Population Delineation and Wintering Ecology of Surf Scoters in Southeast Alaska

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Problem/Issue Statement:

Population delineation and wintering ecology of surf scoters have been studied in detail through much of their range. A conspicuous gap exists for Southeast Alaska, which is near the northern end of their winter distribution. Because Southeast Alaska is an important wintering habitat for a sizeable number of Pacific Surf Scoters, we propose to mark birds with satellite transmitters to quantify links among annual cycle stages, define management units, and conduct studies of wintering ecology that will be directly comparable to work at more southerly wintering sites, allowing a full consideration of latitudinal variation in wintering ecology of the species. This work will provide data to evaluate population dynamics and identify important habitats of this declining species - high priorities in the SDJV Strategic Plan.

SDJV Population Targeted:

Pacific surf scoters (*Melanitta perspicillata*)

Justification:

Based on aerial surveys along all shorelines in Southeast Alaska during winter from 1997-2002, the U.S. Fish and Wildlife Service estimated that this region supports >77,000 scoters (Hodges et al. 2008), a large proportion of which are Surf Scoters. Although wintering ecology of Surf Scoters has been studied in detail at several sites farther south (Strait of Georgia, British Columbia; San Francisco Bay, California; and Baja California), very little wintering ecology information is available from Southeast Alaska. Given that the previous studies have revealed significant latitudinal variation in wintering strategies, the lack of data from the northern end of the winter distribution constrains full understanding of Surf Scoter wintering ecology and limits the management implications that would be derived from such understanding. A study of winter ecology of Surf Scoters in Southeast Alaska would be an especially useful contrast to previous studies because in this area scoters have significantly less daylight for mid-winter foraging, face harsher weather, and exploit habitats in which composition of benthic communities may differ from other winter areas.

This baseline information from northern wintering areas could be especially important for early recognition of potential biological impacts of climate warming on Surf Scoter populations. Predictive climate models suggest that environmental changes will be most severe and detectable at the land-sea interface of northern latitudes and given that there is some evidence for a northward shift in winter distribution of temperate species of birds (Johnson 1994, Root and Weckstein 1995), it would be wise to understand how this northern wintering population fits into the overall wintering ecology of Surf Scoters in the Pacific Flyway.

To fill this data gap, we propose studies of wintering ecology that will allow full consideration of latitudinal variation in wintering strategies. This includes measures of age and sex composition, evaluation of whether there is differential migration to wintering sites

by cohort (data from Mexico suggest this is the case) or differential habitat use within a region. Also, we will quantify survival rates, foraging effort, and movements to determine whether strategies vary by latitude. In Mexico, we have discovered that there may be lower survival, higher foraging effort, and longer movements relative to British Columbia, which are all indicators of lower habitat quality. Data from a more northerly site will be extremely useful for putting this contrast into a larger perspective, and will allow comparison of several metrics of habitat quality across the wintering distribution of the species.

In addition to studies of wintering ecology, we propose deployment of satellite transmitters (PTTs) to complete a range-wide consideration of population delineation of Pacific Surf Scoters. Understanding population structure, i.e., identifying population segments that are demographically distinct, is critical for addressing declines in scoter populations. Without documenting the geographic scale at which dynamics of population segments are independent, surveys cannot be interpreted at the scale of distinct subpopulations, which results in poor resolution for discerning causes of overall declines. Similarly, the inference from local research projects (e.g., documenting survival, production, contaminants, etc.) is unknown without some indication of the population segment to which the results apply. Thus, identification of “management units” (Moritz 1994) is a logical and important first step for effective conservation of scoters. This work has been done at several sites along the Pacific coast and these data suggest that northern wintering scoters may have different breeding areas and migration routes than those wintering in more southerly areas (Rosenberg and Petrula 1999, 2000, Takekawa et al. in review). Initiation of this work in Southeast Alaska was identified as an important priority for this effort during a meeting of Surf Scoter researchers at the Second North American Sea Duck Conference in Annapolis, November 2005.

