DY07-09 NPCREP/BSIERP Spring Ichthyoplankton Cruise
Southeast Bering Sea, May 7 - May 20, 2009

Vessel: NOAA ship Oscar Dyson

Chief Scientist: Janet Duffy-Anderson, AFSC

Participants:

Deborah Blood, AFSC
Chrissy Jump, AFSC
Kathy Mier, AFSC
Kenric Osgood, ST
Stacy Remple, AFSC
Tracey Smart, UW/AFSC
Art Sowles, USFWS
Matt Wilson, AFSC

Objectives:

We examined the interactions among climate, weather, and the recruitment of fishes in the eastern Bering Sea. We conducted ichthyoplankton and zooplankton surveys in the waters along the eastern Aleutian Island chain, the Alaska Peninsula, and the Pribilof Islands (Figure 1). This work is needed to describe larval fish assemblages and determine how physical and biological factors affect the transport and survival of fish larvae. The cruise was a collaboration between the North Pacific Research Board's Bering Sea Integrated Ecosystem Research Program (BSIERP) and NOAA's North Pacific Climate Regimes and Ecosystem Productivity (NPCREP) program. Fish species of particular interest during this cruise were: arrowtooth flounder (*Atheresthes stomias*), Pacific cod (*Gadus macrocephalus*) and walleye pollock (*Theragra chalcogramma*). We determined the horizontal and vertical distribution of these species as well as the abundance and distribution of their plankton prey. Near real-time discrimination of *Atheresthes* spp. larvae was made at sea using molecular techniques.

