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## Habits of Bald Eagles Wintering along the Upper John Day River, Oregon

### Abstract

We investigated the ecology of bald eagles (*Haliaeetus leucocephalus*) wintering along the upper John Day River in northeastern Oregon from late-November through March, 1991-92 and early-December through March, 1992-93. Our primary objective was to locate night roosts. Secondary objectives were to document eagle abundance, locate foraging areas, and describe food habits. The number of eagles peaked at 96 during early-February 1992 and 64 in early-March 1993. Midwinter Bald Eagle Counts and Christmas Bird Counts suggest that the number of bald eagles wintering in the area has increased recently. Primary foraging areas were the John Day River between Picture Gorge and Blue Mountain Hot Springs, the North Fork of the John Day River, and Fox Valley. Mammal carrion was an important food: fish, ground squirrels (*Spermophilus* spp.), and birds were also utilized. Sixty-one night roosts were located and 19 more were suspected. Eighty-five percent of roosts were used by  $\leq 5$  bald eagles. Only 16% of roosts identified in 1991-92 were used in 1992-93 because eagles moved frequently in response to small, scattered, and ephemeral food supplies. Sixty-six percent of the night roosts were in conifers, 33% were in black cottonwood (*Populus trichocarpa*), and one roost (2%) was in a mixed western juniper (*Juniperus occidentalis*), deciduous tree stand; 62% of roosts were on private land. Non-commercial and unregulated cutting of trees on private land is done to expand fields for agriculture, obtain firewood, or clear land for subdivision and other purposes, and commercial harvest of cottonwoods is becoming economical. Consequently, the potential for losing roosts is great, resulting in the possible degradation of wintering habitat for bald eagles. We conclude with management recommendations for monitoring the bald eagle population and managing their foraging and roosting habitats.

### Introduction

Bald eagles are highly mobile, predatory birds that inhabit North America. They capture live prey, scavenge, and steal food from other predators. They eat a wide variety of food and can fly long distances in search of prey. Bald eagles migrate from areas where food is scarce during winter to areas where food is more available. Wintering areas with consistent food supplies develop a tradition of bald eagle use. The number of bald eagles that congregate at wintering areas and the duration of their stay is directly related to the abundance and availability of food. Many wintering areas have been identified (Spencer 1976), and the habits of wintering bald eagles have been intensively studied (Stalmaster 1987, McClelland et al. 1994).

Communal roosting has been defined as:  $> 1$  eagle for at least 1 night (Buehler et al. 1991); and  $\geq 3$  eagles for  $\geq 2$  nights (Anderson et al. 1985). Communal night roosts have been recognized as important components of wintering habitats (Anthony et al. 1982), and the Pacific States Bald Eagle Recovery Team recommended that communal roosts be identified and protected (U.S. Fish and Wildl. Serv. 1986). In contrast, the importance of solitary roosting (1 eagle roosting alone) has received little attention (Buehler et al. 1991).

In Oregon, detailed studies of the habits of wintering bald eagles have been conducted in the Klamath Basin (Keister and Anthony 1983, Keister et al. 1985, Keister et al. 1987), Harney Basin (Isaacs and Anthony 1987), along the lower Columbia River (Watson et al. 1991, Garrett et al. 1993), in the Willamette Valley (DellaSala et al. 1989), along the Crooked River (Isaacs et al. 1993), and in northeastern Oregon (Isaacs et al. 1992). In all of these areas, abundant food attracted bald

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eagles that congregated at foraging areas and night roosts that were used consistently during and among winters.

Historical observations of bald eagles during late fall, winter, and early spring along the John Day River indicated that there were substantial numbers of bald eagles present from January through March and that communal roosts existed (M. Henjum, Oreg. Dep. of Fish and Wildl., pers. comm.). Consequently, there was concern about the potential impacts of habitat alteration and other human activities on the species, and a need to identify important winter habitats. The purpose of this study was to investigate the habits of bald eagles wintering along the upper John Day River. The primary objective was to locate night roosts. Secondary objectives were to document eagle abundance, identify foraging areas, and describe food habits.