We are proposing continuation of a multi-year study to assess annual variation in surf scoter use of winter habitats and how local foraging behavior, survival, and movements in Southeast Alaska may differ from other winter areas. Environmental conditions (e.g., temperatures, storm activity) are generally harsh, but can be quite variable among years at northern latitudes; therefore it is prudent to gather data over multiple years to evaluate natural variability. Collecting data over multiple years will also allow a more accurate determination of how environmental conditions may affect migration chronology and movement of the satellite-marked scoters to and from staging, breeding and molting areas.

Objectives:

Our research will address the following, specific questions in each year of the study:

1) What is foraging effort by wintering scoters in Southeast Alaska, does it vary by age and sex cohort, and how does it compare to other wintering sites?

2) How does survival vary across cohorts and wintering regions?

3) How does body mass compare to that in other wintering areas?

4) How far do individuals move during winter and what habitats do they use?

5) How do age and sex composition vary by habitat, and compare to other wintering regions?

6) What are the key migration routes, migration chronology, and affiliation to specific breeding and molting sites for scoters that winter in southeast Alaska?

7) What rate and scale of site fidelity do surf scoters show throughout the annual cycle, and how does this influence definition of management units?

Scope and Location:

The field work for this study was initiated in late winter 2007-08 (age and sex surveys) and will continue through the full winters of 2008-09 and 2009-10 (all other aspects). This work will be conducted in the Juneau area of Southeast Alaska, which holds significant numbers of wintering scoters and is representative of habitats of scoters in the region. In addition, access to important habitats and agency support are excellent in the Juneau area.

Experimental Design:

During February and March of 2009 and 2010, we will document age and sex ratios of Surf Scoters wintering in Southeast Alaska. Observations will be made by trained observers during mid to late winter when plumage characteristics are suitable for determining age and sex, following established protocols (Iverson et al. 2004) that have been used in other parts of the range and in Southeast Alaska during 2007 and 2008.

During November of 2008 and 2009, we will capture Surf Scoters using floating mist nets. Each year we will mark 50 Surf Scoters, representing all age and sex cohorts, with conventional VHF transmitters, attached by the prong and glue method, which has been shown to work well with scoters (Iverson et al. 2006). We will be using both traditional single-pronged radios, as well as newly developed double-pronged radios (Lewis and Flint 2008), to determine whether retention times and performance differ by attachment method. The VHF transmitters will have battery life spans of roughly 9 months, which will ensure radio life through the winter.

Radio-marked birds will be tracked during winter to determine feeding locations, foraging behavior, movements, survival, and general habitat use patterns at each of the lagoons.
We will locate radioed birds from a boat and/or vehicle using a peak-null antenna system from 2 locations to determine feeding locations and movements. Less precise tracking needed for presence/absence (i.e., survival), foraging behavior (dive frequency and duration) and general habitat use patterns will be determined with single antenna system taken from a boat, vehicle, or plane. Regular (monthly) aerial telemetry flights will be made to document missing birds and movements out of the local area. The methods in the study will follow those used in winter studies in the Strait of Georgia, British Columbia and Baja California to allow comparability.

Finally, PTTs will be deployed in 2008 (n = 10) and 2009 (n = 5). PTTs will be implanted in the coelomic cavities of adult males and females (in roughly equal numbers). Radios will be programmed to provide weekly locations, with the intent of preserving battery life to extend across 2 annual cycles.

All of the field methods and subsequent analyses will follow protocols established by our research group and employed at sites in the Strait of Georgia, British Columbia and Baja California. These have been through numerous peer-reviews and have been widely published (e.g. Kirk et al. 2007, 2008, Lewis et al. 2007, 2008) and will allow direct comparison of results across regions.

Anticipated Output:

We will submit a progress report by September 30, 2009 that will describe the first year of winter ecology and satellite telemetry work, as well as a summary of age and sex composition work to date. A final report will be submitted by September 30, 2010 that summarizes data collection for all field seasons. In addition to these reports, we expect production of a graduate thesis and a series of peer-reviewed journal publications addressing wintering ecology of surf scoters. We also will deliver our findings to appropriate federal, provincial, and state agencies to facilitate recognition and protection of important habitats or habitat features.

