

SURVEY PROTOCOL FOR THE GREAT GRAY OWL



WITHIN THE RANGE OF THE NORTHWEST FOREST PLAN

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**SURVEY PROTOCOL FOR THE GREAT
GRAY OWL
(*Strix nebulosa*)**

EXECUTIVE SUMMARY

The objective of this survey protocol is to reduce the inadvertent loss of undiscovered sites (breeding pairs) by searching potential suitable habitats. This survey protocol is designed to explain the biological requirements of the great gray owl and provide survey methods for pre-disturbance surveys in compliance with the 2001 Standards and Guidelines (USDI/USDA, 2001). It is intended to provide a method of determining presence and absence of great gray owl breeding pairs within proposed project areas with a reasonable level of assurance and to document known sites (breeding pairs) discovered during surveys.

The triggers of this survey protocol are as follows:

1. The proposed activity is within the range of the Great Gray Owl.
2. The proposed activity is within or contains suitable nesting habitat (see description of nesting habitat and nest tree table by physiographic province for size ranges of trees).
3. The proposed activity will cause a significant negative effect on the species' habitat or persistence of the species at the site.

If yes to all three triggers above: Survey suitable nesting habitat for 2 consecutive years, with 6 visits per year within the March 15th-July 15th survey season to fulfill protocol requirements.

Range of the Great Gray Owl within the NWFP areas

The Great Gray Owl is known to occur in the following physiographic provinces within the Northwest Forest Plan area: WA Western Cascades, WA Eastern Cascades, OR Western Cascades, OR Eastern Cascades, OR Coast Range (in Douglas and Lane Counties, on the west from the crest of the OR Coast Range to the east boundary of the Coast Range PP.), OR Willamette Valley and OR Klamath (Interagency Species Management System; Oregon Breeding Bird Survey, 2003; Winters et al, 1986; Fetz, et al, in press).

New Data Reflects a Change Of Known Sites Elevations to below 3000'

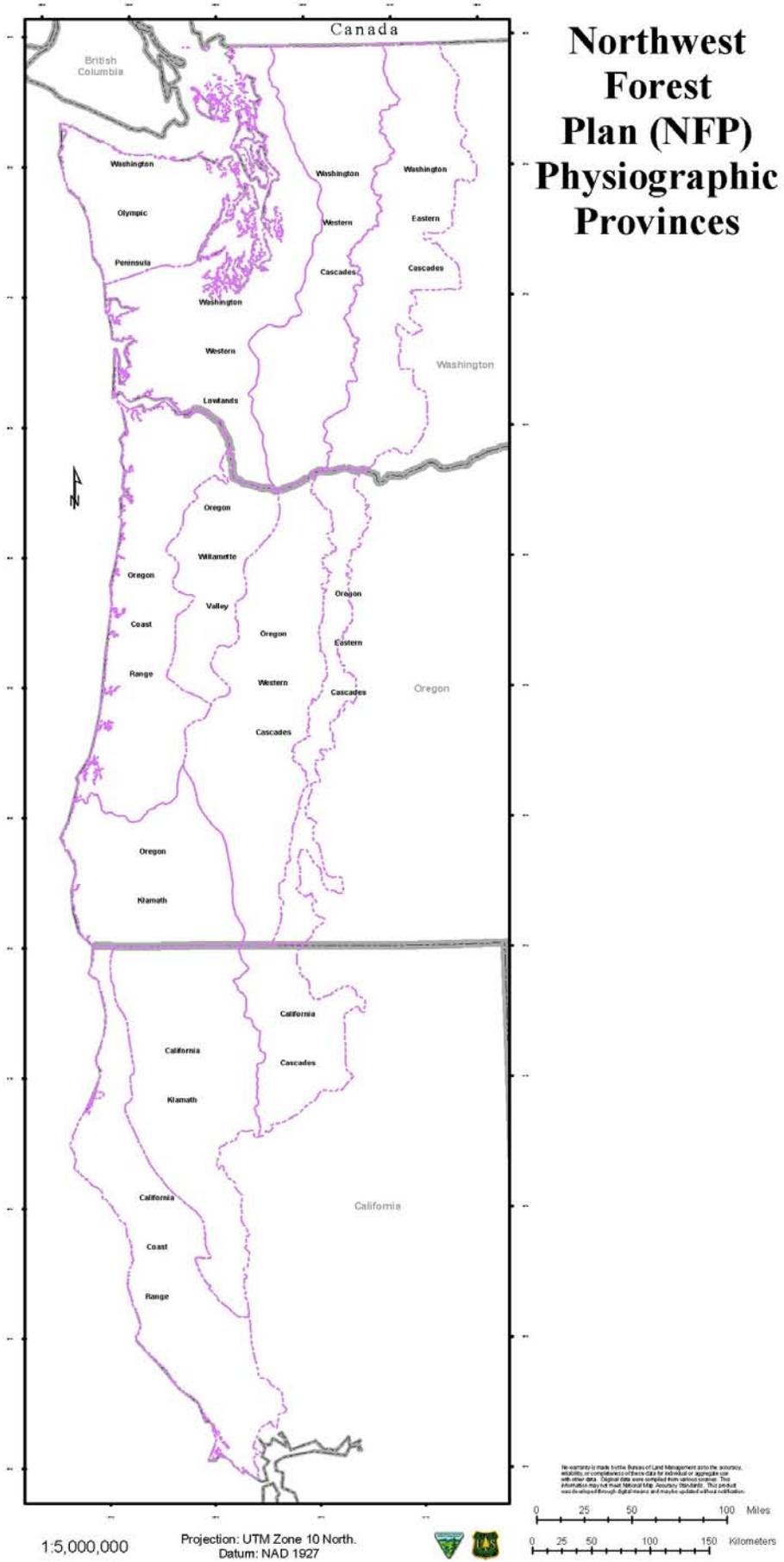
In the 1995 version of the survey protocol it was assumed that Great Gray Owls occupied a 122 m (400 ft) elevation band, 1,372-1,494 m (4,500-4,900 ft) in the Blue Mountains (Bull and Henjum 1990) and a 299 m (980 ft) band on the Westside of the Cascade Mountains, Willamette National Forest, from 945-1,244 m (3,100-4,080 ft) (Goggans and Platt 1992). Recent findings contradict this assumption. In the Cascade Range in recent years, numerous Great Gray Owls and nests have been found below 914 m (3,000 ft), with the lowest known nest at 48 meters (157 ft) (Interagency Species Management System-ISMS). See below for survey elevation limits.

Areas Where Pre-Disturbance Surveys Are NOT Needed For A Reasonable Assurance Of Persistence

In the areas described below pre-disturbance surveys are not necessary to provide for a reasonable assurance of persistence. While there are known sites within these described areas, the inadvertent loss of these undiscovered sites would not substantially increase the concern for persistence, but this does not preclude units from conducting pre-disturbance surveys.

- **Range:** *No pre-disturbance surveys are necessary in the CA Klamath or CA Cascades physiographic provinces.*
- **Foraging openings:** *Suitable nesting habitat adjacent to natural openings smaller than 10 acres is not necessary to be surveyed.*
- **Elevation limits:** *It is necessary to conduct pre-disturbance surveys below 3000 ft. (914 meters) but no lower than 500 ft. (152 meters) and no higher than 6000 ft. (1828 meters).*

Appendices are attached to this document, which contain essential information used in this protocol. Survey forms and associated keys are located in Appendices 1 and 2.



I. TRIGGERS FOR SURVEY

Trigger Criteria

The triggers of this survey protocol are as follows:

1. The proposed activity is within the range of the Great Gray Owl.
2. The proposed activity is within or contains suitable nesting habitat (see description of nesting habitat and nest tree table by physiographic province for size ranges of trees).
3. The proposed activity will cause a significant negative effect on the species' habitat or persistence of the species at the site.

If yes to all three steps above: Survey suitable nesting habitat for 2 consecutive years, with 6 visits per year within the March 15th-July 15th survey season to fulfill protocol requirements.

The 2001 Record of Decision (ROD) Standards and Guidelines from the Survey and Manage (S & M) Final Environmental Impact Statement states that: The line officer should seek specialists' recommendations to help determine the need for a survey based on site-specific information. In making such determinations, the line officer should consider the probability of the species being present on the project site, as well as the probability that the project would cause a significant negative effect on the species habitat or the persistence of the species at the site.

Activities that are Not generally habitat disturbing

The following activities are generally not expected to result in significant negative effects on habitat, life cycle, microclimate or life support systems or persistence of Great Gray Owls at the project location because of short duration or low intensity. The project may result in reduced reproductive output for a breeding year at the disturbed site, but is not expected to affect species persistence at the site.

- Tree planting with hand tools
- Snag creation with inoculation
- Manual fireline construction (without chainsaws)
- Forest road maintenance (includes hazard tree removal)
- Power line corridor brushing
- Hand removal or biological control (using insects/ animals) of noxious weeds
- Occasional (3-4) low-level [<152 m (500ft)] aircraft flights within a 24hr period
- Smoke from prescribed fire outside the breeding season
- Manual trail construction/reconstruction

Activities that Are generally habitat disturbing

The following activities are generally expected to result in significant negative effects on habitat, life cycle, microclimate or life support systems or persistence of Great Gray Owls at the project location.

1. Activities that modify suitable nesting habitat or fall potential nest trees (see description of nesting habitat and nest tree table for each physiographic province).

