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Distribution of the Marbled Murrelet in Southwestern Oregon

Abstract

I summarized data from 889 intensive 2-hour morning surveys between 1992 and 1997 to determine the distribution of marbled murrelets (*Brachyramphus marmoratus*) in suitable habitat (mature and old-growth forest stands) on the Roseburg District of Bureau of Land Management in southwestern Oregon. Murrelets were detected on 17 surveys at 6 sites. Three sites were considered occupied, as defined by the Pacific Seabird Group (PSG), Marbled Murrelet Technical Committee guidelines (Ralph et al. 1993: 1994), all were less than 59 km from the coast. The farthest inland site with detections was 61 km from the coast. Two potential variables are discussed, which may influence the patterns of distribution and abundance in the study area: energetics and predation. Using the PSG protocols, surveys in southwestern Oregon should be conducted in all suitable habitat located 60 km inland from the coast rather than the guidelines for 80 km.

Introduction

The Marbled Murrelet (*Brachyramphus marmoratus*) is a dove-sized seabird in the Alcidae family. The murrelet distribution is closely associated with older-age coniferous forests in the Pacific Northwest (Sealy and Carter 1984; Carter and Sealy 1987; Hamer 1995; Hamer and Nelson 1995; Miller and Ralph 1995). Habitat used by murrelets for nesting usually has large-diameter trees, highly variable canopy closure (15%-100%), and a high number of potential nesting platforms (Grenier and Nelson 1995, Hamer and Nelson 1995). The marbled murrelet was listed in 1992 as a federal threatened species in Washington, Oregon, and California (U.S. Fish and Wildlife Service 1992).

On federal lands, any proposed action that modifies suitable murrelet habitat or impacts the murrelet's ability to reproduce requires the managing agency to initiate intensive surveys based upon Pacific Seabird Group (PSG), Marbled Murrelet Technical Committee guidelines, before implementing the proposed action; thereby, complying with the regulatory rules and regulations of the Endangered Species Act of 1973. The guidelines suggest that all actions within 80 km of the ocean be examined for murrelets and, if occupied, managed appropriately. In Washington the farthest known inland occupied site is 84 km from the coast (Hamer 1995), and in Oregon and California the sites are 61 and 56 km, respectively (U. S. Fish and Wildlife Service 1994). In southwestern Oregon, Dillingham et al. (1995) examined the distribution of the murrelets in the Siskiyou National Forest and suggested their distribution was correlated to vegetation type. In the Siskiyou National Forest murrelets have been found as far as 42 km inland (S.K. Nelson, unpubl. data; P.W. Paton unpubl data). With similar information needs, the Roseburg District of the Bureau of Land Management in the south Coast Range, examined the distribution of the marbled murrelet between 1992 and 1997 by conducting intensive surveys. This paper summarizes our murrelet survey effort and discusses potential factors that may affect murrelet distribution in southwestern Oregon.

Methods

The study area was located west of Roseburg, Oregon (see Fig. 1), approximately 45 to 80 km from the Oregon coast. The land ownership pattern on the study area consists of a checkerboard arrangement of alternating square mile (2.59 km^2) sections of federal and non-federal lands (Richardson 1980). Federal lands, administered by the Roseburg District of the Bureau of Land Management (BLM), have not been as extensively harvested as non-federal lands. I estimated that approximately 6% of non-federal forested stands were ≥80 years old based on aerial photo interpretation, and half the lands administered by the District were still covered by older forests and dominated by trees ≥120 years old (USDI). The BLM lands typically include a mixture of young forests and older unlogged forests (80-450 years

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old) and recent clearcuts. The majority of the young forests, less than 50 years old, were regenerated after logging.

The study area is in the western hemlock (*Tsuga heterophylla*) vegetation zone (Franklin and Dyrness 1973), an area dominated by temperate coniferous forests of Douglas-fir (*Pseudotsuga menziesii*) and western hemlock. This region is characterized by mild, wet winters and warm, dry summers. The vegetation in the study area was classified as either suitable or nonsuitable based upon aerial photographs, forest inventory data, and on-site examinations of the stands. I use the term suitable habitat to mean any forest stand having a medium-to-large live tree and snag (diameter at breast height >38 cm) components in the overstory and were equal to or greater than 80 years of age, and nonsuitable habitat to mean any forest stand less than 80 years of age having small-to-medium live tree (diameter at breast height <38 cm) components in the overstory.

