

Local Occurrence

Short-eared owls are relatively common residents of the open, grassland, meadow, and marsh areas in the lower elevations of the study area and west of the river. We have not located any short-eared owls within our sample areas, but suspect that they occur in suitable habitats. We have noted considerable annual variation in our observations of short-eared owls in our ongoing studies in Teton Valley, and suspect that population fluctuations may make this owl hard to find in some years.

Reproductive Biology

Egg laying at this latitude and altitude might be expected from mid-April to mid-June (Bent 1938). Whitfield and Maj (1994) observed a courting pair of short-eared owls in Teton Valley on 4/16/92. Incubation lasts about 26 days. The young develop very rapidly, probably because of their high vulnerability to predation: these owls are ground nesters. The young owls may depart from the nest after only 15 days, and fledge at about 25 days of age (Clark 1975). The young may be dependent upon the adults until about 50 days old.

Ecology and Habitat Relationships

The short-eared owl is primarily associated with open habitats such as hay meadows, pastures, old fields and wetlands (Clark 1975). Winter roosts may be found in conifers with similar characteristics to those used by long-eared owls, and may even be shared with these owls (Clark 1975).

This species is susceptible to the suite of ecological changes that can threaten the success of many ground nesting birds, such as unfavorable habitat alteration by factors such as fire or agricultural clearing and destruction by increased populations of foxes, skunks, ravens and other predators. Specific habitats used by these owls for nesting, foraging, and roosting should be identified and protected where possible.

Detection Methods

As a ground nesting species, the nest survey protocol follows that described for the northern harrier. Because this owl is often observed during the daytime, especially early morning and later evening, observed adults can help focus a follow-up ground search. This owl also roosts in small groups, often with long-eared owls, in cottonwood and deciduous forests in the winter. These sites may be detected by observation of foraging adults as they leave the roost in early evening.

Western Screech Owl (*Otus kennicottii*)

The Western Screech Owl is found from southern coastal Alaska throughout coastal British Columbia and the United States west of the Rocky Mountains to central Mexico, and inland as far as northwestern Wyoming, Colorado, Arizona and western Texas (Johnsgard 1988). These owls are found in a wide range of habitats varying from coastal lowlands and the Sonoran desert to temperate rain forests. The species is generally found in open deciduous forest and areas of scattered trees. In many areas, western screech owls have declined due to the loss of riparian forest habitats, although they may be found within urban city parks. The western screech hybridizes with the eastern screech owl along interspecies boundaries.

Local Occurrence

We have detected screech owls in the cottonwood bottom in the Heise area only to date, but suspect that this species will be found in much of the cottonwood forest within the study area. We did not detect any Western screech owls in 1994.

Reproductive Biology

Mating pairs are monogamous and apparently life long, but these are short-lived birds

(life span of 3-4 years). Western screech owls may attempt to breed as 1 year olds (80%, Van Camp and Henny 1975). The pairs display many calls, including duetting when in courtship. Copulations are of 2 seconds duration. Clutch sizes of 4 to 6 eggs, are expected, although clutch size may be smaller in interior populations. Incubation lasts about 26 days, with fledging at 30-32 days. There is very high fledging mortality, about 70%.

Ecology and Habitat Relationships

The western screech owl is generally associated with deciduous tree stands in open country, especially riparian hardwoods (cottonwood) bottoms. In central Idaho, Hayward (1983) noted a strong preference for cottonwood river bottoms. Nearby open grassland habitats were used for foraging. These small owls nest in cavities, in woodpecker holes or natural cavities. They sometimes use flicker holes in deciduous trees along stream sides. They also roost against the boles of cottonwoods where their gray coloration is an effective disguise. We have found screech owls roosted in conifers within cottonwood forests.

Johnson et al. (1979) reported that western screech owl pairs nesting in riparian forests may be separated by as little as 50 m (164 ft). Territories may be separated by much greater distances.

