ANNUAL REPORT
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Seasonal distribution and abundance of Steller's eiders in Cook Inlet

By
William W. Larned
U. S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503

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PROJECT ORGANIZATION

William W. Larned:
Principal Investigator, lead pilot and aerial observer, data analyst, report compiler

Paul Anderson, USFWS, Anchorage, Alaska :
Pilot and aerial observer, logistics assistant

Christian Dau, USFWS, Anchorage, Alaska:
Aerial Observer

Heather Wilson, USFWS, Anchorage, Alaska:
Aerial Observer, lead flight attendant

Ed Mallek, USFWS, Fairbanks, Alaska:
Pilot and Aerial Observer

Julian Fischer, USFWS, Anchorage, Alaska:
Financial Data analyst and report compiler

Robert Stehn: USFWS, Anchorage, Alaska:
Biometrician

Charles Monnett, PhD, Minerals Management Service, Anchorage, Alaska:
Contracting Officer's Technical Representative and project Administrator

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INTRODUCTION

The Steller's eider (Polysticta stelleri) has a nearly circumpolar distribution, with the vast majority breeding in Arctic Russia, and molting and wintering together in coastal southwest Alaska. In 1997, the Alaska breeding population of the Steller's eider was listed as "threatened" under the Endangered Species Act. The decision to list was based on the shrinkage of the species' breeding range in Alaska and the resulting increased vulnerability of the remaining breeding population to extirpation (USFWS 2002).

Since it is not known where the listed Alaska breeding population winters, and whether it is concentrated in a few distinct areas or intermixed with the Russian Pacific breeding population, all Steller's eiders wintering in Alaska are currently protected under the authority of the Endangered Species Act as if they belong to the threatened Alaska breeding population.

A small percentage of the wintering population winters in Cook Inlet in southcentral Alaska , and therefore ESA section 7 consultation is required for any federal action, including offshore oil and gas leasing and development, that could jeopardize Steller's eiders or their critical habitat. The subject study was designed by the U. S. Fish and Wildlife Service (FWS) to fulfill this mandate for the Minerals Management Service (MMS).

This report is required by MMS to provide a status update on the project, including fund reserves, and to communicate any problems encountered during the first year, and changes recommended by FWS to the agreed-upon study plan. The report is organized to quote the most important sections of the study plan (contract), and to provide summarized results, recommended changes and other comments for each quoted section. Plan sections are italicised, and followed by our (FWS) remarks.

OBJECTIVES

1. Identify locations important to Steller's eiders wintering in lower Cook Inlet.
2. Describe temporal variation in Steller's eider winter use of the waters in lower Cook Inlet.
3. Estimate numbers of Steller's eiders wintering in lower Cook Inlet.

These objectives were determined by the MMS to be adequate to fulfill the purpose of the study, and we do not recommend any changes

METHODS

Study area

The study area is shown in Figure 1, with aerial transects, survey units and landmarks identified.

