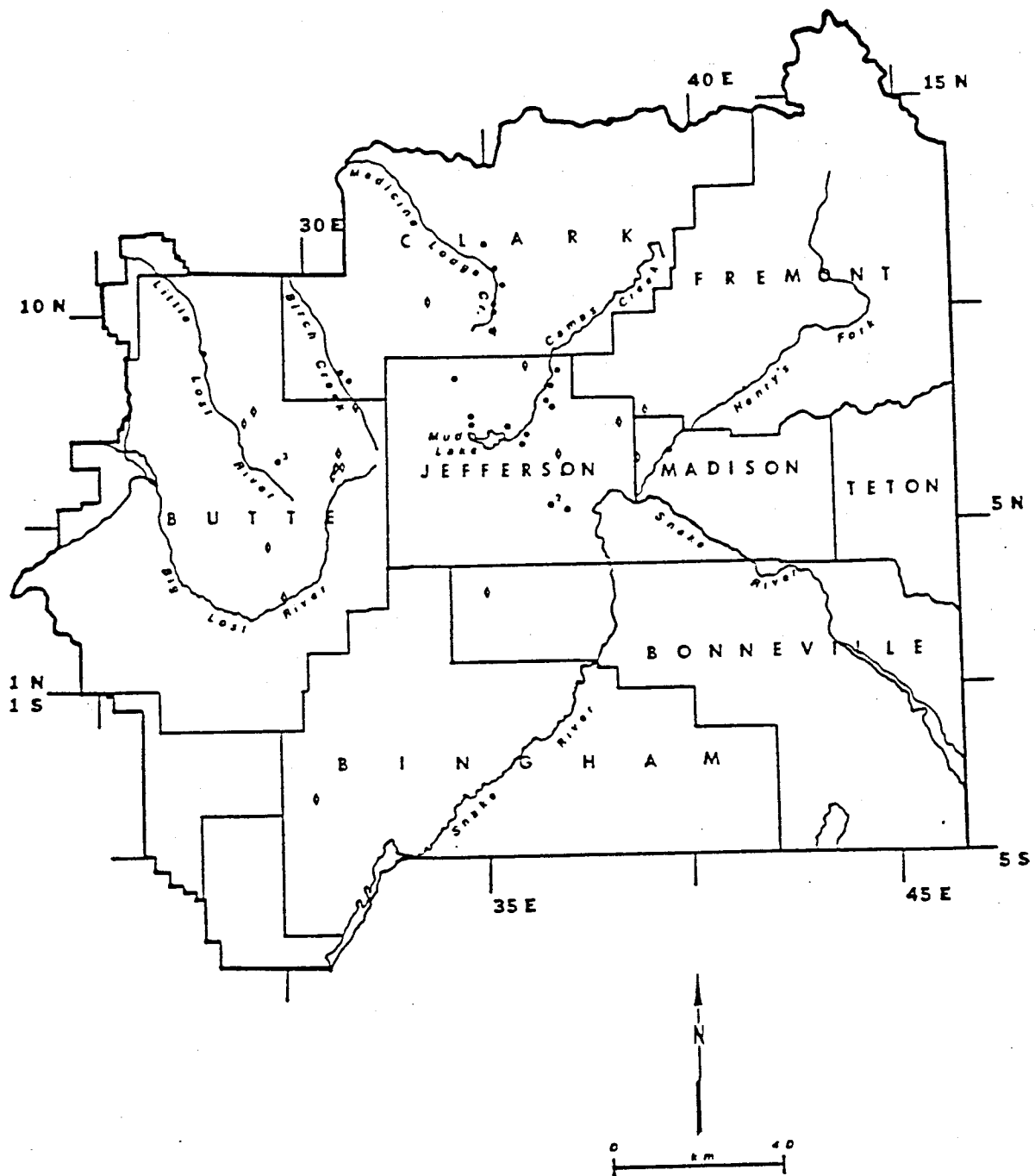


Figure 4. Nest locations of the Swainson's hawk (solid dots) and ferruginous hawk (open diamonds) in the Idaho Falls District of the BLM. When more than one nest occurred in a TRS (township-range-section), the number of nests is indicated in superscript.

