

# APPENDIX C

## BALD EAGLE SURVEY METHODOLOGY

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### GUIDELINES FOR BREEDING/NESTING SITE POPULATIONS<sup>1</sup>

Traditional monitoring methods for bald eagle breeding/nesting populations involve annual completion of 3 temporally separate surveys (collectively designated productivity surveys) to determine: 1) occupancy, 2) activity, and 3) results of all breeding attempts in the population.

Modification of accepted productivity survey practices for more efficient, less disruptive, and more representative methods of determining population trends are recommended. *Number of active breeding pairs and number of total young of advanced age produced* adequately represent annual status and reproductive performance of the population. Analysis of these annual statistics in a historical context will indicate trends.

Absence of occupancy surveys will not affect detection of new breeding areas because Flath et al. (1991) almost always found new nest sites or pairs during activity surveys, seldom during occupancy surveys, and rarely during production surveys or thereafter. Continued determination of occupancy would be at the discretion of the entity responsible for completion of productivity surveys.

Specific timing of surveys must be based on local nesting chronology. Surveys should be designed to minimize disturbance as much as possible. When planning surveys, agency personnel should be aware that *nesting phenology among breeding areas may vary as much as 45 days*, but general guideline for timing is:

**Occupancy surveys (not mandatory)** – may occur as early as 7 February but should be concentrated in the third week of March for most breeding areas.

**Activity surveys and searches for new nests** – should generally occur from 15 April to 5 May (cottonwood leaf-out).

**Production surveys** – should occur in late June but may extend into early July.

Task: Annually survey in a standard manner all breeding areas known to be viable to determine status and annual productivity.

#### **Guidelines:**

1. A Bald Eagle Nest Survey Form standardizes data collection during nesting surveys and should be used. Individuals or agencies assigned specific nest survey responsibilities will receive from the Working Group survey forms prior to each year's survey effort.
2. At least once every 5 years, survey historical breeding areas that have not been active since 1990 to determine current status.

These surveys should follow the timing guidelines provided above and use the Bald Eagle Nest Survey Form.

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<sup>1</sup> Adapted from "Montana Bald Eagle Management Plan" July 1994

Task: Maintain current nest record information for all bald eagle nests.

**Guideline:**

The Bald Eagle Nest Record Form establishes a permanent record of each nest location in the state. This form includes general descriptive information about the nest site. A map of the nest location and instructions on how to find the nest should be included whenever a new nest is found. It is the responsibility of the respective land management agency to complete the Bald Eagle Nest Record Form.

**Guidelines for Wintering Period Surveys<sup>2</sup>**

The guidelines in this appendix address four main questions: 1) What areas should be surveyed? 2) How often are surveys needed? 3) What information should be obtained?, and 4) What procedures should be used?

**Survey Locations**

The vicinities of known nest sites should be checked to determine whether eagles are resident during part or all of the non-breeding season. If eagles are present, attempts should be made to identify their feeding area(s) and night roost(s), and to determine the period of time the eagles remain in the area.

The selection of survey locations outside of nesting habitat depends on whether the objective is to check feeding areas and night roosts usually are checked in separate surveys because they may be as much as 15 miles apart (the highest recorded distance is approximately 17 miles), and because the number of eagles present at them varies with the time of day and several other factors.

To date, most surveys of feeding areas have been confined to locations associated with water. However, where food other than fish or waterfowl is available, open water is not a habitat requirement. Food resources from terrestrial habitats, such as big game and livestock carrion, jack and cottontail rabbits, and ground squirrels are the major food items of wintering bald eagles in several locations. Thus, in addition to aquatic habitats, surveys of feeding areas should include terrestrial habitats.

Priorities for areas to check can be established on the basis of known or suspected levels of prey availability. Other things equal, the number of eagles is likely to be greatest where the most food is available.

Night roosts are found in a variety of habitat types and are not necessarily in the immediate vicinity of feeding areas. Trees in ravines, on the leeward side of hills, or in other wind-protected situations are the most likely to be used, particularly during harsh weather. In relatively flat terrain where few trees are present, eagles usually roost in trees that are clumped or screened from the prevailing wind by other vegetation. As a general rule, trees in exposed sites are occupied only during mild weather.

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<sup>2</sup> Adapted from “Northern States Bald Eagle Recovery Plan” July 1983.