### Study Area

The study area included the John Day River and its major tributaries upstream from Service Creek. This included the John Day River, Camas Creek, the North, Middle, and South Forks of the John Day River, and Fox and Long Creek Valleys (Figure 1). Service Creek was chosen as the downstream limit to the study area because access was limited and because eagle use was thought to be less below that point. Elevations ranged from 500 m at Service Creek to 2755 m on Strawberry Mountain. Elevations of survey routes ranged from 500-1555 m (Table 1).

Vegetation and climate vary considerably over the study area because of the wide range in elevations. Major vegetational communities in order of increasing elevation are shrub-steppe, steppe, ponderosa pine (*Pinus ponderosa*), and white fir

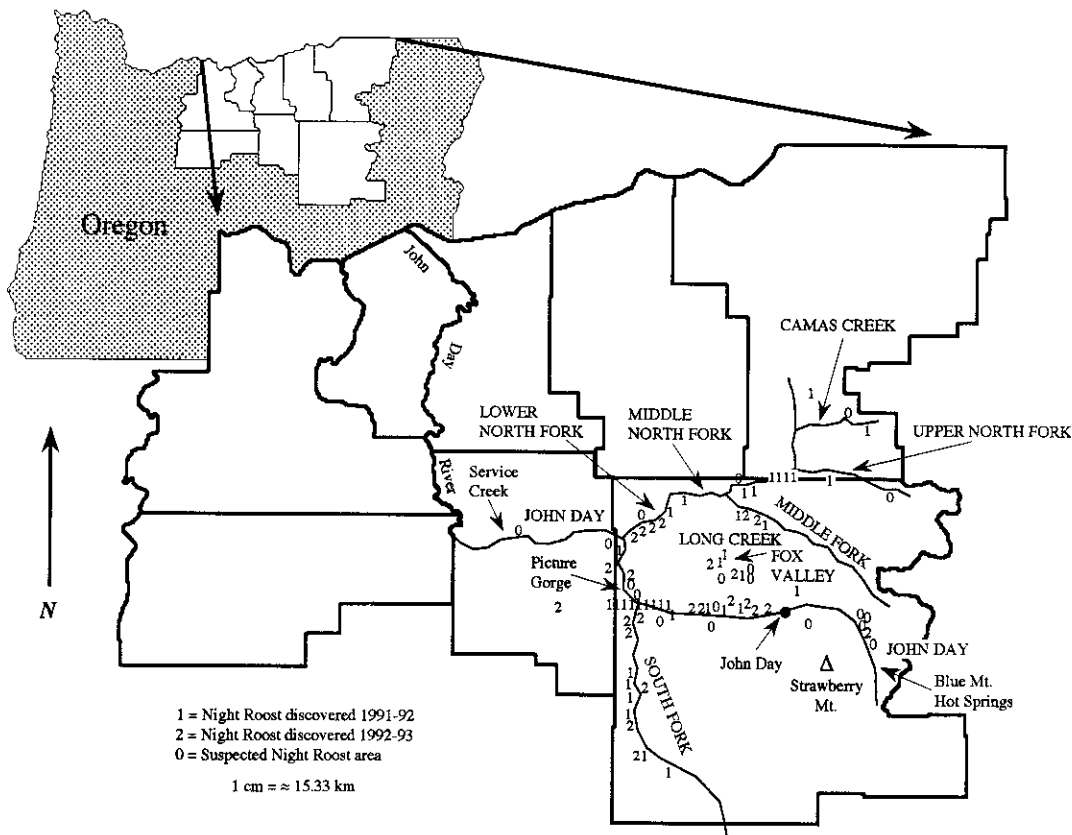


Figure 1. Survey areas and night roost locations for wintering bald eagles along the upper John Day River, Oregon, 1991-93.

