

PROTOCOL FOR SURVEYING  
PROPOSED MANAGEMENT ACTIVITIES  
THAT MAY IMPACT NORTHERN  
SPOTTED OWLS

Endorsed by the  
U.S. Fish and Wildlife Service

7 March 1991

REVISED - March 17, 1992

## PROTOCOL FOR SURVEYING PROPOSED MANAGEMENT ACTIVITIES THAT MAY IMPACT NORTHERN SPOTTED OWLS

### INTRODUCTION

The enclosed protocol was designed for surveying areas where Federal or non-Federal activities may remove or modify northern spotted owl habitat. The U.S. Fish and Wildlife Service (Service) endorses the use of this protocol for gathering information on spotted owl occupancy in proposed project areas for assessing affects of the proposed actions. Note that any information on owl presence within and/or adjacent to the proposed planning or activity areas is important, even if it does not meet the guidelines described below. However, if the only information available for a particular activity was acquired through less intensive surveys, the Service must conservatively assess (i.e. a worst-case analysis) the impacts of the action on northern spotted owls. It is always useful to document reasons for not adhering to the recommended protocol.

This protocol is based on several existing protocols and, when implemented, should serve two primary purposes: (1) provide adequate coverage and assessment of the area for the presence of spotted owls, and (2) ensure a high probability of locating resident spotted owls and identifying owl territories that may be affected by a proposed management activity, thereby minimizing the potential for unauthorized incidental take. It is not appropriate to use this protocol to monitor yearly trends of spotted owls or for many other research applications.

In this document, management activities are defined as those activities which may impact northern spotted owls. The most common activity is harvest or modification of spotted owl habitat. Also included under management activities are various types of disturbance not necessarily associated with timber harvest activities.

This protocol was peer-reviewed by scientists, biologists, and managers who work on various issues pertinent to the ecology and management of northern spotted owls. Reviewers included personnel from:

- U.S. Fish and Wildlife Service
- U.S. Forest Service
- Bureau of Land Management
- Humboldt State University
- Oregon State University
- California Department of Fish and Game
- Oregon Department of Fish and Wildlife
- Washington Department of Wildlife
- National Council of the Paper Industry for Air and Stream Improvement
- Timber Association of California
- Private Timber Companies
- Private Consultants

## APPLICATION OF THE NORTHERN SPOTTED OWL SURVEY PROTOCOL

### SURVEY AREA

- o To the maximum extent possible, all spotted owl habitat within the specified provincial radius from the perimeter of the proposed activity area should be surveyed. The provincial radii are as follows:

Washington Cascades	= 1.8 miles
Olympic Peninsula	= 2.2 miles
Oregon Cascades	= 1.2 miles
Oregon Coast Ranges	= 1.5 miles
Klamath Province	= 1.3 miles

### DURATION OF SURVEYS

Previous survey data were analyzed to determine the number of visits needed to result in a high likelihood that territorial owls will be detected or that a lack of owl responses accurately reflects an absence of spotted owls. Preliminary analysis of the data provided the basis for determining the number of visits per year for both the 2-year and 1-year surveys. Two-year surveys provide more accurate results for an area because of the intermittent occupancy of spotted owls within particular areas. These 2-year surveys are more likely than 1-year surveys to accurately document the presence of owls or territories in these situations. Use the following instructions for surveys during 1992.

- o 1-year (6-visit) surveys are acceptable. However, 1-year surveys provide a somewhat lower likelihood of determining the presence or absence of spotted owls. In addition, 1-year surveys will be valid only until the beginning of the following breeding season.
- o 2-year (3 visits/year) surveys are preferable for surveying a management activity or planning area to determine the presence or absence of spotted owls. Surveys may be completed sooner if a response is obtained and status of the owl(s) is confirmed. However, we recommend that every effort be made to determine the highest status for a given site. 2-year surveys may be valid for 2 additional years.
- o 2-year surveys are encouraged to provide a higher likelihood of accurately determining presence or absence of spotted owls. They may also be more economical, especially in cases where harvest will occur in more than one year.

In this document, a complete survey is defined as coverage of the survey area to the required number of visits and an overall inventory that meets the protocol guidelines.

