Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 2006 – (October 1, 2005 to September 30, 2006)
Reporting Deadline: September 28, 2006

Project Title (SDJV Project #65): Spring Migration of Surf Scoters Along the Pacific Coast: Important Habitats and Energetic Implications

YEAR 2 of a 3 YEAR STUDY

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Project Description:
Although Pacific Surf Scoters have been the subject of a growing body of research during winter, little is known about their spring migration ecology. Spring migration conditions have important implications for waterfowl productivity, and habitat conditions and nutrient reserve levels during spring migration have been implicated as important factors affecting broad-scale and long-term population declines. An important part of establishing connectivity and cross-seasonal effects through the annual cycle is the determination of distributions and habitat requirements at critical annual cycle stages. Satellite and VHF transmitters have been deployed on Surf Scoters across their Pacific wintering range, including Baja California Mexico, San Francisco Bay, Puget Sound, and the Strait of Georgia. As part of a collaborative study of Surf Scoter spring migration ecology, we are using a combination of satellite telemetry, radio telemetry, and surveys to document spring distributions of Pacific Surf Scoters throughout Southeast Alaska, with a focus on identifying important stopover areas and associated habitat attributes. We also collected birds to obtain information on spring energetics. In this document, we describe the findings from the second year of this 3-year project.

Objectives:
This project has several objectives: (1) to identify important Surf Scoter late spring migration stopover areas, (2) to identify habitat attributes that correspond to identified important areas (e.g. herring spawn events, bathymetry, substrate type), and (3) to relate the spatial and temporal use of these sites to their habitat attributes. This project has direct implications for the identification of important coastal habitats – a high priority in the SDJV Strategic Plan. In addition, this work will contribute to studies of body mass variation in relation to areas (e.g., San Francisco Bay and Strait of Georgia), seasons (late winter, pre-migration, migration), and spawn occurrence, as well as to studies of the cross-seasonal persistence of contaminants in Surf Scoters. Our studies will provide an important link for understanding nutritional status and relationships among wintering, migrating, and breeding areas.

Preliminary Results:

Satellite Telemetry

This project relies on satellite telemetry data from cooperators all along the Pacific coast. This broad deployment allows for strong inferences about migration strategies of Pacific Surf Scoters in general, rather than just those from any particular wintering site. Table I shows the number of satellite transmitters (75 total) deployed by wintering site over the past several years. Transmitters that were not active throughout the spring migration period are not included.

Table I. Number of satellite transmitters (PTTs) deployed in Pacific Surf Scoters in 2003, 2004, 2005, and 2006. Transmitters that did not leave wintering areas are not included.

Wintering Site	Partner	2003	2004	2005	2006
Strait of Georgia, BC (**SG**)	CWS/SFU	0	0	8	0
Puget Sound, WA (**PS**)	WDFG	0	7	16	11
San Francisco Bay, CA (**SFB**)	USGS	8	0	9	11
Baja California, Mexico (**BSQ**)	USGS - ASC	0	0	2	3
	Total	**8**	**7**	**35**	**25**

Satellite telemetry data from these years indicates several areas where Surf Scoters appear to congregate during spring migration. In British Columbia, these areas include the Fraser Delta and the Strait of Georgia (Baynes Sound). In Southeast Alaska, these areas include Annette Island, Ernest Sound, and West Behm Canal near Ketchikan, Stephens Passage and Gastineau Channel near Juneau, and northern Lynn Canal, Chilkoot Inlet, Chilkat Inlet, and Taiya Inlet near Haines.

Two general spring migration strategies are apparent from the satellite location data, and these general patterns have been seen in each study year. Some birds stage in the southern Strait of Georgia and Puget Sound and then head directly inland towards breeding grounds, whereas others stage in the Georgia Basin, then move up the coast and stage in northern BC and/or Southeast Alaska prior to heading inland.

Conventional VHF Telemetry

Research partners have marked Surf Scoters with VHF transmitters at wintering sites along the Pacific coast. Table II shows the number of VHF radios deployed by wintering site in 2005 and 2006. Radios that are known to have not left wintering sites (either shed, dead, or non migrant) are not included.

Table I. Number of VHF transmitters deployed in Pacific Surf Scoters in 2005 and 2006.

Wintering Site	Partner	2005	2006
Strait of Georgia, BC (**SG**)	CWS/SFU	69	0
Puget Sound, WA (**PS**)	WDFG	35	30
San Francisco Bay, CA (**SFB**)	USGS	68	38
Baja California, Mexico (**BSQ**)	USGS - ASC	9	17
	Total	**181**	**85**

In addition to the new radios deployed this year; some transmitters deployed in 2005 were still active into the migration period of 2006 (at least 18 radios from SFB, and 24 from PS), making a total of 127 potentially active VHF radios during spring 2006.