Surveys were conducted between 1992 and 1997 for the dual purpose of examining the overall distribution of the murrelet on Bureau lands and inventorying potential timber sale areas. One hundred and five intensive inventory sites were established in suitable habitat during the study on federal lands (46 km to 74 km from the coast), with 64% (n=67) of the sites established specifically to examine the overall distribution of the murrelets and not associated with any planned timber harvest activities (Fig. 1). Whereas, planned timber harvest activities and their associated survey sites (n=38) were grouped and located in areas designated for intense timber management (Northwest Forest Plan, USDA et al. 1994), which systematically avoids large blocks of suitable habitat for the northern spotted owl (*Strix occidentalis*) and the marbled murrelet.

Site location of the non-timber related inventory sites were based upon a non-random selection process, whereby they were systematically and evenly distributed across the breadth of the study area and between timber harvesting activity centers to obtain an equitable and representative sample. A random selection of sites in suitable habitat would have clumped the survey locations in the late-successional reserve management areas for the marbled murrelet and northern spotted owl (*Strix occidentalis caurina*), as these areas are prominent features on the landscape and contain the majority of the suitable murrelet habitat. Conservation reserve areas (designed to maintain a viable population of spotted owls in western Oregon) are not randomly distributed. Their clumped distribution is the result of ownership patterns and historical harvesting activities in the study area.

Once a general location or survey area was selected, individual stand selection was based upon the best available stand of suitable habitat (that is, the stands were older, contained the largest diameter conifers, and potentially the greatest nesting platform availability - Burger 1995; Grenier and Nelson 1995; Hamer 1995; and Hamer and Nelson 1995), largest patch size (that is, the larger the mean patch size the better - Raphael et al. 1995), stands that were not impacted by salvage logging, and were safely accessible. This sampling procedure was designed to distribute the inventory sites in a manner whereby the overall distribution of the species in a range of distances from the coast could be examined. At each survey site a range of 1 to 7 survey stations (mean = 3.6) were established. The number of stations per survey site reflected the size of the site. In general, one survey station was established for each 10 ha of suitable habitat.

Murrelet surveys were systematically located and conducted from 1 May to 5 August, using the intensive (fixed station) survey protocol and station guidelines suggested by the Pacific Seabird Group (PSG), Marbled Murrelet Technical Committee guides (1992-1994, Redwood Sciences Laboratory, 1700 Bayview Drive, Arcata, CA, unpubl. reps.). Each site was visited a minimum of four times per year during the survey period, with at least two visits conducted at each site after June 20 and one visit during the peak period of activity (last three weeks of July). At each station throughout the survey season, surveys were conducted during a 2-hour period from 45 min before to 75 min after official sunrise. During the study, surveys at each site were conducted for two consecutive years, except for 15 new survey sites (4 for general distribution and 11 for timber related activities) established in 1997. The patterns of activity were quantified based on the visual and auditory detections at the sites, and the definitions proposed by Paton (1995). In addition, all sites with detections had additional visits above protocol minimums to either verify or determine potential occupation and nesting.