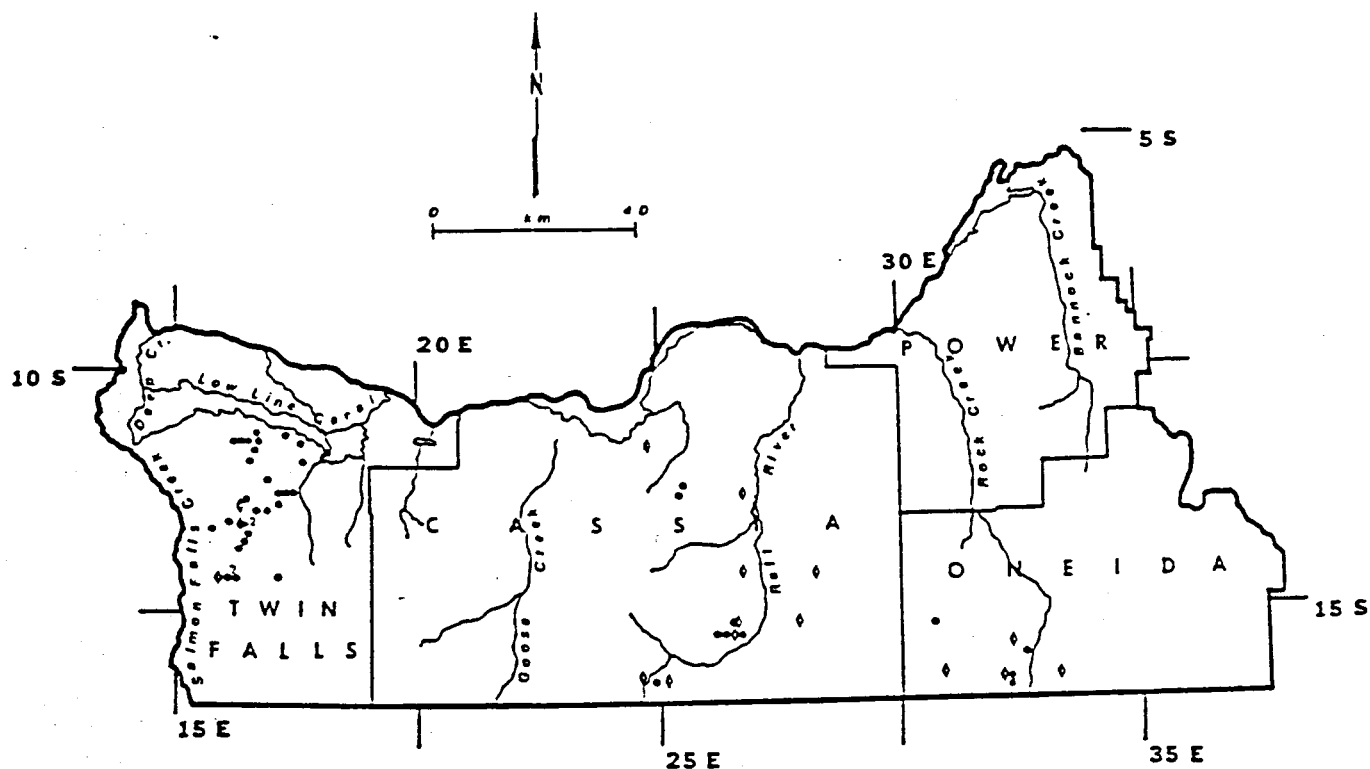


Figure 5. Nest locations of the Swainson's hawk (solid dots) and ferruginous hawk (open diamonds) in the Burley District of the BLM. When more than one nest occurred in a TRS (township-range-section), the number of nests is indicated in superscript.

growing along creeks and irrigation ditches on private land that was being farmed for hay production. Fifteen nests were situated in trees at the border between BLM and privately owned lands, four nests were situated completely on BLM land, and one nest was located on state owned land. Only 10 nests of the Swainson's hawk occurred in Oneida and Cassia counties and the remainder were situated in the heavily farmed country of Twin Falls county, south of the city of Twin Falls. Ferruginous hawk nests were also found in these locations but they were more common in the former two counties, in areas such as Raft River, Black Pine, and Curlew Valleys. Except for one nest built in a Russian olive, all of the ferruginous hawk nests were built in juniper trees that were situated either completely on BLM land or at the boundary between lands under federal and private ownership. Nest trees most frequently occurred as isolated individuals that grew at the ecotone between sage and juniper habitats and the land there was used primarily for livestock grazing. Five nests of the ferruginous hawk also occurred in Twin Falls county near the town of Hollister. The nests there were somewhat different in that they were built in box elders and cottonwoods growing either on private land or at the border between federal and private lands. The habitat surrounding these nests was similar to that already described for the Swainson's hawk with the major type of habitat also being hayfields.

The Shoshone District of the BLM had the fewest active hawk nests. Only one active ferruginous hawk nest was found in the entire district (Fig. 6). It was a ground nest built on a small rock outcrop at the northeast corner of Sand Butte in Lincoln county. The nest was situated entirely on BLM land and was surrounded by sage habitat being grazed by livestock. Nineteen active Swainson's hawk nests were located in the district in Camas, Blaine, Jerome,

and Minidoka counties. These nests occurred mostly in irrigated farmland where cottonwoods grew either on privately owned land that was completely surrounded by hayfields or at the border of private and federal land. In the latter case, the major form of habitat was also hayfields but some of this land was also uncultivated and grazed by livestock. The dominant cover type in adjacent BLM land was sagebrush.

Swainson's and ferruginous hawk nests in the Boise District of the BLM numbered 22 and 35 nests, respectively (Fig. 7). One nest of the Swainson's hawk was found in the small portion of Owyhee county that was included in this survey. It was on private land and was built in a cottonwood tree growing in a livestock corral along an irrigation canal, just west of the town of Grandview. Two Swainson's hawk nests were also found in Elmore county. Both nests were built in black locust trees that were on uncultivated private land grazed by livestock. Six active nests occurred in Ada county. All but one occurred along Kuna-Mora Road south of the city of Boise. They were built in cottonwoods, willows, and black locusts growing along creeks on private land. These nests were within 0.5 km of a farmhouse and the dominant form of agriculture in the surrounding habitats was hay production. Three nests were situated in similar settings in Canyon and Payette counties. The 10 nests located in Washington and Adams counties were built in cottonwoods and willows growing along streams such as Hog Creek, Crane Creek, and the Weiser River. Land surrounding these nests was also privately owned but the nest tree usually bordered BLM land. Thirty-four active ferruginous hawk nests were also found in the district. Thirty-two nests situated in the SRBPNA were built on a variety of substrates ranging from utility structures to cliff nests on basalt outcrops. Of the three nests situated off the SRBPNA, one was built on a

