

Larval Fisheries Ecology of the Bering and Chukchi Seas



Brenda Holladay, University of Alaska Fairbanks

Brenda Norcross and Brenda Holladay of the Institute of Marine Science, University of Alaska Fairbanks, and Morgan Busby of the Alaska Fisheries Science Center, National Marine Fisheries Service, were the research team for the project “Fisheries Ecology of the Bering and Chukchi Seas.” Brenda Holladay was aboard the Professor Khromov to conduct field collections.

Brenda Holladay: Photo K. Wood

Our main project objective was to document fishes in the Bering and Chukchi Seas by gathering baseline information about fish species presence, distribution, relative abundance, and association with the environment. A summary of collection activities is enclosed (Table 1). At 17 sites, we collected larval and juvenile fishes using both a plankton net (LF [Larval Fish] Bongo) and a bottom trawl (LF trawl). At Station 10 we deployed only a LF Bongo; we did not deploy the LF trawl because boulders and large cobbles were caught in the dredge. Thirty-six liter jars of plankton collected by the LF Bongo were preserved in 10% formalin for laboratory identification during the coming year. Fishes collected by the LF trawl were identified and measured on board, with the exception of a few fishes, which will be identified after the cruise. One to three fish of each species collected by LF trawl were preserved in formalin for this project’s voucher collection.

The primary data for this project are the counts of fish larvae and juvenile fishes for use in estimating abundance and species composition. We caught 1,307 fishes with the LF trawl, including fishes of at least 31 species.



The LF Bongo net was a 60 cm diameter Bongo net with paired 0.505-mm mesh plankton nets; it

KatriKatrn Iken and benthic sample: Photo: B. Bluhm

was fished in an oblique tow from the surface to within 10 m of the bottom. The vessel speed was approximately 2 kt during the tow, and the towing cable was let out or retrieved at approximately 20 m per minute. The contents of the two nets were preserved separately. The LF trawl was a 3.05 m plumbstaff beam trawl having 7 mm mesh in the body of the net and a 4 mm mesh codend liner; its effective swath is 2.26 m. The vessel speed was approximately 1-1.5 kt during the LF trawl, which was towed for 1-5 minutes on the sea floor. This net was very effective at capturing epibenthic invertebrates and juvenile fishes, but it also caught a lot of mud. Usually the net codend contained too much mud to drag aboard by hand.

This project is strongly integrated with, and collected samples for use by, three other RUSALCA projects, including “Arctic Epibenthic Community Structure and Benthic Food Web Structure” by Iken et al., “A Census of Arctic Zooplankton



Lowering a trawl, Photo: K. Crane

Communities” by Hopcroft and Kosobokova, and “Fishes of the Chukchi and Northern Bering Seas” by Stein et al. In the coming year, the LF (Larval Fish) plankton samples will be sorted for larval fishes (this project) and larger predatory plankton such as euphausiids and jellyfishes (Hopcroft project). At a few sites, euphausiids and jellyfishes were removed from the LF plankton for stable isotope analysis (Iken project). The LF trawl collected invertebrate fauna for the Iken project, which will assess species composition, abundance and biomass of epibenthic megafauna, and will also conduct stable isotope analysis on each species. The common fish species caught in the LF trawl were sampled for stable isotope analysis (Iken project); muscle tissue was removed from three individuals

of each species. Specimens of several fishes caught in the LF trawl were given to Catherine Mecklenburg and Boris Sheiko for various fish collections. A number of snailfishes caught in the LF trawl were provided to David Stein for laboratory identification and genetics analysis.

This project also collected samples for two projects not associated with RUSALCA, including a study of trace metals by Nate Bickford and Brenda Norcross (IMS/UAF) and a study of fatty acids by Alan Springer and Shiway Wang (IMS/UAF). Samples for the trace metals study included water, sediment, and fish otoliths. At nearly every site, 250 mL water was collected from the CTD rosette bottles at the surface, a mid-depth, and bottom. Approximately 1/3 cup of sediment was collected from the VanVeen grab at most sites (Grebmeier project). Fish larvae caught in the zooplankton nets (Hopcroft project) were preserved in ethanol by this project for potential use for trace metals analysis of otoliths and or genetics analysis. Up to 35 individuals of each common species of fishes caught by LF trawl (this project) or otter trawl (Stein project) were frozen from each site for trace metals analysis of otoliths. Ten to twenty fish of the most common species were frozen for fatty acid analysis (Springer and Wang).