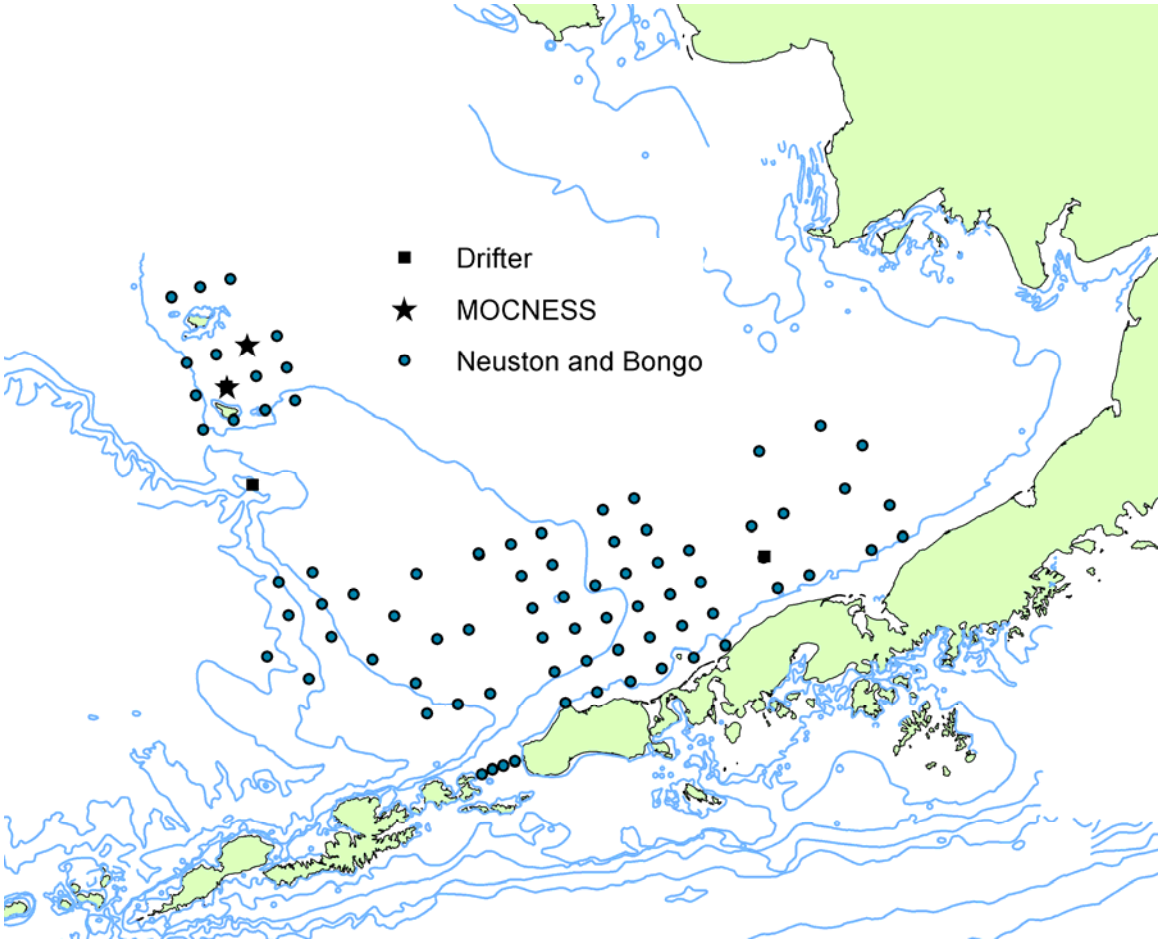

Figure 1. Stations sampled during NOAA Ship Oscar Dyson cruise DY07-09.

Summary:

Eighty-one stations were sampled for ichthyo- and zooplankton abundance using a bongo net array and a neuston net (505 µm mesh) (Figure 2). The bongo net array consisted of two 60-cm diameter opening nets with a mesh size of 505 or 333 µm and two 20-cm diameter opening nets with a mesh size of 153 µm. Bongo nets were fished obliquely from the surface to 10 m off the bottom or to a maximum depth of 300 m. The neuston net was fished at the surface for 10 min. The contents of one of each of the 60-cm and 20-cm bongo nets and the neuston net were immediately preserved in sodium borate-buffered formalin to be sorted and identified at a later date. The contents of the remaining 60-cm bongo net were sorted live for fish larvae (Figure 3).