Examples include but are not limited to:

- Timber harvest
 - ◊ Regeneration harvest
 - ◊ Commercial thinning
- Post and pole thinning
- Road construction/reconstruction
- Guy line or tail hold trees
- Logging landings/expansion
- Trail construction/reconstruction using any motorized equipment

2. Activities that do not modify suitable habitat but do cause a habitat disturbing activity by harassing owls during breeding season (thereby affecting the species “life cycle”).

Certain activities that do not modify suitable nesting habitat can trigger pre-disturbance surveys *if they produce noise above ambient levels within 100 meters of suitable nesting habitat or within 1 mile of suitable nesting habitat for blasting*. Noise alone can trigger surveys when the noise is repetitive or continuous and occurs during the breeding season.

Examples of such activities are:

- Blasting within the breeding season, repeated blasting and crushing in rock pits, quarries and mines (within 1 mile)
- Development of recreational areas (ski areas, campgrounds, trails, etc)
- Road construction
- Pre-commercial thinning (chainsaws), if adjacent to suitable nesting habitat.

II. SPECIES DESCRIPTION

The Great Gray Owl is one of the largest of the North American owls. Like the majority of owls, they exhibit sexual dimorphism where the male is smaller than the female. They have bright, yellow eyes, an obvious white patch over the gular region (commonly known as a bowtie) and do not have ear tufts. Their plumage tends to be dusky-gray to sooty, with white mottling over the crown, nape, back, rump and shoulders, and with streaked under-parts (Duncan and Hayward 1994). The facial disk is grayish-white with distinct concentric semicircular bars of dusky brown. The bill color is a dull to bright yellow or a pale olive green (Johnsgard 1988).



Facial Disk –photo (owl website)

In planning and conducting surveys for Great Gray Owls, it is important to keep in mind several characteristics of this species.

1. Great Gray Owls are not known to defend a large territory and consequently are not likely to answer from or travel a great distance in response to broadcast calls.

2. Both males and females have very soft vocalizations that are difficult to hear and, therefore, require extreme concentration and listening skills to detect.
3. Great Gray Owls are much less likely to approach the observer than are Northern Spotted Owls (*Strix occidentalis*).
4. Great Gray Owls often don't accept prey when offered by a surveyor
5. When Great Gray Owls do take offered prey, they generally eat it themselves rather than leading the observer to a mate or nest.

III. ECOLOGY

Understanding important ecological differences between Great Gray Owls inhabiting boreal forests and Great Gray Owls of the western U.S. is critical to addressing habitat requirements of Great Gray Owls. Throughout this document, it will be necessary to distinguish between traits and behaviors that are shared by all members of the species and those that differ between those residing in boreal forests and those in montane forests of the western U.S. The Great Gray Owl Taxon team has attempted to clarify these distinctions in this document where appropriate.

Range

The Great Gray Owl is the only member of the *Strix* genus found both in North America and Eurasia. It is essentially a bird of the boreal forests, occupying a latitudinal band from Scandinavia through much of the former Soviet Union (Mikkola 1983) and from Alaska through Ontario (Bull and Duncan 1993). The owl's northern limits generally coincide with the treeline; trees are critical for nesting, for cover and for hunting perches. The Great Gray Owl is unevenly distributed throughout its range. The Great Gray Owl is known to occur in the following physiographic provinces within the Northwest Forest Plan area: WA Western Cascades, WA Eastern Cascades, OR Western Cascades, OR Eastern Cascades, OR Coast Range, OR Willamette Valley, OR Klamath, CA Klamath, and CA Cascades where suitable habitat (nesting, roosting and foraging) is present (Interagency Species Management System (ISMS) data 2003, Oregon Breeding Bird Survey, 2003, Winters et al, 1986, Fetz, et al, in press)

The Great Gray Owl extends its breeding range outside the boreal forests in the western United States. In Montana, Wyoming, Idaho, Washington, Oregon, Nevada and California, it is found in montane and subalpine forests (Winter 1986, Bull and Henjum 1987, Forsman and Bryan 1987, Franklin 1987, Bull and Duncan 1993). The most westerly and southerly portions of this breeding range include areas covered under the NWFP (Huff et al. 1996).

General Ecology

Great Gray Owls hunt primarily from perches, listening and watching the ground intently. When prey is detected, the owl usually flies only a short distance (average 10.5 m (35 ft), Bull and Henjum 1990; but up to 100 m (328 ft), (Bull and Duncan 1993). Great Gray Owls can detect and capture prey by sound alone, which permits the capture of prey beneath snow (Law 1960, Godfrey 1967, Nero 1969). Hunting occurs nocturnally, crepuscularly, and particularly in boreal summers or when numerous young are being fed, diurnally. Despite their large size, Great Gray Owls utilize relatively small prey. Throughout their range, the primary prey are small mammals (families *Sciuridae*, *Geomyidae*, *Heteromyidae* and *Muridae*), particularly rodents (Mikkola 1983 and Bull and Duncan 1993).

Similar to most owls, Great Gray Owls do not construct nests or carry nesting materials (though females may scratch a depression in the bottom of a nest such as a snag). Great Gray Owls are, therefore, dependent on existing nest substrates. Potential substrates include stick nests built by Common raven (*Corvus corax*) and hawks (*Buteo* and *Accipiter*), squirrel (*Sciurus*) nests, broken-top snags, the platforms caused by infections of dwarf-mistletoe (*Arceuthobium*) and artificial platforms.

Great Gray Owls are long-lived, capable of high reproduction (nesting annually and producing clutches of as many as nine eggs; Mikkola 1993, Bull and Duncan 1993), and capable of traveling great distances (Nero 1980, Duncan 1992). They tolerate both conspecifics and other birds of prey within their home range (Mikkola 1983) and defend only a small area around their nests (Bull and Duncan 1993); competition for nest sites (with Northern Goshawks (*Accipiter gentiles*), *Buteo* hawks and *Bubo* owls) is likely greater than competition for prey. The highest reported nesting density in North America is 1.88 pairs/km² (0.73 pairs/mi²) in Manitoba and northern Minnesota (Duncan 1987). Bull and Henjum (1990) calculated densities of 1.72 pairs/km² (0.66 pairs/mi²) on their two eastern Oregon study areas.

Ecological Differences

Voles, or voles and pocket gophers, comprise more than 80% of the diet of Great Gray Owls in all studies summarized in Mikkola 1983 and Bull and Duncan 1993. Nonetheless, a critical distinction exists between boreal Great Gray Owls and those in the western U.S. In the montane regions of the western U.S., Great Gray Owls utilize a much wider variety of prey species, including more species within *Microtus* and *Clethrionomys*, more species of other rodents, of other small mammals and of birds (see diet section below for Cascade Range specific information). Moreover, pocket gophers are absent from most of the boreal range of these owls. As a result, nesting by boreal Great Gray Owls is constrained by the abundance of one or two species of voles that are subject to dramatic population fluctuations. One effect of this dependence is that local productivity varies greatly from one year to the next. Great Gray Owls within the Northwest Forest Plan range seem to experience smaller clutch and brood sizes (1-3) than birds in the northern portions of its range.

Additionally, since these population fluctuations tend to be geographically asynchronous, Great Gray Owls in boreal forests can exhibit very nomadic behavior, traveling great distances between seasons or years to find sufficient prey. Even among boreal Great Gray Owls some individuals appear to show remarkable site fidelity, remaining on a breeding home range despite low prey numbers (Mikkola 1983). Among Great Gray Owls breeding in the western U.S., a much greater site fidelity and little movement appear to be characteristic. In this portion of their range, there is no evidence, from banding or telemetry studies, of any seasonal movements greater than 20 km (12 mi) (Bull et al. 1988a, Bull and Duncan 1993), and breeding sites are occupied for many consecutive years (R. Gerhardt pers. obs. 2003, Bull and Henjum, 1990). Home ranges for breeding adults in Northeastern Oregon averaged 449 ha (1,112 ac) and ranged from 131-649 ha (324 to 1,606 ac), though they have been observed foraging up to 3.2 km (2 mi) from the nest (Bull and Henjum 1990).

Diet

Great Gray Owl prey items in the western United States are primarily pocket gophers and voles. Great Gray Owls tend to forage in meadows or other openings, though males in Northeastern Oregon were noted foraging in forest stands with 11-59% canopy closure (Bull and Henjum 1990). Within Western Cascades PP of Oregon the preliminary data reviewed suggests that some Great Gray Owls are foraging within the nest stands (see

photo of GGO nest right). Platt & Goggans (1992) found in their study area in the Western Cascades PP that Western pocket gopher (*Thomomys mazama*) was the preferred prey, with Townsend's chipmunk (*Tamias townsendii*) as second and third was Creeping vole (*Microtus oregoni*).



Pocket Gopher activity sign noted in nest stand

Breeding/ Courtship

Data on breeding Great Gray Owls within the range of the NWFP area and the Northern Spotted owl are limited and are drawn from localized studies and anecdotal descriptions (Duncan and Hayward 1994, Verner 1994, Bull and Henjum 1990). Courtship generally begins in late February or early March. Breeding and egg-laying may take place as early as late March or as late as early June (E. Bull, pers. comm. 1995, Platt and Goggans 1991, Great Gray Owl Strategic Survey 2003) and egg-laying may be delayed in areas with heavier snows or lows in the prey cycle (D. Johnson, pers. comm. 1995). Clutch size varies from one to four eggs and females incubate the eggs while the male brings her prey (Bull and Henjum 1990). Incubation takes about 28-29 days. Franklin (1988) found in his study of nests in southeast Idaho and northwest Wyoming that eggs hatched about May 5th, with a range of 10 days on either side of that date. However, on the first year of our study two of the nest study areas within the Western Cascades pp had birds still incubating in June of 2003 (D. Quintana-Coyer, Per. Obs. 2003).