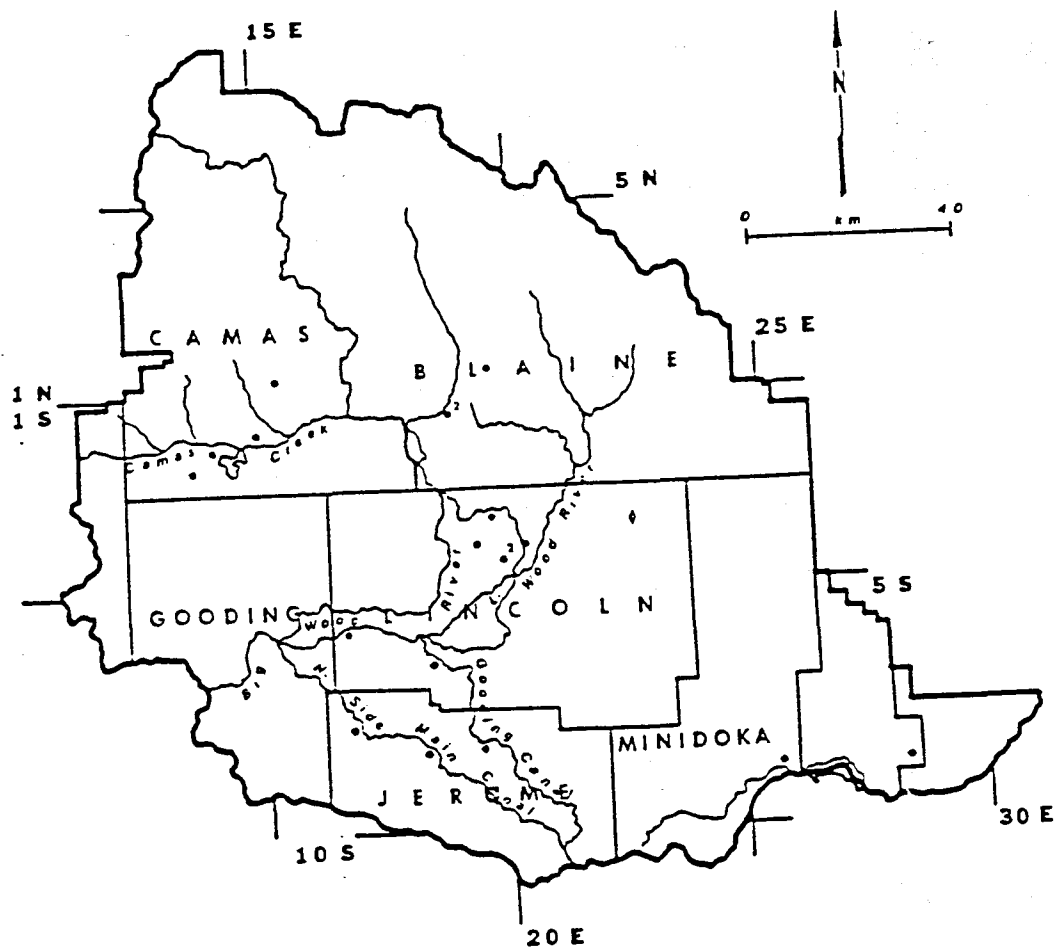


Figure 6. Nest locations of the Swainson's hawk (solid dots) and ferruginous hawk (open diamonds) in the Shoshone District of the BLM. When more than one nest occurred in a TRS (township-range-section), the number of nests is indicated in superscript.

utility structure, one was built in a black locust growing on private land undergoing livestock grazing, and the third nest was situated on BLM land near the town of Eagle.

The results of the survey showed that nests of both species of hawks are, at present, widely distributed across the southern portion of the state. Due to the lack of historical data on the ferruginous hawk, there is little information on which to base a comparison between presettlement and current populations. Nevertheless, a comparison of results of this survey with those of surveys conducted during the 1970s gives the impression that the distribution of nests has not changed over the past 15 years. Areas with the densest concentrations of ferruginous hawk nests in southeastern and southcentral Idaho were then and are now located in Raft River Valley, Curlew Valley, and the INEL site. Nests there are most commonly found in juniper trees at the ecotone between sagebrush and juniper woodlands. In the southwestern portion of the state, most nests have been found over the past 15 years in or adjacent to the SRBPNA. Ferruginous hawks in that area nest mostly in sagebrush habitat either in shrubs, on the ground, or on cliffs. Except for a few exceptional situations where nests are surrounded by hayfields, ferruginous hawks more commonly nest in habitats which have only minimal amounts of crop cultivation associated with them. Most of these areas are under public ownership and are currently administered by the BLM.

