ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
Juneau, AK 99811-5526

Alaska Department of Fish and Game
State Wildlife Grant

Grant Number: T-3 **Segment Number:** 1

Project Number: 10.11

Project Title: Murrelet Watch – A Citizen-based Monitoring Program in SE Alaska

Project Duration: January 1, 2007 – June 30, 2009

Report Period: 1 January 2009 – 30 June 2009

Report Due Date: September 30, 2009

Partner: Alaska Department of Fish and Game

I. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH

The marbled murrelet (*Brachyramphus marmoratus*) is currently listed as a threatened species in California, Oregon, Washington, and British Columbia. An estimated 687,061 (±201,162) *Brachyramphus* murrelets reside in SE Alaska in the summer (Agler et al. 1998), making it the geographic and demographic epicenter of the bird's range. The only published marbled murrelet dataset from SE Alaska that spans > 3 years is from Glacier Bay National Park where, between 1991 and 1999/2000, marbled murrelets declined by 75% – a rate of decline of 17.5% per year ($P < 0.05$) (Piatt and Kuletz 2005). We do not know if the broader population in Southeast Alaska has followed this Glacier Bay trend.

The high cost of large scale, randomized at-sea surveys makes it unlikely such surveys will be conducted on a routine basis in SE Alaska. If marbled murrelets are going to be monitored with any statistical power, trend data will need to be collected consistently over decades-long time periods. This requirement may be met by a local community-based approach, where citizen-volunteers are trained to collect survey data in a systematic way, from the same location, year after year. To that end, we propose using flyway counts (birds in flight over water), and audio-visual detection counts (birds in flight over land) as indices of Marble Murrelet abundance.

II. REVIEW OF PRIOR RESEARCH AND STUDIES IN PROGRESS ON THE PROBLEM OR NEED

The marbled murrelet is one of 13 sea bird species featured in Alaska's Comprehensive Wildlife Conservation Strategy (CWCS) (CWCS Appendix 4, page 180). It was selected because it is a species designated at risk, its population may be declining in the state, and it is sensitive to environmental disturbance. The CWCS conservation objective for marbled murrelets is to restore populations to their historical abundance, estimated to be 750,000 birds. One important action identified by the CWCS to achieve that objective is to determine abundance and monitor trends in the Alaska population in key locations including Southeast Alaska (CWCS Appendix 4, pages 213-215).

Alaska has primarily used fixed-width strip transects for vessel-based surveys. This is partially due to historical precedence. It is also partially due to the fact that in Alaska, large-scale surveys often census all bird species encountered, as well as marine mammals. When populations are dense, as they sometimes are in Alaska, there is insufficient time to collect necessary distance measures (K. Kuletz, personal communication). Hamer (1997) found that multi-species surveys lead to a negative bias for Marbled Murrelets and other small birds.

Audio-visual detection surveys are a common monitoring method for murrelets in the Pacific Northwest, and standardized survey protocols are in place (Pacific Seabird Group recommendations). While it is not difficult to detect Marbled Murrelets by this method, the surveys are typically conducted just before dawn (e.g., 2:30 AM on June 21), which may dampen volunteer enthusiasm somewhat. The second survey method, flyway counts, consist of 10-20 minute counts of marbled murrelets in flight over water (Kirchhoff, in prep). The counts, made with a spotting scope, are conducted during daylight hours, ideally between 5 and 10 AM. Flyway counts are most effective when terrain funnels large numbers of birds through waterways that are less than 3 km across. For waterways > 3 km, an unknown proportion of birds flying in the distant band likely go undetected. As with radar surveys, flyway surveys provide an index of abundance (not a population estimate). Depending on how stable and uniform these surveys are over time (within day and within season), they can be a useful tool for monitoring population trends in Marbled Murrelets.

In Southeast Alaska, we know from radio-tagged birds that Marbled Murrelets can make long flights 1 or more times per day between nesting and foraging sites (x = 78 km, + 27 km) (Whitworth et al. 2000). Other observers in Southeast Alaska, conducting visual counts from stationary points in the post-dawn hours, have detected hundreds to > 1,000 murrelets per hour flying to and from foraging and nesting areas (Van Vliet 1993, McAllister, unpublished data). Such mass movements along predictable flyways provide an ideal opportunity for population monitoring.

