SURF SCOTERS *MELANITTA PERSPICILLATA* AGGREGATE IN ASSOCIATION WITH EPHEMERALLY ABUNDANT POLYCHAETES

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Surf Scoters *Melanitta perspicillata* spend a large part of their annual cycle in marine waters, foraging in intertidal and shallow subtidal areas (Savard *et al.* 1998). They winter in large numbers in coastal British Columbia, foraging primarily on bivalves, particularly mussels in rocky habitats and clams in sandy or muddy habitats (Vermeer 1981, Vermeer & Bourne 1984, Bourne 1984, Lacroix 2001).

As is the case with many other sea ducks, the abundance and distribution of Surf Scoters are influenced by variation and changes in prey density and distribution (Guillemette & Himmelman 1996, Hamilton 2000, Larsen & Guillemette 2000). Surf Scoters have been shown to respond to ephemerally superabundant food sources (Vermeer 1981) particularly herring spawn (Munro & Clemens 1931, Hay *et al.* 1989, Campbell *et al.* 1990, Haegele 1993). In British Columbia, Pacific Herring *Clupea harengus pallasi* spawn in the intertidal and shallow subtidal zones in late winter and early spring (Grosse & Hay 1988). Once deposited, herring eggs are present for approximately two weeks before hatching (Haegele & Schweigert 1985). Scoters and other marine birds feast on the eggs during this period (Vermeer 1981, Rodway *et al.* 2003). As Harlequin Ducks *Histrionicus histrionicus* do, scoters generally abandon their core winter foraging locations and move to spawning sites to consume this abundant and energy-rich food (Rodway *et al.* 2003, D. Esler & S. Boyd unpubl. data).

In addition to responding to predictable superabundant food sources, sea ducks have been observed congregating to forage on a novel food source. For example, large flocks of sea ducks and diving ducks have modified their migration and distribution patterns to feed on the introduced and abundant Zebra Mussel *Dreissena polymorpha* in Canada (Wormington & Leach 1992, Petrie & Knapton 1999, Mitchell *et al.* 2000), United States (Mitchell & Carlson 1993) and Europe (Pedroli 1981, Suter 1982, Burla & Ribi 1998). Lesser Scaup *Aythya affinis* in San Francisco Bay have modified their diets and behavior to consume almost exclusively the prolific introduced Asian Clam *Potamocorbula amurensis* (Poulton *et al.* 2002; J.Y. Takekawa, S.E. Wainwright-De La Cruz & A.K. Miles unpubl. data). Additionally, Frengen and Thingstad (2002) found aggregations of Common Eiders *Somateria mollissima* opportunistically foraging on a mass aggregation of sandeels (*Ammodytes* spp.). In the spring of 2003, we observed Surf Scoters exhibiting a strong distributional and numerical response to a novel, ephemerally superabundant food source in our study area.

From fall 2001 until spring 2004, we conducted extensive field studies investigating the wintering ecology of scoters in Baynes Sound, on the east coast of Vancouver Island, British Columbia. Baynes Sound is characterized by extensive, low gradient, intertidal mud and sand flats (BC MSRM 2002). Surf Scoters and White-winged Scoters *Melanitta fusca* are one of the most abundant marine birds in the area, where they feed mostly on intertidal clams (Bourne 1984, Dawe *et al.* 1998, T. Lewis unpubl. data). As part of our research protocol, we conducted bird surveys, radio-telemetry, and behavioural observations.

During the week of 16–23 April 2003, we observed an unusually large aggregation of sea ducks and a Gray Whale *Eschrichtius robustus* foraging at Mapleguard Point, located in the southern portion of Baynes Sound, after which the site was abandoned. The flock consisted primarily of Surf Scoters with smaller numbers of White-winged Scoters, Long-tailed Ducks *Clangula hyemalis*, and Greater Scaup *Aythya marila.* We estimated approximately 5000 Surf Scoters in the dense flock within a 46 ha intertidal area. This was the largest number of Surf Scoters counted at this site, as well as in all of Baynes Sound (intertidal area = 1500 ha) during 2002/2003 (Fig. 1).

The aggregative response at Mapleguard Point also was illustrated by individually radio-tagged scoters. On 16 April 2003, seven of 15 radio-tagged scoters still remaining in the Baynes Sound study

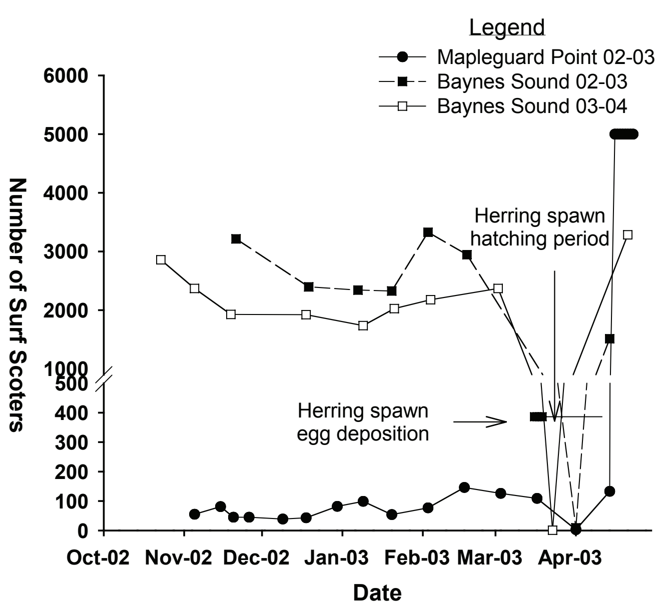

Fig. 1. Surf Scoter *Melanitta perspicillata* abundance at Mapleguard Point and in Baynes Sound between November 2002 and April 2003. The thick band represents the period during which Pacific herring spawned, and the thin line indicates the period when herring roe was present.

area (three Surf Scoters; four White-winged Scoters) were in the foraging flock off Mapleguard Point. This was the largest number of radioed scoters recorded at Mapleguard Point during the entire 2002/2003 field season (Fig. 2).