Fewer nests of the ferruginous hawk were found during 1985 in all areas except the SRBPNA, which was searched independently by BLM personnel both from the air and on the ground. The SRBPNA contained a record number of 32 active nest sites in 1985. The apparent decline in other areas of the state is perhaps part of a widespread periodic decline in Utah, Idaho, and Oregon that

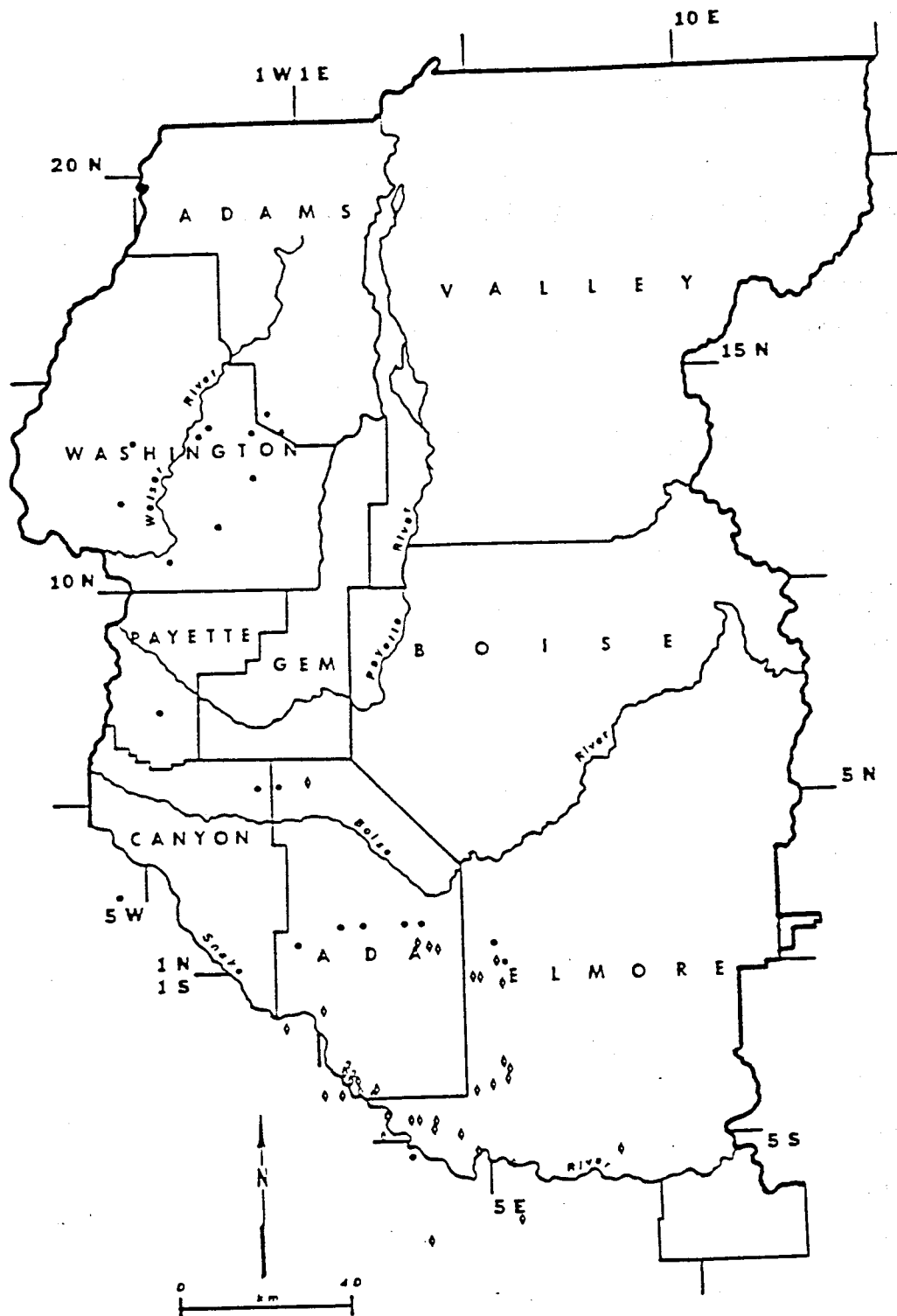


Figure 7. Nest locations of the Swainson's hawk (solid dots) and ferruginous hawk (open diamonds) in the Boise District of the BLM. When more than one nest occurred in a TRS (township-range-section), the number of nests is indicated in superscript.

has coincided with the regionwide crash of the black-tailed jackrabbit (Lepus californianus) since surveys were last conducted. In southcentral Idaho and central Utah, black-tailed jackrabbits are the most important prey of ferruginous hawks (Olendorff, in prep.). Woffinden and Murphy (1977), Thurow et al. (1980), Smith and Murphy (1979), and Smith et al. (1981) have shown a direct relationship between low rabbit numbers and low occupancy of ferruginous hawk territories. Few jackrabbits were observed in 1985 and the population appeared to have reached its 10 year minimum density across southern Idaho. It is possible, therefore, that the low number of active nest sites observed in 1985 was the result of a reduction in nest site occupancy during a period when rabbit densities were minimal. This would explain the record number of active nests on and adjacent to the SRBPNA. Unlike other areas, ferruginous hawks there feed mainly on ground squirrels (Steenhof and Kochert 1985). Since ground squirrel density was high on the SRBPNA in 1985, it was predictable that traditional territories would remain occupied and that marginal sites would become active as transient birds from other areas were attracted by the large amount of prey available.