- o If a 2-year survey is completed (3 visits/year protocol), using the Service's survey protocol, and no responses are obtained, the negative results may be considered accurate for 2 additional years without conducting additional surveys.

Example: 2-year survey

Year 1 (March - Sept.)	3 visits with no response
Year 2 (March - Sept.)	3 visits with no response
Year 3	Harvest without additional surveys
Year 4	Harvest without additional surveys
Year 5	Suspend activities and resurvey the area during the breeding season if harvest is not completed before the start of the breeding season in Year 5

- o If a 1-year survey is completed (6 visits), using the Service's survey protocol, and no responses are obtained, harvest could occur before the start of the next breeding season. If harvest is not completed within this time period, a 3-visit minimum survey would be needed prior to harvest in the second year. This is equivalent to 1 year of a 2-year survey. If harvest was not going to occur until after year 2, and the 3 visits in year 2 produced no responses, the negative results may apply for 2 more years without having to conduct additional surveys.

Example: 1-year survey.

Year 1 (March - Sept.)	6 visits with no responses
Year 2	Conduct 3 more visits as described below if harvest is not completed before the beginning of the breeding season. The 3 visits should be conducted prior to harvest. If no responses obtained, additional surveys not needed for 2 more years.
Year 3	Harvest without additional surveys
Year 4	Harvest without additional surveys
Year 5	Suspend activities and resurvey the area during the breeding season if harvest is not completed before the start of the breeding season in Year 5

- o If a nest site or activity center is located by a 1- or 2-year survey, and if harvest will take place in the area in years following the initial surveys, further surveys may be necessary, as follows:

If an owl site is located during a 1-year survey, and the project area is large enough to possibly support more than one site, remaining potential sites should be surveyed three times in the second year. Also, unless otherwise authorized under an incidental take statement or permit from the Service, the original nest site or activity center should be surveyed for occupancy in the year of the action. It is not unusual for owls to change their nesting location from year to year. If the owls are not at the original location, all areas inside harvest units and within 0.25 mile of harvest units should be surveyed each year of harvest according to a 3-visit protocol to eliminate the chances of disturbance to spotted owls during the breeding season.

## **OVERLAP OF NEW AREAS WITH AREAS SURVEYED IN THE PREVIOUS YEAR**

- o In cases where a survey area overlaps all or part of a previous year's survey area, a minimum of 3 visits should be completed for those areas covered by the previous year's surveys, and the new areas should be surveyed with either the 1-year or 2-year protocol (see **DURATION OF SURVEYS**)

## **DETERMINING UNOCCUPIED STATUS OF AN HISTORICALLY OCCUPIED SITE**

- o If no responses have been obtained from an historical site after 3 years of survey (using the guidelines established in this document), the site may be considered unoccupied, barring other evidence to the contrary.

## NORTHERN SPOTTED OWL SURVEY PROTOCOL

### HABITAT TO BE SURVEYED

For purposes of surveying, spotted owl habitat is any habitat where you may expect to elicit a response from a resident owl or pair of owls. Descriptions of spotted owl habitat for the various areas and physiographic provinces should be available from the various state wildlife and forestry agencies.

### COORDINATION OF INFORMATION

The importance of coordination in conducting spotted owl surveys cannot be overemphasized. Appropriate coordination involves: 1) pre-season planning (including coordination of commitments by adjacent landowners on the areas to be surveyed by each party); 2) immediate communication of results, positive or negative, that may affect other landowners; and 3) exchange of post-calling season information summaries. Common mistakes, such as overlapping visits by more than one survey group, can be avoided through coordinated pre-planning. It is also advisable to inform adjacent landowners of all surveys near their ownership because new survey results may affect their management and logging operations.

The state agency or spotted owl database holder responsible for evaluating forest practice applications and analyzing survey data should be kept up to date with new survey results.