TABLE 1. Bald eagle counts for the upper John Day River area, Oregon, 1991-93. Underlined numbers are peak counts for 1991-92, boxed numbers are peak counts for 1992-93. Route name is followed by the range of elevations on the route and approximate length of the route

Route Winter	Count for the Week Beginning:															Total Eagles	No. of Surveys	Eagles per Survey	Eagles per km		
	November			December			January			February			March								
	30	7	14	21	28	4	11	18	25	1	8	15	22	29	7	14	21				
John Day River above Picture Gorge; 686-1282 m; 116 km																					
1991-92	11	7	7	13	5	30	21	27	7	20	19	<u>42</u>	21	12	21	5	5	273	17	16	0.14
1992-93	9	9				21	<u>31</u>		20	10			22	11	10	14	8	165	11	15	0.13
John Day River below Picture Gorge; 500-686 m; 72 km																					
1991-92	7	3	7	5	<u>16</u>	9	13	10	8	6	6	5	8	2	3	2	4	114	17	7	0.09
1992-93	2	9			<u>5</u>	3	7		<u>9</u>	8			4	3	2	0	0	52	12	4	0.06
Camas Creek; 823-1341 m; 82 km																					
1991-92	7	9	3	<u>9</u>	4	2	2	6	7	6	6	3	1	4	2			71	15	5	0.06
1992-93	6	<u>3</u>		<u>0</u>	1	2		0		3		4		5	2		<u>7</u>	33	11	3	0.04
Upper North Fork; 695-975 m; 56 km																					
1991-92	5	4	4	11	8	11	8	14	10	16	<u>26</u>	6	4	2	<u>2</u>	0	0	131	17	8	0.14
1992-93	7	2			1	4		4			<u>2</u>		8		<u>24</u>	0	1	53	10	5	0.09
Middle North Fork; 632-695 m; 26 km																					
1991-92									6	5	<u>12</u>			1	0		0	24	6	4	0.15
Lower North Fork; 555-632 m; 32 km																					
1991-92	2	2	0	4	4	5	4	0	1	<u>6</u>	2	3	5	5	3	1	0	47	17	3	0.09
1992-93	8	3			8	<u>9</u>			5		5		2	1	2	1	44	10	4	0.14	
Middle Fork; 739-1244 m; 89 km																					
1991-92	0	0	0	0	1	<u>2</u>	2	3	3	<u>6</u>	5	3	0	1	1	1	0	28	17	2	0.02
1992-93	1	1			4	<u>6</u>	0		0		0		3	1	0	0	0	16	11	1	0.02
South Fork; 719-1341 m; 89 km																					
1991-92	2	0	<u>6</u>	1	1	2	2	3	5	1	3	0	0	2	1	0	1	30	17	2	0.02
1992-93	2	<u>1</u>			1	3	2		0		9		<u>14</u>	5	5	3	3	48	12	4	0.04
Fox Valley; 875-1555 m; 68 km																					
1991-92				7		2	1	2	12	<u>28</u>	10	16	6	4	7	<u>5</u>	6	106	13	8	0.12
1992-93	1				4	2		3	<u>3</u>		3	1		16	<u>26</u>	22	78	9	9	0.13	
Long Creek; 1085-1555 m; 50 km																					
1991-92					0	1	<u>2</u>	0	1	0	<u>2</u>	0	0	0	0	0	3	9	12	1	0.01
1992-93	0				0	0	<u>0</u>	2		0	<u>0</u>	0	0	0	0	<u>4</u>	3	9	9	1	0.02
Total Weekly Count																					
1991-92	27	23	33	44	44	65	54	63	58	<u>96</u>	89	83	47	30	42	16	19	833	17	49	0.07
1992-93		35	29			47	57		43	<u>40</u>		58			<u>64</u>	51	45	469	10	47	0.07

(*Abies grandis*) and Douglas-fir (*Pseudotsuga menziesii*) (Franklin and Dyrness 1973). Most of the floodplain of the John Day River and its major tributaries is privately owned and has been converted to pasture. Black cottonwood is common in riparian areas at lower elevations, especially along the John Day River between Picture Gorge and Blue Mountain Hot Springs. Mean annual precipitation ranges from 30-60 cm and a high proportion of the total annual precipitation falls as snow from October through March. January is the coldest month, with a mean minimum temperature range of -13 to -5 °C. July is the warmest month, with a mean maximum temperature range of 27 to 31 °C (Franklin and Dyrness 1973). The effects of elevation and aspect on temperature and precipitation are important natural factors influencing the distribution of vegetation types in the region.