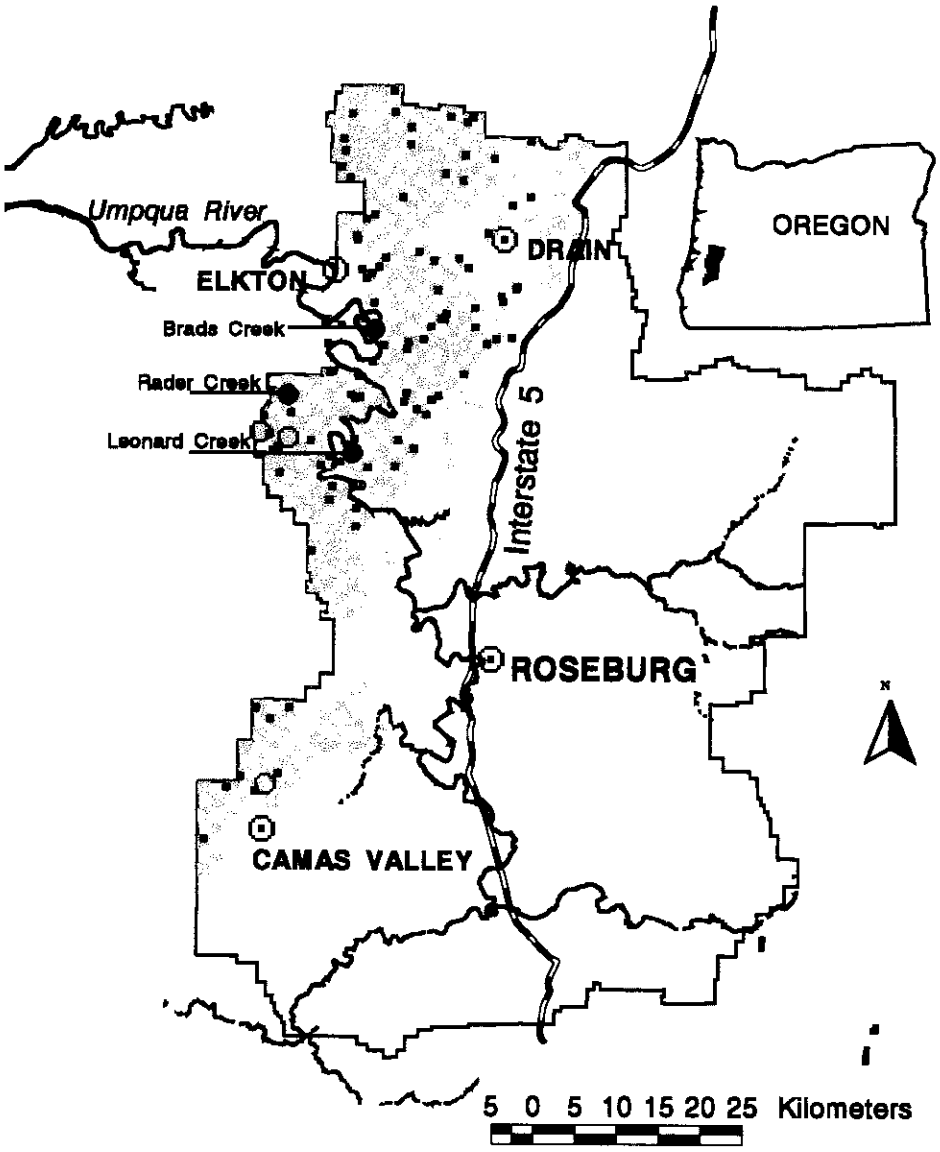

Figure 1. Distribution of intensive survey sites (solid squares), occupied sites (solid circles), and sites with detections only (hollow circles) on public lands in the Roseburg District of Bureau of Land Management in southwestern Oregon. The shaded area represents Bureau administered lands within the study area and dotted circles human population centers.

Surveyors had their hearing tested on one or more occasions during the study, and were trained each year for a minimum of two weeks during the month of April to familiarize them with both auditory and visual identification of murrelets and all potential birds that could be seen or heard during a survey.

Results

Between 1992 and 1997, we conducted 889 intensive (fixed station) 2-hr surveys. Murrelets were detected at six sites during 17 of these surveys. Subcanopy and circling flight behaviors were observed at three sites (Rader Creek, Leonard

Creek, and Brads Creek) and, therefore, were considered occupied as defined by the Pacific Seabird Group, Marbled Murrelet Technical Committee guides and Paton (1995). At the other three sites, murrelets were detected flying above the canopy only. At two of these sites there were numerous detections each with multiple keer calls (a two-syllable, high pitched vocalization, similar to the vocalizations of many gulls, *Larus* spp., [O'Donnell 1993]) per detection during two separate surveys to each site. The third site had only two single auditory detections (i.e., two single 'keer' calls above the canopy) within two minutes of each other during the second year of survey. No detections were observed during an additional third year of survey effort.

The Leonard Creek site adjacent to the Umpqua River was initially found in 1992 and was periodically occupied (unoccupied in 1994 and 1996 based on the lack of detections) during the study. The Rader Creek site was found in 1993 and has been consistently occupied. With additional visits to Rader Creek in 1994, the farthest known inland nest site was identified and characterized (Witt, In press). The Brads Creek site, also adjacent to the Umpqua River, was found in 1995 and was only unoccupied in 1996.

The murrelet flight paths observed at Rader Creek site indicate the use of creeks and drainages to get to and from the site. While the observations at Leonard Creek suggest a more directional east and west line of flight, as they were seen using road prisms and not the adjacent Umpqua River. The two sites with above canopy detections near Rader Creek also suggest a east and west line of flight.

