

Northern Goshawk (*Accipiter gentiles*)

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The northern goshawk (goshawk) is a short-winged, highly maneuverable hawk of the accipiter group inhabiting boreal and mountain forests of North America, Europe, and northern Russia. Some goshawks migrate; some are resident; and others are probably nomadic, moving more in years of low prey. The breeding and winter ranges of the goshawk overlap extensively. In Southeastern Alaska (Southeast), the goshawk is a year-round resident and begins to occupy nesting stands in February and March (Iverson et al. 1996) (Fig 1). Relatively large size, a slate gray back, and a fine gray barring on underparts make the adult goshawk difficult to confuse with any other bird of prey in the Tongass National Forest. Under poor light and in the forest, however, the goshawk and red-tailed hawk (*Buteo jamaicensis*) can be confused, even by experienced birders. Short wings and a long tail make the goshawk well-suited for navigating through its most common habitat of old-growth forest, where it often crashes through dense brush to capture birds and small mammals. In Southeast, the primary diet of the goshawk includes grouse, ptarmigan, red squirrels (*Tamiasciurus hudsonicus*), songbirds, jays, and crows (Lewis 2001).

In the mid-1990s, the conservation status of the Queen Charlotte goshawk (*Accipiter gentiles laingi*), the subspecies most commonly found in Southeast, was the focus of much public and legal debate. The issue centered on the vulnerability of this goshawk to large-scale timber harvesting because of its association with mature and old-growth forests across much of its range. In 1990, the U.S. Forest Service (USFS), Alaska Department of Fish and Game (ADF&G), and U.S. Fish and Wildlife Service (USFWS) embarked on a



FIG 1. Male northern goshawk at nest in old-growth forest in southeastern Alaska. (Bob Armstrong)

multiyear study to examine the ecology and habitat associations of Queen Charlotte goshawks in the Tongass National Forest.

STATUS IN SOUTHEASTERN ALASKA

Distribution

The goshawk is found across the Tongass National Forest from Dixon Entrance in southern Southeast (Iverson et al. 1996) to Yakutat (Islieb and Kessel 1973).

Abundance

Northern goshawks are found in low density across the Tongass (Titus 1994). Recent estimates of goshawk abundance in the Tongass range from 100–800 breeding pairs (Crocker-Bedford 1990, 1994; Iverson 1990). Although an interagency study of goshawks in the Tongass found 61 nesting areas within an

approximately 30,000 mi² (77,000 km²) study area (Flatten et al. 2001), it must be emphasized that this number does not represent a density estimate. No quantitative population estimate exists, and none has been attempted.

Special Taxonomic Considerations

Generally, 3 subspecies of goshawk are recognized in North America, 2 of which occur in Alaska. In southern Southeast, the Queen Charlotte goshawk predominates, but the northern goshawk is the common form throughout most of North America, including most of Alaska. Intermediate forms of the Queen Charlotte goshawk (*A.g. laingi*) and northern goshawk (*A.g. atricapillus*) occur in northern Southeast. It is believed by many that Southeast goshawks represent a north-to-south and east-to-west variation (cline) in physical characteristics between the small, dark Queen Charlotte goshawk and the larger, lighter-colored northern goshawk (Iverson et al. 1996).

Significance to the Region and Tongass National Forest

The Queen Charlotte goshawk is endemic to coastal rainforests from Vancouver Island to northern Southeast (Iverson et al. 1996, Squires and Reynolds 1997), where it is a year-round resident and an integral part of the biodiversity and natural heritage of the Tongass National Forest. The importance of the Tongass to the Queen Charlotte goshawk is apparent when the amount of suitable habitat in insular (island) British Columbian forests is considered. Generally, insular British Columbia forests have been converted to early seral stages (i.e., younger forests) more rapidly, and to a greater extent, than the old-growth forests of the Tongass (USFWS 1997). The goshawk is an old-growth forest inhabitant and, as a year-round predator of small mammals and birds, likely plays a pivotal role in the complex predator-prey dynamics of the forest. Because most or all goshawks in the Tongass are year-round residents and because the species is associated with old-growth coniferous forests for nesting and hunting, the goshawk is particularly vulnerable to widespread conversion of old-growth habitats to clearcuts and younger-aged successional forests (Iverson et al. 1996, USFWS 1997, Flatten et al. 2001). A persistent goshawk population in the Tongass could serve as an indicator of old-growth forest health. Despite 10 years of quantitative natural history study of the goshawk in the Tongass and its clear association with old-growth forests, when a detailed understanding of how forest

management influences goshawks at the population level might be obtained is difficult to predict.