### SURVEY PERIOD

- o All surveys of proposed management activity areas must take place between 15 March and 31 August. For areas where there is adequate biological information that birds are defending their established territories prior to 15 March, then earlier dates may be used as a starting time. Conversely, surveys should begin 1 April for the higher Cascades area where previous survey information has shown that birds return to their established territories later. Positive responses after 31 August are still valid, but negative results after this date do not count towards the number of visits required for completing the year's survey. Positive responses obtained only after 31 August also indicate that the area in question should be surveyed the following year.

### ESTABLISHING THE SURVEY AREA

- o Develop transects and/or calling points to cover all spotted owl habitat within the delineated survey area.
- o Establish calling stations and survey routes to achieve complete coverage of the area, preferably with coverage from more than 1 calling point. Calling stations should be spaced approximately 1/4 to 1/2 mile apart, depending on topography and background noise levels. Take advantage of prominent points within the survey area when establishing calling stations. If necessary to ensure complete coverage of the area, supplement the prominent points with intermediate calling stations.

Where known spotted owl activity centers exist within the survey area, survey areas may be adjusted to exclude habitat that would be within earshot of the activity center. However, consider the need to survey the known activity center for current status.

The intent is to obtain complete coverage of the area where owls will be able to hear the surveyor and the surveyor will be able to hear the owl.

- o For each visit, whether results are positive or negative, record the following information on a survey form:
  - 1) Brief description of survey route.
  - 2) Survey start and stop time (total amount of time spent calling) and total time of survey.
  - 3) Weather conditions (including estimated wind conditions and precipitation).
  - 4) Survey results: note all spotted owl detections, including sex and age if possible, time of response and type of location (e.g. audio, visual, or both). For multiple or moving owls, list information and number each response or observation. This will allow more accurate determinations of management centers.
  
- o It is recommended that all sightings of, or responses by, barred owls, great horned owls, northern goshawks, or any other raptor species be recorded. The presence of barred owls, great horned owls, and goshawks may affect spotted owl responses.
  
- o For each visit, regardless of survey results, map (preferably on a USGS topographic, orthophoto, or some other high quality map), the following:
  - 1) Route surveyed and stations called; and
  - 2) All spotted owl response or observation locations. For multiple or moving owls, map all response or observation locations and number to correspond with survey results. Again, this will assist in determining activity centers.

It is recommended that barred owl, great horned owl, and northern goshawk responses or observation locations be mapped.

## SURVEY METHODS

Two types of surveys are accepted: spot calling and leapfrog calling. Each is described below. Spot calling is the recommended method. Whatever method you use, be sure you cover all spotted owl habitat within the survey area.

- 1) Spot calling: Set up a series of calling points 1/4 to 1/2 mile apart along the road transects. When possible, pick prominent points which cover large areas. Spend at least 10 minutes at each point. Spend more time if the topography prevents you from hearing birds that might respond from the previous calling point (eg. you cross a major ridge). If the topography lends itself to fewer, prominent calling points, spend more time at each point. Be sure the entire survey area is adequately covered.

- 2) Continuous walking or leapfrog surveys: Walk the designated route playing the tape and pausing at prominent points and at regular intervals throughout the area to conduct informal stations of 10-minute duration. If two people are involved, you may use a leapfrog method (See Forsman 1983 - Methods and Materials for Locating and Studying Spotted Owls, USFS Gen. Tech. Rept. PNW-162).

The following instructions should be followed using either method:

- o It is recommended that a surveyor use a cassette tape with recorded spotted owl calls, a tape player, and a sound amplification device (e.g. a hand-held megaphone or loudspeaker). The use of a cassette tape, tape player, and sound amplification device enables surveyors to assure consistent and equitable calling methods. The amplified sound must be heard at least 1/4 mile. Surveyors must be stationed outside their vehicle. CAUTION: In areas of high owl density (e.g., California coastal area), over-amplification may confound survey results by eliciting responses from spotted owls representing multiple territories.
- o Start the tape and let it run for 3-7 calls, listen for a minute or two, then play another set of calls. It is recommended that the owl tape contain calls from both male and female owls. In particular, it should include male 4-note contact calls, and male and female agitated calls.
- o Continue this process for at least 10 minutes at each calling station.
- o Voice calling may be used by experienced surveyors at the discretion of the project leader (see SURVEYOR CREDENTIALS/QUALIFICATIONS). Negative results from inexperienced voice callers may not be adequate for evaluating spotted owl presence/absence.
- o Characterize behavioral observations as best you can. Make note of agitated calls, continuous responses, movement (toward you or away from you), or situations such as when one response is received and the owl is quiet thereafter. Recording this type of information may assist with the identification of activity centers.
- o Conduct night surveys between sunset and sunrise. Be sure not to call the same section of a survey route at the same time on each survey effort (i.e., vary time you start and the section of the route from which you start).
- o Do not survey under inclement weather conditions, such as high winds (> 10 mph), rain, heavy fog, or high noise levels (stream noise, machinery, etc.) which would prevent you from hearing responses. If weather conditions or noise levels are in doubt, be conservative. Survey visits conducted under marginal conditions will reduce quality of the overall survey effort. Negative results collected under inclement weather conditions may not be adequate for evaluating spotted owl presence/absence.
- o Systematically survey spotted owl habitat within each planning or activity area (as defined above in SURVEY AREA) until an owl responds, or if no response is heard, until a minimum of 3 complete night visits are conducted each year for a 2-year period or a minimum of 6 complete night visits are conducted for a 1-year period.

- The objective of a complete visit is to conduct a thorough survey of the entire area in one field outing; however, in some cases this may not be possible. A complete visit may be a combination of a day and a night field outing and, in addition, may include a daytime follow-up visit. If reasonable effort was made to cover the area (timber sale or planning) in one outing, but this was not accomplished, then the remaining unsurveyed area should be surveyed in the following field effort. To reduce the chance of owls moving between portions of the survey area and, as a result, being missed, complete the visit on consecutive days as much as possible. The entire area should be covered within 7 days in order to be considered as one complete visit.

- If the project area is too large to be surveyed in 7 days, it should be divided into smaller areas based on available habitat, topography, drainages, and other important factors. Survey areas need to be small enough to be completely surveyed within the specified time period.

- If a surveyor gets an owl response at night and conducts a daytime follow-up, the combination of the night outing and the daytime follow-up would be counted as 1 complete visit for that owl or pair of owls. If a surveyor goes out at night and does not get a response, a daytime follow-up would not be necessary. In this case, the night outing alone would be considered as 1 complete visit. Whether or not owls are heard, the entire area needs to be surveyed to count as a complete visit.

- Visits must be spaced at least 5 days apart. For example, assume a visit ends on the 3rd of May. Using a proper five-day spacing (4-8 May), the next possible visit date would be 9 May.

\* At least 2 of the night visits per year must be conducted before 30 June for a 2-year survey and at least 4 of the night visits must be conducted before 30 June for a 1-year survey. To ensure the best coverage, at least 1 visit should be conducted in June. Survey effort should be spread out over 2-3 months, to avoid survey efforts concentrated in a short period of time, particularly at the beginning of the survey season. Concentrating visits early in the season may result in inaccurate assessments of nesting status; therefore such surveys may not be adequate for evaluating spotted owl presence/absence.

- Where survey seasons are restricted (due to snow, landslides, mud, bridge failures, etc.), the survey period may be adjusted to fit the conditions. Documentation should be provided to explain the modified survey period.

- Surveys may be conducted during the day where there are no roads or foot trails to traverse at night, or where there are other safety concerns. Documentation should be provided for specific safety concerns, etc.

o If birds are heard during a survey:

- Estimate the bird's original and final location. One method is to triangulate on the owl's call, taking compass bearings from 2-3 locations. Make sure compass bearings are taken in as short a time-frame as

possible. Record on the survey form the method used to estimate the location.

- Record the location(s) of the owl, preferably on a map or photo attached to the survey form.

The intent of the triangulation and mapping is to provide a means for verification of the location. Attempt to confirm the owl(s) with a daytime follow-up. Daytime locations are very important in determining more precise management (activity) centers.