Fledglings leave the nest between three and four weeks of age. Both the male and female feed the young, with the female staying close to protect them. After another three to six weeks, the adult females tend to leave the site and the care of the young to the male. Males will continue to feed the young for up to three months after the young leave the nest (Bull and Henjum 1990).

In general, Great Gray Owls are not territorial, usually only defending and hooting from the immediate nest site (E. Bull, pers. comm. 1995, D. Johnson, pers. comm. 1995). However, members of the Great Gray Owl Taxon team have noted that there are exceptions to this behavior and have seen mixed results on response distance in the Cascades. Single owls will also hoot and establish a territory. Pairs will aggressively defend the nest site and are known to pursue and attack people, Common Ravens, Red-tailed Hawks (*Buteo jamaicensis*), even coyotes (*Canis latrans*) (Bull and Henjum 1990). Eggs, nestlings and fledglings are preyed upon by a variety of predators, but principally Common Ravens, Northern Goshawks and Great Horned Owls (*Bubo virginianus*) (D. Johnson, pers. comm. 1995, Bull and Duncan 1993).

Habitat Use

Availability of nest sites and suitable foraging habitat are considered the most important factors governing habitat use by breeding Great Gray Owls (Collins 1980, Nero 1980,

Mikkola 1983). Since foraging and nesting habitat can be quite different, proximity of these key components may become important as well.

Habek (1994) includes a comprehensive discussion of the dynamics of forest communities used by Great Gray Owls. This includes information from throughout the owl's North American range, but has sections specific to portions of the NWFP area. Within the NWFP area, relatively few studies (Goggans and Platt 1992, Fetz et al. in press) have examined the habitat associations of Great Gray Owls. A strategic telemetry study was initiated in the spring of 2003 within both the OR-Western Cascades and Klamath physiographic provinces. However, this data will not be available for analysis until Fall of 2005. There are, however, frequent anecdotal descriptions of Great Gray Owl habitat associations, as determined through presence/absence surveys in the NWFP area (pers. comm. with surveyors and ISMS data 2003). Consequently, these sources and studies indicate that forest types and habitat associations of areas used by Great Gray Owls are quite varied. Where mature stands (for nesting and roosting) exist near open, grassy areas (for foraging), tree species and forest composition seem of little importance to these birds.

Nest Structure

Great Gray Owls rely on old hawk and raven stick nests or natural depressions on broken-topped snags or stumps for nest sites (Duncan and Hayward 1994). They also nest on natural platforms formed by dwarf-mistletoe. Great Gray Owls will accept artificial nest structures as well (Bull et al. 1987, Bull and Henjum 1990). In the Siskiyou Mountains of southern Oregon, Fetz et al. (in press) found that all Great Gray Owl nests were stick platforms situated either in the forked top of trees or on a horizontal limb next to the trunk. The actual nest structure and its support may be relatively unimportant in nest site selection compared to the nest site habitat and availability and proximity of foraging habitat (Duncan and Hayward 1994).

Nesting Habitat

In southcentral Oregon coniferous forests associated with meadow systems were used for nesting (Forsman and Bryan 1987). In northeastern Oregon, all forest types sampled had nests, with 50% found in Douglas-fir (*Pseudotsuga menziesii*)/grand fir (*Abies grandis*) and 29% in lodgepole pine (*Pinus ponderosa*)/western larch (*Larix occidentalis*) (Bull et al. 1988b, Bull and Henjum 1990). In the Western Cascades physiographic province, the dbh of nest trees was found to have a range of 97-108 cm (38-42 in) (GGO Taxon Team data, 2003, Platt and Goggans, 1991). In the OR Klamath physiographic province, Fetz et al. (In press) found a mean dbh of 64.0 cm (25 in) in their study area nest trees. In Eastern Oregon nest trees varied from 58-79 cm (23-31 in) dbh. (Gerhardt, 2003, Per. Comm., Bull and Henjum 1990, Bull et al. 1988b).



Great Gray Owl nest (2003) Middle Fork RD, Willamette NF

In the Siskiyou Mountains of southern Oregon, Great Gray Owls nested most frequently in late successional stands dominated by Douglas-fir located near forest edges (Fetz et al. in press). Both nest sites and pair-sites (non-nesting owls) contained about 45% closed canopy forest within 0.8 km (0.5 mi) radius from the owl pair location or nest tree. Oak (*Quercus*) and oak/madrone (*Arbutus menziesii*) woodland was the second most common habitat. Regeneration harvests [clear-cuts] did not account for more than 10% of the area (0.8 km (0.5 mi) radius) at the ten nest sites. Aspect of nest sites was predominately north, with 20 of the 28 sites on northerly aspects.

Bull and Henjum (1990) found that Great Gray Owls preferred to nest in mature or older stands, with a fairly open understory and dense overstory (60% or greater canopy closure). The birds tend to select nest sites in forests near meadows or other openings that have sufficient prey numbers. However, they will nest in a wide variety of habitat types as long as the required habitat characteristics exist.

Required Habitat Characteristics -

- ◇ Large diameter nest trees –see Nest tree table
- ◇ Forest for roosting cover – see below.
- ◇ Proximity to foraging areas – see below.

Nest Tree Table by Physiographic Province

<i>Physiographic Province</i>	<i>Nest Tree size (dbh)</i>
WA Western Cascades	97-108 cm (38-42 in) dbh-Mixed Conifer
WA Eastern Cascades	58-79cm(23-31in)dbh-Mixed Conifer/Lodgepole/Pine
OR Western Cascades	97-108cm(38-42in)dbh-Mixed Conifer/fir/Oak/Madrone
OR Eastern Cascades	58-79cm(23-31 in) dbh-Lodgepole/Pine/Mixed Conifer
OR Coast Range (boundary defined above)	58-108cm(23-42in)dbh-Mixed Conifer/Pine/Oak/Madrone
OR Willamette Valley	97-108cm(38-42in)dbh-Mixed Conifer/Pine/Oak/Madrone
OR Klamath	58-108cm(23-42in)dbh-Mixed Conifer/Pine/Oak/Madrone/Lodgepole
<i>Use this table as general guidelines only--birds may use larger or smaller trees depending on the site.</i>	

Leaning trees and dense cover are important habitat components for fledglings. Since fledglings leave the nest before being able to fly, leaning trees enable the owlets to climb above the ground, making them less susceptible to predation (Bull et al. 1988).

Breeding season monitoring in southern Oregon suggests that Great Gray Owls will exhibit site fidelity during subsequent years (M. Broyles, pers. Comm. 2003). They have also been documented using alternate nest sites and may nest more than 0.8 km (0.5 mi) from the previous years nest (Bull and Henjum 1990). Great Gray Owls will also nest in close proximity (within 0.40-0.48 km (0.25-0.30 mi) to conspecifics (Bull and Henjum 1990).

Great Gray Owls tend to select nest sites in mature or remnant old-growth mixed-conifer forests near openings (within 200m of openings) that have sufficient prey numbers (Platt & Goggans, 1992). They will nest in a wide variety of habitat types as long as the required habitat characteristics exist. Nesting habitat may have a sufficiently open understory to allow for grass and forbs, which in turn support vole (*Microtus* and *Clethrionomys*) and pocket gopher (*Thomomys*) populations. This creates a situation whereby the same

area functions as both nesting and foraging habitat. Conversely, the nest stand may not provide foraging habitat but may be near openings, meadows and young plantations that do. Known Sites (nest trees) in the OR-Western Cascades PP were primarily (96% where N=25) located closer to (129m (423ft)) to man-made openings (foraging areas), than to natural opening (ISMS 2003).

Pre-disturbance surveys are NOT suggested in suitable habitat nesting habitat adjacent to man-made openings at this time.

Roosting Habitat

Great Gray Owls typically roost in trees near the trunk. They roost in trees with fairly dense canopy during hot weather and close to the trunk in inclement weather. Winter (1986) noted that Great Gray Owls roost at lower heights during warmer weather, possibly as a thermoregulatory response. In winter, owls occasionally roost in sunny open areas atop snags (Duncan and Hayward 1994). Although Great Gray Owls frequently use meadows or open areas for foraging, they typically roost away from the meadow's edge (Winter 1986).

Because fledglings leave the nest before they can fly, forested habitat around the nest is considered important for their survival. Bull and Henjum (1990) noted that roosts accessible to flightless young, such as leaning and deformed trees and perches high enough to avoid terrestrial predators, may increase reproductive success. Franklin (1987) found similar correlations in eastern Idaho.

Foraging Habitat

Foraging habitat throughout the Great Gray Owl's range is relatively open, grassy habitat, to include bogs, natural meadows, open forests and selective/regeneration harvest areas (Nero 1980, Winter 1986, Goggans and Platt 1992).

Bryan and Forsman (1987) and Bull and Henjum (1990) reported Great Gray Owls foraging in and showing statistical selection for open forests, again with grass or grass/forb ground cover, in southcentral and northeastern Oregon, respectively.