Special Management or Conservation Designations

Goshawks in Southeast have garnered the attention of government agencies, conservation organizations, and the environmental community nationwide. During the last decade, conservation designations by agencies and organizations have varied; however, the status of the goshawk in Southeast remains a concern. It is a species of special concern to the State of Alaska. Stenhouse and Senner (2005) include the Queen Charlotte goshawk on Audubon's Alaska WatchList because of its limited distribution and potential threats posed by commercial timber harvesting in breeding and nonbreeding seasons. The USFS considers the Queen Charlotte goshawk a species of special management concern in the Tongass National Forest. The special management concern of the goshawk results from its year-round residency, the likelihood of its habitat being affected by land management activities, its negative response to habitat fragmentation, and its characteristic role as an ecological specialist (Iverson and René 1997). Several other criteria, including susceptibility to disturbance, geographic range and distribution, and population size and trend, also contribute to its high ranking.

In the mid-1990s, the USFWS was petitioned to list the Queen Charlotte goshawk as endangered. After careful review, the USFWS twice found the petition to be not warranted. Legal challenges against the USFWS have continued, and the future conservation status of the goshawk will be revisited (U.S. District Court, District of Columbia, 2004). In the 1997 Tongass National Forest Land and Resource Management Plan (TLMP), the USFS included the goshawk as a species of special management concern. In the final supplemental environmental impact statement for the Tongass Forest Plan (USFS 2003), the USFS proposed dropping the goshawk from monitoring, citing the high cost and difficulty of monitoring and the low density of the species in the Tongass.

In 2000, the Canadian government listed the Queen Charlotte goshawk as threatened because of continued logging of low-elevation, old-growth coniferous forests within its range and likely population declines (Environment Canada 2004).

HABITAT RELATIONSHIPS

Most of what is known about goshawk ecology, populations, and habitat associations comes from the multiyear, cooperative studies of the USFS, ADF&G, and USFWS (Iverson et al. 1996, Flatten et al. 2001). These studies were in response to mounting concern over potential impacts of large-scale timber harvest on Tongass goshawks. Because of the inaccessibility of goshawk nests and difficulty of monitoring, most habitat use data were collected by relocating radio-tagged birds, and identifying the habitat characteristics at these relocation sites with the use of habitat maps based on a geographic information system (GIS), aerial photography, or both. During nearly 1 decade, birds inhabiting 61 goshawk nesting areas across the Tongass were studied (Flatten et al. 2001).

According to the USFS, goshawks in Southeast require “productive old growth,” nest sites below 800-ft (244 m) elevation, and large (10,000–30,000 acres [4,050–12,150 hectares]) use areas of mixed habitats (USFS 2002). This description of habitat use is based on habitat associations derived from overlaying radio-telemetry relocations of goshawks on GIS and aerial photography habitat maps of the Tongass. As summarized below, goshawks select old-growth forest habitats over younger forests and nonforested areas.

Relocations of radio-telemetered goshawks occur more often in old-growth forests with high volume (referred to as large-tree old growth) and medium volumes (referred to as medium-tree old growth) than in any other habitat type. In goshawk use areas studied, 32.2% and 26.4% of all relocations occurred in forest habitats characterized by large-tree and medium-tree old growth. The occurrence of these 2 habitat types in goshawk use areas was 23% for large-tree old growth and 19.5% for medium-tree old growth. Because relocations of goshawks in these habitats occur more often than expected based on availability of these habitats, it has been concluded that goshawks select for large-tree and medium-tree old-growth forest habitats. Selection for habitats did not occur in mature sawtimber, scrub forest, forests with small-tree old-growth, nonforest, or clearcut habitats. To further the assertion that goshawks select old-growth habitats, Iverson et al. (1996) suggested that values given to support preferential use of old-growth forests by goshawks is likely conservative because of GIS limitations in describing old-growth habitats. Goshawks also use riparian and beach-fringe habitats

more often than predictions based on occurrence of those habitats.

