

Essential Fish Habitat project status report

Reporting date: October 31, 2008

Project number: 2007-12

Title: **Habitat Influence on Rearing Condition and Overwinter Survival of Juvenile Capelin (*Mallotus villosus*)**

PIs: J. Vollenweider, J. Hudson, R. Heintz, E. Calvert

Funding year: FY 2007

Funding amount: \$57.9K

Status: Complete Incomplete, on schedule Incomplete, behind schedule

Planned completion date if incomplete: Field work completed April 2008. Fish sample proximate analysis completed September 2008. Data summarization, analysis and report/manuscript drafting will be completed in FY 2009.

Reporting: Have the project results been reported? If yes, where were the results reported? The project results have not been reported. Cruise reports attached below.

Results: What is the most important result of the study? There are few results available at this time. Length frequency distributions for age-0 capelin in November and April suggest size-selective overwinter mortality. Capelin appear to be more abundant in Muir Inlet than in Berners Bay and Fritz Cove.

Study goals update: The object of this study was to compare overwinter energy dynamics and habitat of juvenile capelin between two sites – Glacier Bay and Berners Bay. Low capelin catches in Berners Bay in November 2007 will prevent us from making this comparison. However, we have collected sufficient numbers of fish from Muir Inlet in Glacier Bay to describe the winter energy dynamics of juvenile capelin at this site, and the potential influence of habitat and prey availability. Also, we have data on the winter energy dynamics of juvenile capelin in Berners Bay in winter 2003/2004. We will explore the potential for combining these data sets into a single manuscript.

EFH Status Report

31 October 2008

Habitat Influence on Rearing Condition and Overwinter Survival of Juvenile Capelin (*Mallotus villosus*)

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On April 12, 2008 we completed the second research cruise (post-winter observation) for the 2nd winter field season of the project. Due to the low numbers of capelin observed in Berners Bay in November 2007, we focused the entire spring 2008 cruise on Glacier Bay. While juvenile capelin were abundant in Muir Inlet in November 2007, they proved difficult to find and catch in April 2008. We were able to use the extra time afforded by not visiting Berners Bay to search for capelin at several sites in Glacier Bay, including throughout Muir Inlet, Wachussett Inlet, and Whidbey Pass. Ultimately we were able to collect sufficient numbers of fish near Muir Inlet to meet our study objectives. As in November 2007, we collected acoustic and oceanographic (CTD) data as well as zooplankton samples at sites where fish were collected.

Trawl catches were immediately sorted by species on board the vessel. Juvenile (age 0) and adult capelin were wrapped in cellophane, placed in labeled plastic bags, and frozen. Zooplankton samples were placed in labeled plastic sample bags and preserved with 95% ethanol. Fish samples were processed for biological information and proximate composition during summer 2008. Zooplankton will be identified and enumerated in winter 2008/2009. Zooplankton densities will be used to generate an index of prey availability in November and April. Length frequency distributions suggest overwinter size-selective mortality between November and April. Proximate composition (i.e. % lipid, protein, and water) and energy density have been determined for a subset of fish. From these data we will compare allometric relationships between size and lipid and protein content and energy density.

EFH Status Report

16 November 2007

Habitat Influence on Rearing Condition and Overwinter Survival of Juvenile Capelin (*Mallotus villosus*)

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On November 21, 2007, we completed the first research cruise (pre-winter observation) for the 2nd winter field season of the project. During the 7-day cruise, we revisited the previously-established acoustic survey line in Berners Bay, performed CTD casts and zooplankton tows at the 14 stations, and used mid-water trawl to collect samples of juvenile capelin for morphometric and chemical analyses (see figure 1). We also established a study area in Muir Inlet, Glacier Bay using previous reports of larval capelin during summer¹. Specifically, we examined the southern portion of Muir Inlet on a scale similar to that of Berners Bay, including the area of Adams Inlet south to Caroline Shoals (see figure 2). In this area, juvenile capelin were considerably more abundant than observed in Fritz Cove during year 1 and Berners Bay in both years (see figure 3 for example of acoustic echogram). In addition, we performed a broadscale survey of the northern portion of Muir Inlet, where juvenile capelin appear to be less abundant. Throughout Muir Inlet, we used the same sampling procedures as in Berners Bay, including acoustic surveys, CTD and zooplankton casts at 17 stations, and mid-water trawl for sample collection.

