Northwest Science Notes

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Reproductive Success of Northern Saw-whet Owls Nesting in Hybrid Poplar Plantations

Abstract

I studied northern saw-whet owl nest productivity and survival in hybrid poplar plantations in eastern Oregon. I placed twenty-five nest boxes in 2- to 5-yr-old plantations and monitored them during the 1999 nesting season. Nine nesting attempts were made and eight were successful. Daily survival rates for eggs and nestlings as estimated by the Mayfield method were 0.9919 ± 0.0025. Clutch size, number of eggs hatched, and number of fledglings for all nesting attempts were 5.22 ± 0.49, 4.33 ± 0.69, and 3.55 ± 0.60. Hybrid poplar plantations can provide suitable nesting habitat for northern saw-whet owls if nest boxes are provided.

Introduction

The establishment of large, hybrid poplar (*Populus* spp.) plantations in North America is becoming increasingly common with the forest products industry because these fast-growing trees produce abundant wood fiber in a short period of time. In the past 15 yr, over 28,000 ha of hybrid poplar plantations have been established in the Pacific Northwest to produce fiber for both paper and dimensional lumber products (Heilman et al. 1995, Stanton et al. 2002).

Little is known about the influence of these plantations on bird communities. Published studies of bird use of hybrid poplar plantations are few and relatively recent, and focused primarily in the Midwest (Christian et al. 1997, Hanowski et al. 1997). Furthermore, these studies document wildlife use of plantations, rather than reproductive success. Because density alone can be a misleading indicator of habitat quality (Van Horne 1983), it is also important to measure reproductive success in these plantations.

Northern saw-whet owls (*Aegolius acadicus*) are secondary cavity nesters that use both natural and artificial cavities in forested habitats throughout North America (Cannings 1993). Reproductive success of northern saw-whet owls appears to vary geographically. Marks and Doremus (2000) studied northern saw-whet use of nest boxes in southwestern Idaho and documented mean annual occupancy rates of less than 5%. Mean number of fledglings was 3.3 per nesting attempt and 4.8 per successful nest. Cannings (1993) reported average clutches in British Columbia of 5.67 eggs and mean fledging rates of 2.68 young per nesting attempt and 3.47 young per successful nest. Murray (1976) reported mean clutch size of 3.79 eggs along the Pacific coast and 4.96 eggs in eastern North America. None of these studies estimated daily survival rates of eggs or young. The objectives of this study were to: 1) document the reproductive success of northern saw-whet owls nesting in hybrid poplar plantations in eastern Oregon, and 2) compute daily survival rates of eggs and young.

Study Area

The study was conducted on a 7050 ha complex of hybrid poplar plantations in the Columbia River

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Basin, Morrow County, Oregon. The natural vegetation in this region is steppe and shrub-steppe (Franklin and Dyrness 1988), and soil types are sandy and sandy loam. Topography varies from flat to slightly undulating with elevations ranging from 150 to 250 m. Annual precipitation averages 22 cm (Ruffner 1978), most of which falls in late winter and early spring. Drip-irrigated plantations were first established in 1994, primarily on former agricultural croplands irrigated by center-pivot systems. Tree height and diameter growth average 3 m and 2.5 cm per yr. Plantations are managed on a 7- to 10-yr rotation, therefore few trees become large enough to provide natural cavities for nests.

Methods

I placed 25 nest boxes 3-5 m high on trees in four plantation age classes (2- to 5-yr-old) during fall 1998. I checked nest boxes for occupancy beginning 7 April 1999, and continued to monitor occupied nest boxes every 3-4 days from incubation to fledging to document the fate of each nest. Nests were considered successful if at least one young fledged. I estimated daily survival rates of eggs and nestlings for each nest using the Mayfield method (Mayfield 1961, 1975). Estimates were calculated using the program MAYFIELD (Hines 1996), which was developed based on Bart and Robson (1982). I assumed constant survival over the entire nesting period. When an egg failed to hatch, I assumed mortality of the embryo at the approximate midpoint between the hatching date of the first egg and the last egg in that nest. Values reported are mean ± SE.

Results

Of nine nesting attempts, eight were successful for a total nest box occupancy rate of 36%. I found at least one successful nest in each of the four plantation age classes. I discovered all eight successful nests during the incubation period. Furthermore, I determined that the failed nest had been deserted by the time I found it because the partial clutch of two eggs was cold and no adults were observed near the nest. Thus, I could not compute daily survival estimates for this nest. Daily survival rate for the eight successful nests was 0.9919 ± 0.0025. Clutch size for all nine nests was 5.22 ± 0.49. Of these clutches, 4.33 ± 0.69 eggs hatched. Number of fledglings for all nine nests was 3.55 ± 0.60. The only causes of mortality for eggs were either infertile eggs or death of embryos. None was lost to predators. I was unable to determine the cause of nestling mortality because siblings quickly consumed nestling carcasses, leaving only the bones in the nest.

Discussion

Daily survival rates during the entire nesting period were relatively high, probably due to lack of typical arboreal mammalian nest predators, such as squirrels, in these plantations (Moser et al. 2002). Eggs failed to hatch due to either infertility or death of the embryo from unknown causes as suggested by Cannings (1993), because no other causes of mortality were apparent. Although I could not determine the cause of nestling mortality, Cannings (1993) suggested that most nestling deaths were likely due to starvation. However, Houston et al. (1998) reported rare instances of siblicide in great horned owls (*Bubo virginianus*). No published data exist on siblicide in northern saw-whet owls.

Nest box occupancy rates appeared to be higher in this study than those reported by Marks and Doremus (2000) for northern saw-whet owls nesting along the Snake River in Idaho. Mean clutch size from this study was comparable to that reported by Cannings (1993) for North America, and exceeded those values reported by Murray (1976) for both eastern and western North America. Mean number of fledglings from this study exceeded those reported by both Cannings (1993) and Marks and Doremus (2000). These data suggest that hybrid poplar plantations augmented with nest boxes may provide nesting habitat that is similar or superior to other habitats in North America. However the small sample size, isolated geographic location, and single year of data may not characterize all populations every year. Nevertheless, northern saw-whet owls can successfully nest in hybrid poplar plantations if nest boxes are provided.

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