Chapter 14

A Review of the Effects of Station Placement and Observer Bias in Detections of Marbled Murrelets in Forest Stands

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Abstract: A variety of factors influence the results of surveys conducted for Marbled Murrelets (*Brachyramphus marmoratus*) in the forest. In this paper we examine observer variability and survey station placement as factors influencing murrelet survey data. A training and evaluation protocol (Ralph and others 1993) was developed to insure high field abilities and comparability of data among and between observers. Site characteristics which may limit the hearing and sighting of murrelets (e.g., wind, road, or stream noise, visual obstructions) can largely be controlled through the sensible placement of survey stations.

In order to interpret data from inland surveys of Marbled Murrelets (*Brachyramphus marmoratus*), we must be aware of those factors influencing numbers and types of detections at a site. Topography, stand size and shape, and other factors that may influence murrelet densities and habitat use are examined elsewhere in this volume, as are temporal influences on detections and behavior levels. If two areas, each having equivalent populations of murrelets, were surveyed, why might the survey data differ between the two sites? Variability within and among persons conducting surveys is clearly one factor influencing survey data. Levels of extraneous noise or visibility at survey stations may also differ between sites. This chapter examines the influences of observer and survey station placement on murrelet survey data.

Observer Variability

There has been little quantitative analysis of observer effects on murrelet survey results. Rodway and others (1993b) found that the numbers of detections recorded by pairs of observers at the same sites showed significant positive correlation. However, they also found significant differences between observers in the proportion of visual detections. In Ralph and Scott (1981), there are studies on observer effects on landbird censusing results. Ralph (pers. comm.) compared murrelet surveys by many observers from a high-activity site in northwestern California to find the area around the observer that is effectively surveyed. Kuletz and others (1994c) found significant observer effects on detection levels at sites in Alaska.

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Site Characteristics

Visibility at Survey Station

A high percentage of murrelets remain unseen to the observer during surveys (Paton and Ralph 1988; Nelson 1989). The numbers of visual sightings of murrelets are strongly influenced by the location of the observer, yet they are critical for determining murrelet use of a stand (Paton, this volume). Nelson (1989) reported the highest percent of visual detections (55 percent) occurred at a survey station with the greatest view of open sky. Rodway and others (1993b) detected murrelets visually in 19 percent and 26 percent of detections at two sites in British Columbia. They speculate that greater visibility accounted for more visual detections at the latter site. Ralph (pers. comm.) examined the effect of canopy cover upon detection and behavior levels to assess the level of survey effort needed to determine occupancy by breeding murrelets in a stand. Detections indicating probable nesting in a stand are of murrelets below or within the canopy, and require visual sightings of the birds (Paton, this volume). At a dense canopy site, only 3 percent of detections indicated occupancy, while at moderate and open canopy sites, these detections were 14 percent and 30 percent, respectively. I (O'Donnell 1993) found that, in general, sites with greater visibility had more detections of murrelets below the canopy (*fig. 1*). Visibility at each site was quantified by estimation of the percent of clear view to the horizon in all directions. Including only sites in or near old-growth stands, I found that visibility had a significant positive relationship (r = 0.73, P = 0.04, n = 8) with the numbers of below canopy behaviors observed.

Environmental Noise

While there are no studies which examine the effects of extraneous noise (e.g., wind, road, or stream) specifically on murrelet survey results, it seems very likely that any noise impairing an observer's ability to hear murrelets will be detrimental to survey goals. The effects of environmental noise on the audio detection of landbirds are discussed in papers in Ralph and Scott (1981).

Environmental Acoustics

Acoustical properties in the environment will degrade bird song and calls in a variety of ways (Richards 1981). Attenuation, the decrease in intensity of sound with distance, can be affected by habitat type. Kuletz and others (1994c)

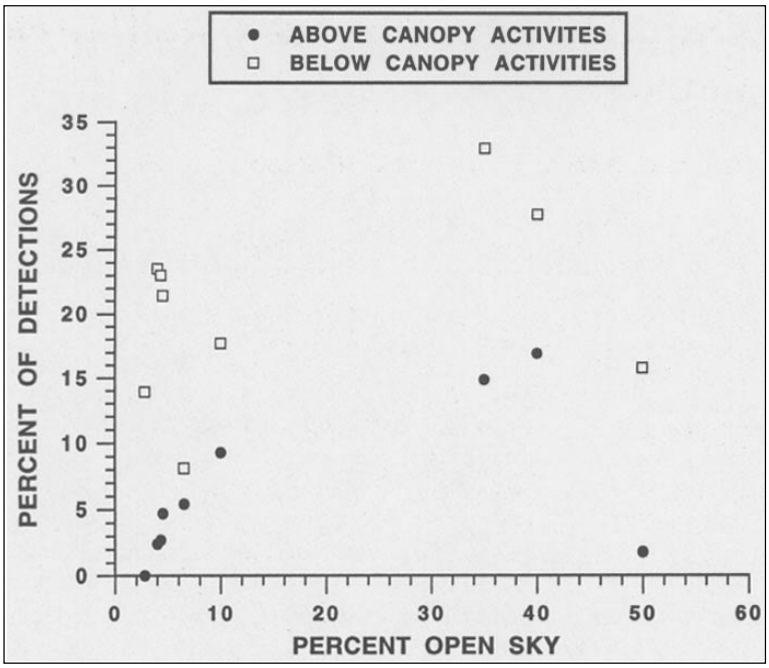

Figure 1—Relationship between percent of open sky at survey stations and observations of marbled murrelets flying above and below the canopy. Data from nine sites in northwestern California.

detected murrelets by sound at greater distances from stations placed in open meadow, than at stations closely surrounded by forest, accounting for difference in numbers of detections between sites. Detection distances for murrelets that were heard and not seen varied considerably between sites in northwestern California (O'Donnell, unpubl. data). The locations of stations ranged from closed canopy forest to large, open prairies. The maximum detection distances at stations in more open areas was generally greater than for stations within the forest.

Discussion

Observer Variability

There can be little doubt that variability exists between observers in their ability to see and hear murrelets. While some differences between observers cannot be eliminated, adequate training and evaluation can greatly improve individual abilities and increase comparability between observers. A training and evaluation protocol (Ralph and others 1993) was developed to accomplish this goal. The training program helps trainees to develop their ability to detect murrelets in the forest and to accurately record observations according to protocol. The evaluation, a simultaneous survey conducted by trainees and a qualified evaluator, insures that trainees are able to survey murrelets at acceptable levels of proficiency. In California, Oregon, and Washington, all persons conducting murrelet surveys for management or research purposes must successfully complete an evaluation process. Since inception of the training and evaluation program in 1991, approximately 500 persons have been evaluated in California alone (Burkett, pers. comm.), providing a large pool of qualified observers.

Site Characteristics

Factors influencing an observer's ability to hear and see murrelets can largely be controlled by sensible placement of survey stations. Because such a high proportion of murrelets are detected by call alone, survey stations should not be placed near sources of loud noise. Similarly, since behaviors suggestive of breeding activity are determined primarily from visual observations of murrelets, it is important to place survey stations in areas that have the greatest view of open sky (Ralph and others 1993).

Acknowledgments

I thank Steve Courtney, Dave Fortna, Debbie Kristan, S. Kim Nelson, Peter Paton, C. John Ralph, and Sherri Miller for comments on this manuscript.