Detection Methods

These owls respond very readily to taped calls. We have successfully called western screech owls in Jackson Hole and the South Fork at Heise in mid-March to early April in earlier years. The same broadcast calling method described for large owls applies with special attention to screech owl habitat and nesting chronology (Appendix A, Table 3).

Burrowing Owl (*Athene cunicularia*)

The burrowing owl breeds locally

throughout the western United States and extreme southern edge of the western Canadian provinces with the exception of the Pacific coast, and in Mexico, Central America, and South America outside of the Amazon River Basin (Johnsgard 1988). It also resides in Florida and the West Indies. These owls are usually found in open, dry pasture lands, grasslands, or deserts where burrows are available. It is migratory in this region, and winters south in unknown areas. The burrowing owl has declined in much of its range, largely because of the removal of burrow building mammals. It is listed as a sensitive species by the BLM and a priority 2 species in Wyoming, but does not have special status in Idaho.

Local Occurrence

Within the Greater Yellowstone Ecosystem, the burrowing owl is found in isolated colonies in rural areas where open plain habitat predominates (Olenick 1989). Nesting by burrowing owls in the GYE may be sporadic (Olenick 1989). We have not detected any burrowing owls within the study area.

Reproductive Biology

Egg laying may occur over a broad period between April and July (Bent 1938, Stewart 1975). With an incubation period of 30 days, and a minimum fledging period of 40 days, the reproductive cycle likely requires 70-80 days (Landry 1979). Burrowing owls have relatively large broods, with an average of 4.6 juveniles/breeding pair at independence (Wedgewood 1976).

Ecology and Habitat Relationships

Typical burrowing owl habitat is open flat pasture land or grassland that has available burrows (Johnsgard 1988). Nesting areas must also feature perch sites such as fence posts or raised rodent mounds (Grant 1965). Nesting may occur in a localized area that would require a focused habitat protection effort. Artificial nest

burrows have been successfully used to enhance burrowing owl habitat in areas where burrowing mammals have been removed (Olenick 1987).

Detection Methods

Ground surveys are used in detecting burrowing owls. Searches should start in known prairie dog towns, short grass communities and disturbed sites such as cut-banks along road, railroad and airstrip ways. Both territorial adults and juveniles will respond to elicited broadcast calls. Generally observations of burrows for a few hours during their breeding season will provide information on presence. Adults may occasionally be observed perched near nest burrows on low elevation structures such a raised land surface or fence posts.

Great Gray Owl (*Strix nebulosa*)

The North American breeding range of the great gray owl includes central Alaska, most of Canada, the Cascades and Sierra Nevada ranges to California and the Rockies into the Greater Yellowstone Region of Idaho and Wyoming (Johnsgard 1988). Great gray owls nest in a variety of vegetation types from subalpine conifer forests to foothill forests interspersed with open areas, and winter at lower elevations. The great gray owl is a species of special concern in Idaho, and a sensitive species within the Targhee and Bridger-Teton National Forests.

Local Occurrence

The Eastern Idaho/Northwest Wyoming portion of the Greater Yellowstone Ecosystem, including the upper elevations of the study area, features a notably large and productive population of great gray owls (Franklin 1987, 1988). We are aware of great owl breeding areas at the edges of the study area in Douglas-fir dominated habitats above the river between Palisades Dam and Conant Valley and in similar habitats in the foothills of the northern Big Hole mountains. Concentrations of wintering great gray owls have

been found in cottonwood bottoms in Teton Valley and the upper Henry's Fork near Chester, Idaho (Franklin 1987). Similar winter habitat features are found in Swan Valley and along the upper South Fork and Henry's Fork within this study area, although we have not seen wintering great gray owls here. We did not detect any great gray owls in our 1994 sample sections.