Telemetry and survey data from previous years had identified several promising stopover areas near Ketchikan and Juneau, and telemetry flights were conducted in these areas. Observers flew a total of 25 hours over 7 days before and during the migration and spawning period (April 1, 2, 20, 24, and May 8, 9, and 15).

We located a total of 23 individuals this year from the following wintering areas; 18 from SFB, 4 from PS, and 1 from BSQ. This is an increase from the 18 individuals heard in spring 2005, and represents an 18 % detection rate, which is also an increase from 10% the previous year. Figure 1 summarizes the locations of all radios heard and flocks observed. Most locations occurred in the northern end of Lynn Canal, particularly near the Chilkat Islands and Taiya Inlet; although 5 radios were heard in the vicinity of Ketchikan (in Ernest Sound and Annette Island). Considering that the coastline covered during these telemetry flights is only a very small proportion of the habitat available, the number of VHF radios heard indicates that these habitat areas are of considerable use and importance.

Surveys

During telemetry flights, we also noted the location and size of all aggregations of Surf Scoters observed along the coastline (Fig. 1). Surveys were conducted in early April to document Surf Scoter distributions and abundance in the survey areas before migration and herring spawning started, as well as during the peak of migration spawning. In the Ketchikan area, most of the observations were made in Ernest Sound, West Behm Canal, and the east side of Annette Island; a slight shift from the distributions seen in 2005. Near Juneau, large aggregations were observed in Gastineau Channel, Stephens Passage, and Berners Bay. Very large aggregations were also observed around the northern end of Lynn Canal; particularly in Chilkoot Inlet, around the Chilkat Islands, and Taiya Inlet. Aggregations were typically monospecific, although some White-winged Scoters were observed in some of the flocks around and north of Juneau, particularly in Stephens Passage and Gastineau Channel. The White-winged Scoters were typically observed intermixed with smaller flocks, and were not observed in the large dense aggregations seen around the northern end of Lynn Canal.

Satellite telemetry, conventional radio telemetry, and surveys all provided a similar depiction of the areas being used by migrating Surf Scoters. Observations during boat-based work also indicated that the areas identified by telemetry and aerial observations were heavily used. In general, each of these data types provided useful information in confirming the importance of these identified stopover sites.