In the Western Cascades of Oregon a review of the ISMS Known Site database revealed that of the 67 Known Sites on the Willamette National Forest (n=25) and Medford Bureau of Land Management (n=42) 81% of all sites are closer to man-made openings than to naturally occurring meadows. While this is not a complete analysis it does represent approximately 60% of the total Known Site data (n=114 - ISMS 2003). On the Willamette National Forest, 96% of the Known Sites are within 129 meters (423 ft.) of a man-made opening. In the Siskiyou, openings in the vicinity of owl observations most often included Oregon white oak (*Quercus garryana*) and oak/madrone woodlands as well as grassy meadows (Fetz et al. in press). Four of ten Great Gray Owl nest sites in the Fetz study area (Western Cascades and Klamath physiographic provinces) were within 0.8 km (0.5 mi) of harvested areas [clear-cuts] (Fetz, et al. in press).

In northeastern Oregon, male owls foraged in stands with 11-59% canopy closure and with heavy ground cover dominated by grasses (Bull et al. 1988b, Bull and Henjum 1990). Perch heights were typically 3.0-4.9 m (10-16 ft) high in both live trees and small meadow snags adjacent to or within grassy areas. Large meadows without perches are rarely used; the birds seem to prefer the forest edges or adjacent small meadows when no perches are available. In the Siskiyou Mountains, openings in the vicinity of owl observations most often included open Oregon white oak and oak/madrone woodlands as well as grassy meadows (Fetz, et al. in press). On the westslope of the Cascades, regeneration harvests

initiate an early successional stage that can support small-mammal populations likely to be used by Great Gray Owls up to the first decade or so after harvest (Goggans and Platt 1992). On the Willamette National Forest which is within the Western Cascades physiographic province, Great Gray Owls are known to use older harvested stands for foraging. These stands are a minimum of 10 years old and some of the (poorer growing) sites are still providing foraging habitat 30-40 years post harvest (D. Quintana-Coyer, 2003, pers. comm.). No similar studies are available as yet, to establish maximum stand ages for foraging habitat within other physiographic provinces.

Juxtaposition of foraging habitat and nesting habitat is important. Although Great Gray Owls have been observed foraging up to 3.2 km (2 mi) from the nest (Bull and Henjum 1990), it is reasonable to suppose that breeding success decreases as this distance increases. Artificial platforms placed near known foraging habitat on the Winema National Forest are often used for nesting in the first season following placement (R. Gerhardt, pers. comm. 2003). This suggests that suitable natural nests are either entirely absent or so far from these foraging areas that the much closer platforms are preferred. In the Western Cascades openings used for foraging are generally complexes of smaller openings less than 0.4 ha (1 ac) or are man-made openings of various sizes (harvested units, seed orchards, & young plantations) (ISMS, 2003). The ISMS data that was analyzed showed that the mean cluster or openings sizes within 158 meters were 5 hectares (12.35 ac) in size or larger. However, the size of the openings does not seem to matter as much as the availability of prey (D. Quintana-Coyer, Per. Obs. 2003, Platt and Goggans, 1992).

Within the southern portions of the OR Western Cascades PP and OR Klamath PP the distance from Known Sites (nest trees) to nearest openings were noted to be 158 m (518ft) (ISMS 2003). It was further noted that 71% (where n=44) of these Known Sites were closer to man-made openings, than to naturally occurring openings (ISMS 2003).

Platt & Goggans (1992) reported that in their study area on the Willamette National Forest the amount of edge between forest and openings ranged from 0.93, 1.23, and 2.22 km and none of the areas contained any natural openings. Moreover, they found that in their study the openings (clear-cut and shelterwood only) ranged from 17-62 percent of



left: Western Foraging Habitat



bottom left: Western Foraging Habitat



bottom right: Western Cascades stand that is being used as nesting and foraging

the nesting area (Platt & Goggans, 1992). They postulated that Great Gray Owls were foraging in the timber harvest units because they were the only openings in the study area and that prey species, specifically *Thomomys spp.* were found to increase in the diet proportionally to the number of clear-cuts near nest sites (Franklin, 1988 in Platt & Goggans, 1992).

While these man-made openings may be ephemeral in nature, they currently provide foraging habitat for > 81% of Known Sites within the NWFP area (GGO Taxon team data, 2003). The fact that Great Gray Owls seem to have an affinity for man-made openings within the NWFP area may be due to the low prey numbers or site condition (rank/course vegetation for prey, conifer encroachment, etc) of the natural openings with the NWFP area.

Elevation Use

The Great Gray Owl is a well-feathered bird adapted to survive cold conditions. To the extent that thermoregulatory characteristics may restrict its geographic distribution, it is hot conditions that are thought to be limiting to this species. It has been commonly assumed that their occurrence at these more southerly latitudes is only at elevations high enough to ameliorate the heat associated with these latitudes. Under that assumption and data available at that time, the 1995 version of the survey protocol identified Great Gray Owls as occupying a 122 m (400 ft) elevation band, 1,372-1,494 m (4,500-4,900 ft) in the Blue Mountains (Bull and Henjum 1990) and a 299 m (980 ft) band on the Westside of the Cascade Mountains, Willamette National Forest, from 945-1,244 m (3,100-4,080 ft) (Goggans and Platt 1992).

More recent findings contradict this assumption. In the Siskiyou Mountains of southern Oregon, Great Gray Owls nested most frequently in late successional stands dominated by Douglas-fir located near forest edges (Fetz et al. in press). Ninety percent of the nests (n= 10), 100% of the fledglings (n=5), 60% of the pairs (n=10) and 63% of all sightings (n=92) were below 3,000 feet elevation; only 43% of the 117, 359 ha (290,000 ac) survey area was located below 914 m (3,000 ft). In the Cascades Range in recent years, numerous Great Gray Owls and nests have been found below 914 m (3,000 ft), with the lowest known nest at 48 m (157 ft) (ISMS data, 2003).

Wintering Habitat

In general, winter foraging and roosting habitat are similar to that used at other seasons. However, in boreal portions of the species' range, winter habitat may be as distant from breeding habitat as 700 km (435 mi) (Bull and Duncan 1993). In the western U.S., however, no such movements have been documented. Rather, much smaller movements (up to 20 km (12 mi); Bull et al. 1988a) appear to be in response to snow conditions that limit prey availability. Strategic Survey data is expected to further define the winter range within the range of the NWFP.

Areas Where Pre-Disturbance Surveys Are NOT Needed For a Reasonable Assurance of Persistence

In these areas described below pre-disturbance surveys are not necessary to provide for a reasonable assurance of persistence. While there are known sites within these described areas, the inadvertent loss of undiscovered sites would not substantially increase the concern for persistence, but this does not preclude units from conducting pre-disturbance surveys.

Range: Great gray owls have been observed during the breeding season in the CA Klamath and CA Cascades Physiographic Provinces, but have not been confirmed to be breeding in those areas. Until we have knowledge to support breeding populations within these physiographic provinces, is not necessary to conduct pre-disturbance surveys. Once Strategic Surveys (that would determine likelihood of presence of breeding pairs or nesting habitat) are completed, this protocol would be revised to incorporate this new information.

Foraging openings: Suitable nesting habitat adjacent to natural openings smaller than 10 acres is not necessary to be surveyed.

Elevation limits: The majority of known sites occur between 152 meters (500 ft.) and 1829 meters (6000 ft.). While there are known sites above and below these limits, the inadvertent loss of undiscovered sites would not substantially increase the concern for persistence. It is not necessary to conduct pre-disturbance surveys below 152 meters (500 ft.).

IV. METHODS

Read the entire methodology section before initiating any phase of the survey. The protocol guidelines are a step-by-step process. Though this protocol may resemble the Northern Spotted Owl protocol, there are important differences. This protocol requires six visits during the breeding season for two consecutive seasons. This is a presence/ inferred-absence survey technique.

Survey Period

Depending on elevation and snow depths, Great Gray Owls will nest anytime from late February through mid-July. *A total of six visits are required for two consecutive years to fulfill protocol requirements.* Deviations from the field season dates must be documented with supporting rationale.

1. Field Season:

March 15 – July 15: Six visits should occur within this timeframe, with each visit at least a week apart.

2. Survey Timing

Night Surveys: One hour before sunset to one hour after sunrise

Daytime Surveys: Sunrise to Sunset - One hour after sunrise to one hour before sunset.

In general, daytime surveys should be combined with nighttime visits to effectively detect the Great Gray Owl. Daytime surveys only are not advisable.

March 15 - May 15 (approximately the incubation and brooding periods)

Three complete survey visits should occur within this timeframe, with each visit at least a week apart.

May 15 – July 15 (approximately the late nestling and fledging periods)

Three complete survey visits should occur within this timeframe, with each visit at least a week apart.

Hungry owlets can be quite vocal at and after fledging, and many are found at this time. Putting the most survey effort into this period, however, would result in missing nest attempts that result in failure prior to this stage.

Pre-Survey Planning

Survey Plan

A survey plan is recommended in preparation for survey efforts. Such a plan should include:

- a. A brief narrative describing the project (survey) area(s).
- b. A map showing boundaries of the project area(s), Great Gray Owl habitat, delineated survey areas, survey routes and calling stations.
- c. Estimates of time, number of personnel needed and costs to complete.
- d. Acreages of Great Gray Owl suitable nesting habitat

Mapping the Habitat to Survey

Delineate a 1/4-mile survey boundary beyond the proposed habitat altering activity or activities. Delineate the likely habitat on a photograph, topographic map or other suitable map. The area delineated will be the survey area. Large areas should be divided into smaller survey areas to ensure that a visit can be completed in seven days.

If available, Geographic Information Systems/ ArcView and ISMS can be useful in helping to locate Great Gray Owl nesting, roosting, foraging habitat, or mature/old growth habitat and any historical/ Known Sites of Great Gray Owls.