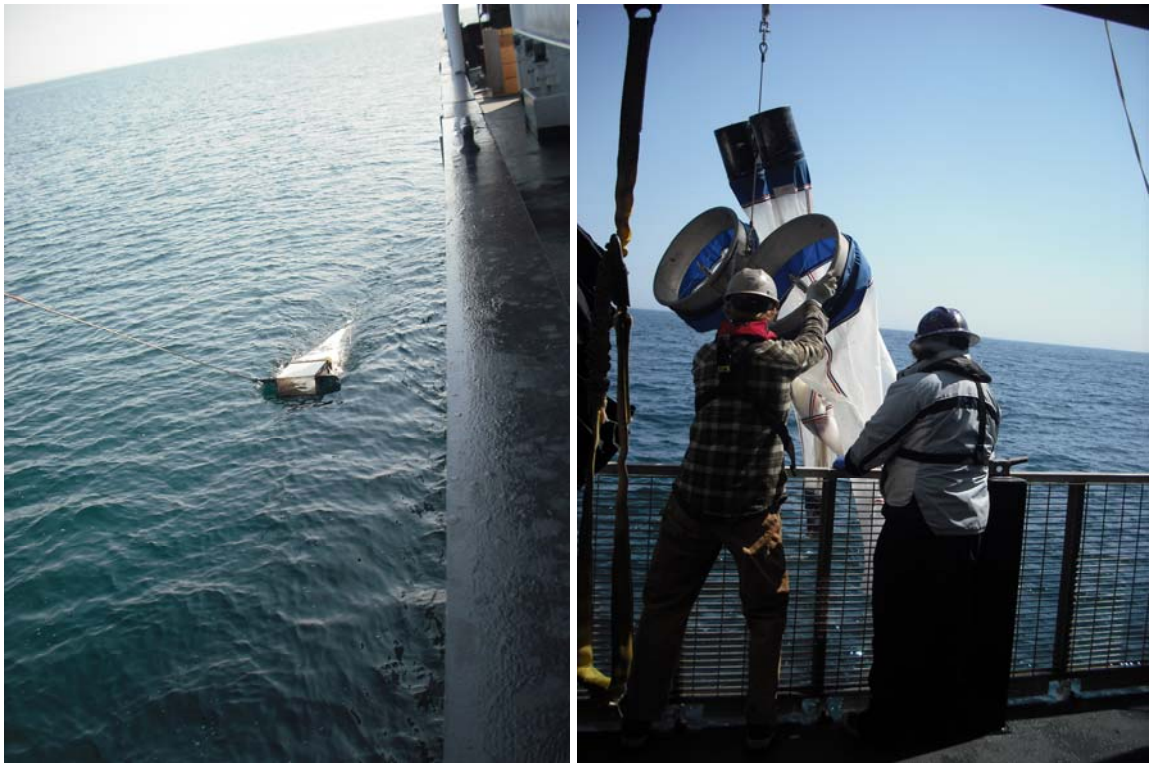

Figure 2. A) neuston net fishing and B) bongo net array being deployed over the side of the Oscar Dyson by survey technician Jay and deckhand Robert (photo credit: Tracey Smart).

Figure 3. Scientists Debbie Blood and Tracey Smart sorting through the contents of a bongo net for fish larvae (photo credit: Chrissy Jump). The brown color of the water is

due to the high abundance of large centric diatoms at some stations and long, chain-forming diatoms at others.

At the beginning of the cruise, we sampled along the slope between Bering and Pribilof Canyons, catching about 2 dozen *Atheresthes* spp. larvae. After this, we moved northward to sample around the Pribilof Islands. Catches of walleye pollock eggs in this area were high, particularly in the surface neuston tows. Catches of larvae however, were relatively low. Water temperatures were very cold (<1ºC), which may have influenced the abundance of larvae, either by affecting the location or timing of spawning adults. In total, we caught only 25 walleye pollock larvae at 15 stations around the islands, and no Pacific cod. Two stations in the Pribilof Islands were sampled for vertical distribution of fish eggs and larvae with the MOCNESS (505 µm mesh).

On our way back toward the peninsula to continue the search for pollock and cod larvae, the ship had to navigate through a large field of sea ice (Figure 4). Sea ice over the middle shelf in mid-May is unusual for mid-May, and has not been documented in at least the last 10 years. Sea ice is further evidence of the very cold conditions over the middle and outer shelves. Plankton sampling along the Alaska Peninsula revealed that larvae of any fish species were relatively scarce at most stations and water temperatures remained low until we moved further west. For the peninsula and eastern Aleutian Islands, we again caught only 25 walleye pollock and 2 cod larvae at 46 stations. Typically catches are 1-2 orders of magnitudes higher in these geographic locations.

Figure 4. Icebergs along side the Oscar Dyson (photo: Tracey Smart).

Within Unimak Pass and over Bering Canyon, we continued our efforts and were rewarded with more *Atheresthes* spp. larvae, 30 pollock larvae, one cod larva, and the highest larval diversity we had yet to see on this cruise (approximately 12 genera). It is most likely that these larvae were spawned in the Gulf of Alaska and were being transported through Unimak Pass into the Bering Sea. Previous years of sampling in Unimak Pass have demonstrated that larvae are routinely advected through this area from the Gulf to the Bering.

Three satellite-tracked drifters were released during this cruise, the first over the slope, the second between St. George and St. Paul Islands, and the third along the Alaska Peninsula. A cruise this summer led by our colleague, Dr. Nicola Hillgruber (UAF), will use the drifter data to locate the fish contained in the patches in the spring and conduct additional sampling for the NPRB/BSIERP.

Of the 47 *Atheresthes* spp. larvae collected, we were able to genetically identify 41 to species while at sea. Catches at the northern stations (between the canyons and in the Pribilof Islands) tended to have more Kamchatka flounder (*A. evermanni*) than arrowtooth flounder (*A. stomias*), while catches at the southern stations (Unimak Pass and Bering Canyon) tended to have more arrowtooth than Kamchatka flounder (Figure 5).