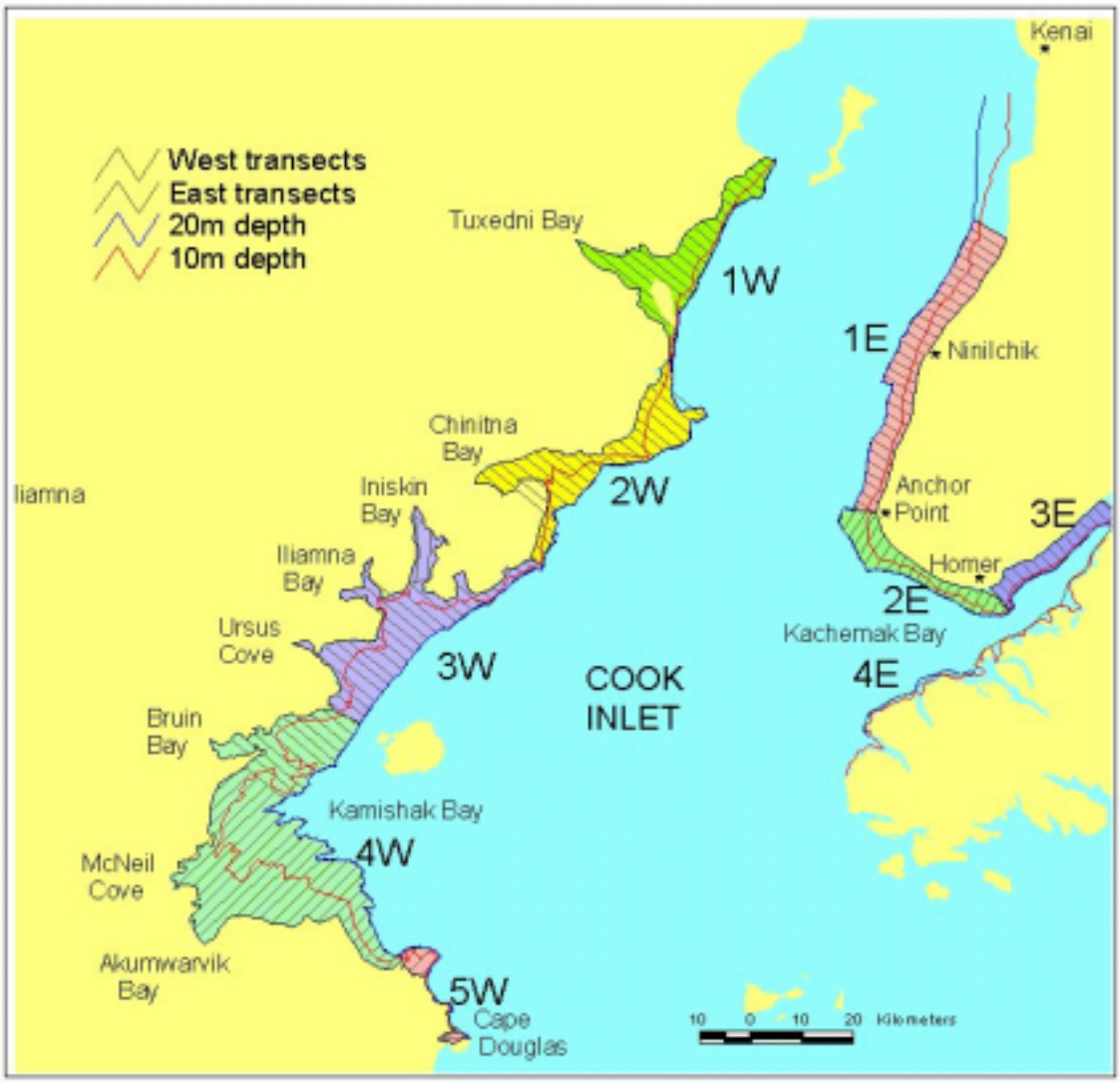


Figure 1. Survey area, Steller's eider aerial survey, Cook Inlet, Alaska, Jan. – April, 2004

The survey area boundaries, as defined by shoreline features, known historic eider distribution and bathymetry were used as described in the study plan. Two problems occurred during the first season. The first involved the length of time required to survey the western portions of the survey area. Especially during January and February the days weren't long enough to permit us to complete a replicate of all the western survey units in one day, and the windows of flyable weather so short that we were often unable to complete the survey. We recommend shifting the focus in the western portion of the

survey area to unit 4W, with other units completed as weather and day length permit. This focus limit should not change results or conclusions unless the distribution among units is radically different from the previous year, and, in that worse-case scenario, we should be able to detect the change during ferry flights, which traverse the skipped units. The second problem concerned our ability to complete unit 4E, a single shoreline transect from upper Kachemak Bay to English Bay. Due to weather, sea-state and exposure-related problems, we were able to complete this flight only once. However, we did not encounter any Steller's eiders during that flight, nor did we anticipate any for the reasons listed in the proposal – This served as a "buffer" for the primary study area. We recommend deleting the unit as it will not affect year-to year comparisons nor materially compromise the study objectives. However, it should be noted that scoters and several other species of sea ducks are abundant along this route, and some are especially vulnerable to spills and other disasters due to the high-energy nature of the shoreline most often used by the birds, and that fact should be considered when developing contingency plans.