- o When a bird responds, record the required data. If no response is heard, proceed to the next calling point. Continue until the survey area is completely covered.
- o If a bird(s) responds at night, return to the area during the day as soon as possible (daytime follow-up) to verify status as described below, unless status has already been determined.
  - The objective of the daytime follow-up is to locate spotted owls (pairs or singles) by conducting an intensive search within the general vicinity (approximately a 0.5-mile radius) of the original response location at night. Surveys may begin from roads closest to the night response area. However, if owls do not respond to road surveys, surveyors should conduct walking routes through the area. Surveyors should spend sufficient time within the stand to cover the area well. This may take several hours, depending on the terrain. Observers should watch for owls flying in without responding and other evidence of occupancy, such as pellets, whitewash, and molted feathers. Pellets, whitewash, or feathers alone are not sufficient to document spotted owl presence or residency. Mobbing jays are also a potential indicator of owl presence. The follow-up should be completed as soon as possible after presence was detected, as owls are more apt to be located near the previous night's location. A daytime follow-up is only the second part of a complete visit.
- o If a response occurs during daylight hours and there is sufficient time to determine the status, do so.

DO NOT HOOT ANY MORE THAN IS NECESSARY. BY STIMULATING THE OWLS TO MOVE AROUND, YOU MAY INCREASE THEIR RISK OF PREDATION.

EXCESSIVE CALLING NEAR A NEST SITE MAY CAUSE HARASSMENT BY BRINGING THE FEMALE OFF THE NEST. EXCESSIVE USE OF THE AGITATED CALL IN HIGH OWL DENSITY AREAS (E.G., CALIFORNIA COASTAL AREAS) MAY ALSO CONFOUND SURVEY RESULTS BY ELICITING RESPONSES FROM OWLS REPRESENTING MULTIPLE TERRITORIES.

USE CONSERVATIVE JUDGEMENT AND HOOT ONLY AS MUCH AS IS NEEDED TO DETERMINE STATUS.

- o Once a bird responds at night, complete the station to determine pair status and the remainder of the survey route. To avoid 'leading' a spotted owl through calling, we recommend that once an owl responds, the surveyor go to the other end of the survey route and complete the rest of the survey. If that is not practical, survey only the remaining points that are beyond the earshot of the

responding bird. Beyond earshot is generally over a ridge or at least 1/2 to 3/4 mile straight-line distance from the owl. Completing the route will provide an opportunity to detect any other owls.

- o Continue to call for the duration of the station visit even after other species respond unless the surveyor believes that this will increase the potential for predation by great horned owls or goshawks, for example.
- o If a single bird responds, and after 3 complete visits (2-year survey) or 6 complete visits (1-year survey) resident status has not been determined, then up to 3 additional visits may be necessary in that year. Additional visits are visits conducted beyond the number of complete visits required by the 2- or 1-year survey protocol and are conducted only in the general area of the response (a 0.5-mile radius around the site). If resident status is determined at any point during the additional visits, no more visits to that particular site are required that year. Other portions of the project activity area may require further surveys.
- o For additional visits, maintain the standards (timing, intervals, weather condition limitations, etc.) outlined elsewhere in this document.

- 2-year survey

In a 2-year survey, the additional visits are to be conducted the same year as the response.

If the last response occurs on:

- visit #1, conduct 1 additional visit
- visit #2, conduct 2 additional visits
- visit #3, conduct 3 additional visits

OR

until resident status is determined.

- 1-year survey

If the last response occurs on:

- visit #4, conduct 1 additional visit
- visit #5, conduct 2 additional visits
- visit #6, conduct 3 additional visits

OR

until resident status is determined

If 3 responses are not obtained, even after the additional visits, then the bird is not classified as a resident single.

## STATUS

- o Verify the status according to the following definitions (status visits can be day or night). These definitions may be somewhat different from the status definitions outlined in the density/demography survey guidelines due to the different objectives of the guidelines for surveying proposed management activities.

PAIR STATUS is established by any of the following:

- 1) a male and female are heard and/or observed (either initially or through their movement) in proximity (< 1/4 mile apart) to each other on the same visit; or
- 2) a male takes a mouse to a female (see "mousing" clarification under GUIDELINES FOR DETERMINING REPRODUCTIVE STATUS); or
- 3) a female is detected (seen) on a nest; or
- 4) one or both adults are observed with young. Young alone do not define a pair because young barred owls look like young spotted owls until late in the summer.