A website will be developed on the Alaska Science Centers Homepage (w/ links to the SDJV website) to display details of the proposed study (cooperators, funding sources, etc.), including summaries of annual progress reports and seasonal maps showing the movements of the satellite-marked scoters.

Management Implications:

This project will address several key SDJV priority issues by:

1. Providing managers with the appropriate timing information to better design and interpret sea duck surveys.

2. Defining functional breeding and molting scoter populations for effective annual monitoring, harvest management and habitat conservation programs.

3. Identifying migration corridors and important staging and molting areas.

4. Describing scoter habitat use and foraging behavior in a region where habitats, climate, and day length substantially differ from other studied winter areas.

5. Evaluating winter ecology of scoters in the northern portion of their winter range.

6. Determining factors affecting survival.

Our study will help managers assess potential impacts of human perturbations to scoters and their habitats in a region where there is increased interest in developing transportation infrastructure, expanding development of mineral resources and associated port facilities, high volumes of marine vessel traffic, and possible development of offshore wind farm power generation in nearby British Columbia.

Relationship to Other Projects:

This work is designed to compliment other studies and provide a more complete latitudinal understanding of Surf Scoter wintering ecology and population delineation along the Pacific coast. We will have the opportunity to contrast attributes of habitat quality (through foraging effort), survival, migration chronology, diet, and population structure with datasets collected previously in Prince William Sound, Alaska by Rosenberg (Alaska Department of Fish and Game), San Francisco Bay by Takekawa and colleagues (USGS), Puget Sound, Washington by Nyeswander and Evenson (Washington Department of Fish and Game), the Strait of Georgia, British Columbia by Boyd and Esler (Canadian Wildlife Service and Simon Fraser University, respectively), and Baja California by Ward, Esler, and colleagues (USGS and Simon Fraser University). The radio telemetry portion of the study also will compliment studies of molting Surf Scoters in Southeast Alaska (SDJV Project # 107). This latter study will also mark birds with radios of which some may over-winter in Southeast Alaska, providing an opportunity to assess and contrast rates of survival over larger portion of the annual cycle. Locations of radioed marked birds will also contribute to an ongoing study of Surf Scoter winter distribution patterns in Southeast Alaska as outlined in SDJV Project 86.

Literature Cited:

Conant, B., J. I. Hodges, and D. Groves. 1997. Population estimates for waterbirds wintering in Southeast Alaska – 1996. Unpublished report, U.S. Fish and Wildlife Service, Juneau, Alaska.

Hodges, J. I., D. J. Groves, and B. Conant. 2008. Distribution and abundance of waterbirds near shore in Southeast Alaska, 1997-2002. Northwestern Naturalist 89:85-96.

Johnson, N. K. 1994. Pioneering and natural expansion of breeding distributions in western North American birds. Studies in Avian Biology 15:27-44.

Iverson, S. A., W. S. Boyd, D. Esler, D. M. Mulcahy, and T. D. Bowman. 2006. Comparison of the effects and performance of four radio transmitter types for use with scoters. Wildlife Society Bulletin 34:656-663.

Kirk, M., D. Esler, and W. S. Boyd. 2007. Foraging effort of Surf Scoters (*Melanitta perspicillata*) wintering in a spatially and temporally variable prey landscape. Canadian Journal of Zoology 85:1207-1215.

Kirk, M., D. Esler, S. A. Iverson, and W. S. Boyd. 2008. Movements of wintering surf scoters: predator responses to different prey landscapes. Oecologia: in press.

Lewis, T.L. and P.L. Flint. 2008. Modified method for external attachment of transmitters to birds using two subcutaneous anchors. Journal of Field Ornithology 79:343-348.

Lewis, T.L., D. Esler and W.S. Boyd. 2007. Foraging behaviours of Surf Scoters and White-winged Scoters at spawning sites of Pacific herring. Condor 109:216-222.