The 1985 survey was the largest effort ever undertaken to document locations of Swainson's hawk nests in Idaho. No attempt was made to search Nez Perce, Latah, Bonneville, and Bannock counties where Swainson's hawks were reported in historical time. While the current status of these northern and southeastern nest sites remains in question, the results do indicate that the species continues to be a widespread and fairly common nester across much of the southern portion of the state. Nests, for instance, still occur in Birch Creek Canyon where C. Hart Merriam recorded seeing birds in 1890, in Oneida county where some of the first museum specimens were collected in the state,

and between Arco and Blackfoot where they have been reported since 1939. Besides verifying the continued occurrence of the species in areas where it was reported in the past, this survey also identified several, previously unreported, nesting areas in the state. These newly documented nesting areas included the Kuna-Mora Road area in Ada county and the Mud Lake Wildlife Management Area in Jefferson county.

Unlike ferruginous hawks, most Swainson's hawk nests were situated on private land within one mile of a riparian zone. Nests were built in trees close to farms and the major type of habitat surrounding them was irrigated hayfields. This finding was consistent with reports by Bloom (1980) and Schmutz (1984a) who reported nests of the Swainson's hawk in California and Alberta to be closely associated with riparian areas in which more than 50% of the habitat was agriculturally developed with the major form of agriculture being pasture and hayfields. The nesting habitat of the Swainson's hawk was primarily riparian when Charles Bendire first observed it in the 1870s (Bendire 1892). Then, nests were mostly built in willows and cottonwoods that grew along streams. Today, very little native, riparian habitat remains, most having been destroyed by irrigation and stream clearing projects, or by cattle grazing. Bendire's report suggests that with the loss of riparian areas, Swainson's hawks have switched their habitat preference and begun using cottonwoods, willows, and black locusts planted as windbreaks and for shade around farm sites. Apparently, such areas, such as Hollister, Richfield, Fairfield, and Mud Lake where there are large amounts of irrigated hayfields, the combined effect of higher rodent densities together with an increase in the availability of nest trees may have actually resulted in local increases in the nesting density of Swainson's hawks since the time of first settlement.

Reports such as that of Fayre Kenagy (1914) indicate that, in other areas of southern Idaho where agricultural development has been more extensive and the cultivation of potatoes, sugar beets, corn and other annual crops dominates much of the landscape, it is likely that the Swainson's hawk has been less fortunate. The decimation of gopher and ground squirrel populations caused by decades of soil tillage has undoubtedly adversely affected the Swainson's hawk, resulting in local reductions and/or total elimination of active nests in these areas since the state was first settled.

Data obtained by this study indicate that the widespread declines of Swainson's and ferruginous hawks reported in California, Nevada, Oregon, and Washington have not extended into southern Idaho. While nesting populations of both species have disappeared in many areas of the West, hawks in Idaho appeared to continue to find suitable nesting habitat throughout much of the southern portion of the state. Although local declines probably occurred as the result of agricultural development, it is unlikely that they have ever been as widespread in this state as reported elsewhere. This finding supports the theory that declines of both species were most serious at the boundaries of the historical distributions and that they did not extend into the core of their North American breeding ranges.

Nest Productivity

The survey was conducted between 20 May and 3 July so Swainson's hawk nests were observed from the earliest stages of nesting. Data could not be obtained on the productivity of all nests but a sample of 18 nests was revisited in late July to determine fledging success. Fifteen nests were successful in fledging 21 young for an average of 1.17 young/active nest (Table 5). Seven nests were also observed from initiation to fledging in 1984; two were successful and they produced four young. Average fledging success over the 2-year period was 1 young/active nest. Reports of averages of 1.19, 1.60, 1.67, 2.06, and 1.85 young/active nest in Colorado (Olendorff 1973), Utah (Smith and Murphy 1973), Illinois (Keir 1976), Wyoming (Dunkle 1977), and southcentral Washington (Fitzner 1980), respectively, indicated the two-year average for southern Idaho was somewhat low. Bechard (1983) reported low nest productivity in southeastern Washington also. There, limited prey availability prevented a higher degree of nesting success. There is no explanation at present for the apparent low reproductive success of the Swainson's hawk in southern Idaho, but it warrants further study to determine if agricultural practices have had a similar effect to that reported in Washington.

Ferruginous hawk nests were only observed once during the nesting season, therefore, estimates for nest success were not available. All nests were observed after hatching, when nestlings ranged from 14 to 30 days of age. Ninety-one young were banded in 36 nests for an average of 2.53 young/active nest. This average was similar to averages reported for ferruginous hawks nesting in the SRBPNA (Steenhof et al. in prep.), Washington (Knight and Smith 1982), Oregon (Lardy 1980, Cotrell 1981), southcentral Idaho (Howard 1975) and Utah (Woffinden 1975).

Table 5. Nest productivity of Swainson's hawks in southern Idaho during 1984 and 1985.

YEAR	# ACTIVE NESTS	#NESTS SUCCESSFUL	TOTAL YOUNG	# YOUNG PER ACTIVE NEST
1984	7	2	4	0.57
1985	18	15	21	1.17

Nesting Platforms

Ten nesting platforms were constructed in 1985. Together with structures previously built by the BLM, they brought the total number in southern Idaho to 108 structures (Fig. 8, Table 6). These platforms were erected in Camas county to fill the gap in structures across the northern part of the Shoshone District. Nine platforms were placed on BLM land and the tenth was built on state owned land. All were situated within 0.5 km of privately owned land that was being used as pasture or hayland. Because hayfields and pastures supported large populations of Columbian ground squirrels (Spermophilus columbianus) and mowing of hayfields and grazing of pastureland kept cover low, this type of setting was considered to be optimal and a good representation of the habitat described in the model proposed by Jasikoff (1982) for ideal hawk habitat.