- o When unidentified calls are heard in the vicinity of a known spotted owl do not assume species identification of the unknown owl. Daytime follow-ups should be used to clarify these situations.

RESIDENT SINGLE STATUS is established by:

- 1) the presence or response of a single owl within the same general area on 3 or more occasions within a breeding season, with no response by an owl of the opposite sex after a complete survey; or
- 2) Multiple responses over several years (i.e., 2 responses in year 1 and 1 response in year 2, from the same general area).

- o A resident single may represent a succession of single owls within the same general area in a single or multiple years.

Determining if the responses occur within the same general area should be based on topography and the location of any other owls known for the surrounding area. This should be determined by the wildlife biologist for the particular area. Radio-telemetry and banding data can also be used to aid in determining status of singles.

TWO BIRDS, PAIR STATUS UNKNOWN is established by:

- The presence or response of 2 birds of the opposite sex where pair status cannot be determined and where at least 1 member must meet the resident single requirements.

STATUS UNKNOWN is established by:

- The response of a male and/or female which does not meet any of the above category definitions.

## PROTOCOL FOR DETERMINING REPRODUCTIVE STATUS

### REPRODUCTION SURVEYS

Determining reproductive success is not required to avoid "take", if breeding season restrictions are applied to all harvest activity in order to protect owl reproduction during any given year. Restrictions may be dropped if, according to the protocol, surveys reveal that owls are non-nesting or that no young were produced.

The following is the recommended protocol for determining reproductive status of spotted owls. The protocol is designed for management purposes and may not meet all research goals. Reproduction surveys may provide information on nest tree locations which provide the most accurate management (activity) center locations.

- o There are 2 stages of reproduction surveys: nesting status and reproductive success.

### NESTING STATUS

- o Conduct nesting status surveys between 1 April and 1 June. The start date is based on nest initiation dates. If local data suggests a different date for nest initiation, adjust the start date accordingly. Young identified after 1 June would still confirm nesting.
- o Spread the surveys throughout the survey period. Do not conduct all nesting status surveys early in the breeding season.
- o Use a standard "mousing" procedure as described below to determine nesting status. However, DO NOT "MOUSE" BIRDS ANY MORE THAN IS NECESSARY TO DETERMINE NESTING STATUS. BY STIMULATING THEM TO MOVE AROUND DURING THE DAY, YOU MAY INCREASE THEIR RISK OF PREDATION. THE SAME GOES FOR HOOTING. EXCESSIVE CALLING NEAR A NEST SITE MAY CAUSE HARASSMENT AND ENDANGER EGGS OR YOUNG BY BRINGING THE FEMALE OFF THE NEST.

### MOUSING

- o Locate 1 or both members of a pair during the day and offer them mice or other small prey items.
- o Once the owl(s) take prey, or are found with natural prey, record the 'fate' of each prey item (e.g., eaten, cached, given to female or young). The fate of the prey is used to classify nesting status.
- o If the owl eats the prey item, continue to offer additional prey items until the owl caches the prey, sits on it for an extended period of time (30-60 minutes), refuses to take additional prey, or carries the prey away. If the bird flies with the prey, follow and try to determine the final disposition of the prey. For more details on mousing procedures, see Forsman (1983) Methods and Materials for Locating and Studying Spotted Owls. USDA Forest Service, Gen. Tech Rept. PNW-162.

- o Field personnel should make a concerted effort to get the owl(s) to take mice. Be creative in placing a mouse where the owl can easily see and capture it and offer mice to the mate of an owl that has refused mice on that visit.

The site will be classified as nesting, non-nesting, or unknown nesting status based on your observations.

## NESTING

The owls will be classified as nesting if any of the following conditions are observed.

Two observations, at least 1 week apart, are required to determine nesting status if the first observation occurs before 1 May. This is necessary because the owls may show signs of initiating nesting early in the season without actually laying eggs and their behavior could easily be mistaken for nesting behavior. After 1 May, a single observation is sufficient.