## **Survey Frequency**

The number of surveys needed in local wintering areas depends on the amount of information available for site-specific management plans. If the approximate date when bald eagles first arrive in an area is not known, surveys should begin in mid- to late October. The main value of an early survey is to establish the initial date for seasonal restrictions on human activity in important wintering areas.

At locations where peak periods and levels of use have not been determined, or where preferred feeding sites and night roosts are not known, surveys are recommended at 7 to 21 day intervals throughout the winter period. Survey frequency can be adjusted so that areas with the greatest potential for high use are checked most frequently.

Biologists unfamiliar with the characteristics of wintering eagles might question the need for more than one or two surveys each winter, especially because only two surveys are recommended for the breeding season. The need for repeated surveys stems from the high mobility of wintering bald eagles. Some remain in one locations for months, but others move quite frequently. Reasons for the movements are not fully understood, although some clearly are related to changes in prey availability and weather conditions. As a result of these movements, distribution and abundance of eagles in local areas fluctuates considerably during winter. For example, a location where an average of 10 eagles are seen in January might have an average count of 40 in February and a peak of 60 in March. Preferred feeding sites within an area could shift from open water early in the winter to adjacent terrestrial habitat later in the season. The level of use at night roosts also is variable. Thus, to identify important feeding areas and night roosts, surveys are needed throughout the winter period. In many locations a high level of survey effort probably will be required for at least two winters to identify regularly used sites. Thereafter, survey frequency can be reduced to whatever is desired for monitoring a particular area of interest.

## **Survey Information**

For each survey of a roost or feeding area a complete record should be made of the date, time, personnel, procedures, route, and weather conditions. Determining the distribution of wintering bald eagles is as important as determining their abundance. Therefore, the locations of eagles observed during surveys should be plotted as precisely as possible on maps. Consistently-used feeding areas and even individual hunting perches are identified by comparing the observations plotted over a number of surveys. Detailed information of this type is essential for delineating the boundaries and special features of wintering areas where a site-specific management plans are needed. This level of detail also is needed for Endangered Species Act (Section 7) formal consultations.

## **Survey Procedures**

To the extent possible, survey procedures should be the same all winter. Because observer competence is a major source of variability in winter survey results, the same experienced observer(s) should conduct all surveys in a particular area, with the same pilot and aircraft for aerial surveys. Recording detailed information during a survey may require a primary observer to look for eagles and a recorder to plot the locations of eagles, carrion, waterfowl, stretches of open water, or other items of interest and value. Eagles missed by the primary observer but seen by the recorder or the pilot should be noted separately.

Surveys can be conducted from the air, the ground, or by boat. Visibility from a boat usually is limited by shoreline vegetation or topography; therefore, surveys by boat are advisable only for locations inaccessible from the ground or unsafe for aerial survey. Surveys from the ground are recommended where vegetation and terrain do not restrict visibility, e.g. small lakes or rivers where the entire shoreline can be seen from a few fixed points. Aerial surveys are recommended for large wintering areas, and locations where ground access is poor, or visibility is limited. Some feeding areas and roosts appear suitable for both ground and aerial surveys. At such locations, initial surveys can be conducted simultaneously from the ground and the air to assess which procedure is better.

Safety is the foremost consideration during aerial surveys. Pilots should have considerable prior experience conducting wildlife surveys that require slow, low-level flying. The route and the location of potential hazards such as power lines should be determined before each flight. Tight turns should be minimized.

Aerial surveys can be conducted from helicopters or fixed-wing aircraft. More eagles are likely to be detected from helicopters because eagles usually flush ahead of them and are quite noticeable. However, flushing eagles from roosts or feeding areas on a regular basis could lead to abandonment of these essential wintering sites by some or all of the affected birds. Also, the cost of using a helicopter (about five times the hourly cost of a fixed-wing aircraft) is seldom justified. Therefore, helicopters are recommended only where use is dictated by safety considerations.