Platforms were not constructed until after the 1985 nesting season was completed, therefore, there are no data available at this time on their use. BLM platforms were also observed in 1985 to record their use. None of the platforms in the Idaho Falls, Burley, and Shoshone Districts were used by nesting hawks last year. The only platforms in use were located in the Boise District and all were located on or adjacent to the SRBPNA. Active structures have received routine maintenance by BLM personnel and new nesting material has been added to the platforms as needed. Schmutz (1984b) has reported that Swainson's and ferruginous hawks in Alberta will not accept a structure that is not densely packed with sticks, sod, etc...so that the birds cannot see through the bottom of the platform. Because the unused structures in the other three BLM districts were not routinely maintained and packed with sticks, it was felt that this could explain the low occupancy of platforms across the state. During March 1986, nine structures in the Burley District Black Pine Valley

Figure 8. Locations of nest platforms erected in southern Idaho. Platforms constructed during the study are indicated by open diamonds.

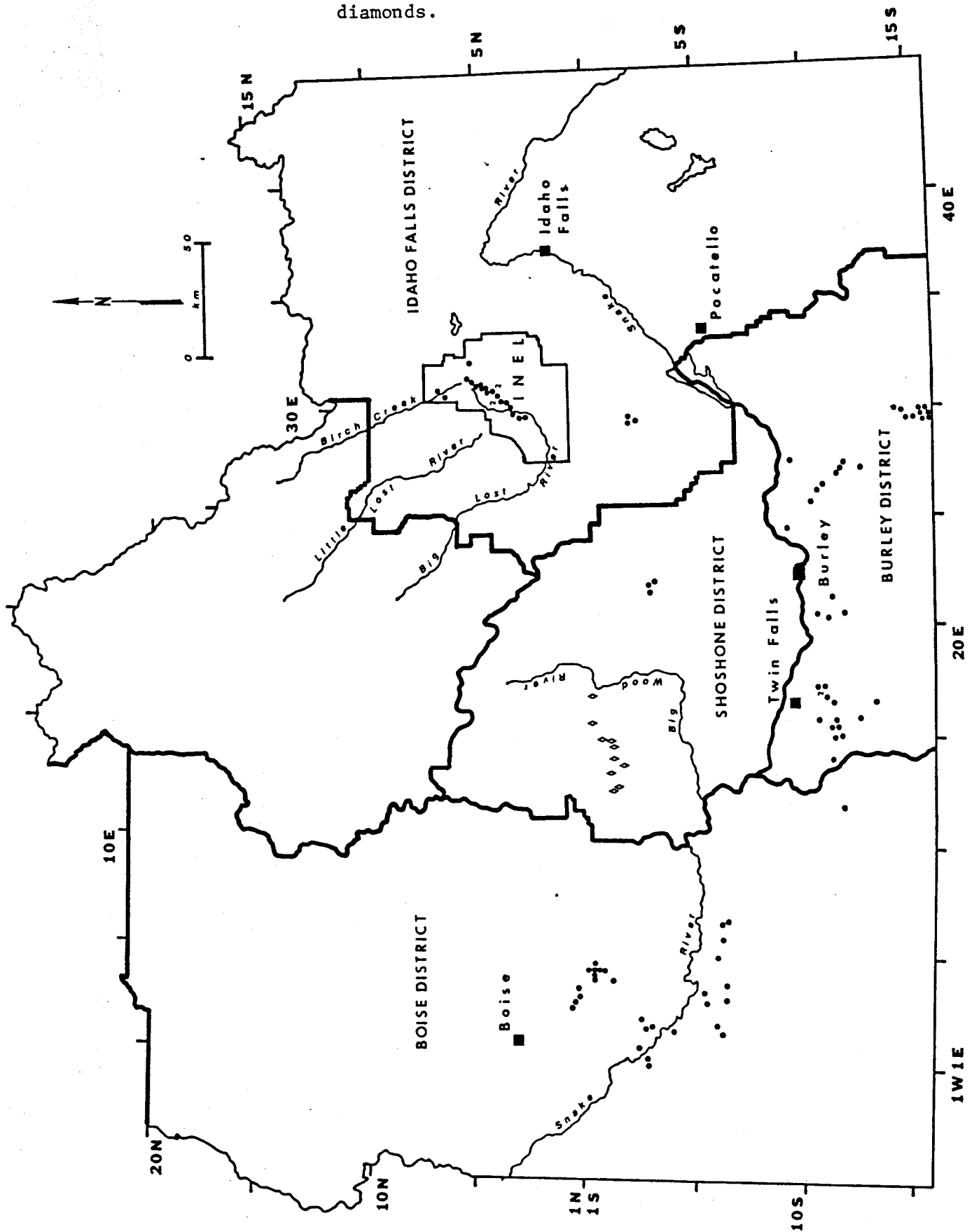


Table 6. Locations of nest platforms constructed prior to and during this study in southern Idaho.