## Methods

Locating night roosts was our primary goal. In order to locate roosts, we had to become familiar with the diurnal habits of bald eagles on the study area. We used ground surveys by vehicle to count eagles, locate feeding areas, and document food habits. Counts and foraging observations were subject to the vagaries of weather (poor visibility, road closures), timing of surveys, and observer bias (experience, number of observers per survey), and were limited to two field seasons with different survey schedules (weekly in 1991-92 vs. once every two weeks in 1992-93). Eventhough the results of these observations are important to understanding our conclusions, their usefulness outside of the realm of this study may be limited.

Surveys were conducted from late-November through March, 1991-92 and early-Decem-

ber through March, 1992-93. Surveys usually began at  $\approx$  0900 h; after most eagles had left night roosts to feed. Age class (adult = all white head and tail, subadult = any degree of brown in head or tail feathers, or unknown = plumage not distinguishable), location, activity, and time were recorded for each eagle observed. We tried to complete surveys by 1400 h so that birds leaving feeding areas to soar, loaf, or return to roosts were not missed. Counts of bald eagles observed during surveys were totaled for survey weeks and used as an estimate of the minimum number of bald eagles on the study area. Foods utilized by foraging eagles and potential prey observed at foraging areas were recorded opportunistically to describe diets.

Survey routes were driven in 4-wheel-drive vehicles weekly during 1991-92 and at least once every two weeks (except for late December) in 1992-93 (Table 1). We attempted to locate every bald eagle that was visible by naked eye, with binoculars, or with a 45X spotting scope. We drove at slow speeds (16-64 km/h) and stopped when necessary to scan the surrounding area. Driving routes were modified during the study to improve coverage and increase efficiency. Major changes were the addition of the Fox Valley and Long Creek routes based on reports of local residents and agency personnel, and eagle observations made during the first month of field work. During 1992-93 some routes could not be surveyed or were only partially surveyed due to weather-related road closures. Personnel from cooperating agencies helped with some counts.

Searches for roosts began by observing and mapping flights of eagles leaving feeding areas during late afternoon. Eagles were followed to night roosts by vehicle when possible, otherwise, if a consistent pattern of flights to an area was observed, that area was searched for a night roost. An area was determined to be a night roost when an eagle was present after dark. After a roost was located, tree species were recorded and the roost was mapped on a 1:24,000 U.S. Geological Survey topographic map. Subsequent counts of eagles using roosts were conducted as frequently as possible. Usually we searched for new roosts rather than monitor known roosts because of the large number of suspected roost areas. Eagles were counted leaving roosts at dawn or arriving at roosts at dusk. Time, age class, and flight direction were recorded for each bald eagle observed. Volunteers

from local communities and personnel from cooperating agencies helped with counts at some roosts. In addition, general areas with suspected roosts were mapped based on observations of evening flights.

We defined solitary roosting as 1 eagle roosting alone and communal roosting as  $\geq$  2 eagles roosting together. Thus, a night roost could have solitary roosting one night and communal roosting another. We evaluated roost use by comparing the maximum eagle count at roosts to the percent of bald eagles using roosts with different maximum counts.

Monthly normal minimum temperatures and monthly normal precipitation at the town of John Day (Figure 1) for 1961-90 are from Owenby and Ezell (1992). Daily weather data measured at John Day (Natl. Climatic Data Cent., Asheville, N.C., unpubl. data) were used to calculate average daily minimum temperatures by month for 1991-93.

## Results and Discussion

### Timing and Abundance

Bald eagles were observed throughout both field seasons (Table 1, Figure 2). The highest count for 1991-92 was 96 during the week of 1 February (Table 1). High counts continued for the next 2 weeks in February, then decreased considerably from late February through March (Figure 2). In 1992-93, the peak count of 64 occurred during the week of 7 March (Figure 2). Counts for 1992-93 were lower than for 1991-92 during most of December, January, and February, but higher than the 1991-92 counts during March (Figure 2).

Our counts were the first to document eagle abundance on the entire study area. Historical counts for portions of the study area suggest that there has been a recent increase in the number of bald eagles that occur on the upper John Day River in winter. Midwinter bald eagle counts were conducted on portions of the study area from 1979-83 and 1988-1993. Midwinter counts for 1979-83 were 6, 8, 7, 1, and 1, respectively; 1988-93 counts were 10, 12, 12, 31, 25, and 34, respectively (Oregon Eagle Foundation, Inc., unpubl. data). Christmas Bird Counts conducted at John Day from 1981-92 included 0, 0, 3, 1, 1, 4, 4, 3, 3, 9, 3, and 9 bald eagles, respectively (T. Winters, pers. comm.).

