# Surf scoter (*Melanitta perspicillata*) habitats in the mesohaline Chesapeake Bay, Maryland

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## Introduction:

Chesapeake Bay is as an important wintering area for surf scoters. Populations of surf scoters are declining along the Atlantic coast and the causes of this decline are unknown. Additionally, habitat use of surf scoters is poorly understood along the Atlantic Coast, especially in the Chesapeake Bay. Surf scoter food habits in the Bay have found dwarf surf clam and hooked mussels to be important food items. This study seeks to quantify scoter habitat and determine whether surf scoter are susceptible to mounting anthropogenic pressures in the Bay.

## Objectives:

1. Determine faunal and sediment composition of surf scoter feeding sites.
2. Determine faunal and sediment composition of non-feeding sites and compare with feeding sites.
3. Determine physical characteristics of feeding and non-feeding sites

## Methods:

- Distribution of scoters was determined monthly, from November 2004 – March 2005, via a fast moving boat.
- One km$^2$ study sites (n=3 were located where surf scoter were found feeding and where no scoters were observed (n=3) over the survey period. Ten sampling points were randomly chosen within each site.
- Benthic samples were taken in summer and fall 2005 as well as spring 2006.
- Organisms were identified to lowest taxa possible and density and Ash-free dry mass (AFDM) biomass m$^{-2}$ were determined.

Table 1. Mean (range) of depth (m) and dissolved oxygen (mg/l)from random sampling points within feeding and non-feeding sites.

| Site | Mean Depth (m) (range) | Mean Dissolved Oxygen (mg/l) |
|---|---|---|
| | Feeding Scoters Present | |
| Herring Bay | 2.7 (1.8-4.0) | 6.4 |
| Poplar Island | 4.5 (2.4-5.2) | 6.1 |
| Shady Side[1] | 2.5 (1.2-5.8) | 6.7 |
| | No Feeding Scoters Present | |
| Herring Bay | 3.6 (1.0-4.6) | 5.9 |
| Poplar Island | 5.0 (2.1-6.7) | 6.4 |
| Shady Side[1] | 3.3 (1.0-6.1) | 6.7 |

[1] Data obtained from nearby MD DNR water quality monitoring station.

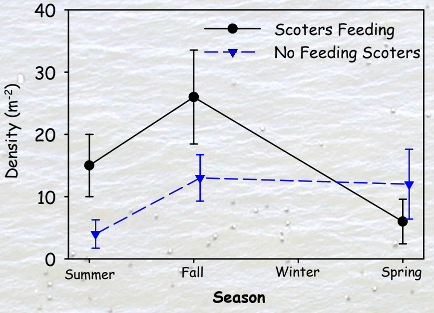



Figure 1. Mean (±SEM) seasonal density (m$^{-2}$) of hooked mussel (*Ischadium recurvum*) at feeding and non-feeding sites

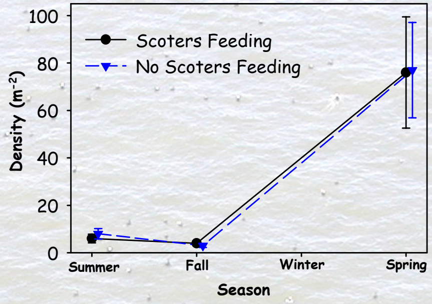
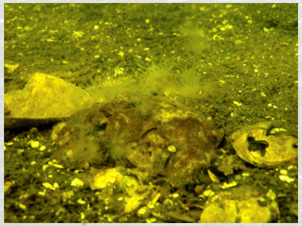



Figure 2. Mean (±SEM) seasonal density (m$^{-2}$) of dwarf surf clam (*Mulinia lateralis*) at feeding and non-feeding sites



White anemone (*Diadumene leucolena*) on fossil oyster shell at Herring Bay

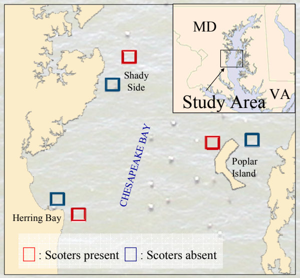



Figure 3. Location of benthic study sites.

Group of hooked Mussel

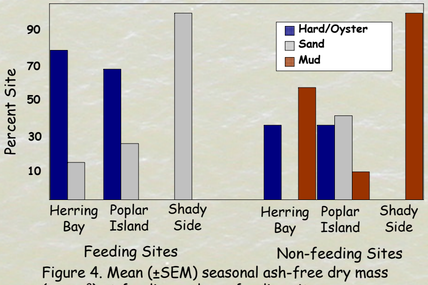



Figure 4. Mean (±SEM) seasonal ash-free dry mass (mg m$^{-2}$) at feeding and non-feeding sites

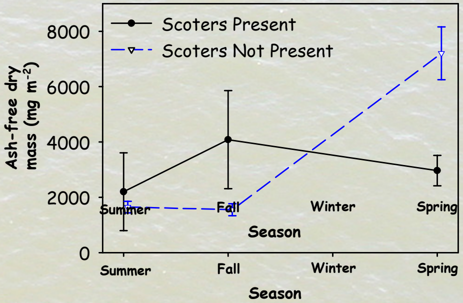



Figure 5. Mean (±SEM) seasonal ash-free dry mass (mg m$^{-2}$) of invertebrates at feeding and non-feeding sites

## Results:

- No difference in salinity, water depth or dissolved oxygen between feeding and non-feeding sites.
- Dissolved oxygen was above the hypoxic/anoxic threshold for most invertebrates. However, nearby MD DNR monitoring station recorded periodic hypoxic condition during summer.
- Hooked mussel density (figure 1) were highest in fall (as scoters arrive in Bay) at feeding sites and lowest the in spring (as scoters migrate from bay). Mussel densities at non-feeding sites remained stable from fall to spring.
- Dwarf surf clam densities (figure 2) were low in summer and fall at both feeding and non-feeding sites, and increased exponentially over winter.
- Habitat at feeding sites consisted of hard and sand substrates. Habitat at non-feeding sites was mixed, but contained large amounts of mud and lower amounts of hard and sand relative to feeding sites.
- Hard substrates at feeding sites consisted of degraded oyster bars and packed clay with scattered shells.
- Ash-free dry biomass (mg m$^{-2}$) at feeding sites was highest in fall and declined slightly by spring. Biomass at non-feeding sites increased exponentially from fall to spring, which was due to large increases in densities of infaunal bivalves.

Male surf scoter

## Conclusion:

- Scoters appear to cause a reduction of hooked mussel (*Ischadium recurvum*) within the study area.
- Depletion of mussels may cause scoters to switch foods from mussels to dwarf surf clam *(Mulinia lateralis)*, which increased over winter.
- Scoters are feeding over sand and hard substrates (primarily degraded oyster bar and packed clay), while avoiding mud.
- Oyster restoration in Bay may positively affect scoter through the creation of habitat.

## Contact Information:

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