Lewis, T. L., D. Esler, and W. S. Boyd. 2008. Foraging behaviors of Surf and White-winged Scoters in relation to clam density: inferring food availability and habitat quality. Auk 125:149-157.

Moritz, C. 1994. Defining evolutionarily significant units for conservation. Trends in Ecology and Evolution 9:373-375.

Root, T. L., and J. D. Weckstein. 1995. changes in winter ranges of selected birds, 1901-89. Pg. 386-389 in E. T. LaRoe, G.S. Farris, C. E. Puckett, P. D. Doran, and M. J. Mac (eds.) Our living resources: a report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosytems. U.S. Department if the Interior, National Biological Service, Washington D. C.

Rosenberg, D.H. and M.P. Petrula 1999. Scoter life history and ecology: Linking satellite technology with traditional knowledge, Exxon Valdez Oil Spill Restoration Proj. Ann. Rept. (Restor. Proj. 98273), Alaska Dept. of Fish and Game, Division of Wildl. Conser., Anchorage.

Rosenberg, D.H. and M.P. Petrula 2000. Scoter life history and ecology: Linking satellite technology with traditional knowledge, Exxon Valdez Oil Spill Restoration Proj. Ann. Rept. (Restor. Proj. 99273), Alaska Dept. of Fish and Game, Division of Wildl. Conser., Anchorage.

Savard, J. P., Bordage, L. D. and Reed, A. 1998. Surf Scoter (*Melanitta perspicillata*). *In* The Birds of North America. Edited by A. Poole and F. Gill. The Birds of North America, Inc., Philadelphia, PA.

Personnel:

Dan Esler is a Research Associate with Simon Fraser University's Centre for Wildlife Ecology. Leads a research team addressing applied ecology of several sea duck species. Project responsibilities will include development of research design, assistance with data collection, and graduate student advisor.

David Ward, Research Wildlife Biologist, Alaska Science Center, U.S. Geological Survey. Works on waterfowl ecology and habitat issues in coastal Alaska and Mexico and will help coordination of funding and field logistics, development of research design. and will participate in data review and writing.

Jerry Hupp is Research Wildlife Biologist with the Alaska Science Center, U.S. Geological Survey. He has extensive experience studying waterfowl, including research on Canada Geese in the region proposed for this work. Project responsibilities will include coordination of field logistics, development of research design, and assistance with data collection.

Corey VanStratt is a MSc candidate with the Centre for Wildlife Ecology, Simon Fraser University. He will be supervised by Dan Esler, and will be responsible for performance of much of the work described in this proposal.

Rob MacDonald is a pilot/biologist with U.S. Fish and Wildlife Service, Migratory Bird Management, based out of Juneau. He has worked on wildlife issues throughout the state of Alaska for nearly 2 decades. Project responsibilities will include assistance with capture and marking of scoters, and aerial tracking of radiomarked individuals.

Dennis Chester is the District Wildlife Biologist for the Juneau Ranger District, U.S. Forest Service. He has been involved in avian population monitoring and research in coastal forests of Southcentral and Southeast Alaska for the past two decades . Project responsibilities will include facilitating logistical support in Juneau and possibly assisting with capture efforts.

Schedule:

April 2008 – October 2008:
–Prepare full set of standard operating procedures to direct field work.
–Arrange logistics for field work, including equipment procurement, maintenance, and shipping.
–Hire technicians.
–Preparation of first SDJV annual report, and proposal for subsequent years.
–Create a website to display information about the project

November 2008:
-Conduct captures for radio attachment for the first year of winter ecology studies and implantation of PTTs.

December 2008:
–Notification of SDJV funding for year 2.

December 2008 – April 2009:
–Conduct first full year of winter ecology field studies.
–Conduct age and sex composition surveys.
–Update website

November 2009 – April 2010:
–Conduct second year of winter ecology and PTT work.
–Update website

September 2010:
–Analyses and write-up of graduate thesis and publications
–Submit final report for study.
–Update website