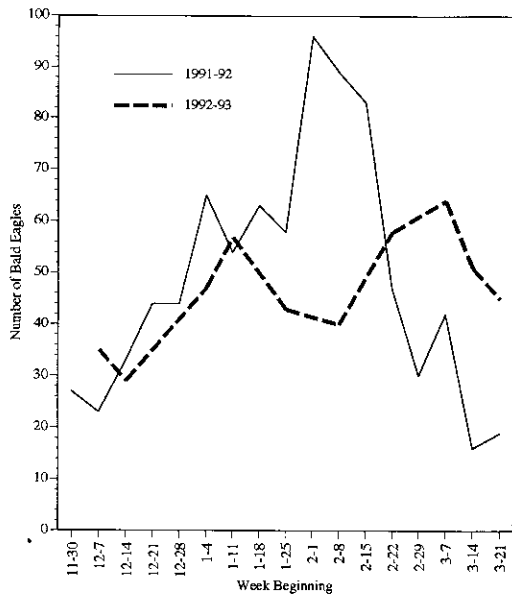


Figure 2. Weekly minimum estimates of bald eagles along the upper John Day River, Oregon, 1991-93.

Timing of peak eagle abundance in 1991-92 (early and mid-February; Figure 2) was similar to that observed in other wintering areas in eastern Oregon (Keister et al. 1987, Isaacs and Anthony 1987, Isaacs et al. 1992, Isaacs et al. 1993). Counts before February probably represented the over-wintering population whereas counts in February probably increased because of an influx of northward migrants from other wintering areas. The decrease in counts after the February peak was probably due to northward migration out of the area. Counts in 1992-93 (Figure 2) were similar to 1991-92 until early January. Counts then decreased until late February when they again began to increase to a second peak in early March. The decrease in the last half of January 1992-93 apparently was due to harsh weather and a lack of food. The late-January and early-February counts probably represented the over-wintering population. The increase in late February and early March was probably due to an influx of northward migrants from other wintering areas and the decrease in counts after the March peak was probably due to northward migration out of the area.

We speculate that the temporal differences in eagle abundance between years (Figure 2) was due to the effects of weather on the availability of prey. Winter 1991-92 was mild with average

daily minimum temperatures greater than normal during all months and monthly precipitation less than normal during all months except November (Figure 3). That weather pattern resulted in little or no snow cover and rivers remaining ice-free throughout most of the study area all winter. In contrast, winter 1992-93 was much colder and had more precipitation than normal for most of the winter (Figure 3). That winter, deep snow and ice covered the landscape for extended periods except at the lowest elevations. Consequently, prey was probably more available during 1991-92 because of the mild weather, allowing eagles to stay on the study area rather than move to other wintering areas.

The relationship between elevation of survey route and timing of peak counts for individual

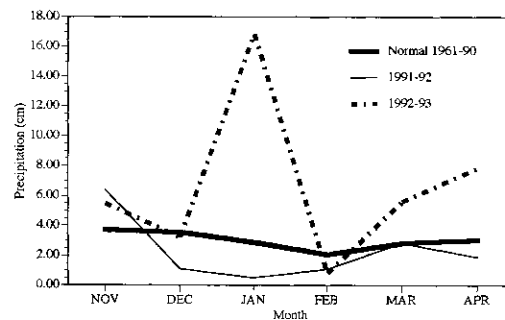
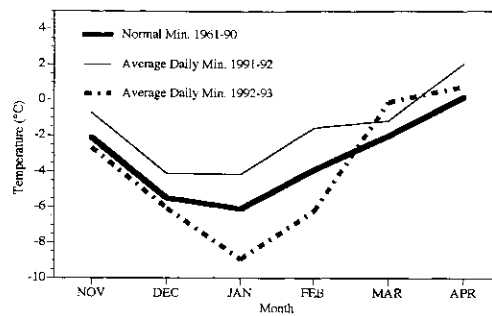