Reproductive Biology

In late winter, great gray owls are increasingly gregarious, with pair formation from early February to a few weeks prior to egg laying in April or May (Franklin 1988). Territorial male great grays are expected to be calling in this region from late February to April. Only females incubate the eggs; breeding females typically commence incubation in April to early May in this locale (Craighead and Craighead 1956, Franklin 1988). Egg laying may be delayed in years of heavy snow cover (Franklin 1988, Whitfield and Maj 1995). Hatching occurs 30 to 36 days after incubation begins (Mikkola 1981, Franklin 1988). The young owlets leave the nest at 3-4 weeks after hatching (Franklin 1988, Bull et al. 1989a), although they do not begin to fly until about 50-55 days old. The young owlets are agile climbers and climb leaning trees near the nest area. The young are fed by an adult, usually the male, for about 3 months after they fledge.

Mean clutch sizes are 3 to 3.3 in Idaho/Wyoming (Franklin 1988), up to 5 in Oregon (Bull and Henjum 1990), with a potential for as many as 9 eggs (Mikkola 1983, as cited in Johnsgard 1988). Fledging-aged broods of 1 to 5 (mean of 2.2) are the norm in Oregon (Bull and Henjum 1990). In a 1994 study in the eastern portion of Targhee National Forest, an average of 2.3 fledged young/brood (n = 10) were found (Whitfield et al. 1995).

Ecology and Habitat Relationships

Great gray owls nest in a variety of vegetation types along their range from north to south. Locally, Franklin (1987) reported that

over 90% of observations of great gray owls in the Southeastern Idaho/Western Wyoming area were in the lodgepole pine/Douglas fir/aspens zone. Most of the nests reported by Franklin were in Douglas-fir forests. The most common nest trees in this region are Douglas fir and lodgepole pine. Aspen are occasionally used. Great gray owls do not build nests; nest structures are usually old hawk (usually goshawk) or raven stick nests, depressions in the tops of broken-topped snags, or dwarf-mistletoe platforms (Franklin 1988, Whitfield et al. 1995).

There were few specific descriptions of juvenile great gray owl habitat use or preferences in the literature. Newly fledged juveniles are agile, flightless climbers. They use their feet, wings and bills to move throughout their habitat (Mikkola 1983). Young great grays require forest stands with small, deformed, or leaning trees (Franklin 1987, 1988). During the heat of summer, juveniles avoid sunlight and seek shade by frequenting trees with a dense canopy (Bull and Duncan 1993).

Nero (1980) suggests that great gray owls hunt in open, grassy habitats and avoid timbered stands, but Bull and Henjum (1990) found that hunting adults actually preferred to hunt in open forests with canopy closures of 11-59%. In the eastern half of Targhee National Forest, clearcuts were favored over other foraging habitats, although open canopy lodgepole pine and aspen forests were also used (Whitfield et al. 1995).

Detection Methods

Like other raptorial species detection of great gray owls can be enhanced with the use of broadcast conspecific calls. Generally surveys using calls should be started in March, continuing into the end of April. In years when deep snows persist into the spring vocalization surveys should be delayed since great gray owl may delay their courtship when such conditions occur. Surveys should be performed 3-4 hours after dusk. Evening surveys are preferable to early morning surveys. Young owlets can be detected with the use of conspecific food-beg-

ging vocalizations from early July to mid August, a period in which they are particularly vocal. The earlier young owlets are detected after fledging, the more likely they will still be in close proximity to the nest. Adults are territorial within close proximity to the nest and thus the further away from the nest the less likely an adult can respond. A response can be elicited with taped calls (USDA 1993).

Barred Owl (*Strix varia*)

In the West, barred owls are resident from southeastern Alaska and eastern British Columbia into the northwestern states in the interior Rockies to northern California (Johnsgard 1988). They are now rarely found into southeast Idaho, western Montana, and northwest Wyoming. Barred owls in the East are found from Nova Scotia to Central Alberta across Canada, and throughout the eastern and southeastern United States.