Establish Calling Stations and Survey Routes

Establish survey routes and calling stations within the survey area to attain full coverage of Great Gray Owl suitable habitat types (nesting, foraging and roosting). The intent is for the owls to hear the surveyor and for the surveyor to be able to hear responding owls. Along each survey route, space fixed calling stations at every 0.10 mile. The area covered at each station is deemed to be 0.10 mile in radius. Owls can hear the broadcast across greater distances, but they are less likely to respond and the observer is less likely to be able to hear such responses.

The following guidelines should be followed when establishing calling routes:

- a. Create a survey plan as described above.
- b. Consider the physical characteristics of the survey area when establishing calling stations. (i.e. sound travels in a straight line-but not around bends or over ridges).
- c. Avoid establishing a calling station near loud noise sources, such as loud creeks and noisy roads. If these areas cannot be avoided, increase the survey effort with more stations.
- d. Establish stations at useful geographic features such as prominent ridge points, saddles, and openings in the vegetation to ensure complete coverage of the survey area.

Vary distances between calling stations depending on local topography and habitat. In general, the greater the variation in topography, the closer the spacing between transects

and calling stations should be. Mark each established station on an aerial photograph and/or topographic map (the minimum standard is 1:24,000), and assign route and station numbers (mapping stations using a GPS (global positioning system) is strongly recommended).

The following are options for conducting Great Gray Owl surveys:

- a. Nighttime Survey Using Roads:** Survey areas that have accessible roads for establishing stations from which to call should be called at night.
- b. Nighttime Survey Using Trails:** In habitat without roads, nighttime calling stations will only be established in survey areas that can be traversed safely. Calling stations may be established on well maintained trails where there is little danger to a caller equipped with only a flashlight or headlamp.
- c. Daytime Surveys Using Roads and Trails:** Survey areas that cannot be effectively and safely surveyed from the roads or trails at night will be surveyed during the daytime. Midday surveys should be avoided in favor of evening or early-morning surveys.
- d. Daytime Surveys Using Continuous Walk-Through:** An alternative survey method when roads and trails do not effectively cover suitable habitat, is a continuous walking transect that effectively covers the stand. The surveyor walks along at a normal pace, playing calls every 30-61 m (100-200 ft), and then pausing to listen for one to three minutes. Ensure the survey route is marked on a map and/or aerial photo or there is a pre-determined compass bearing for the surveyor to follow.

Great Gray Owls may not call or respond to calls during the day, so calling may be ineffective. Be cognizant of stick nests, broken-topped snags, mistletoe brooms, whitewash, owl feathers, pellets, movements by birds, and mobbing behavior by Common Ravens, crows, jays, and small birds. These signs may help in visually locating Great Gray Owls or their nests.

Calling Techniques

Use only a CD (GGO Taxon team 2002) or MP3 player for calling surveys, included in protocol or downloadable to PC from Survey & Manage website www.or.blm.gov/surveyandmanage.

Recommended Equipment Specifications for Surveying Great Gray Owls

There are many equipment options available which would adequately reproduce the calls of Great Gray Owls. CD players and MP3 players are both possibilities. Tape players are no longer an acceptable method of broadcast calling for Great Gray Owls. Special attention should be paid to the speakers selected for this type of survey. Great Gray Owl calls are very low-pitched (~200 Hz.). Speakers for use in Great Gray Owl surveys must reproduce sound extending to at least this frequency. Reference the manufacturer's ratings for speaker frequency range in your selection of appropriate speaker models. Sound reproduction must also be of sufficient volume to carry a minimum of 0.1 miles in field settings without notable distortion. Field-testing of equipment is necessary to be certain these sound reproduction parameters are met.

The following calls are provided on the CD:

Calls used primarily to meet protocol:

- Male territorial call (Early Season/Late Season)
- Female begging/contact call (Early Season/Late Season)
- Juvenile begging call (Late Season)

Additional, sometimes useful calls:

- Female w/nest chatter (Late Season)
- Adult agitated call

Listening should occur at each station for a minimum of six minutes: one minute of silent listening after arriving at the calling station followed by five minutes with intervals of broadcasted calls and silent listening.

Three types of calls are utilized in this protocol. Early in the nesting season there may be better response to the male territorial call than there would be after incubation. After owlets have fledged, it is likely that there would be better response to a juvenile begging call (E. Bull, pers. comm. 1995). Female begging calls (who-oo call) can work well throughout the season (S. Godwin, pers. comm. 2002).

The use of CD tracks containing “nest chatter” (Track 6) and “agitated adult series hoot” (Track 7) are to be used at the discretion of the surveyor. “Nest chatter” is most likely to elicit response during late nesting and early fledging (May 15 through July 15). “Agitated adult series hoot” may elicit responses during all portions of the survey season. Use of these tracks should be withheld until standard survey tracks from the CD have been utilized without success. Care should be taken to avoid agitating owls more than is necessary. Be aware of potential predators (e.g. Common Ravens, Great Horned Owls and Northern Goshawks) and discontinue call playback when these species are detected.

Conducting Surveys

March 15-May 15 (Early Season)

1. After arriving at the call station, the surveyor should listen silently for one minute before playing the CD call track (silently means focus time, not eating, moving around or gathering gear). Track #1 on the CD issued with this protocol should be used.
2. If there is a night response, triangulate the location, skip a sufficient number of stations, and re-start the survey in an area out of ear-shot of the owls. If the response is in the day, immediately try to find the bird/nest and continue transect surveys when you are done with the follow up survey.
3. Continue to the remaining stations until the visit is complete.

May 15-July 15 (Late Season)

1. After arriving at the call station, the surveyor should listen silently for one minute before playing the CD call track (silently means focus time, not eating, moving around or gathering gear). Track #2 on the CD issued with this protocol should be used.
2. If there is a night response, triangulate the location, skip a sufficient number of stations, and re-start the survey in an area out of ear-shot of the owls. If the response is in the day, immediately try to find the bird/nest and continue transect surveys when you are done with the follow up survey.

3. Continue to the remaining stations until the visit is complete or there is a response.

Preliminary Survey Using Historical Information

Great Gray Owls may be located more efficiently by going directly to a historical observation location during the day. If it is possible to locate pairs or singles without doing station visits, time and effort may be saved. Use your knowledge of the area in deciding if this will be beneficial and use the following five-step process as a guide. Additional calling stations may be required depending on the outcome of this type of survey technique.

1. Identify the Known Site or historical observations in the survey area on a map or aerial photo.
2. Visit the historical observations during the day. Use whatever techniques are appropriate to locate the pair or resident single (calling, nest searching).
3. If a pair or single is located, record the information on the field form (Appendix 2).
4. If occupancy of a pair or resident single cannot be determined during a day visit, use night calling in the general area of the historical observation. Note that Great Gray Owls may use alternate nest sites within their home territory.
5. If the historical or known pair or single owl cannot be located, then proceed with establishing survey routes.
6. If a pair is located, additional visits may be necessary to determine reproductive success.

Survey Procedures for a Complete Visit Using Stations

These procedures would be the same whether surveying along roads or trails, at night or day. See above procedures for "Day-Time Walk-Through."

Use the survey form in Appendix 1. Record results including other owl responses in addition to those of Great Gray Owls.

1. If a response to the calls is detected, estimate the owl's location by getting a compass bearing and estimating the distance from the station to the response. In order to get a better location, use triangulation by taking compass bearings from two to three locations along the survey route. Make sure the compass bearings are taken as soon as possible after a response.
2. Record the location and compass bearing(s) on a map or aerial photo and the field visit form. Attach a map to the field visit form, and include the compass bearing(s) and estimated distance from the station to the response.
3. Flag and GPS the response location to establish a start point for the follow-up survey.
4. Continue to the next calling station beyond audible distance of the responding owl (two to three stations) and continue surveying the remaining stations.
5. Once occupancy status is determined (see section: Determining a Known Site), calling stations within audible distance (two to three stations) may be dropped on subsequent visits.
6. Conduct a follow-up visit preferably within 48 hours of the response. If the response is during the day, immediately try and find the Great Gray Owl/nest and continue transect surveys when you are done with the follow-up visit.

7. The night survey visit and follow-up visit will be considered a complete visit. If there is no response during a night visit, it will be considered a complete visit.

Survey Procedures for Daytime Continuous-Calling Walk-Through

1. Continuously walk a transect that effectively covers the stand. The surveyor should walk at a normal pace, playing calls appropriate to the season every 30-61 m (100-200 ft), and then pausing to listen for one to three minutes. Make sure the survey route is marked on a map and/or aerial photo or there is a pre-determined compass bearing for the surveyor to follow.
2. If you receive a response, immediately attempt to locate the bird and determine status.
3. Flag and GPS the best location from this visit (bird and/or nest location). Attach a map to the field visit form, and include the GPS locations.
4. Once status is determined, move out of audible distance and continue with walk-through.

Follow-up Visits

The goal of a follow-up visit is to visually confirm or infer the presence of a pair of Great Gray Owls and to locate a nest tree. Use the field form to record results in locating a pair or single owl and the nest tree information.