Goshawks, especially females, are more likely to be found in upland landscapes below 800 ft (244 m) and on slopes of less than 35 degrees. Level terrain is generally avoided by goshawks, likely because it is characterized by poorly drained, deep organic soils with low productivity.

Goshawks in the Tongass use large tracts of land during the entire year (Iverson et al. 1996, Flatten et al. 2001). A nesting area, defined as the area that includes all nest sites and alternative nest sites used by a pair or an individual within its breeding home range, can be as large as 1,987 acres (804 hectares). Nest sites include prey handling areas and roosts, and are generally much smaller than nesting areas, 12–37 acres (5–15 hectares).

Iverson et al. (1996) conducted detailed analysis on nesting habitat selection of Tongass goshawks. They compared habitat features on 30 acre (12 hectare) and 160 acre (65 hectare) plots centered on nests to the same-size randomly selected plots in old-growth forest. The 30 acre (12 hectare) nest plots were more heavily forested and contained less forest-nonforest edge than random plots. Amount of cover was less variable in nesting plots, indicating that nesting plots contain fewer large gaps than random plots. Nesting plots generally have more hemlock, higher canopy closure, and more multistory canopy structure than randomly selected plots of old-growth forest (Fig 2). In comparisons of cover types in 600 acre (243 hectare) plots centered on nests with 10,000 acre (4,047 hectare) plots centered on the same nests, the 600 acre



FIG 2. Goshawk chicks in nest under the forest canopy in an old growth forest in southeastern Alaska. Goshawks in Southeast have large home ranges and select low elevation old-growth forest habitats on productive sites with medium to large trees for nesting and feeding. (Rich Lowell)

(243 hectare) plots contained higher proportions of forests with large-tree and medium-tree old growth, suggesting that goshawks are selecting the most productive forest areas within large forest tracts for nesting. Goshawks tend to nest far from marine (mean = 2 mi [3.2 km]), lacustrine (mean = 1 mi [1.6 km]), and riverine (mean = 900 ft [274 m]) shorelines.

Stick and bark goshawk nests are usually placed near the trunk on large conifer limbs, low in the forest canopy. Nest size depends on frequency of use, but is usually 1–2 ft (0.3–0.6 m) deep and about 3 ft (1 m) in diameter (ADF&G 2003).

IMPLICATIONS FOR CONSERVATION

In Southeast, the loss of old-growth forest habitat is the primary threat to goshawk populations (Iverson et al. 1996, Iverson and René 1997, Flatten et al. 2001). Clearcut logging removes the most valuable habitat (old-growth forest) and replaces it with habitats avoided by goshawks. Clearcutting of old-growth forest stands likely affects goshawk use of those areas for at least 100 years (Iverson et al. 1996), because goshawks tend to avoid clearcuts and early seral forests. Widespread logging may also have indirect effects by diminishing prey habitats and populations (Iverson et al. 1996). Thrushes, grouse, and squirrels (common forest inhabitants that may be affected by timber harvesting) contribute up to 60% of prey deliveries to goshawk nests during the breeding season (Lewis et al. 2004). Although goshawks are considered generalist predators and possess some adaptability to fluctuations in their prey base, large-scale habitat disturbance may diminish breeding success through changes in prey availability (Lewis et al. 2004). Other human activities such as mining and urban development can also impair goshawk nesting and foraging habitat (ADF&G 2003). Forest management practices that maintain the most old-growth forest, especially large-tree and medium-tree old-growth stands, will provide the most direct and indirect benefits to Tongass goshawks.

Forest management practices in the Tongass will likely influence the long-term conservation of Southeast goshawk populations. Iverson et al. (1996) compared the impact of continued timber harvesting rates under the old forest management plan to a 300 year timber rotation. They assumed that 300 year, forest-wide timber rotations would preserve sufficient old-growth habitat to sustain healthy populations of goshawks across the forest. In a 300 year rotation

scenario, 33% of the forest remains as productive old-growth habitat at any point in time. Harvest rates consistent with the previous forest management resulted in exceeding the 33% harvest guideline in half of Tongass biogeographic provinces by 2055, potentially placing goshawks at conservation risk.