Equipment, transect layout and data recording
We will use two Cessna 206 Amphibious aircraft, equipped with long range tanks (minimum 6.5 hour endurance at survey power settings). The survey will be flown at 200 ft. altitude, with two highly experienced observers in each aircraft counting or estimating Steller's eiders and other seaducks (to the extent that doing so does not compromise the objectives above). We will fly a set of transects oriented perpendicular to the shoreline (sample variance is normally minimized with transects perpendicular to any expected distributional gradient (Eberhardt 1978), between the shoreline and the nearest 20m isobath, and spaced approximately 2 km apart (Fig. 1). Based on experience with this species, we believe this spacing is the minimum possible without risk of flushing eiders on adjacent transects, possibly resulting in double or under counting some birds. Observations will be recorded vocal1y directly into GPS-linked laptop computers, producing data files with geographic coordinates, time, observer, and environmental data for each observation. The data collection program will also provide a digital moving map with survey area boundaries and transects displayed for navigation.

We found that detectability of Stellers eiders, especially those in small groups, was more variable than we anticipated, so we felt we missed a higher proportion of birds than expected. This variation resulted primarily from a combination of surface chop and glare. Either of these factors alone, within the planned limits, does not seem to cause a problem, but in combination they can significantly alter detectability. The area most affected was from the Homer spit to Anchor River, and especially offshore from Bluff Point. This area often experiences strong and gusty winds even when the rest of the east survey area is relatively calm. The occasional high variation in numbers recorded in unit 4W on sequential days suggested that this phenomenon was at play there too. While we can assume that average numbers estimated for the survey were biased slightly low, (which is normal for this type of survey) the distributional data have not been materially compromised, and the abundance estimates are not biased to the extent of adversely affecting the decisions likely to be based on this type of information. On reflection, reducing the transect spacing might improve the detectability performance, however, it

would add considerably to the cost, reduce the number of successful replications, increase the likelihood of double-counting some flocks, and render the year-to-year comparison less defensible. Therefore we recommend staying the course for the winter of 2004-05. I am, however, making inquiries of several investigators who have conducted ground or boat-based surveys in the Homer Spit to Bluff Point area to consider the practicality of ground-truthing our aerial surveys to improve our understanding of detectability of eiders in this aerial survey environment. We will advise MMS of the results of this effort. The small amount of double sampling we have done in the past was encouraging, although it was focused mainly on aggregations of flocks, which are more easily detected than scattered small flocks. As such they validated mostly the precision of our flock estimates. All other aspects of data collection techniques described above went as predicted, with no major problems encountered.

The surveys will be conducted once per month from early December through mid-April, during the winters of 2003-2004 and 2004-2005. Two similar aircraft and crews will be used to enhance safety, reduce the time required for completion of each survey area (east side and west side lower Cook Inlet), and for independent survey replication. For refueling and overnight staging we will use Soldotna and Homer on the east side of the Inlet and Iliamna on the west side.

We did not complete a survey in December 2003 because the contractual paperwork had not cleared in time. December is a difficult month to complete a survey due to very short day lengths and holiday complications. This year we intend to begin on approximately 29 November, and complete the December surveys by 19 December.

Refueling last year was done in Kenai and Homer, and only once in Illiamna. The mountains and lack of weather information proved too great an obstacle to make Illiamna practical for logistical support, so we based entirely out of Kenai, where we procured heated hanger space from SOAR Aviation Ministries and saved per diem using FWS bunkhouse space.