During the winter period (20 December 2002 – 15 February 2003), an average of 40 radioed scoters (n = 65) were detected in the study area every week. Once the herring spawn commenced in the northern Strait of Georgia, the number of radioed scoters located in the study area dropped to an average of nine individuals per week as the scoters moved out of the area to the largest traditional spawning grounds (Hay & McCarter 2004). During the spawning period (after 16 February 2003), an average of 19 radioed scoters were found out of the study area foraging on the most profitable spawning grounds (Rusch 2003). The general pattern of scoters moving out of the study area during the spawning period was also observed in the bird survey data from 2003 and 2004 (Fig. 1).

The Surf Scoters at Mapleguard Point were observed swimming close to shore in dense aggregations and diving synchronously. These foraging behaviors are not typically seen in Baynes Sound, where scoters feed primarily on clams, a more patchily distributed resource (Gillespie 2000, Gillespie *et al.* 2004, T. Lewis unpubl. data), and do not normally dive synchronously.

We first suspected that the scoters were feeding on herring spawn. However, on 21 April, a scuba diver at the site observed a large continuous gelatinous matrix embedded with millions of small polychaetes and collected samples. This benthic matrix was surrounded by loose decaying algae. No herring roe was observed. The lack of herring eggs is further supported by herring spawn dive and aerial surveys conducted for Fisheries and Oceans Canada 12–23 March. Those surveys found that Pacific Herring spawned at Mapleguard Point between 16 and 19 March 2003 (Rusch 2003). By 11 April, the herring eggs would have hatched given the average two-week period between deposition and hatch (Haegele & Schweigert 1985). Samples of the polychaetes were taken to a taxonomist and were identified to the genus *Ophryotrocha.*

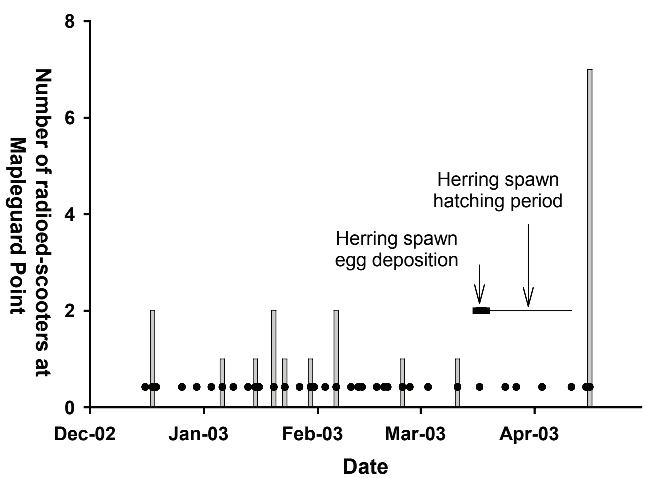

Fig. 2. The number of radio-tagged scoters at Mapleguard Point between December 2002 to April 2003. The dots corresponds to the days when telemetry surveys were conducted at Mapleguard Point, the thick band represents the period during which Pacific herring spawned, and the thin line indicates the period when herring roe was present.

The presence of a feeding Gray Whale at Mapleguard Spit further highlights the unique nature of this event. These cetaceans are rarely found in the area (J. Ford pers. comm.). From 1972 to 2004, this is the first recorded Gray Whale sighting in Baynes Sound out of a total of 1309 recorded sightings in all of British Columbia (VAMSC & FOC 2004). These whales are known to forage on polychaetes (Darling *et al.* 1998).

Ophryotrocha species are interstitial inhabitants of organically enriched and anthropogenically disturbed sediments (Sella & Ramella 1999, Dahlgren *et al.* 2001, Brooks *et al.* 2003). Several species of *Ophryotrocha* produce a net of mucous-lined tubes where they find conspecifics, and mate and brood their young (Sella & Ramella 1999). They converge in areas where mucous trails meet, generating a clumped distribution (Sella & Ramella 1999).

Mapleguard Point is not considered a polluted or disturbed area. It has only a small marina nearby and low amounts of marine traffic. We speculate that the relatively untouched herring spawn deposited on algae as it decomposed created an organically rich environment conducive to an *Ophryotrocha* aggregation. Teztlin *et al.* (1997) discovered a species of *Ophryotrocha* colonizing and inhabiting aggregations of decaying kelp fronds in the White Sea.

Our observations clearly suggest that foraging scoters showed a strong distributional and numerical response to the *Ophryotrocha* species. The scoter flock at Mapleguard Point likely consisted of both wintering residents and migrants; a radioed Surf Scoter that wintered in San Francisco Bay was detected in the aggregation on 15 April 2003.

We are unaware of any other record of scoters aggregating or foraging on ephemerally abundant polychaetes. This observation is another example of the ability of Surf Scoters and other sea ducks to locate and capitalize on ephemeral food sources, whether predictable or not.

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A portion of the feeding flock of Surf Scoter *Melanitta perspicillata* (with scattered Greater Scaup *Aythya marila*) foraging on polychaetes at Mapleguard Spit, British Columbia (photo Molly Kirk)