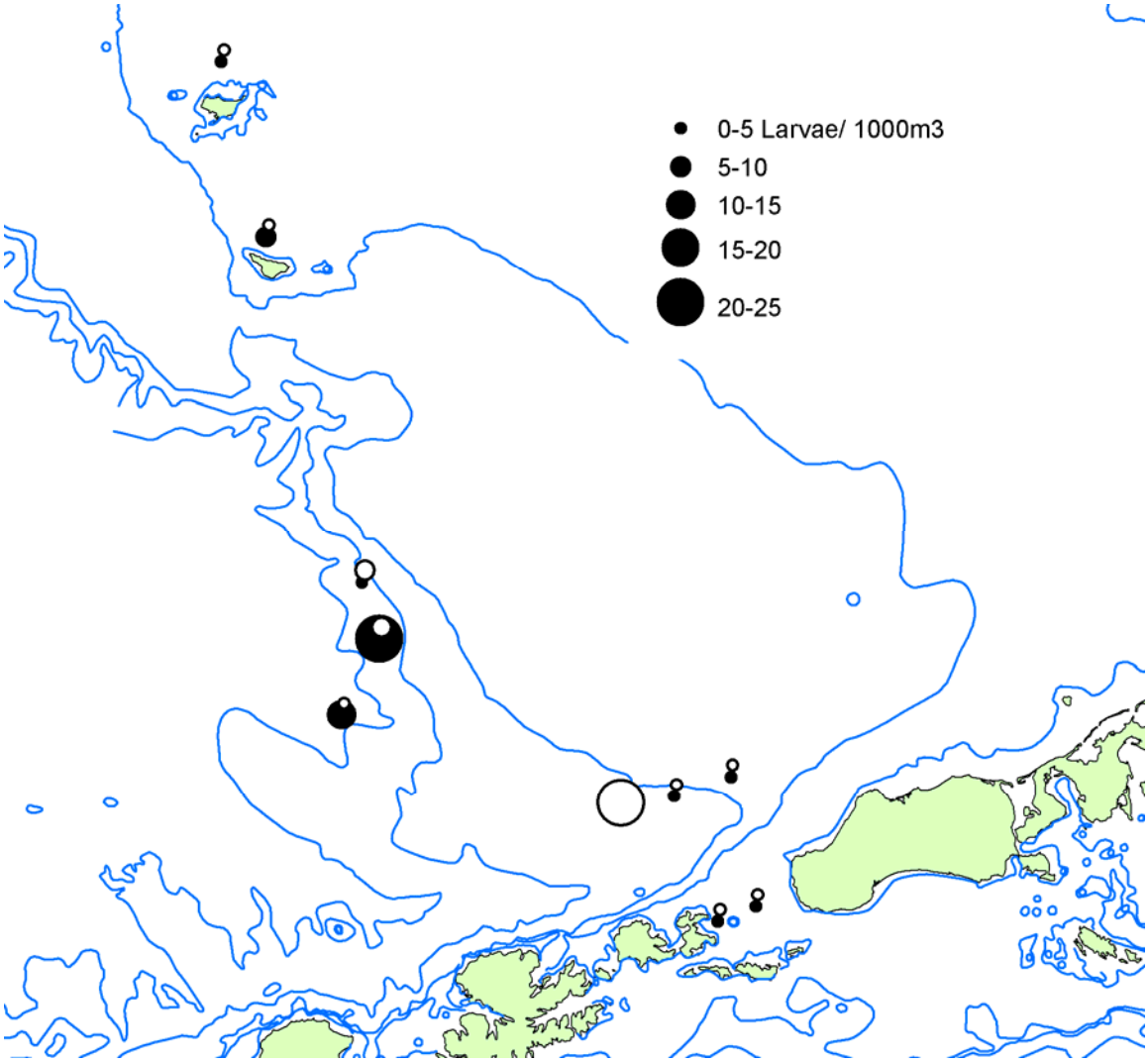

Figure 5. Locations and abundances of arrowtooth (white) and Kamchatka (black) flounder larvae.