Figure 3. Average temperature and precipitation measured at John Day, Oregon. Monthly normal minimum temperatures and monthly normal precipitation from: Owenby, J.R. and D.S. Ezell, 1992. Monthly station normals of temperature, precipitation, and heating and cooling degree days, 1961-90, Oregon. Climatography of the U.S. No. 81. U.S. Dep. of Commerce, Natl. Climatic Data Cent., Asheville, N.C. 32pp.; daily weather data measured at John Day (Natl. Climatic Data Cent., Asheville, N.C., unpubl. data) were used to calculate average daily minimum temperatures by month for 1991-93.

routes also suggested that the effects of weather on prey availability affected the number of eagles on the study area. During 1991-92, the mild, dry weather resulted in similar foraging conditions throughout the study area. Consequently, peak counts on most routes occurred in early February (Table 1). In 1992-93, the cold, snowy weather resulted in thick ice and deep snow, especially at higher elevations. Consequently, peak counts on individual routes were spread over the winter, occurring later at higher elevations (Table 1) as food availability improved with the spring thaw.

### Food Habits

Bald eagles were observed feeding ( $n = 41$ ) on a variety of foods. Mammals were utilized most frequently (66%); fish (10%) and birds (2%) were also eaten; 22% of food items were not identified. Cow (*Bos taurus*) carrion was the most frequently observed food item and made up 37% of the mammalian food by number ( $n = 27$ ). Other mammalian foods were mule deer carrion (*Odocoileus hemionus*; 19%), ground squirrels (15%), jackrabbits (*Lepus* spp.; 7%), coyote carrion (*Canis latrans*; 7%), cow placenta (7%), and unidentified mammals (7%).

Food habits of bald eagles are difficult to quantify for a variety of reasons (Mersmann et al. 1992). Since our observations were recorded opportunistically, these data may not accurately quantify the food habits of bald eagles along the upper John Day River. We believe that large mammal carcasses, especially cows and road, hunter, and winter-killed mule deer and elk (*Cervus elaphus*) were important foods, but also think that fish, waterfowl, and ground squirrels were more important than the data suggest. The size of large mammal carcasses made them readily detectable whereas smaller prey was difficult to detect because of its small size and how quickly it could be consumed. Bald eagles consistently were observed along rivers with fish, near waterfowl concentrations, and were common near feed lots and calving areas for cattle. They were also observed consistently near fields with large populations of ground squirrels in late winter and early spring.

### Night Roosts

We located 61 bald eagle night roosts, 37 in 1991-92 and 24 in 1992-93, and observed eagle activity that suggested night roosting in 18 other areas, 11

in 1991-92 and 7 in 1992-93 (Figure 1). In addition, 1 night roost reported in spring 1991 (prior to this study) was included as a suspected roost (P. Sweeney, U.S.D.A. Forest Serv., pers. comm.).

We recorded the results of 137 roost counts. Many more unsuccessful roost searches were conducted. Roost counts for a single night ranged from 0 to 21 bald eagles. The longest observed flight from a feeding area to a roost was 5.6 km. Although we believe that the major communal night roosts used by bald eagles were located, we suspect that other night roosts existed.

Night roosts were located on land managed by a variety of owners ( $n = 66$ ): 62% were on private land, 26% were on land managed by Bureau of Land Management, 8% were on State of Oregon land, and 5% were on land managed by U.S. Forest Service. Night roosts ( $n = 61$ ) were in conifers (66%), black cottonwood (33%), and a mixed western juniper, deciduous tree stand (2%). Fifty percent of conifer roosts ( $n = 40$ ) were in ponderosa pine stands, 45% were in mixed conifer stands, 2.5% (1 roost) were in stands of western juniper, and 2.5% (1 roost) were dead conifers of undetermined species. Roosts were in mature and over-mature trees that were close to feeding areas and isolated from human activities. Our observations suggest that roost tree characteristics were similar to those reported for similar forest types in the Pacific Northwest (Anthony et al. 1982, Keister and Anthony 1983, Isaacs and Anthony 1987, Isaacs et al. 1993).