Survey weather conditions

Conditions to be avoided for this type of survey are heavy chop and whitecaps, especially in combination with sun glare or low visibility due to precipitation or mist. While ideally we would only survey when conditions were flat calm or nearly so, certain areas are chronically subject to local wind channeling, especially in Kamishak Bay on the west side of the Inlet and offshore south of Anchor Point on the East side. Therefore to be practical we will set a fairly liberal initial limit of Beaufort 3 (wind 7-10 kts., large wavelets, scattered whitecaps) above which surveys will not be initiated, and Beaufort 4 (wind 11-16 kts., numerous whitecaps) above which surveys will be discontinued. Also, the survey will not be flown with flight visibility less than 5 miles. Within those outside limits, however, survey crews will use their own judgement to discontinue a survey rather than compromise safety and/or accuracy.

While we were able to complete several surveys while remaining strictly within planned environmental parameters, several surveys had to be abbreviated due to changing conditions. We felt we did as well as could be expected given the poor quality and availability of weather data. The go/no go protocol seemed adequate.

Replication

Because our assumption of total observability of large flocks between transects (maximum distance of approximately 1 km) has not been proven empirically, we will conduct survey replicates whenever possible by :survey unit, immediately or as soon as possible on the same or a subsequent day, to determine whether or not we can closely duplicate our results. Replicates will usually be conducted by different aerial crews. Considering the clumped eider distributions anticipated, when the initial coverage is completed and the crew finds a cluster of flocks, for coverage efficiency they will provide the second crew with a subset of transects containing the productive area, which the second crew will then survey. Replicate results will be matched by individual observation whenever possible.

If the assumptions of birds not moving between survey units and of nearly 100 percent detectability of flocks are met, replication should provide a measure of estimation bias. Since we had no robust test of these assumptions, such as an independent double sample including a ground or boat-based count, we are not able to quantify estimation error or detectability variation. However, locations of clusters of flocks were almost always similar among time-paired replicates, suggesting that we were not missing many large flocks and that the surveys gave a good measure of gross distribution of STEI aggregations. We feel this warrants continuation of replication in the coming season.

Survey priorities

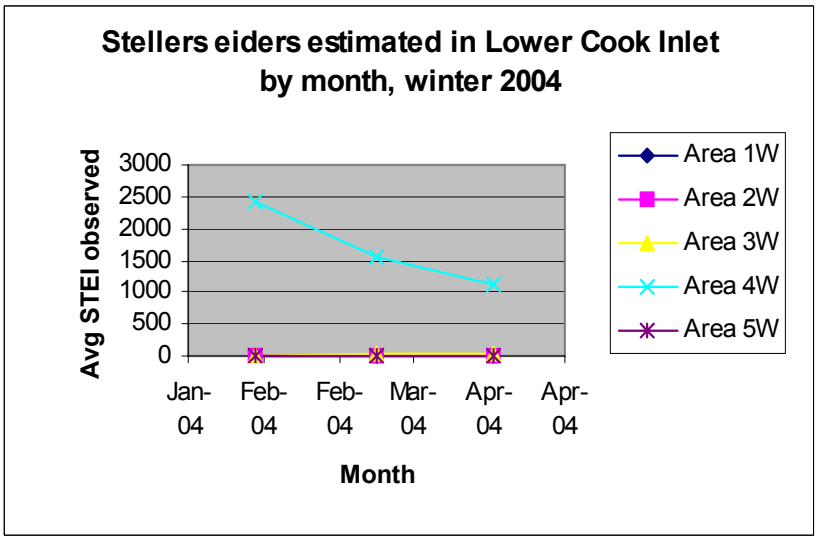
Due to the logistic and safety challenges inherent in conducting winter surveys in coastal Alaska, we will conduct surveys according to predetermined priorities. Initially, in western Cook Inlet, survey units 3 and 4 will be completed first, then the others as time and conditions permit. These areas receive highest priority because they have historical records of winter use by Steller's eiders, while the others do not. Units 1 and 2, however, will at least receive a single shoreline transect coverage by each crew, while transiting down and back, and unit 5 will be given a single shoreline coverage if possible, to ensure that we don't miss any large concentrations that unexpectedly end up in those areas. On the east side of the Inlet, units 1 and 2 have the highest priority due to the consistent observations of Steller's eiders there. The lowest priority is the south side of Kachemak Bay, which has had no Steller's eider observations on recent winter surveys (Petrula and Rosenberg 2002), and where we propose to merely fly a single transect at approximately the 10 m isobath (we may drop this area altogether early in the project). Priorities may change depending on initial survey results. In either area, the likelihood of complete transect coverage is lower in December and January than later due to high latitude day length characteristics.