TRS	TRS	TRS
1. 003N030E, S6	48. 013S016E, S14	95. 003S001E, S14
2. 004N030E, S31	49. 011S018E, S19	96. 003S001E, S30
3. 004N030E, S15	50. 011S018E, S30	97. 003S002E, S13
4. 004N030E, S21	51. 010S021E, S29	98. 006S002E, S34
5. 004N030E, S11	52. 011S021E, S31	99. 006S003E, S15
6. 004N030E, S15	53. 012S021E, S29	100. 006S004E, S7
7. 004N030E, S11	54. 012S022E, S6	101. 006S005E, S35
8. 004N030E, S1	55. 009S028E, S20	102. 007S002E, S5
9. 005N031E, S31	56. 011S027E, S18	103. 007S003E, S11
10. 005N031E, S31	57. 011S027E, S20	104. 007S004E, S9
11. 005N031E, S29	58. 011S021E, S17	105. 012S012E, S27
12. 005N031E, S20	59. 010S028E, S4	106. 007S006E, S3
13. 005N031E, S16	60. 011S026E, S3	107. 007S007E, S5
14. 005N031E, S9	61. 009S014E, S6	108. 007S007E, S8
15. 005N031E, S3	62. 009S014E, S6	
16. 006N031E, S34	63. 012S016E, S5	
17. 006N031E, S26	64. 012S016E, S8	
18. 006N031E, S24	65. 013S028E, S18	
19. 007N031E, S18	66. 012S027E, S12	
20. 007N031E, S4	67. 012S028E, S18	
21. 006N033E, S19	68. 012S028E, S20	
22. 002S030E, S34	69. 015S030E, S2	
23. 002S030E, S32	70. 015S030E, S15	
24. 003S030E, S4	71. 015S030E, S21	
25. 002S013E, S8	72. 015S030E, S33	
26. 002S014E, S6	73. 016S030E, S13	
27. 002S014E, S11	74. 016S030E, S14	
28. 002S013E, S16	75. 016S030E, S20	
29. 002S014E, S27	76. 016S030E, S23	
30. 001S015E, S27	77. 016S030E, S28	
31. 002S015E, S3	78. 016S030E, S29	
32. 002S015E, S5	79. 001N003E, S9	
33. 001S016E, S16	80. 001N003E, S14	
34. 001S017E, S15	81. 001N003E, S24	
35. 003S022E, S30	82. 001N004E, S19	
36. 003S022E, S28	83. 001S004E, S11	
37. 003S022E, S34	84. 001S004E, S12	
38. 014S017E, S4	85. 001S005E, S6	
39. 012S015E, S11	86. 001S005E, S7	
40. 012S015E, S24	87. 001S005E, S9	
41. 012S016E, S10	88. 001S005E, S18	
42. 011S016E, S22	89. 001S005E, S19	
43. 011S017E, S34	90. 002S004E, S2	
44. 011S017E, S34	91. 003S002E, S28	
45. 012S017E, S4	92. 003S002E, S34	
46. 009S025E, S32	93. 004S002E, S33	
47. 012S014E, S1	94. 003S001W, S25	

were repaired and new nesting material was added to them. The remaining platforms in the district received no maintenance. In future years, use of these platforms and those erected in Camas county will be monitored to determine the importance of refurbishing and resupplying nesting material for use by nesting hawks.

Suggestions for Management and Future Study

The ferruginous hawk is very sensitive to disturbances and often nests in an isolated setting far removed from such sources of disturbance as well-travelled roads, farmyards, pipelines, and airports (Olendorff, in prep.). While actual human interference is a real problem, habitat alterations are generally considered to pose the most serious threat to the nests of this species (Thurrow, et al. 1980). Intensive agriculture renders native grasslands, shrublands, and juniper forests useless as nesting habitat because monotypic agriculture results in lower prey densities, an absence of nest trees, and large amounts of springtime farming activity (Howard 1975, Cotrell 1981, Gilmer and Stewart 1983, Schmutz 1984a). Therefore, to insure proper management of this species, any factors which increase either the level of human activity or intensity of agriculture in the vicinity of nest sites must be closely monitored. Several attributes of the ferruginous hawk indicate it is an excellent candidate species for implementation of a successful management program. Its use of a variety of habitats ranging from treeless grasslands, shrub steppes, canyonlands, and badlands, and use of numerous nesting substrates, gives it the potential to be adaptable. In addition, its predisposition to accept artificial nesting platforms makes it a species readily attracted to more suitable nesting areas if management cannot mitigate the effects of agriculture and human disturbances (Olendorff and Stoddard 1974).

Allen (1985) used a Vulnerability Rating scheme to evaluate the status of hawk nests in Washington that was based on the degree of human disturbance and estimates of agriculture activity in surrounding habitats. Using this system, 75% of the 36 ferruginous hawk nests observed during this study were considered

to be Vulnerable or Highly Vulnerable to future loss of habitat and/or human disturbance. In much of southern Idaho, ferruginous hawks nest in juniper trees. They seem to prefer lone trees growing in the transitional region between juniper and sagebrush habitats. These areas most often occur on publicly owned land that is currently grazed and may or may not have received such treatments for "range improvement" as sage eradication and crested wheatgrass seedings. While land adjacent to all of the nests was being farmed, the most imminent danger to currently active nests was livestock grazing. All sites received heavy amounts of use and cattle were observed herding under trees for shade during the hot, summer months. Erosion around the roots of the nest trees resulting from trampling and soil compaction, as well as direct injury to the trees from use by cattle as scratching posts reduces their life expectancy and jeopardizes future use by ferruginous hawks.