Only 6 of 37 (16%) night roosts and 2 of 11 (16%) suspected roost areas mapped in 1991-92 were observed being used in 1992-93. This degree of difference in roost use between years is unusual when compared to other wintering areas in eastern Oregon. Ten of 12 (83%) roosts discovered along the Crooked River in 1986 were reused in 1987 (Isaacs et al. 1987). Eleven of 14 (77%) and 15 of 24 (63%) roosts in northeastern Oregon were reused the following year, and 10 of 14 (71%) roosts were used 2 years after discovery (Isaacs et al. 1992). The reasons for this difference are unknown, but we suspect that the amount of suitable roosting habitat, and the amount and distribution of food were important. On most of the John Day River study area, suitable roosting habitat was abundant and evenly distributed whereas foraging opportunities usually were scattered and ephemeral. In contrast, suitable roosting

habitat was more localized and foraging opportunities usually were more consistent along the Crooked River and in other areas of northeastern Oregon, (F.B. Isaacs, pers. observation). Consequently, eagles along the John Day River likely changed foraging areas and night roosts more often than eagles in the other areas.

Classifying night roosts as communal may be appropriate only when a roost is monitored intensively for many nights throughout each of several winters. For example, a night roost was visible from our field station. We counted eagles roosting there as often as possible from 4 January to 24 March 1993. Eagles were present on 27 of 47 (57%) nights and  $\geq 2$  eagles roosted together on 22 nights (47%). During January there was at least 1 bird present each night counted ( $n = 11$ ). In February, 1 or more eagles were present on 76% of the nights observed ( $n = 21$ ); in March no eagles were observed during 15 nights of observation. Although as many as 10 bald eagles used this roost on a single night,  $\geq 2$  eagles roosted together on 22 nights, and our counts averaged 2.0 eagles / night over the entire period, periodic counts might not have resulted in observation of  $\geq 2$  eagles on a given night. For instance, counts conducted on 5 January, 3 February, and 2 March would have documented use by just 1 bald eagle for one night.

Eighty-five percent ( $n = 61$ ) of night roosts were used by  $\leq 5$  bald eagles and solitary roosting was observed during 43 of 137 roost counts (31%). In addition, the highest count at 33% ( $n = 61$ ) of night roosts was 1 eagle (Figure 4). Communal night roosting ( $\geq 2$  eagles roosting together) occurred at 41 of 61 night roosts (67%). If we had used Anderson et al.'s (1985) definition of communal night roosting ( $\geq 3$  eagles for  $\geq 2$  nights) only 5 roosts (8%) would have been classified as communal. We believe that many more night roosts would have been classified as communal if they had been monitored more often, especially if counts were made on successive nights immediately after discovery. We also believe that roosts used by small numbers of eagles were important. Fifty-four percent ( $n = 215$ ) of bald eagles roosted in groups of 5 or less; 24.2% roosted alone or with 1 other eagle (Figure 4). Consequently, a large percentage of this bald eagle population may depend on roost sites that would not be classified as communal roosts and may not be protected under existing definitions and regulations.

#### Human Activities

Although human activities were not quantified during this study, they deserve comment because of the potential for affecting wintering bald eagles. Potential conflicts between human activities and

