Alaska Department of Fish and Game
State Wildlife Grant
ANNUAL INTERIM PERFORMANCE REPORT

Grant Number: T-1 **Segment Number:** 6
Project Number: 14
Project Title: Current population and decadal trends of Kittlitz's and marbled murrelets in Kachemak Bay, Alaska
Project Duration: July 1, 2004 – June 30, 2007
Report Period: July 1, 2004 – June 30, 2005
Report Due Date: September 30, 2005

Objectives (*as submitted in grant project statement*):

1. Obtain population estimates for Kittlitz's and marbled murrelets in Kachemak Bay.
2. Determine decadal trends of Kittlitz's and marbled murrelets in Kachemak Bay.
3. Track annual and seasonal patterns of abundance and distribution of adult and juvenile Kittlitz's and marbled murrelets in Kachemak Bay.
4. Identify critical habitats for Kittlitz's and marbled murrelets within Kachemak Bay.

Summary of Accomplishments

The following accomplishments are related to Objectives 1-3:

1. At-sea surveys were conducted on 24 April 2005 to obtain information on early migration of *Brachyramphus* murrelets into Kachemak Bay. Eight transects covering 6.92 km^2 were surveyed along the south shore, following historic transects (Fig. 1). Twenty-one bird species and three marine mammal species were recorded. Only two Kittlitz's murrelets in winter plumage were observed, and six marbled murrelets, indicating that most birds must arrive later in spring. Biologists with URS, Inc. assisted in data collection.

2. At-sea surveys were conducted from 16 to 19 June 2005 to repeat surveys conducted by U.S. Fish and Wildlife Service (USFWS) during the same period in June 1993 (Fig. 2). This survey covered 46 transects for a total of 161.7 km (32.2 km^2). Thirty-six species of birds and three species of marine mammals were encountered. No Kittlitz's murrelets were observed on these transects. Marbled murrelets were observed on 20 transects, with an average density on these 20 transects of 2.56 birds/km^2 . Highest densities of marbled murrelets were encountered in Eldridge Passage and the mouth of Tutka Bay (Fig. 3). These data will be used to examine decadal trends in murrelet densities. We were assisted in all surveys by URS biologists, Cook Inlet Keeper, and Alaska Center for Coastal Studies.

3. At-sea surveys were conducted on 20 June 2005 to repeat surveys conducted by USFWS and USGS during the same period in 1988, 1989, and 1996-1999 along the south side of the bay (Fig. 4). Three transects totaling 13.5 km (2.7 km^2) were surveyed. Three Kittlitz's murrelets were observed on transect in the region normally occupied by this species, between Aurora Lagoon and Glacier Spit (Fig. 4). Also on transect were 35 marbled murrelets and 4 unidentified *Brachyramphus* murrelets (Fig. 4). The only other species observed on transect were black-legged kittiwakes, glaucous-winged gulls, and a minke whale. These data will be used to examine trends in murrelet densities since 1988.

Because these same transects will be surveyed again in July and August, they will also be used to describe seasonal changes in murrelet abundance and distribution.

4. A systematic survey design was decided on to obtain a current population estimate for marbled and Kittlitz's murrelets in Kachemak Bay. Previous track lines only allowed us to compare densities of birds in the bay. The survey track lines were based on the grid used in the random selection of transects for the 1993 USFWS survey, but connected all block lines for more complete coverage of the bay (Fig. 5). This will ensure that areas occupied by Kittlitz's murrelets, and all types of habitats, will be sampled. These transects were to be surveyed in July 2005, when murrelet numbers should be at their peak.

The following accomplishments are related to Objective 4:

5. Environmental variables were collected at the start of each transect, including sea surface temperature and salinity (with digital meter), water clarity (with sechi disk), wind speed and direction (Kestrel wind gauge), air temperature, and sea state. Sea state was also changed during the surveys as conditions changed, since continuous plotting by GPS provided track lines and location data for every recorded observation. In addition, we collected data on water column structure using a CTD probe (Fig. 2; see below).

6. Investigation and data compilation for long-term environmental factors were initiated with the assistance of the Homer Soil and Water Conservation District (HSWCD) and the Spruce Bark Beetle Mitigation Program of the Kenai Peninsula Borough (KPB). D. Lehner (HSWCD) began compiling and summarizing plant community data and NRCS snow survey data to determine seasonal averages and long-term trends in snow depth and snow water equivalent around Kachemak Bay. M. Fastabend and M. Rude (KPB) provided technical information, maps, and unpublished data on the spread of spruce bark beetle on the southern Kenai Peninsula. These data will assist in identifying important habitats for marbled and Kittlitz's murrelets in Kachemak Bay, and they will be used to investigate factors that may be associated with changes in murrelet populations or habitat use.

Significant Deviations*:*

None

Actual Costs during this Report Period *(personnel plus all operating expense totals)*:

Federal (from ADF&G):	Partner (nonfederal share):
$11,506.67	$3,835.56

Project Leader *(or Report Contact Person)*: Kathy Kuletz

Additional Information: *See attached figures. Data tables and figures showing distribution of other species recorded during at-sea surveys of Kachemak Bay can be provided on request.*

1. Because the cooperative agreement with ADF&G was not finalized until September 2004, we used USFWS funds ($12,000) to conduct at-sea surveys in Kachemak Bay in August 2004, over a period of 18 days (Fig. 6). These data will be incorporated into the decadal trends analyses for the final report, although the federal contribution was not

indicated in the budget of the final agreement. During this time, we also used ArcGIS to incorporate historic track lines into DLOG software (R.G. Ford, Inc., Portland OR), to enable us to follow historic transects during subsequent surveys. Numbers of all birds, including both *Brachyramphus* murrelets, were higher in August than during the June 2004 surveys. During these surveys we counted 4,434 murrelets on transect, comprised of 85 % marbled (Fig. 7), 11 % Kittlitz's (Fig. 8) and 4 % unidentified. We observed juveniles of both murrelet species during the August surveys (Fig. 9), indicating local breeding of both species.

2. Because water column structure may be an important determinant of murrelet distribution at sea, we added additional environmental factors to our data collection. We used a CTD (Conductivity-Temperature-Depth) probe (Seabird Electronics Inc., SBE 19 SEACAT), fitted with an additional sensor to measure turbidity, to determine the vertical profile of the water column. Water structure can vary considerably throughout Kachemak Bay, due to the bathymetry of inner and outer bay regions, and the influence of clear, saline water from the Alaska Coastal Current entering from the southwest, and turbid, fresher water entering the northwest region of Kachemak from upper Cook Inlet. Therefore, we conducted 11 CTD casts along the middle of the bay (Fig. 2). Preliminary results show well mixed outer bay waters and highly stratified inner bay waters. A more extensive grid of CTD casts was also sampled in July 2005. This data will be important in defining critical marine habitats for each murrelet species. The CTD (a $10,000 instrument) was donated by Auk Bay Laboratory, Juneau, Alaska, which was not in the original proposal as part of the federal contribution.
3. Our at-sea surveys were conducted from a 25 ft. whaler, which had difficulty accessing some shallow areas. In addition, we had to complete the 1993 transects during the same time frame in which they were conducted in 1993, but we had only one vessel whereas the USFWS used two in 1993. Because of extreme tides in June 2005 and limited time, we relied on Cook Inlet Keeper (Bob Shavelson and his assistants) to conduct surveys of selected transects using their vessel. This effort was beyond what was anticipated in the proposal, and is reflected in the invoiced budget submitted June 30, 2005.