The surveys in this study were conducted by volunteers under the supervision of ADF&G staff. Some survey sites were accessed from community road systems, with volunteers conducting the surveys before or after work. In other cases, the surveys were conducted at remote sites, where volunteers established a field camp. At these latter sites, surveys were conducted throughout the day. The purpose of this study is to (1) identify patterns of flyways activity in time and space, across a number of survey locations in Southeast Alaska (2) determine within- and between-day variability in flyway counts at these locations, (3) identify optimal times and locations for conducting these surveys, (4) model the statistical power of different surveys to detect Marbled Murrelet population trends over a ten-year time frame, and (5) make recommendations for citizen-based monitoring in the future.

III. APPROACHES USED AND FINDINGS RELATED TO THE OBJECTIVES AND TO PROBLEM OR NEED

OBJECTIVE 1: Monitor long-term trends in Marbled Murrelet populations in Southeast Alaska, while building awareness and support for the conservation of nongame wildlife in the region.

A citizen-based program for monitoring population trends of Marbled-Murrelets (*Brachyramphus marmoratus*) using land-based flyway surveys was initiated during summer, 2007. Volunteers in 5 communities completed 365 surveys, from 7 locations, over 52 individual survey days during the summer. Surveys were conducted mostly in the mornings, before 0900 hours. The average number of Marbled Murrelets counted per 15 minute survey was 9.7. Counts were higher in July than in June, and higher in early morning versus late morning and afternoon. Counts were significantly higher in the Juneau, Sitka and Ketchikan areas compared to the Funter Bay and Wrangell areas. To reduce noise in the data, we selected a subset of data for the trend analysis. We included surveys conducted between 0530 and 0830 hours during the month of July only. The coefficient of variation (CV) for this subset was 24% lower (CV = 1.3) than the CV for the entire data set. From these data we modeled the power to detect changes in the Marbled Murrelet population over time. The power was relatively low. Assuming 5 survey sites, 21 surveys per year per site, similar CV's to those measured in 2007, and a 10 year monitoring effort, we were 71% likely to detect a 5% per annum decline in the population.

A total of 32 volunteers participated in flyway surveys during July 2008. Surveys were conducted from seven sites in Juneau, Petersburg, Sitka and Ketchikan, and from 2 remote field camp sites in eastern Icy Strait. Per the recommendations made in the 2007 report, flyway surveys during 2008 were conducted during shorter time intervals (7-17 July for community based surveys, and 20-27 for remote surveys). Volunteers completed 288 community-based flyway surveys from 7 locations in Southeast Alaska, and 347 flyway surveys from 2 field camps located in Icy Strait. To minimize unwanted variance in these data, analyses were restricted to surveys with visibility rated good to excellent.

The field-camp-based surveys in Icy Strait were conducted on the hour and half hour throughout the day. The waters of western Icy Strait, from Point Adolphus to Lemesurier Island, are an important foraging area for Marbled Murrelets, drawing many birds from long distances. Consistent with expectations, times of peak activity occurred in the early AM and late PM hours. We documented thousands of murrelets per hour flying westward in the early morning, and returning eastward in the late evening. Community-based surveys were conducted only during the peak morning and evening time periods. They showed relatively low counts compared to the Icy Strait sites, with peak activity measured in the tens to hundreds of birds per hour, depending on the site. The highest counts were from the Sitka and Ketchikan sites, and the lowest counts were recorded on the Petersburg sites. We modeled the power of these various surveys to detect different-sized changes in the murrelet population over time. The community-based surveys were highly variable, and as a consequence, had limited ability to detect even dramatic population changes. In contrast, the Icy Strait sites had relatively low coefficients of variation (< 0.30), and high statistical power.

IV. MANAGEMENT IMPLICATIONS

The relatively low and variable counts associated with the community based surveys translate into low power to detect population trends. Even with a sustained (10-year) annual monitoring program, the power to detect a 10% per annum decline is less than 20% (one-tailed t-test, P=0.10). In contrast, the peak morning and evening counts at 2 sites in Icy Strait had many birds, low variability, and acceptably high power to detect long-term trends (e.g., 98% power to detect a 4% per annum decline). While monitoring could be justified in Icy Strait using flyway counts, the method produces much lower, and more variable counts elsewhere in Southeast Alaska. For that reason, we do not recommend continuing citizen-science monitoring for Marbled Murrelets using land-based flyway counts in Southeast Alaska.

V. SUMMARY OF WORK COMPLETED ON JOBS FOR LAST SEGMENT PERIOD ONLY (January 1, 2009 – June 30, 2009)

There was no activity during the last segment period.

VI. PUBLICATIONS

None.