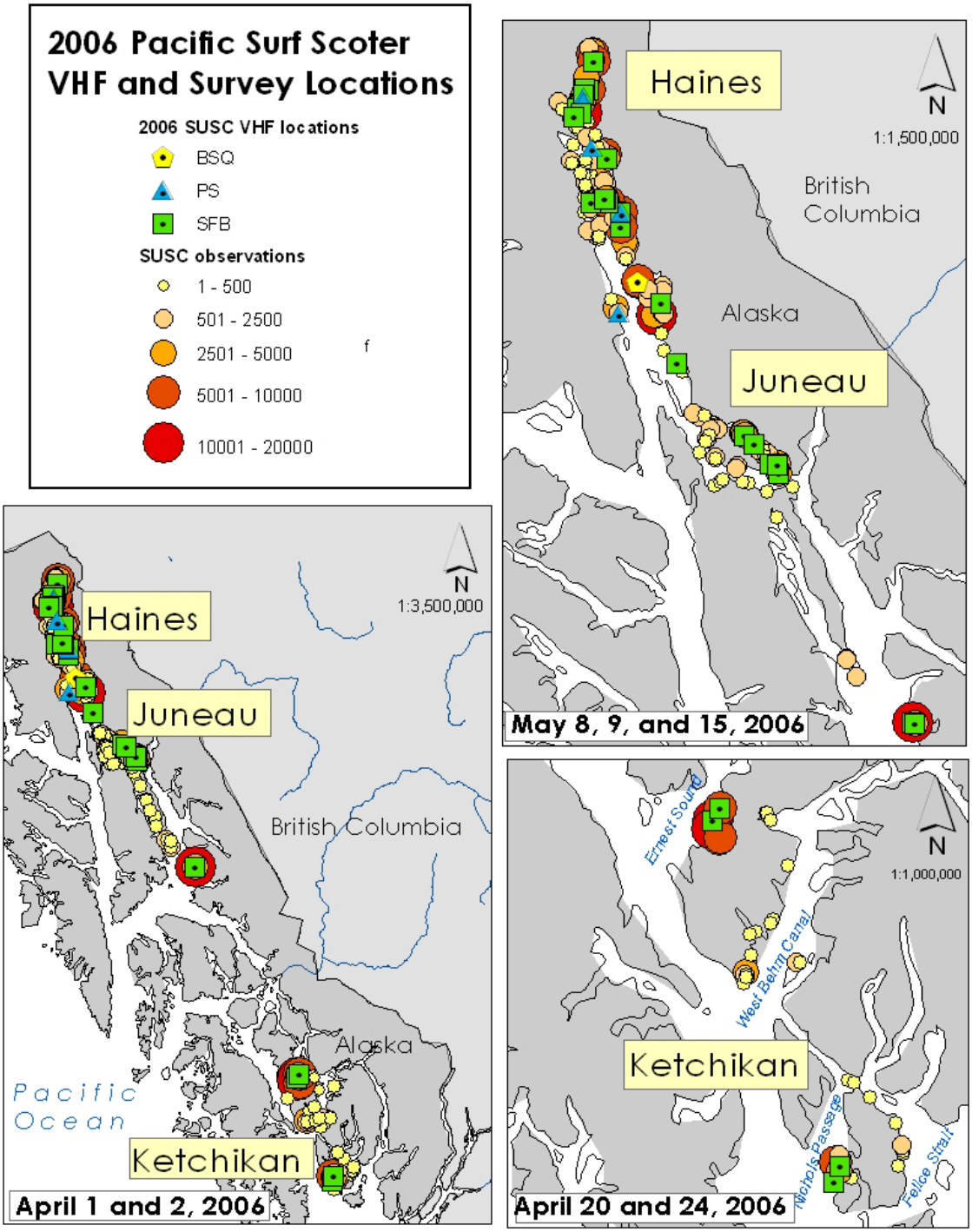

Figure 1. Summary maps showing VHF locations and aerial survey observations of Surf Scoters in April and May 2006.

Important Habitat Attributes

As seen in the previous year, the relationship between Surf Scoter aggregations and herring spawn is very conspicuous. We conducted our observations before and during spawn events; changes in abundance and distribution appear to be closely linked to the spatial and temporal distribution of herring spawning events.

Large numbers of birds were observed in areas where herring spawn had recently occurred, and diet observations from collections indicated that Surf Scoters feed heavily on this resource when available. However, extremely large aggregations also were seen in areas that are not known to be major herring spawn areas, particularly in northern Lynn Canal; indicating that there are likely other important factors influencing the use of these staging areas. Bathymetry and substrate type also appear to be related to use of stopover sites, as these factors are related to the availability of food resources.

Figure 2. Surf Scoters feeding on mussels at Taiya Point, AK on May 15 2006.

Collections

Collections were conducted to obtain tissue samples for stable isotope, body condition, diet, and contaminant analysis, in collaboration with Eric Anderson (U.Wyoming), Susan Wainwright-De La Cruz (USGS) and Matthew Wilson (USGS). A total of 63 Surf Scoters (30 male and 33 female) were collected at sites near Ketchikan (Back Island), near Juneau (Berners Bay, Lynn Canal) and near Haines (Chilkoot Inlet, Taiya/Lutak Inlets). Samples taken included blood, feathers, liver, kidney, adipose and breast tissue. Lab analyses are pending: samples and carcasses are being stored at the San Francisco Bay Estuary Field Station. Body mass variation in female and male Surf Scoters throughout spring for 2002 to 2006 is shown in Fig. 3.

Preliminary diet data show that scoters are feeding heavily on herring spawn when it is available; but are feeding on mussels when and where it is not. Of the 63 birds collected, 21 were collected close to an active spawning area and 20 of those birds had been feeding on spawn. All other birds were feeding on mussels. It is interesting to note that collections in the Juneau area in 2006 were conducted several days before an atypically late herring spawn in that area, and that collections in 2005 were conducted during and after an active spawn in the same area.