1. Starting from the station where a response was heard, and using compass bearing(s) obtained when a response was noted, begin a search by moving toward the approximate response location. Once a Great Gray Owl has responded, and after walking into the general area of the response, it is often helpful to softly broadcast a call toward the area from which the observer came, or toward the ground, in order to make the call softer and more diffuse. Midday visits should be avoided in favor of evening or early-morning visits.
2. Do a systematic search, looking for:
 - Live or dead trees with broken tops or mistletoe brooms
 - Abandoned Northern Goshawk, Common Raven, or Red-Tailed Hawk stick nests
 - Whitewash, feathers, and/or pellets around the base of possible nest and/or roost sites (E. Bull, pers. comm. 1995)
 - Movement in the canopy
 - Mobbing behavior by other birds
3. Keep the original location of the owl response in mind, and try to visually locate them. Great Gray Owls tend to fly away from intruders, so search for other visual clues as suggested above. Whitewash and pellets are often found near nest sites, but not actually under the nest until a week before young leave the nest. Whitewash and pellets are generally associated with roost sites. Calling may help to elicit responses from Great Gray Owls, but they may not respond to calls during the day. A technique that may be helpful is to broadcast the call softly and point the speaker downward when calling to avoid startling the owl as one walks in the direction of the original response.
4. Use the CD call track appropriate for the season of survey.
5. If a Great Gray Owl is not located after two hours of effort, note the negative results on the field form and the visit is complete.

6. If an owl is located, allow up to two hours to establish pair status. Use visual observation to help determine status. Observe and note behavior. Document all behavior noted, for example agitated calls, continuous responses (males often look toward the nest area), movements, roosting, preening or other behavior.
7. Once visual contact is established, evaluate the situation before moving closer. The surveyor may only be able to get within 27 m (90 ft) or so of an adult without causing it to flush. Do not call or stimulate owls any more than is necessary to determine status. By stimulating owls to move around during the day, one may increase their risk of predation. Be cognizant of predators in the area. For example, calling may attract Common Ravens. Great Gray Owl chicks and fledglings are very susceptible to avian and mammalian predation. If predators are attracted, leave the area and try a follow-up at another time.
8. If the owl is located, but is observed roosting/sleeping and there are no signs indicating a pair status within the two-hour follow-up visit, the visit is over.
9. The follow-up survey may take up to four hours: two hours searching for an owl and two hours trying to determine pair status. Additional time may be used, as the time constraints are minimums.

Requirements

1. Complete a field visit form for all outings, regardless if an owl was detected or not.
2. Surveyors must be outside their vehicle and use a projection device that can project the call so it can be heard at least 0.16 km (0.10 mi).
3. Do not survey under inclement weather conditions, such as high winds (> 10 mph), moderate to heavy rain or high noise levels (e.g., stream noise, machinery), which would prevent surveyor from hearing a Great Gray Owl response. Additionally, research has shown that owls are not likely to respond to calls during inclement weather (GGO protocol, 1995, Huff et al. 1996)
4. The responsiveness of owls depends on many factors, which may include:
 - a. Time of day. Great Gray Owls are more likely to be detected at night, near sunrise, and after sunset. During the middle of the day they are relatively inactive and less likely to respond.
 - b. Temperature. Air temperature will affect an owl's responsiveness. In hot weather, owls may be less likely to respond.
 - c. Individual variation. Owls vary greatly in their responsiveness to broadcast calls.
5. Record observations of other avian predators (e.g., Northern Goshawk, Great Horned Owl, Common Ravens) that are detected while surveying for Great Gray Owls.
6. Additional visits are recommended in areas in which pair or single status could not be determined, even though an owl was detected and it is judged that the site may be occupied by a pair or resident single. Only the general area where the owl was detected should be searched. There is no time limit or minimum number of visits in conducting additional visits.

Determining a Known Site

Known Site Status is determined by any of the following:

- A male and female are heard and/or observed in proximity (<.10 mile) to each other on the same outing during the day
- A male takes prey to a female
- A female is seen on a nest
- A Young Live or dead GGO is observed [and can be determined by the presence of an adult GGO or other means that it is a definite GGO young (yellow eyes, etc)].

Once this is determined, it is considered a “*Known Site*.” Since no additional survey effort is required to locate Great Gray Owls in this area, adjust the area to be surveyed for the remaining visits during a given survey year to complete the survey so you do not pick up this pair again. The only survey effort required after determining pair status is to locate the nest and document in ISMS.

Determining Other Observations Status

Resident Single Status is determined by:

A Great Gray Owl that is not known to be paired with a mate. Singles may establish a territory during a breeding season. A resident single is confirmed by at least two detections made in a two-year timeframe (one each year) or three detections in one year during the breeding season.

It is desirable to conduct additional visits to determine *Known Site* (pair status) and reproductive success. The sex should be positively identified by call. If the sex of an individual is uncertain, it is considered an “unknown sex Great Gray Owl single.”

Status Unknown (single owl) is determined by:

The response of a male and/or female, which does not meet the pair or resident single requirements.

Inferred Unoccupied Habitat is determined when:

The lack of detections after two years of protocol survey should be viewed as a high likelihood, not a certainty, that the site is unoccupied.

Presence is determined by:

The detection of pellets or feathers that can be identified as being from Great Gray Owl.

Baiting or “Mousing”

At present there is no evidence for utilizing bait (e.g. mice, rats, etc.) in the determination of occupancy or reproductive status with Great Gray Owls. Great Gray Owls will frequently accept such bait, but are less likely than Northern Spotted Owls to transport them to a mate or young. This should not deter surveyors from attempting to feed bait items to Great Gray Owls as this practice can lead to the location of another adult, a nest or juveniles. Negative results (i.e. refusal, unknown disposition, repeated consumption and/or caching) should not be interpreted as indicating the absence of a mate, nest or young.

Data Management

To document and track information obtained through surveying and to make adjustments to the protocol where necessary, the following procedure must take place. All field units should maintain hard copies of survey plans, field forms, maps and aerial photos used during the surveys. Known Site and survey data must be stored electronically in ISMS.

Training/Qualifications

The protocol is designed for field biologists who will be conducting Great Gray Owl surveys on federal land within the range of the Northern Spotted Owl. "Field biologist" may include those currently employed as professional biologists, biological technicians, contractors or volunteers that are supervised by a professional biologist.

Professional judgment is involved in interpreting the owl survey, behavior and habitat use. The following qualifications are provided as requirements for personnel involved in the identification and designation of Great Gray Owl *Known Sites*.

The minimum requirements for personnel designating Known Sites are:

- A bachelor's degree in wildlife biology or similar field and/or qualifies as a GS-486-9; and
- At least two years of field experience with surveying for Northern Spotted Owls or other owl species.

If available personnel do not meet the minimum requirements above, they must be supervised by someone who does.

Field Surveyors should:

- Familiarize themselves with project area boundaries prior to establishing calling stations.
- Be competent in establishing compass bearings, including triangulation.
- Able to use GPS for marking the nest tree location.
- Possess birding skills, such as ability to visually identify all the owl species that occur in their area, know their calls, as well as potential predator species such as the Northern Goshawk, Common Ravens, Red-tailed Hawk, and species that may sound similar to a Great Gray Owl such as Blue Grouse (*Dendragapus obscurus*) and Great Horned Owls.
- Locate, describe and interpret visual signs of owl nesting, occupancy and behavior.
- In addition, since Great Gray Owls can be very difficult to hear, a standard hearing exam is recommended for personnel surveying for the Great Gray Owl. Anyone who can hear within normal limits should be able to hear the species.

It is assumed that many field biologists who work within the range of the Northern Spotted Owl are familiar with the procedures for surveying for Northern Spotted Owls, and the calls of the various species of owls that occur within its range and therefore should have no problems interpreting or training for this survey methodology. Biologists who are planning to train and supervise seasonal or volunteer personnel to do Northern Spotted Owl surveys could train the crews in Great Gray Owl surveys at the same time.

V. APPENDICES

Appendix 1: Great Gray Owl General Survey Field Form and Key
Appendix 2: Great Gray Owl Species Location Field Form and Key
Appendix 3: Great Gray Owl Taxon Team Biologists
Appendix 4: Bibliography
Appendix 5: Definitions/Glossary

APPENDIX 1

GREAT GRAY OWL GENERAL SURVEY FIELD FORM KEY

(Field Names in **BOLD** type are required by ISMS database, all fields should be populated if at all possible to maximize the usefulness of your survey data.)

GENERAL SURVEY LOC ID: Unique identifier for general survey location as assigned by unit.

GENERAL SURVEY LOC CN: Automatically assigned as records are entered into the ISMS database. This blank may be filled in on this form for tracking purposes.

VISIT #: Assign sequential numbers to survey outings to the same area during the same survey season.

SURVEY / FOLLOW-UP: Circle the appropriate survey descriptor.

“Survey” refers to any outing to conduct general surveys.

“Follow-up” refers to an outing to a response location of great gray owls detected during a survey.

ADMIN UNIT: Administrative unit. See ISMS “List of Values” for appropriate code for your administrative unit.

TOWNSHIP/RANGE/SECTION: Legal location

ROUTE NAME: Unique identifier used to refer to a given calling area in day to day survey management.

SURVEY TYPE: E.g. “Pre-Disturbance”. See ISMS List Of Values for other appropriate codes.

SURVEY ID: Name or ID number for survey route/area as assigned by unit.

DATE: DD-MMM-YYYY

PROJECT NAME: Project name as assigned by unit.

SURVEY METHOD: “Call Stations”
“Casual Observations”
“Continuous Calling Walk Through”
“Incidental”
“Telemetry”

PROTOCOL MET: Was this survey conducted as set forth in the current survey protocol?
YES/NO

OBSERVERS: All persons involved in a survey outing.

START TIME: 24 hour time at beginning of survey.

END TIME: 24 hour time at end of survey.