A small plane such as a Piper PA18 (“Super Cub”) is ideal for aerial surveys by one observer. For surveys that require two observers, a small four-seater capable of slow flight (e.g. Cessna 172 or 180) is recommended. During aerial surveys a speed of 60 to 75 mph is optimal; up to 90 mph is acceptable. Detection of bald eagles drops sharply above 90 mph. The recommended survey height is 100 to 300 feet above ground or tree level. Flights above 300 feet are of limited value because many less conspicuous eagles are missed. During surveys along rivers both shorelines should be visible from one side of the plane. Where tree cover is dense, or river is braided or so wide that both shorelines cannot be seen adequately on a single pass, the plane should circle and make additional passes until the area is covered thoroughly.

Surveys in feeding areas should coincide with the time of day when most bald eagles are foraging. This usually is one to three hours after daylight. It is advisable to check night roosts just before an early morning survey of feeding areas, and to delay the survey until later in the morning if a large number of birds are still at roosts. Surveys late in the morning or in the afternoon are not recommended because some bald eagles soar when weather conditions are appropriate, and others move to roosts or other protected sites to rest after feeding.

Both direct and indirect methods can be used to determine whether bald eagles hunt in terrestrial habitats adjacent to water. One indirect, highly recommended method is checking beneath roost trees for prey remains and regurgitated pellets of undigested material. Do this only when no eagles are at the roosts, e.g., at mid-day. Because eagles can digest fish completely, few castings are found where fish are the major item in the diet. Vegetation from fish stomachs sometimes is regurgitated in pellet form, and fish scales and cartilage occasionally are found in castings that contain feathers or hair. A large proportion of castings with hair indicate that eagles are obtaining carrion or live prey in terrestrial habitats. By analyzing castings it may be possible to determine which mammals are fed upon; in many instances one species clearly is dominant. These data can be used to infer that eagles hunt at particular sites or in certain vegetation types known to support the prey species. Roost sites should be checked for castings on a regular basis, e.g., once per month.

Another indirect means of determining whether terrestrial habitats are used is to count eagles at night roosts and compare the results with a count made the following morning in aquatic feeding areas. The morning survey should be preceded by a check of roost areas to determine how many eagles are still there. A night roost count that substantially exceeds the count from the morning aquatic area survey is an indication that some of the eagles may be in terrestrial areas.

The general pattern of eagle distribution in terrestrial feeding areas usually can be determined directly by conducting surveys in suitable prey habitat. Where there are few suitable sites for bald eagles to hunt, each site can be checked. However, where the potential hunting area is vast, aerial surveys along the transect lines are recommended. This type of survey provides an index of eagle distribution in relation to vegetation types and other habitat characteristics. Transect lines spaced 1.5 miles apart are suggested. The length of the lines depends on the suitability of vegetation as prey habitat. In any case, transects normally need not extend further than 15 miles from roosts. It should be recognized that a survey along transect lines provides an index of distribution and information on the extent of feeding areas; it does not provide accurate data on use by eagles, the best means of assessing abundance is to count at night roosts.

Night roost surveys are conducted at dusk or dawn. Dusk is preferred because most eagles return to roosts before dark, while there still is enough light to see them, whereas some eagles leave roosts at or before daybreak, when it is too dim for accurate count. It is important to search periodically for roosts, until there is a high degree of confidence that all regularly used sites have been identified.

Occasionally, counts at roosts cannot be made safely from the air, nor can roosts be seen directly from the ground. In these situations observers watch from a distance and count eagles as they fly toward the roost site (or from it, if the survey is done in the morning). This procedure underestimates the actual number of birds using a roost because eagle remaining there all day are not seen, and some flying to (or from) the roost could be missed.

### **Other considerations**

There has been confusion over the interpretation of winter survey data, particularly with regard to abundance, and a discussion of the matter is appropriate in these guidelines:

1. Because of visibility biases inherent to surveys, a survey provides an index rather than an absolute count of the eagles present at a particular time.
2. Counts at night roosts generally provide more accurate indices of abundance than counts in feeding areas, provided all roosts in a wintering area are checked.
3. The total number of eagles using a particular location during winter cannot be determined because individual birds vary in the length of time they remain in any one place. Therefore, the “wintering population” in a particular location, county, state, or region is dynamic, not fixed in size. At present the range, average, and peak number of eagles observed in feeding areas or at roost sites are the most meaningful measures of use in wintering years. Better indices (e.g. estimates of “bald eagle use days”) for comparing levels of use in various locations are desirable and hopefully will be developed in the future.