The mean shortest distance to the Oregon coast for all survey sites was 59.4 km (S.D.= 6.8) with a range of 46 km to 74 km. All three occupied sites were less than 59 km from the coast (range: 49-58 km). Two of the three sites with above canopy detections only were located only a few kilometers from the Rader Creek site and were 46 km and 50 km from the coast. The farthest inland site with two above canopy detections was 61 km from the coast.

Discussion

The sampling approach used in the study combined the need for survey clearance efforts for potential timber sale projects with the basic need for information about the murrelet distribution in western Oregon. The systematic design incorporated a variety of factors (availability of suitable habitat on public lands, quality of suitable habitat, patch size, and distance to coast) in an effort to achieve a representative sample of the potential habitat available in the District and the Coast Range.

Miller and Ralph (1995) in California found that the strongest predictors of murrelet presence and occupancy in California were the density of old-growth cover and species composition, with mean detection rates being highest in major drainages and at lower elevations. They also found a strong pattern of declining presence with increased distance from the coast, with the highest frequencies of presence (89%) at stands within 10 km of the coast. In Washington, an analysis of landscape attributes indicated that the amount (mean patch size) and configuration (mean shape index) of the old-growth and large sawtimber stands were important factors in murrelet distribution (Raphael et al. 1995). In a vegetation analysis, Hamer (1995) found a pattern related to the distance from the coast, with 98.5% of all detections being observed <64 km inland.

In Oregon, murrelets were found to have a clumped distribution along the coast and in the adjacent Coast Range, with concentrations between Yaquina and Heceta heads (Nelson et al. 1992). Grenier and Nelson (1995) compared occupied sites with random locations and found that occupied sites were generally older, had larger midstory trees, and had larger and greater densities of dominant trees than random sites. Dillingham et al.(1995) hypothesized that the murrelet distribution in the Siskiyou National Forest in southwestern Oregon was influenced by habitat suitability, vegetation type, topography, climate, and distance from the ocean. Within the tanoak/western hemlock zone they observed 448 detections and only one detection was observed in the eastern part of the national forest in the mixed conifer/mixed evergreen zone. The mixed conifer/mixed evergreen zone was suspected to limit murrelet distribution because it was drier and had smaller trees than the western hemlock vegetation zone (Dillingham et al. 1995).

The distribution pattern observed in California and Washington of declining presence with increased distance from the coast suggest that some

form of limiting factor is acting on the murrelet. Dillingham et al. (1995) hypothesized that the limiting factor was related to tree growth and abundance of large limbs. In the Roseburg study area, I believe that both the physical and climatic factors in the study area are conducive to creating suitable nesting habitat. One possible reason for their present distribution and low numbers in the study area is that the population is already drastically limited and the pattern observed is merely a reflection of a decreasing population, where only the optimal or best habitat is occupied by the few remaining individuals. The Rader Creek nest site would fit this profile as it is both one of the oldest and one of the largest patches in the study area. The other two sites are not exceptionaly old and they are relatively small in size, but because they are adjacent to the Umpqua River may be more influenced by the presence of early morning fog along the river.

Perhaps it is a combination of factors that formed the patterns I observed. I believe that energetic requirements of flying inland to incubate eggs and feed young, and coupled with increased opportunties of being predated while in transit could have a major influence on their distribution and abundance inland. Another factor would be the potential predation of fledglings heading to the ocean and their potential navigational problems or exhaustion while on route (Nelson and Hamer 1995). Eberl and Picman (1993) found that the reproductive success and density of red-throated loons (*Gavia stellata*) decreased as the distance to the ocean increased. Although, both energetics and predation have not been formally tested, numerous authors have suggested that both aspects could influence the overall inland distribution of marbled murrelets (Dillingham et al. 1995; Hamer 1995; Hamer and Nelson 1995; Nelson and Hamer 1995; Ralph et al. 1995).

In conclusion, I agree with Ralph et al. (1995) and consider it prudent to focus survey efforts in the recovery zones, and that there is little virtue in conducting surveys in areas where murrelets are rarely observed. Given the present knowledge of the distribution and the ecology of the marbled murrelet, I recommend that surveys in southwestern Oregon be conducted in all suitable habitat located 60 km inland from the coast using the Pacific Seabird Group, Marbled Murrelet Technical Committee guides (Ralph et al. 1993; 1994) rather than the guidelines for 80 km.

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