SURVEY NOTES: Record other species detected, weather conditions, and other pertinent information.

PRESENCE: “Y” = Yes, a great gray owl was detected during this survey.
“N” = No, a great gray owl was not detected during this survey.

SPECIES LOCATION LOC_ID to which this GENERAL SURVEY is associated: If a SPECIES LOCATION record will be entered into ISMS for great gray owls detected during this survey, then note that SPECIES LOCATION LOC_ID in this block. If no such record will be entered, then leave this block blank.

GREAT GRAY OWL GENERAL SURVEY FIELD FORM

GENERAL SURVEY LOC ID				GENERAL SURVEY LOC CN				VISIT #		SURVEY FOLLOW-UP
ADMIN UNIT			TOWN- SHIP		RANGE		SECTION(S)			
ROUTE NAME			SURVEY TYPE			SURVEY ID				
DATE		PROJECT NAME			SURVEY METHOD			PROTOCOL MET?		
OBSERVERS				START TIME		END TIME		TOTAL SURVEY TIME		hrs mins
SURVEY NOTES: (e.g.—other species observed, weather-wind speed, rain, sun, etc, GPS/Azimuth bearings, Nest type, height, & nest stand vegetation							PRESENCE	Y	N	
SPECIES LOCATION LOC_ID(s) to which this GENERAL SURVEY is associated (if applicable)										

APPENDIX 2

GREAT GRAY OWL SPECIES LOCATION FIELD FORM KEY

(Field Names in **BOLD** type are required by ISMS database, all fields should be populated if at all possible to maximize the usefulness of your survey data.)

SPECIES LOCATION LOC ID: Unique identifier for species location as assigned by unit.

SPECIES LOCATION LOC CN: Automatically assigned as records are entered into the ISMS database. This blank may be filled in on this form for tracking purposes.

VISIT #: Assign sequential numbers to survey outings to the same area during the same survey season.

SURVEY / FOLLOW-UP: Circle the appropriate survey descriptor.

“Survey” refers to any outing to conduct general surveys.

“Follow-up” refers to an outing to a response location of great gray owls detected during a survey.

ADMIN UNIT: Administrative unit. See ISMS “List of Values” for appropriate code for your administrative unit.

LOC NAME : Location name as assigned by unit.

ASPECT: Dominant aspect of species location expressed in degrees.

ELEVATION: Species location elevation expressed in feet.

SLOPE: Species location slope expressed in percent.

MAP SOURCE: Source or method used to delineate location on a map. See ISMS List Of Values. Common values for Great Gray Owls are: GPS, Air-Photo-24K, Narrative, etc...

TOWNSHIP/RANGE/SECTION/ ¼ SECTION/ 1/16 SECTION/ 1/64 SECTION: Legal location

SURVEY TYPE: E.g. “Pre-Disturbance”. See ISMS List Of Values for other appropriate codes.

SURVEY ID: Name or ID number for survey route/area as assigned by unit.

SURVEY METHOD: “Call Stations”
“Casual Observations”
“Continuous Calling Walk Through”
“Incidental”
“Telemetry”

PROTOCOL MET: Was this survey conducted as set forth in the current survey protocol? YES/NO

DATE: DD-MMM-YYYY

START TIME: 24 hour time at beginning of survey.

END TIME: 24 hour time at end of survey.

OBSERVERS: All persons involved in a survey outing.

PROJECT NAME: Project name as assigned by unit.

CMTY CLASSIF: Community Classification. See ISMS List Of Values. Options are too numerous to list here.

CMTY CODE: Community Code. See ISMS List Of Values. Options are too numerous to list here.

SURVEY NOTES: Record other species detected, weather conditions, and other pertinent information.

PRESENCE: "Y" = Yes, a great gray owl was detected during this survey.
"N" = No, a great gray owl was not detected during this survey.

OBSERVATION TYPE: "Sign" – Feathers, pellets only
"Visual" – Visual/ ocular observation only.
"Visual/Vocal" – Visual and vocal observation
"Vocal" – Vocal observation only.

RESPONSE TIME: 24 hour time of GGO detection.

GGO OBSERVED: Number of individual GGOs detected at a location.

SEX: Sex of individuals, if determined.

AGE: Age of individuals, if determined.
"Adult/Mature" – Able to reproduce.
"Fledgling" – Can fly, depends on parents.
"Hatchling" – Recently hatched, downy.
"Juvenile/Immature" – Pre-adult stage.
"Nestling" – Young, unable to leave nest.
"Unknown" – Age unknown.

ACTIVITY TYPE: "Feeding/Drinking"
"Fleeing"
"Flying"
"Hunting/Foraging"
"Mating/Courting"
"Nesting"
"Roosting"

REPRO STATUS: "Non-Repro"—No evidence of reproduction.
"Repro"—Evidence of reproduction.
"Unknown" – Reproductive status unknown.

SPECIES LOCATION NOTES: Record information related to the species location or behavior.

GENERAL SURVEY LOC_ID to which this Species Location is associated: If a this Species Location is associated with a General Survey record, and then enter the corresponding GENERAL SURVEY LOC_ID in this block. If this Species Location is not associated with a General Survey record, then leave this block blank.

GREAT GRAY OWL SPECIES LOCATION FIELD FORM

SPECIES LOCATION LOC ID			SPECIES LOCATION LOC CN (computer generated)			VISIT #	SURVEY FOLLOW-UP		
ADMIN UNIT	UTM E			UTM N					
LOC NAME	ASPECT		ELEVATION (ft)		SLOPE (%)		MAP SOURCE		
TOWN- SHIP	RANGE	SECTION		¼ SECTION	1/16 SECTION		1/64 SECTION		
SURVEY TYPE	SURVEY ID		SURVEY METHOD		PROTOCOL MET?		DATE		
START TIME	END TIME	TOTAL SURVEY TIME		hrs mins	OBSERVERS				
PROJECT NAME	CMTY CLASSIF			CMTY CODE					
SURVEY NOTES: (e.g.—other species observed, weather-wind speed, rain,sun, etc, Azimuth bearings, Nest type, height, & nest stand vegetation							PRESENCE	Y	N
OBSERVATION TYPE	RESPONSE TIME	# GGO OBSERVED		SEX	AGE	ACTIVITY TYPE	REPRO STATUS		
SPECIES LOCATION NOTES (e.g. prey items fed, behavior, etc...):									
GENERAL SURVEY LOC_ID to which this Species Location is associated (if applicable):									

APPENDIX 3

Great Gray Owl Taxon Team Biologists and Contract Experts

Matthew D. Broyles, Wildlife Biologist, Ashland Resource Area, Medford Bureau of Land Management

Matt holds a Bachelor of Science in Wildlife Management from Humboldt State University. He has worked in the Ashland Resource Area of the Medford Bureau of Land Management District since 1990. His experience includes survey and inventory work for a variety of special status species and land management planning. Matt is the wildlife biologist assigned to the Medford BLM District's Cascade-Siskiyou National Monument. He has worked on Great Gray Owl management since the mid-1990's

Jeff A. Dillon, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service

Jeff holds a Bachelor of Science in Forestry (B.S.F.) from Purdue University (West Lafayette, Indiana) in Wildlife Management and a Master of Science (M.S.) from Louisiana State University (Baton Rouge, Louisiana) in Wildlife Ecology. He has been with the U.S. Fish and Wildlife Service and a Fish and Wildlife Biologist since 1994 and is currently at the Oregon Fish and Wildlife Office in Portland, Oregon. Jeff has been working with Northwest Forest Plan issues for over seven years and has been a member of the Great Gray Owl team since 2001.

Cheryl A. Friesen, Supervisory Wildlife Biologist and Resources Staff, McKenzie River Ranger District, Willamette National Forest

Cheryl holds a Bachelor of Science in Zoology from California State Polytechnic University and an Master of Science in Wildlife Management from Oregon State University. She has been a Wildlife Biologist with the Forest Service for over 15 years.

Richard P. Gerhardt, Contract Taxon Expert, Sage Science

Rick received his Bachelor of Arts in Zoology from DePauw University in 1978 and his Master of Science in Raptor Biology from Boise State University in 1991. He has worked as a research ecologist for the past 14 years, specializing in owls and other raptors of North America and the Neotropics. He is presently owner and president of Sage Science, a small research and consulting firm. Rick has been studying Great Gray Owls since 1993. He has special interest in the metapopulation structure of this species in the Western U.S.

Steven A. Godwin, Biological Technician (Wildlife Lead), Ashland Resource Area, Medford Bureau of Land Management

Steve holds a Bachelor of Science in Biology from Dana College. He has been with the Medford Bureau of Land Management District, Ashland Resource Area since 1990. Steve has extensive experience in field survey work with a variety of wildlife species. Since 1995, he has lead the Great Gray Owl survey effort for the Ashland Resource Area, directing field crews and contractors in surveying more than 30,000 acres of habitat suitable for the species. Since 2000, he has been capturing, radio-tagging and tracking Great Gray Owls. Steve has been a member of the Great Gray Owl team since 2001.

Shane D. Kamrath, Wildlife Biologist, McKenzie River Ranger District, Willamette National Forest

Shane received two Bachelor of Science Degrees from Oregon State University in Wildlife Science and Fisheries. He has worked as a Wildlife Biologist with the Forest Service for 15 years. He began handling raptors in 1985 and has captured and banded Northern Spotted Owls. He has been surveying for Great Gray Owls since 1995.