4. Fluctuations in use occur between winters and within winters. As a general rule, however, wintering areas where suitable prey resources are regularly available, relatively abundant, and easy for eagles to obtain are used each year and support far more eagles than do surrounding, less suitable locations. Properly conducted surveys should reflect these types of differences.

Surveys do not provide all the information necessary for the preparation of site-specific management plans. Additional studies are needed for the following:

1. identifying and assessing important habitat for major prey species;
2. assessing tree regeneration at night roosts and in feeding areas; and
3. identifying vegetation or terrain features that screen roosts and feeding areas from human activity or wind.

Also, in some locations intensive observations or telemetry studies will be necessary to adequately define the extent of bald eagle hunting areas. This is particularly true when eagles use terrestrial habitats extensively.

## SAMPLE BALD EAGLE NEST SURVEY FORM

Year: \_\_\_\_\_

**I. ID**

Territory Name: \_\_\_\_\_ Territory Number \_\_\_\_\_

Historical Data: \_\_\_\_\_ Survey Results \_\_\_\_\_

**II. SURVEY SUMMARY**

Survey:

\_\_\_\_\_ (1) Not Checked \_\_\_\_\_ (2) Not Located \_\_\_\_\_ (3) No Occupancy Check \_\_\_\_\_ (4) No Activity \_\_\_\_\_ (5) Unknown Outcome  
 \_\_\_\_\_ (6) Complete Survey

Status:

\_\_\_\_\_ (1) Unoccupied \_\_\_\_\_ (2) Other Species \_\_\_\_\_ (3) Single Adult \_\_\_\_\_ (4) Occupied \_\_\_\_\_ (5) Active \_\_\_\_\_ (6) Unsuccessful  
 \_\_\_\_\_ (7) Successful \_\_\_\_\_ (8) Inactive \_\_\_\_\_ (9) Unknown \_\_\_\_\_ (A) Found \_\_\_\_\_ (B) New Territory

Nest Condition:

\_\_\_\_\_ (1) New Nest # \_\_\_\_\_ (2) Good \_\_\_\_\_ (3) Fair \_\_\_\_\_ (4) Poor \_\_\_\_\_ (5) Destroyed Nest # \_\_\_\_\_

Number of Young: \_\_\_\_\_

**III. SURVEY RESULTS**

Nesting Period	Date Checked	Survey Method	Nest Condition	Findings	Observer	Comments
Occupancy (3/1 - 3/31)						
Activity (4/1 - 4/30)						
Nestlings (5/1 - 5/31)						
Fledgling (6/1 - 7/15)						

**IV Supplemental Nesting Information (if known)**

Date of adult arrival: \_\_\_\_\_

Date of adult dispersal: \_\_\_\_\_

Date of hatching: \_\_\_\_\_

Date/Number of fledglings at dispersal: \_\_\_\_\_

Date of fledging: \_\_\_\_\_

Banding Data: \_\_\_\_\_

**V NARRATIVE INFORMATION**

Nesting Failure, date/nesting period failure \_\_\_\_\_

Reason for failure \_\_\_\_\_

Observations, remarks, food habits: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Prepared by: \_\_\_\_\_ Phone: \_\_\_\_\_ Date: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

\_\_\_\_\_ Date

\_\_\_\_\_ Agency and Office

**SAMPLE BALD EAGLE NEST RECORD FORM**

Species: \_\_\_\_\_

Territory name: \_\_\_\_\_

Territory/nest number: \_\_\_\_\_

Reported by and date: \_\_\_\_\_

Location: T \_\_\_\_\_ R \_\_\_\_\_ Section \_\_\_\_\_ ¼ \_\_\_\_\_ ¼ \_\_\_\_\_

State: \_\_\_\_\_ County: \_\_\_\_\_

Elevation: \_\_\_\_\_ Aspect: \_\_\_\_\_

Latilong: \_\_\_\_\_ Hydrologic unit: \_\_\_\_\_

Nest stratum: \_\_\_\_\_ Nest height: \_\_\_\_\_

Position on slope: \_\_\_\_\_ Nest condition: \_\_\_\_\_

Land Ownership: \_\_\_\_\_

Directions to nest: \_\_\_\_\_

Other: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Map (1:24000 USGS quad) and Photos

Photograph Showing Nest Site

Photograph Showing Nest

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_