We recommend slight modification of the priorities as indicated on page 1 of this report.

RESULTS AND CONCLUSIONS

Results presented here include summaries for Steller's eiders only, though the final report will include results for other sea ducks and sea otters. Data are similar for the other species, except that no off-transect observations were recorded.

Preliminary monthly average Steller's eider estimates are graphed below, with one graph representing western Cook Inlet, and the other the eastern portion. Note that most of the Stellers eiders were recorded in 1E and 4W, and that peak counts occurred in February, which corresponds closely with patterns observed by US Army Corps of Engineers investigators in Kachemak Bay and elsewhere in Alaska (Hoffman pers. com.). This pattern conflicts with the common conceptual model of waterfowl becoming sedentary for several months on their winter ranges. Please note that Western Cook Inlet was not surveyed in January, and neither side in December.



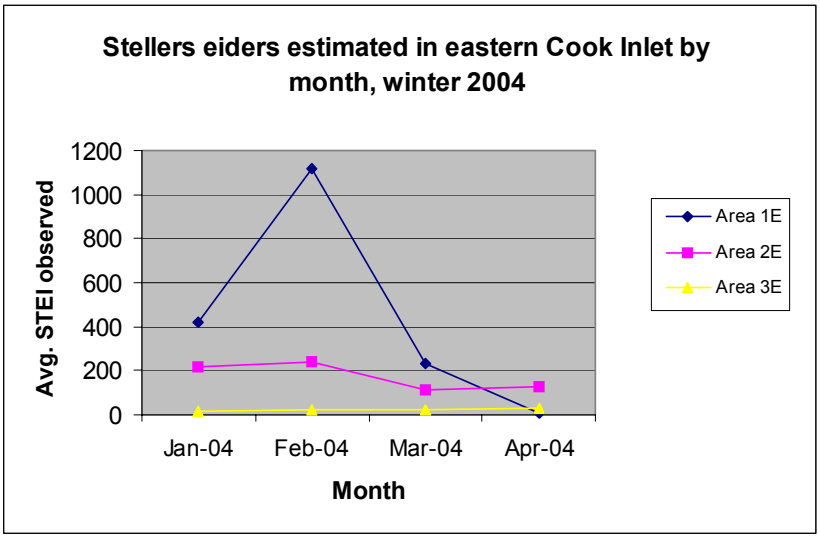


Figure 2. Steller's eiders estimated by month, Cook Inlet, Alaska, winter, 2004.

