Oceanographic Habitat Conditions along the Eastern Bering Sea Slope

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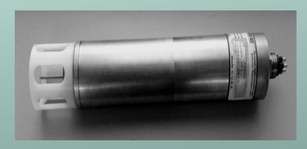
ABSTRACT

Rising temperature, decreased dissolved oxygen, rising CO_2 and lower pH levels, are predicted environmental changes for the North Pacific due to climate change. Fish and invertebrate response to a changing marine environment is an emerging question for scientists and an important aspect of ecosystem management. Through environmental monitoring and amassing time series data we can begin to track changes in the environment and associated faunal response. I used the platform of the eastern Bering Sea upper continental slope groundfish survey conducted by the Alaska Fisheries Science Center to examine the relationship between fish and invertebrate distribution with oceanographic habitat conditions.

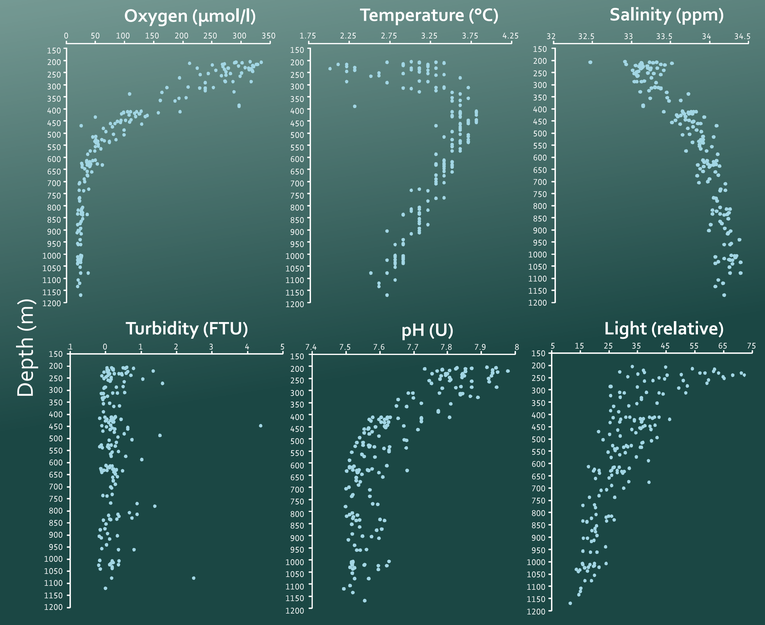
METHODS

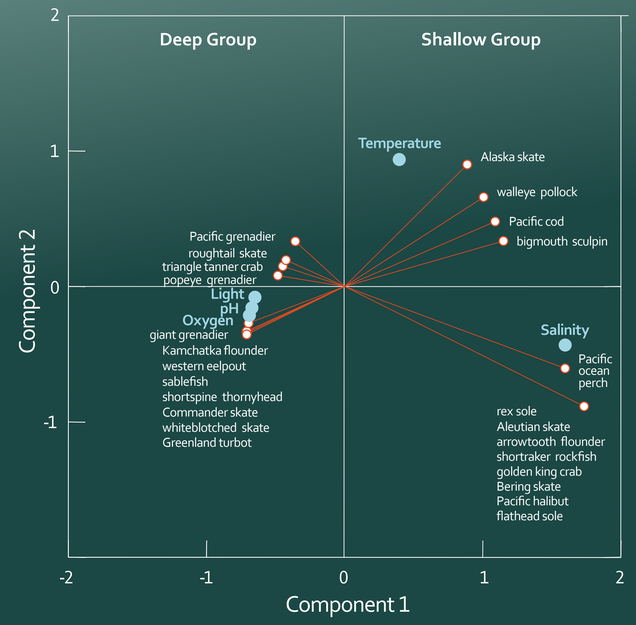
One hundred eighty-four standardized bottom trawl samples from the eastern Bering Sea upper continental slope groundfish survey conducted by the Alaska Fisheries Science Center were used to examine the relationship between fish and invertebrate distributions and a suite of oceanographic habitat conditions. A ruggedized data logger (Seaguard-Aanderaa), light meter (Wildlife MK-9), and Seabird SBE-9 were attached to the trawl headrope for recording depth, temperature, light, salinity, pH, oxygen, and turbidity measurements from each trawl haul. Oceanographic variables were coupled with the 25 most abundant fish and invertebrate species (by biomass) and examined for the patterns in faunal distribution.