Because the goshawk uses large areas of the forest during the entire year, it is a landscape species. Currently, a 100 acre (40 hectare) buffer around known goshawk nests is required under the TLMP (USFS 1997). Unfortunately, this policy does not adequately protect goshawks in the Tongass for 2 main reasons. First, unless radio telemetry is used, it is unlikely that most goshawk nests will be located. An inability to locate nests makes it impossible to accurately define a buffer centered on a nest. Second, nesting areas can be nearly 2,000 acres (800 hectares) in size (Iverson et al. 1996, Flatten et al. 2001), obviously much bigger than buffer zones presently specified in the TLMP. Therefore, if protecting nesting areas is the primary approach to goshawk conservation, larger nesting area buffers are needed, as concluded by Flatten et al. (2001):

Based on these results and inferred low rate of active nest detection we experienced when searching nesting areas without radiotelemetry, we recommend that the minimum size of “no commercial timber harvest” buffers around goshawk nests be increased beyond the 40.5 hectares (100 acres) currently specified in the TLMP if a nest and nesting area based approach to goshawk management is to be used in the future. From our data and observations, we conclude that increasing the size of buffers around known nests will provide greater integrity to nesting areas by protecting more distant (0.359 – 3.2 km) alternate nests that have low probability of detection without the aid of radio telemetry.

Rather than using a nest-by-nest conservation approach, the 1997 TLMP also included old-growth reserves and wildlife standards and guidelines.

Currently, the USFS lists the goshawk as a species of special management concern in the Tongass National Forest. However, no long-term, cost-effective monitoring strategy has been proposed. None of the bird monitoring protocols currently used in the Tongass (Breeding Bird Survey [BBS], Christmas Bird Count [CBC], and Monitoring Avian Productivity and Survivorship [MAPS]) is designed to adequately monitor goshawks. Although a final decision has yet to be announced, the goshawk may be removed from

monitoring requirements. The USFS has identified several reasons for removing goshawks from its monitoring list, including the expense of maintaining an adequate goshawk monitoring program, difficulties of detecting birds and nests, the low density of goshawks across the forest, and the belief that other old-growth forest inhabitants may better serve monitoring of old-growth forest health (USFS 2002)

Extensive logging throughout coastal British Columbia has likely contributed to diminished numbers of goshawks found there (USFWS 1997), and similar trends may also be seen in some portions of the Tongass where timber harvest has significantly reduced the abundance and distribution of productive stands of old-growth forest (Lewis et al. 2004). The combination of a limited range (coastal British Columbia and Southeast) and habitat loss has increased the risk of maintaining abundant, well-distributed populations of Queen Charlotte goshawks throughout their range in northern coastal rainforests. The ability of goshawk populations to survive and reproduce is tied closely to the maintenance of large, undisturbed tracts of productive (large-tree) old-growth forest throughout the Tongass National Forest (Fig 3).

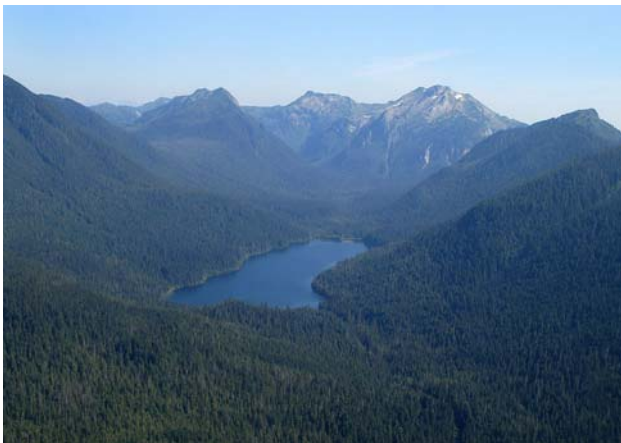


FIG 3 Unbroken tracts of low elevation old-growth forest like this large-tree stand at Kanalku Lake on Admiralty Island provide valuable nesting and feeding habitat for northern goshawks. (John Schoen)

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