ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
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Alaska Department of Fish and Game
State Wildlife Grant

GRANT AND SEGMENT NR: **T-1-16**

PROJECT NUMBER: **1**

PROJECT TITLE: Marbled Murrelet activity patterns and health at Port Snettisham, Alaska

PARTNER: Wildlife Trust and Oregon State University

PRINCIPAL INVESTIGATORS: S. Kim Nelson and Scott Newman

PROJECT DURATION: May 20, 2005 – December 31, 2008

REPORT PERIOD: May 20, 2007 – May 19, 2008

Project Objectives

Activity Patterns and Habitat Use

1. Determine daily flight and foraging patterns of radio-marked Marbled Murrelets (*Brachyramphus marmoratus,* MAMU) during nesting, chick rearing, and post-fledging periods (2005-2007);
2. Determine initial post-breeding dispersal movements as best as possible based on battery signal strength, flight time costs, and distances birds move from Port Snettisham (PS; 2005);
3. Identify nesting habitat and potentially locate nests (2006-2007);

Health Assessment

4. Conduct health evaluations for 30-35 MAMU/year using hematologic and biochemical testing (2005-2007);
5. Establish blood-based reference ranges for Southeastern Alaska MAMU;
6. Compare health indices inter-annually;
7. Conduct geographic health comparison between MAMU from Southeast Alaska and MAMU from central California (samples previously collected and analyzed); and
8. Archive blood samples for future DNA analyses, disease testing, and isotope research.

Summary of Accomplishments:

We captured 40 and radio-marked 39 MAMU in mid-May 2007. We tracked radio-marked MAMU using aerial and boat surveys, and six fixed data logger stations located within Port Snettisham (PS) from mid-May through the end of July.

JOB/ACTIVITY 1: Determine daily flight and foraging patterns of radio-marked Marbled Murrelets (*Brachyramphus marmoratus,* MAMU) during nesting, chick rearing, and post-fledging periods.

The combination of boat surveys and data logger stations allowed us to determine daily and seasonal activity patterns for murrelets foraging inside PS. The Mist Is. and South Shore data loggers and boat-based surveys near the mouth of PS showed significantly higher nighttime detection totals than daytime detection totals, demonstrating that many MAMU exit interior PS during the late evening hours where they congregate at the mouth of PS. MAMU return to interior PS early in the morning hours and many are found foraging and loafing near the juncture of the Whiting and Speel arms of PS. However, other than the Whiting River data logger no differences were found in the numbers of MAMU present during the day compared to night.

JOB/ACTIVITY 2: Determine initial post-breeding dispersal movements as best as possible based on battery signal strength, flight time costs, and distances birds move from Port Snettisham.

Although determining post-breeding dispersal was not a research focus in 2007, we documented dispersal dates for 17 (44%) radio-marked murrelets, of which, 5 (13%) were known breeders. Post-breeding dispersal dates ranged from 25 June to 24 July with a mean departure date of 12 July (± 9 d). We did not track dispersal locations in 2007, but in 2005 birds moved to areas at least 150 km from PS, including as far north as Glacier Bay and Icy Strait and as far south as Chatham Strait off Kuiu Island.

JOB/ACTIVITY 3: Identify nesting habitat and potentially locate nests.

A total of 16 active inland nest sites were located via aerial telemetry, including three nests for radio-marked pairs and one second nest attempt. Eight of the nests were located in trees, three on cliffs, and five on either cliffs or trees. Half of the nests were located more than 15km inland, and two were along the Whiting River in Canada, more than 50km inland. One murrelet nested above the Bridge Glacier (off Speel Arm) in habitat more characteristic of the Kittlitz's Murrelet (*B. brevirostris*).

One additional murrelet was later determined to have attended an active nest using the "on/off" incubation pattern detected by combined data logger and boat survey information. Also, we identified two potentially inactive nesting areas where individual murrelets sporadically attended inland sites.

JOB/ACTIVITY 4: Conduct health evaluations for 30-35 MAMU/year using hematologic and biochemical testing.

During captures from 2005 to 2007, blood samples were taken from 101 MAMU in PS (42, 36 and 23 in each year, respectively). Blood samples were analyzed for hematological and biochemical parameters, screened for diseases, and used to determine sex. In addition, in 2007, fecal samples were analyzed for Avian Influenza and Exotic Newcastle Disease. Plasma from Alaska MAMU collected in 2005 and 2006 was analyzed for biochemical parameters and compared to biochemical data collected from California MAMU between 1997 and 2000.

JOB/ACTIVITY 5: Establish blood-based reference ranges for Southeastern Alaska MAMU.

By collecting the blood samples over three years and analyzing them for hematological and biochemical parameters, and screening them for diseases, we have established baseline reference ranges that can be used in future studies to look at changes in the health of MAMU in Southeast Alaska.

JOB/ACTIVITY 6: Compare health indices inter-annually.

Of the three years of this study, the average total white blood cells (WBC) for 2007 birds was approximately five times higher than the previous two years. Birds were sampled in June 2005, in April 2006, and in May 2007. Because May is the height of the breeding season, physiological stress from breeding may be playing a role in the increased WBC count for 2007. Also egg production during this period may cause antigen stimulation in females, causing increased WBC production. This is supported by our results from the comparison of 2006 females to 2007 females. WBC for May 2007 females was significantly higher than WBC for April 2006 females.

JOB/ACTIVITY 7: Conduct geographic health comparison between MAMU from Southeast Alaska and MAMU from central California (samples previously collected and analyzed).

Hematological parameters (e.g., white blood cells), the immune response parameter total protein (TP), phosphorous (and indicator of electrolyte activity and acid), and lactate dehydrogenase (an indicator of muscle function) were lower for CA MAMU than for AK MAMU. However, hematological and biochemical values for AK MAMU were similar to reference ranges established for MAMU from the Aleutian Islands (Newman *et al.* 1997) and XAMU from California (Newman *et al.* 2005). Such low WBC, differential leukocyte counts, and TP values may suggest that the immune systems of CA MAMU may be compromised.

Monocytes were an order of magnitude higher for PS MAMU (2005 and 2006) compared to MAMU from the Aleutian Islands and XAMU from California (both radio-marked and non-radio-marked). Monocytes are responsible for phagocytosis of foreign substances in the body, and thus high monocyte values may reflect the presence of blood-borne pathogens in the PS population. Because monocyte values did not differ between MAMU with blood parasites and those without blood parasites, monocyte response is likely due to other pathogens that we could not readily detect.

JOB/ACTIVITY 8: Archive blood samples for future DNA analyses, disease testing, and isotope research.

All of the blood samples have been archived or are currently undergoing DNA and stable isotope analyses.

Significant Deviations:

We have no significant deviations to report for the Activity Patterns and Habitat Use portion of the study. However, for the health analyses, we collected fewer blood samples in 2007 than originally proposed as we felt we already had enough blood to conduct sufficient analyses of all our hematological and biochemical parameters.