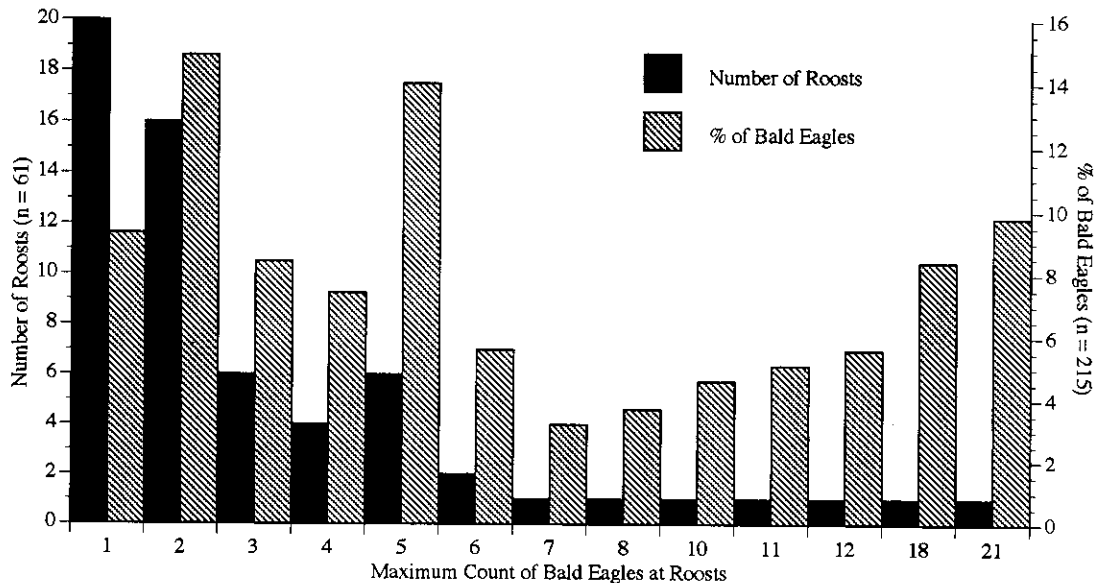


Figure 4. Use of bald eagle roosts located in the upper John Day River area, Oregon, 1991-93.

habitat use by bald eagles included agricultural and recreational activities at foraging areas, harvest of day perching and night roost trees, and ground squirrel control in foraging areas. Cutting of perch and roost trees for harvest or land clearing for agriculture were probably the greatest threats. A recent increase in the value of wood products has made it economical to harvest relatively small stands of cottonwoods and truck them long distances for processing. This jeopardizes eagle perching and roosting sites on the John Day River because 28% of roosts ( $n = 61$ ) were in cottonwoods on private land.

### Management Recommendations

Our results provide baseline data on bald eagles wintering along the upper John Day River. Future population monitoring efforts should be focused on primary foraging areas and night roosts. Foraging areas and roosts should be managed to maintain conditions that attracted eagles. Specific management recommendations follow:

#### Monitoring

- Continue conducting annual Midwinter Bald Eagle Counts and Christmas Bird Counts to document long-term trends in abundance and distribution of bald eagles wintering in the upper John Day River area. These counts cover two of the three primary foraging areas.
- Survey Fox Valley, the third primary foraging area, in February, March, or April, depending on the severity of the winter (later in years with more severe winters) because of its importance as a late-winter, early-spring foraging area, in order to document long-term trends in that area.
- Monitor roosts to determine roost boundaries and document use within and among winters. Monitoring over successive nights throughout successive winters might be needed to understand use patterns.

#### Foraging Areas

- Maintain individual trees and stands of mature and overmature cottonwoods and conifers along river corridors to provide foraging perches. Large trees should be distributed so that they provide unobstructed views of foraging areas and are isolated from human activities.
- Maintain fish populations at or above current levels.

- Use non-poisonous rodent control measures to prevent secondary poisoning of bald eagles feeding on carcasses.
- Move large mammal carcasses away from roads to areas isolated from human activities to enhance foraging opportunities for eagles (Isaacs et al. 1993) and to reduce the chances of collisions with vehicles.

#### Roosts

- Document new roosts by describing roost trees, mapping locations, determining landowners, and documenting eagle use.
- Protect roosts from cutting and development by exempting roosts and a 400-m perimeter (Isaacs et al. 1993) from inappropriate tree cutting (cutting that doesn't improve roosting habitat) and construction.
- Avoid human activities within 400 m of roost boundaries from October through April.
- Maintain stands containing mature and overmature trees along river corridors, especially at or near documented roost locations. Restrict grazing in roosts if it is suppressing tree regeneration.
- Prepare site-specific management plans (U.S. Fish and Wildl. Serv. 1986) for roosts that are threatened with logging or development.

### Acknowledgements

We thank Oregon Department of Fish and Wildlife, U.S.D.A. Forest Service (Pacific Northwest Region), and U.S.D.I. Bureau of Land Management for funding and logistical support; and Oregon Department of Forestry for maps. Special thanks to members of the Grant County Bird Club for their interest in the project and for helping with roost counts. We are especially grateful to Gary Wing for helping out when needed. We thank Monte Garrett, Riley McClelland, and two anonymous reviewers for their constructive comments on the manuscript.

This study was conducted under the auspices of the Oregon Cooperative Wildlife Research Unit; Oregon State University, Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and the Wildlife Management Institute cooperating.

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*Received 21 November 1994*

*Accepted for publication 24 October 1995*