Trawl catches were immediately sorted by species on board the vessel. Juvenile (age 0) and adult capelin were wrapped in cellophane, placed in labeled plastic bags, and frozen. Zooplankton samples were placed in labeled plastic sample bags and preserved with 10% formalin (in sea water). Zooplankton and fish samples will be processed between December 2007 and March 2008. Zooplankton will be identified and enumerated. Zooplankton densities will be used to generate an index of prey availability for comparisons within and between bays. All capelin will be measured for fork length; a subset of fish from each bay will be measured for wet mass and gut contents assessed for prey types and stomach fullness. Length frequency distributions will be produced for each bay and compared to post-winter distributions for evidence of overwinter size-selective mortality. Proximate composition (i.e. % lipid, protein, and water) and energy density will be measured for a subset of fish. From these data we will compare allometric relationships between size and lipid and protein content and energy density. ANCOVA will be used to compare pre-winter energy allocation and overwinter energy consumption strategies of juvenile capelin between bays. Biophysical habitat parameters will be used to explain differences in overwinter survival and energetics between bays.

A post-winter research cruise is planned during which time similar measurements will be taken to estimate overwinter energy consumption and size-selective mortality of juvenile capelin.

¹ Arimitsu ML, Piatt JF, Litzow MA, Abookire AA, Romano MD, Robards MD (In draft) Distribution and spawning dynamics of capelin (*Mallotus villosus*) in Glacier Bay, Alaska: A cold water refugium. U.S. Geological Survey – AK Science Center, 3100 National Park Rd, Juneau AK, 99801.

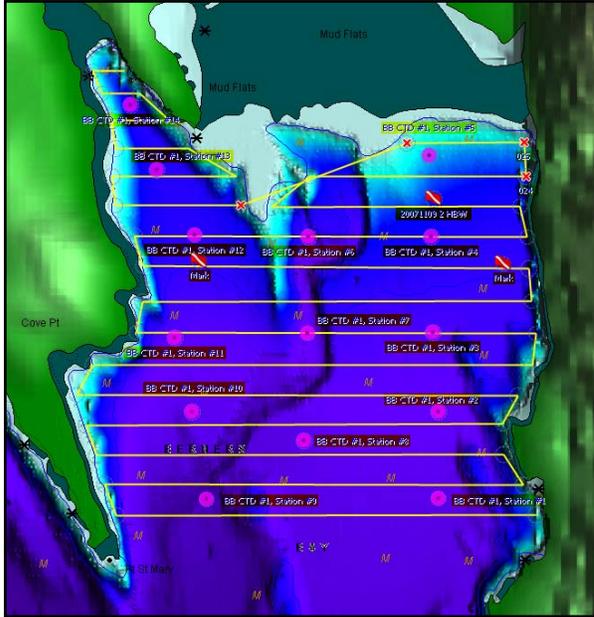


Figure 1. Berners Bay study site, depicting acoustic transect line and 14 CTD/zooplankton sampling stations.

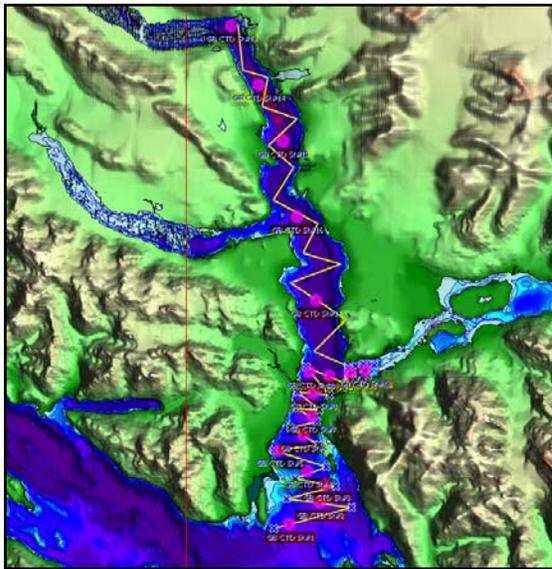


Figure 2. Muir Inlet study site, depicting acoustic transect line and 17 CTD/zooplankton sampling stations.

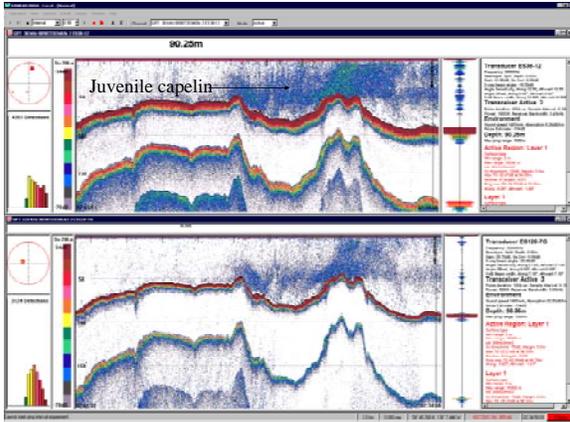


Figure 3. Echogram of juvenile capelin in Muir Inlet, Glacier Bay.