Deborah L. Quintana-Coyer, Great Gray Owl Taxon Lead, Regions 5 & 6 U.S. Forest Service

Deborah has a Master of Science in Conservation Biology & Resource Management from University Of Nevada-Reno, Bachelor's of Science: Environmental Science (Wildlife/ Forestry) & Gen Agriculture/Range/Botany from Oregon State University and an Associate in Arts in Forest Sciences/Biology from Sierra College. She has worked as a Supervisory District Wildlife Biologist with the USDA Forest Service for 15 years in Oregon, California, Utah and Alaska working with Great Gray Owls, Northern, California, and Mexican Spotted Owls, Northern Goshawks and other predators. She has performed the role of Great Gray Owl Taxon lead since 2000.

James A. (Jim) Thrailkill, Contract Ecologist, McKenzie Ecological

Jim has a Bachelor of Science in Wildlife Management from Humboldt State University. He is the sole proprietor of McKenzie Ecological based out of Vida, Oregon. Jim has conducted field surveys for Great Gray Owls in the Cascades of Oregon, including a pilot study examining the effectiveness of the 1995 version of the Great Gray Owl protocol. Jim was the Taxon team contract expert from 2001-2002.

APPENDIX 4

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APPENDIX 5

DEFINITIONS/GLOSSARY

Boreal

Northern; used to describe a region that has a northern temperate climate, with cold winters and warm summers.

Breeding Season

This period encompassing egg-laying, incubation, brooding, nestling, and fledging periods. For the area covered by the NWFP, this is approximately March 15 through July 15. Actual dates of nesting vary with weather and elevation, and may vary from year to year at the same site. Great Gray Owls lay eggs one to three days apart and begin incubation with the laying of the first egg. Eggs hatch after approximately 30 days. Brooding occurs for two to three weeks and young leave the nest after approximately four weeks. They cannot fly well until nearly two weeks after leaving the nest.

Complete Survey

The survey area has been surveyed to protocol standards, which is a minimum of six complete survey visits each year for two consecutive years.

Complete Visit

A nighttime survey of the entire survey area is conducted in one night. If a surveyor gets a Great Gray Owl response at night, then the surveyor will conduct a daytime follow-up visit, and the combination of the night outing and the follow-up visit would be counted as one complete visit. If a surveyor goes out at night and does not get a response, a follow-up visit would not be necessary, so the night outing alone would be considered as one complete visit.

If the survey area cannot be completely surveyed in one night, then the remaining survey area must be surveyed in a second field outing. Complete the outing on consecutive days if possible, weather permitting. If it is discovered that the survey area is too large to be covered within seven days, it should be divided into smaller survey areas based on available habitat, topography, drainages, and other physical characteristics.

Current Pair

A Great Gray Owl pair that has been verified within the last 10 years.

Effects

Effects, impacts and consequences are synonymous. Effects may be direct, indirect or cumulative and may fall in one of these categories: aesthetic, historical, cultural, economic, social, health or ecological.

Field Forms

Forms used to record data collected during pre-disturbance survey and follow-up visits.

Field Season

March 15 - May 15 (3 surveys) (Early Season - approximately the nesting / incubation period)
May 15 - July 15 (3 surveys) (Late Season - approximately the fledging period)

Follow-up Visit

A follow-up visit is performed to visually confirm or infer the presence of a pair of Great Gray Owls and to locate a nest tree. Use the field form to record results when a pair or nest is located.

Ground-disturbing activity

See "habitat-disturbing activity".

Habitat

Place or environment where a plant or animal naturally or normally lives and grows.

Habitat for Surveys

Habitat specific to the species being surveyed; generally described in Survey Protocols or Management Recommendations.

Habitat-disturbing Activity

Activities with disturbances having a likely substantial negative impact on the species habitat, its life cycle, microclimate, or life support requirements (ROD 2001).

Historical Pair

A pair of Great Gray Owls that have not been verified within the last 10 years.

Inferred Unoccupied

The lack of detections after two years of protocol survey should be viewed as a high likelihood, not a certainty, that the site is unoccupied. For project planning purposes, an area meeting this definition is "unoccupied."

Known Site (GGO ASR 2001 – managed)

These sites are managed under the 2001 ROD. They include sites with evidence of current reproductive behavior or a high likelihood of future reproductive behavior. They meet the requirements under "Pair Status".

Known Site (as defined in ROD, 2001 for all species except Great Gray Owls – as clarified in the 2001 ASR)

Historical and current location of a species reported by a credible source, available to field offices, and that does not require additional species verification or survey by the Agency to locate the species. Known sites includes those known prior to the signing of the Northwest Forest Plan Record of Decision (USDA, USDI 1994b), as well as sites located in the future. Known sites can be based on any documented and credible source (such as herbaria/museum records, published documents, Agency records, species expert records, and documented public information). Historical locations where it can be demonstrated that the species and its habitat no longer occur do not have to be considered Known Sites. A credible source is a professional or amateur person who has academic training and/or demonstrated expertise in identification of the Taxon of interest sufficient for the Agency to accept the identification as correct. These can include Agency staff and private individuals.

The Known Site identification should be precise enough to locate the species by geographic coordinates, maps, or descriptions sufficient to design specific management actions or to be located by other individuals. Also see "site" for description of size and components.

Line Officer

In the BLM and FS, the individual managers in the direct chain of command. For example, in the FS, the chain runs from chief/deputy chiefs, to regional forester, to forest supervisors, to district rangers, and there is only one line officer at each "office" (although two line officers may share an office while administering different geographic areas). These line officers have the decision-making authority and responsibility assigned to their administrative level; other individuals at that unit advise and work for the line officer 2 (ROD 2001).

Listening Duration

Listening shall occur at each station for a minimum of six minutes: one minute of silent listening after arriving at the calling station followed by five minutes with intervals of broadcasted calls and silent listening.

Manage (as in manage Known Sites)

To maintain the habitat elements needed to provide for persistence of the species at the site. Manage may range from maintaining one or more habitat components such as down logs or canopy cover, up to complete exclusion from disturbance for many acres, and may permit loss of some individuals, area, or elements not affecting continued site occupancy (ROD 2001)

Montane

Belonging to mountainous regions; growing or living in mountainous regions

Mousing

The act of feeding domestic mice, rats, gerbils, or hamsters to adult male and female owls by a surveyor.

Nest

The actual substrate eggs are laid upon.

Pair Status (see also “Known Site”)

This status implies evidence of current reproductive behavior or a high likelihood of future reproductive behavior. Pair status is confirmed or inferred by any of the following:

- A male and female are heard and/or observed in proximity (<1/4 mile apart) to each other on the same outing during the day.
- A male takes prey to a female.
- A female is seen on a nest
- A young live or dead great gray owl is observed and can be determined as the correct species by the presence of an adult Great Gray Owl or other means that is defensible.

Persistence (as in persistence objective for a species)

An abbreviated expression of the species management objectives for these standards and guidelines. Generally the persistence objective for vertebrates is based on the FS viability provisions in the regulations implementing NFMA (ROD 2001).

Persistence (as in persistence at a site)

Continued occupancy by a species at a Known Site (ROD 2001).

Pre-Disturbance Surveys

Surveys that follow this survey protocol. The 2001 ROD says: See “Surveys Prior to Habitat-Disturbing Activities”

Presence

A visual observation of a Great Gray Owl. The detection of pellets or feathers that can be identified as from Great Gray Owl.

Proposive Surveys

One type of landscape-scale or strategic survey, proposive surveys are focused searches conducted where taxa experts anticipate finding the target species. They are used to find sites of the rarest species, i.e. those that may not be picked up in random plots (ROD 2001).

Range of the Northern Spotted Owl

Area generally comprised of lands in Western portions of Washington, Oregon and Northern California.

Rare

A species is considered to be rare when: there are a low number of extant Known Sites with low numbers of individuals present at each site and populations are not well-distributed within its natural range. “Low” numbers and “not well distributed” are relative terms that must be considered in the context of other criteria such as distribution of habitat, fecundity, and so forth (ROD 2001).

Resident Single

A Great Gray Owl that is not known to be paired with a mate. Singles may establish a territory during a breeding season. A resident single is confirmed by at least two detections made in a two-year timeframe (one each year) or three detections in one year during the breeding season.

Site (as in occupied site)

The location where a specimen or population of the target species (taxonomic entity) was located, observed, or presumed to exist (occasionally used as a local option to pre-disturbance surveys for certain vertebrates) based on indicators described in Survey Protocol or Management Recommendations (ROD 2001).

Site (as used in manage Known Sites)

The occupied site plus any buffer needed to maintain the habitat parameters described in the Management Recommendation (ROD 2001).

Status Unknown (Single Owl)

Status is unknown if the response of an owl does not meet the pair or resident single status definitions above.

Survey Area

Potential nesting habitat within a 1/4 mile distance from the perimeter of a habitat disturbing activity.

Survey Repetitions

A minimum of six complete visits per survey season for two consecutive years within the survey area. Survey visits shall be at least a week apart. See “Field Season” above for more information.

Survey Timing

- One hour before sunset-to-sunrise (for night surveys). Generally, starting just before dark is optimal time, but refer to “Calling” for additional guidance.
- Sunrise-to-sunset (for day surveys)

In general, daytime surveys should be combined with nighttime visits to effectively detect the Great Gray Owl. Daytime surveys only are not advisable.

Surveys Prior to Habitat-Disturbing Activities

Surveys conducted to determine if the species is present at a site proposed for habitat-disturbing activities (ROD 2001).

Young

A live or dead Great Gray Owlet.