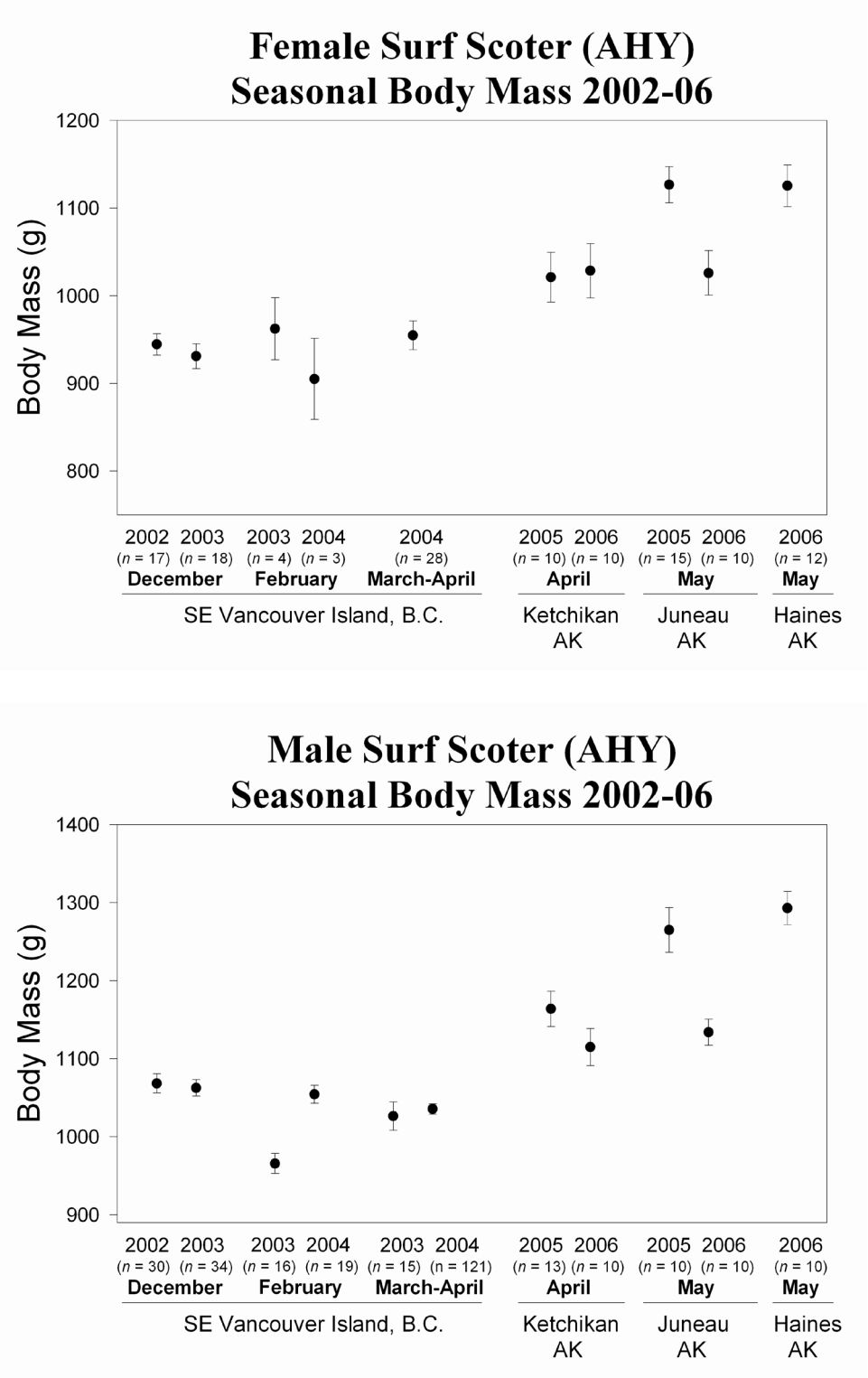

Figure 3. Seasonal body mass variation in female and male Surf Scoters in 2002 - 2006

Project Status:

We have identified some important stopover areas in SE Alaska, using satellite telemetry data and VHF and survey data from the first two years of this project. Conventional radio telemetry and surveys have provided a useful confirmation of the effectiveness of satellite telemetry over such large areas; field work in this capacity is completed. Important biotic and abiotic habitat attributes (spawning events, bathymetry, and substrate type) are being examined using existing habitat information and GIS; there is still considerable GIS and lab work needed to fully understand these important spring migration habitats. The recent acquisition of a GIS shoreline habitat database for Southeast Alaska (compiled by The Nature Conservancy), adds valuable data to the project.

This year was successful in increasing sample sizes in all aspects of this project (location data, habitat information, and energetics data). Data from partners is being compiled, reviewed, and analyzed with the purpose of incorporation into reports, theses, and publications.

The final year of this project, pending SDJV funding, will be used for finishing lab and GIS data generation, data analysis, and writing.

Project Funding Sources (US$)

SDJV (USFWS) Contribution	Other U.S. federal contributions	U.S. non-federal contributions	Canadian federal contributions	Canadian non-federal contributions	Source of funding (agency or organization)
$38,700					
				$42,235	SFU
	$28,000				USGS
		$18,000 $10,000			Wa Dept Fish + Wild Univ. Wyoming

Total Expenditures by Category (US$)

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding					
Surveys					
Research			**$136,935**		
Communication					
Coordination					