

## Habitat Influence on Rearing Condition and Overwinter Survival of Juvenile Capelin (*Mallotus villosus*) - Auke Bay Laboratories

Overwinter mortality of juvenile fish is a major factor influencing productivity of marine species at high latitudes. Failure to acquire adequate energy stores to endure resource-deplete winter periods is a primary mechanism of overwinter mortality. Habitat quality influences the ability for individuals to grow and obtain sufficient energy stores. It is the purpose of this study to contrast habitat features of 2 capelin nursery areas and relate differences in these habitats to capelin condition and overwinter survival. Cohort strength and population structure of fish populations at high latitudes are strongly influenced by size-selective overwinter mortality of juveniles (Sogard 1997, Hurst & Conover 1998, Schultz & Conover 1999). Thus, it is critical that juvenile fish attain sufficient energy during summer periods of high productivity to stave off starvation or foraging-induced predation mortality (Shuter & Post 1990, Post & Parkinson 2001, Garvey et al. 2004). In the fall, energy reserves are at a maximum, indexing summer productivity as well as habitat quality, nutritional condition and overwinter survival (Norcross et al. 2001, Lloret & Planes 2003, Shulman et al. 2005). During the winter of 2006-2007, we characterized habitat features of Berners Bay, a nursery area for juvenile capelin. In winter 2007-2008, we will complete a second winter of pre-post winter measurements, and correlate these features with capelin condition and overwinter survival. Further, with cooperation of USGS in Glacier Bay, we will extend our sampling during the winter (2007-2008) and compare Berners Bay to Glacier Bay, a highly productive capelin nursery (Arimitsu et al. 2003). USGS has summer projects on capelin, and this will extend their data. But more importantly, it will allow the comparison of the quality and production of juveniles from two different habitats. A detailed understanding of capelin habitat requirements will be useful for predicting how climate change will affect forage fish distributions. Capelin are patchily distributed in southeastern Alaska (Johnson et al. 2005) in association with glacially-influenced waterbodies (Arimitsu et al. 2003, Hudson et al. In prep). They are highly sensitive to environmental change, particularly temperature (Hunt et al. 2002, Rose 2005) and sea ice distribution (Methven & Piatt 1991). Thus, this study will provide insight into the specific habitat characteristics that favor survival and productivity of capelin and therefore may be predictive of the impacts of decreasing ice coverage in the Bering Sea. Our analysis will complement summer habitat assessments of capelin currently funded by the National Park Service in Glacier Bay by providing data on habitat requirements and recruitment processes over winter. Expertise provided by M. Arimitsu (USGS) who has worked extensively with capelin in Glacier Bay will be particularly useful for study design, as well as facilitating permitting issues in Glacier Bay National Park. The level of detail offered by these complementary studies could only be obtained in locations such as Glacier Bay and Berners Bay, which provide year-round access to capelin populations.