Nesting is confirmed if, on 2 visits before 1 May, or 1 visit after 1 May:

- 1) the female is detected (seen) on the nest; or
- 2) either member of a pair carries natural or observer-provided prey to the nest; or
- 3) a female possesses a brood patch when examined in hand during mid-April to mid-June. Only 1 observation is required. Dates may vary with the particular areas. Be careful not to confuse the normal small area of bare skin (apteria) on the abdomen with the much larger brood patch. A fully developed brood patch covers most of the lower abdomen, extending to the base of the wings. Describe the brood patch on the field form, including length, width, color, and texture of the skin, and any evidence of regenerating feathers around the edge (NOTE - while a scientific research permit is not required by the Service for calling spotted owls, any capture or handling of spotted owls does require such a permit); or
- 4) young are detected in the presence of 1 or both adults. Because young barred owls look like young spotted owls until late in the summer, young alone are not sufficient.

## NON-NESTING

The site is classified as non-nesting if any of the following are observed. Again, except for brood patch information, 2 observations are required during the nest survey period, with at least 3 weeks separating these observations to ensure that late nesting attempts are not missed. The second observation should occur after 15 April. Because nesting attempts may fail before surveys are conducted, the non-nesting status includes owls that did not attempt to nest as well as those that have failed.

Non-nesting is inferred if:

- 1) the female is observed roosting for 60 minutes, particularly early in the season (1 April to 1 May). (Be aware that nesting females with large nestlings often roost outside the nest during warm weather. If in doubt, be sure to schedule 1 or more visits in mid-June to check for fledglings.);
- 2) the female does not possess a brood patch when examined in hand between mid-April and mid-June; or
- 3) you offer prey to 1 or both members of the pair and they cache the prey, sit with prey for an extended period of time (30-60 minutes), or refuse to take additional prey beyond the minimum of 2 prey items. To be considered a valid nesting survey, an owl must take at least 2 prey items.

Surveys where the bird(s) leaves the area with prey and you are unable to determine the fate of the prey cannot be classified as to nesting status and do not count toward the required 2 visits. Banded or radio-marked birds may be reluctant to take prey at all; therefore, nesting status should be inferred from other means (e.g., checking for fledglings later in the season).

#### UNKNOWN NESTING STATUS

If nesting is not determined before 1 June, you CANNOT classify the owls as non-nesting using the criteria listed above.

- o If owls are found after 1 June, without young, nesting status is unknown.
- o If no owls are found after 1 June (at those sites where owls were present prior to 1 June), nesting status is unknown.

#### REPRODUCTIVE SUCCESS (NUMBER OF YOUNG FLEDGED)

Once a pair is classified as nesting, conduct reproductive success surveys after the time the young leave the nest (fledge), usually in late May to late June. If local fledging times are available you may adjust the dates accordingly.

Schedule at least 2 visits to the site to locate and count fledged young, timing the visits so that the fledged young are observed as soon after leaving the nest as possible to reduce losses to predation.

- o Attempt to locate fledged young. Use visual searches and/or mousing. If young are present, the adults should take at least some of the prey to the young. The sight of an adult with prey will usually stimulate the young to beg, revealing their number and location.
- o If the birds take at least 2 prey items and eventually cache, sit with, or refuse further prey without ever taking prey to fledged young; on at least 2 occasions, separated by at least 1 week, 0 young are recorded.

If you wish to determine the true number of fledged young, do the following:

- o On the first reproductive success visit, count the number of fledged young seen or heard.
- o Conduct a minimum of 1 follow-up visit, 3 to 10 days after the first fledged young is seen. This is necessary because it is possible to miss some owlets on a single visit.
- o If you do not elicit a response on a minimum of 2 visits, separated by at least 1 week during the fledging period, then classify the production of young as unknown.
- o If you count young on 1 visit but do not get back for a second visit, or find no owls on the second visit, classify the number of young as 1+ or 2+ etc.

Opportunistic mousing late in the season (after July 30) may be useful for providing supplemental information about site productivity. However, mousing efforts late in the season must be considered inconclusive if they fail to provide positive information, because dispersal and/or mortality may have occurred.