The barred owl is a forest-dependent owl, and has suffered in areas where forests have been extensively cut. In areas where forest habitats are relatively small in size, barred owls may be excluded by much larger great horned owls. However, the barred owl does appear more adaptive than some other species. Barred owl populations have greatly expanded their range into the Northwestern U. S. since the 1960s, and are now found in many habitats formerly occupied by spotted owls (Hamer and Allen 1985). Barred owls occur into southeast Alaska, and into our region in southern Idaho and Northwest Wyoming.

Local Occurrence

The closest documented occurrence of a barred owl is in the Centennial Mountains along the continental and state divides between Montana and Idaho. They have also been reported in northwestern Wyoming. Their documented range expansion suggests that barred owls may be found within our study area.

Reproductive Biology

Courtship begins in winter, as the pair exchanges hoots, and males pursue females with a variety of calls and displays and courtship feeding and preening (Johnsgard 1988). Barred owl calls are highly distinctive: "Who cooks for you; who cooks for you all"?

Barred owls might be expected to initiate nesting in early April to May at our latitude. They have a relatively long breeding season, and will often renest following egg or brood loss (Johnsgard 1988). Females do all the incubation and brooding, whereas males bring in the food. Clutch sizes are relatively small, on average 2.4 eggs/clutch (Murray 1976). Yearly variations in clutch size are influenced by prey base and winter severity. Incubation begins with the first egg laid, which equates to staggered hatching. Incubation lasts 28 to 33 days. Average number of nestlings is about 2 (Apfelbaum and Seelbach 1983). Young grow rapidly in the first month. At 4-5 weeks, the young regularly leave the nest to climb into nearby trees and hide in branches. Young begin to fly at about 6-7 weeks old. They may receive some food from adults for up to 4 months.

Barred owls are thought to have permanent pair bonds, which persist year around, but this feature is not well known. They are fairly sedentary and territorial much of the year, although mostly solitary from July to early December. There is a high degree of nest tenacity and territoriality. The owls are relatively long-lived, with records of up to 10 years in the wild. Barred owl occupancy of nest territories has been documented for over 30 years.

Ecology and Habitat Relationships

Barred owls typically breed within dense, mature woodlands, varying from uplands to lowland swamps, but especially wetland areas in deep woods (Nicholls and Warner 1972, Elody and Sloan 1985). Nesting territories are usually in mature and dense mixed deciduous/conifer forests, often near water. Nests are most often in

a cavity in a large tree (roughly 50 cm or about 20 inches dbh or larger), often in a deciduous tree. The owls use natural cavities or old squirrel or hawk nests. Nest heights ranged from 14 to 32 feet in eastern Canada. Often nests are near forest openings, and sometimes in the tops of hollowed tree stubs. Day roosts are typically in areas of maximum daytime concealment in densely foliated trees.

Barred owls prefer open hunting areas, forest edges, and also woodlands or areas with scattered trees and a lack of brush. They often hunt in marshes (Bosakowski et al. 1987). Older forests are preferred because they provide more sub-canopy flying room. Older growth forests also may contain an abundance of down trees that provide rodent habitat. Barred owls are opportunistic foragers; they adapt to local conditions, and take many kinds of prey. Prey items include a large variety of mammals and birds, with average mammalian prey sizes in the range of partially grown cottontails, voles, shrews, and birds the size of flickers, but up to grouse, pheasants, and even long-eared owls. They are semi-nocturnal to nocturnal hunters with hunting techniques and prey preferences that cause strong overlap with spotted owls.

Average barred owl home range sizes were 231 hectares in a Minnesota radio-telemetry study (Nicholls and Warner 1972) and 282 hectares in a Michigan radio-tracking study (Elody and Sloan 1985). Only about 118 hectares of that area was used in summer when the prey base was more dense. Barred owls are strongly defensive of territories (Nicholls and Fuller 1987). They are generally sedentary, but some migratory movements are noted in more northern areas during winter. The owls, particularly the females, may occupy their territories most of the year.

Detection Methods

Barred owls are highly vocal during their nesting period and will respond to taped conspecific calls. In suitable nesting habitat, careful listening will often be sufficient to determine presence of this owl because they call frequently