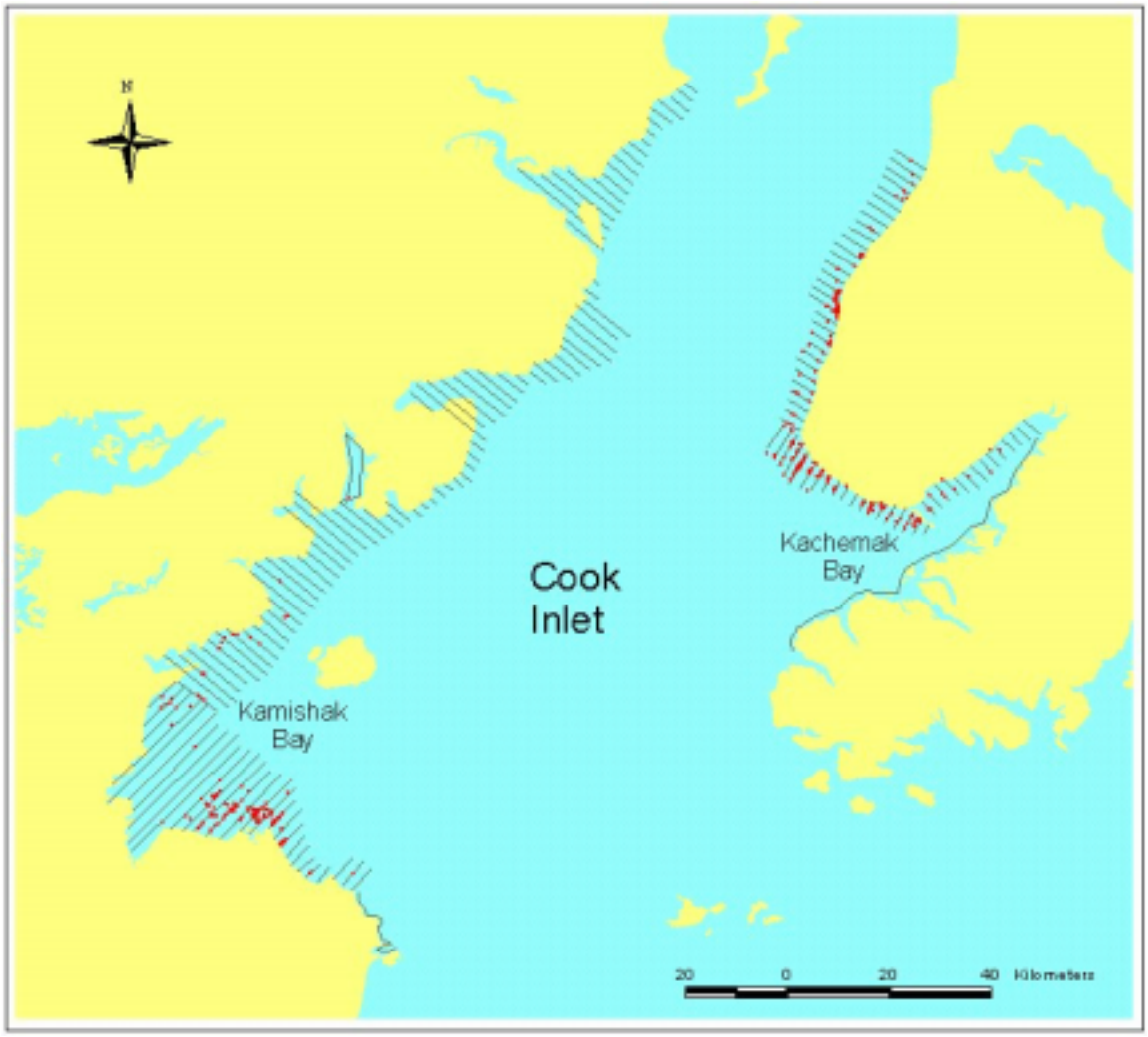


Figure 3. Distribution of all observations of Steller's eiders made during multiple aerial surveys in Cook Inlet, Alaska, January through April, 2004.

The distribution of Steller's eiders was consistently concentrated in survey units 4W and 1E and 2E, primarily in areas known to have shallow reefs. This corresponds closely with the historic distribution from surveys and anecdotal information.

BUDGET

First year budget:

Aircraft direct costs (flt hrs, fuel, storage)	29,150
Other direct costs (travel, overtime, perdiem, office)	19,970
Subtotal direct	49,120
Field equipment purchase	2,000
Subtotal project costs	51,120
Agency Overhead @ 18%	9,201
Total budget for 2004	60,321

First year expenditures:

Aircraft direct costs (flt hrs, fuel, storage)	20,515
Other direct costs (travel, overtime, perdiem, office)	12,315
Subtotal direct	32,830
Field equipment purchase	2,211
Subtotal project costs	35,041
Agency Overhead @ 18%	6,307
Total expenditures for 2004	41,348

Total expenditures were 18,973 under budget. However, delays in interagency agreement resulted in cancellation of the December survey. MMS subsequently decided to reduce the funding by 1/5 of the first-year operational costs, or 11,592, leaving 48,729. Therefore, there is a first year budget surplus of 7,381, which, when added to the second year allocation of 57,963, leaves 65,344 for completion of the Project. This should be adequate to satisfy all contract obligations, barring any major unforeseen difficulties.