Measures should be undertaken to establish buffer zones around these nest sites. Since most nests are on public land, it would be appropriate for the BLM to restrict the amount of activity in and around territories during the nesting season. This should be extended to include all activities, even those of BLM personnel. Nests are frequently checked by biologists for activity during the incubation stage, a period when disturbance is most detrimental. Because there is no need for clutch size data on these birds, nest investigation should be restricted until approximately June, when hatching is completed. In so doing, the negative effects of disturbance will be minimized and more useful data on brood sizes can be obtained. Efforts should also be made to protect lone juniper trees growing at the ecotone between sage and juniper habitats from future cattle use by proper fencing. If range improvement measures are planned where active ferruginous hawk nests are

located, they should be undertaken as described by Howard and Wolfe (1978) to maximize the amount of edge and include the appropriate amount of habitat interspersion. This will increase habitat diversity and insure ample foraging and nesting habitats will remain for ferruginous hawks in the future.

Further study of ferruginous hawks is warranted in Idaho for two reasons. First, more research is needed to determine the sizes of nesting territories. This type of information is necessary in order to establish appropriately sized buffer zones around nest sites aimed at minimizing disturbance. Second, more data are needed on the ecology of ferruginous hawks nesting in Idaho. It now appears that the southern part of Idaho is a transitional zone where the ecology of the ferruginous hawk undergoes a change and the population can be divided into two groups. One group, located in southeastern and southcentral Idaho, is similar to ferruginous hawks nesting in the northern Great Basin in that it is heavily rabbit dependent. In years when jackrabbit numbers are low, this group of hawks nests in very limited numbers, but when rabbits are abundant, it can be very dense. The second group, which is located in the southwestern portion of the state, feeds much less on rabbits. It has characteristics similar to birds nesting in eastern Oregon and central Washington which prey heavily on ground squirrels. Its nesting density appears to be fairly constant and is unaffected by rabbit densities. A follow-up study should be undertaken in 1990, or at which time rabbits reach their peak densities, to determine the nesting density of ferruginous hawks across the state. The survey should be modified to consist of several complete searches of randomly selected quadrats from each of the four BLM districts. The exact size and number of quadrats would first have to be determined but they could be similar to those described by Schmutz (1984a). This technique would allow

estimates of population densities to be made, thus providing a better understanding of the manner in which the populations of these two groups of ferruginous hawks fluctuate in relation to the availability of jackrabbit and ground squirrel prey.

Unlike the Ferruginous hawk, the Swainson's hawk is relatively insensitive to human disturbance and habitat alteration at its nests. In fact, nesting densities may actually increase when moderate forms of agriculture such as alfalfa and hay production increase the availability of prey (Bloom 1980, Schmutz 1984a). The Swainson's hawk is, however, completely dependent on trees for use as nest sites and it only rarely is found nesting anywhere other than a tree. Because of this dependency, a management program for this species should be directed at the mitigation of tree losses in and around areas of hay and pasture land if current population levels are to be maintained.

An evaluation of nest trees observed in 1985 showed that 85% of the 109 nests observed were situated in Highly Vulnerable settings. Many trees were in marginal locations such as the middle of cultivated fields or near well-travelled roads. Few trees were reproducing and capable of replacing themselves, and most were either partially dead or in a less-than-healthy condition. With the future survival of these nest trees in question, and no visible evidence that they were likely to be replaced, we believe there is a pressing need in this state to take measures which would insure the availability of nest trees in years to come.

Because of the close association of the Swainson's hawk with farms, a public education program should be undertaken to alert the agricultural community to the plight of this species. This program should concentrate on informing farmers of the importance of uncultivated tracts of pasture and

hayfields to this species with parcels of even a few acres providing ample foraging habitat to support a nest (Bechard 1982). An effort should be made to emphasize the benefits of these birds and to dispel the misconception that they kill poultry and game birds. Their predation on ground squirrels, pocket gophers and insects certainly deserves emphasis since it has the potential to eliminate the need for poisoning programs which the agricultural community feels are necessary to control rodents in areas with large amounts of hayfields. To insure the availability of nest sites, the program should stress the importance of preserving trees for use by Swainson's hawks. It should also make available to cooperating farmers seedlings of cottonwood and black locust trees for planting along property lines or at the boundaries of cropland to increase the availability of nest trees in years to come. Where tree plantings are not feasible because of limited water availability, farmers should be given information and/or materials for the construction of nesting platforms which could also be erected in locations where they would not interfere with farming activities.

No attempt was made in this study to determine the status of the nesting population of Swainson's hawk in Nez Perce and Latah counties of northern Idaho. A future survey is needed in this area of the state in order to document the statewide status of the Swainson's hawk. Swainson's hawks in southern Idaho do not appear to be reproducing at levels comparable to other locations. These birds consume large amounts of grasshoppers and rodents which may be contaminated with a variety of pesticide residues. Additional study is warranted in this area of the species' biology to ascertain if the reason for its apparent poor reproductive performance is related to some form of pesticide contamination.

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