Abundance and distribution of pelagic nekton from GLOBEC 2002 surface trawl surveys

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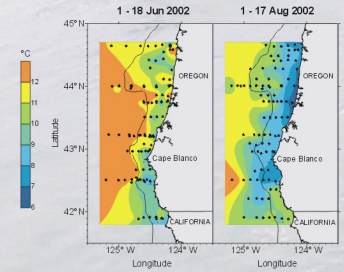
ABSTRACT

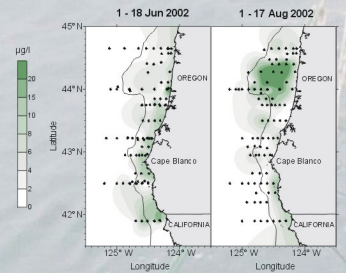
The abundance and distribution patterns of pelagic nekton in the northern California Current System offshore of Newport, OR to Crescent City, CA are poorly known. These nekton include prey, predators, and potential competitors of juvenile salmon. Therefore, gathering baseline data to increase our knowledge of pelagic nekton will lead to a better understanding of juvenile salmon in their ocean habitat. To examine the nekton community, surface trawling was conducted at meso- and finescale stations in June (104 tows) and August (99 tows) 2002. In addition, a 24-hour diel study was done at one station where a large number of salmonids were caught during the mesoscale surveys in June and August. Trawl catches showed that few chinook and coho salmon were present south of Cape Blanco, whereas they were abundant on the shelf north of Cape Blanco. Common non-salmonid nekton included jack mackerel, Pacific herring, Pacific sardine, whitebait smelt, surf smelt, Pacific saury, Pacific hake, juvenile rockfish, and market squid. The diel study in June showed a shift from market squid during the day to smelt and Pacific herring at night, whereas in August, Pacific herring and Pacific sardine dominated the catches. The spatial and temporal patterns of the pelagic nekton and their trophic relationships are currently being analyzed to identify interactions between the nekton community and salmonids.

Surface trawl stations (dots) and surface sea temperature (°C)



Sea surface temperature at the offshore stations was warmer in June than August. Cold water was observed along the coast in August.

Water sampling stations (dots) and chlorophyll *a* concentrations (μg/l)

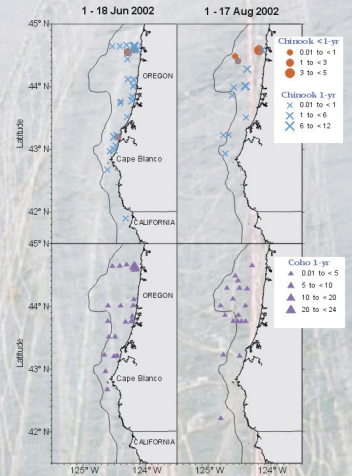


In June, 3-m chlorophyll *a* was concentrated nearshore. The June maximum was 45.4 μg/l at station HH-2. Elsewhere, chlorophyll concentrations were <23.9 μg/l. In August, chlorophyll continued to be high nearshore south of Cape Blanco. However, north of the cape, chlorophyll was highly concentrated over the Heceta Bank (max. = 37.8 μg/l).

Composition of major nekton taxonomic groups

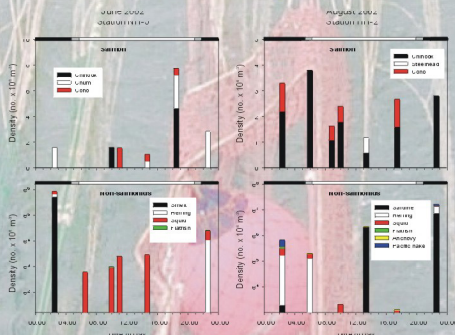
Clupeids (Pacific sardine, Pacific herring, and American shad) comprised a large proportion of the taxa composition during each cruise. Osmerids (whitebait and surf smelts) were common in June 2000, but in a small proportion at other times. Pacific hake were not observed in 2000, but caught in 2002. The remaining taxonomic groups' proportions varied between months and years.

Juvenile chinook and coho salmon abundance (no. x 10^6 m^{-3}) and distribution



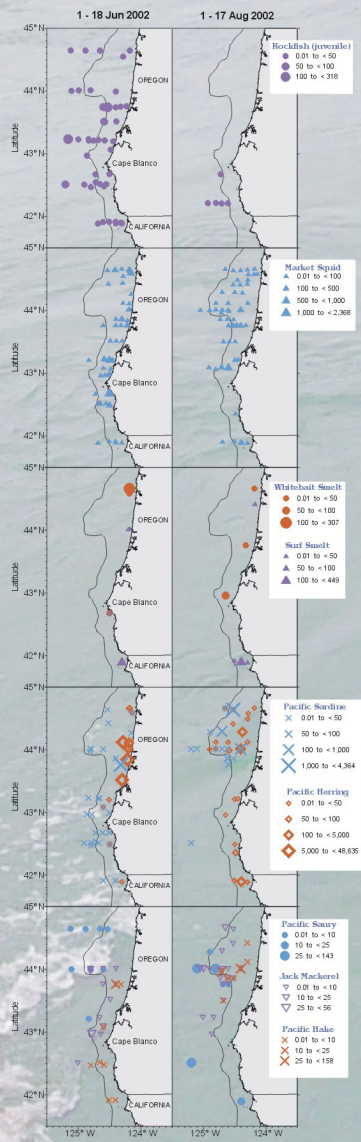
Chinook salmon of approximately age 1-year appeared to be utilizing the nearshore area in June, but spread out over the shelf in August. Few chinook salmon age <1-year were observed. Coho salmon of about age 1-year were observed shelf-wide, including a few beyond the shelf edge. Both chinook and coho salmon were found primarily north of Cape Blanco.

Diel study



During both cruises, a diel study was undertaken to observe day to night shifts in species composition and abundance. In June, only chum salmon were caught during the night, whereas in August, both chinook and coho salmon were present. As for the non-salmonids, June saw a shift from market squids during the day to smelts and Pacific herring at night. In August, Pacific sardine and Pacific herring were observed during both day and night. In addition, flatfish, Northern anchovy, and Pacific hake were present in the August study.

Abundance (no. x 10^6 m^{-3}) and distribution of dominant nekton species



Juvenile rockfishes were common in June, not August. Market squid were distributed north and south of Cape Blanco as were the smelts. Pacific sardine, Pacific herring, Pacific saury, jack mackerel, and Pacific hake were common on the shelf and concentrated near or on Heceta Bank in August.

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