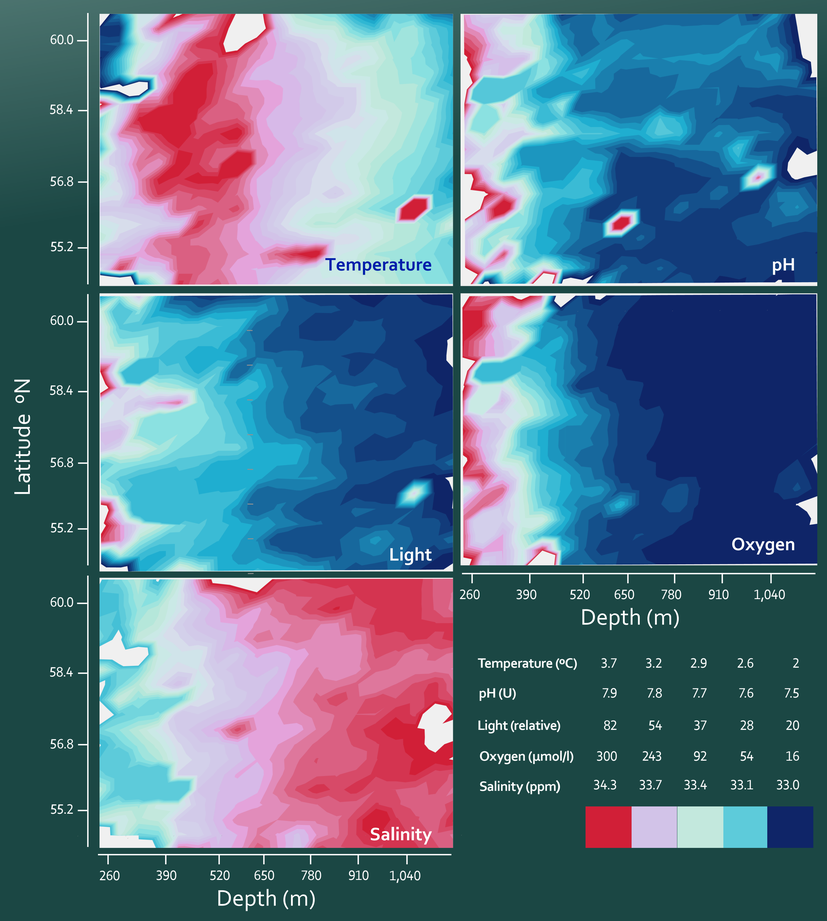


RESULTS

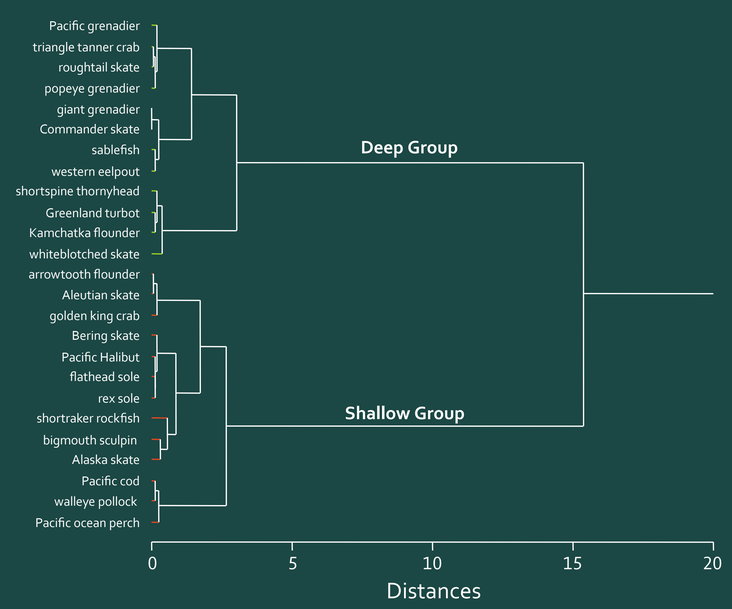
Shallow slope (<~550 m) environmental conditions were characterized as having higher variability and a linear relationship with depth while deeper slope (>~550 m) conditions were more uniform and nearly monotonic with depth. Further partitioning of the slope into a northern (>57 °N) and southern (<57 °N) component suggested that oceanographic conditions were significantly different between the north and south. Multivariate analysis separated a shallow and deep group of organisms based on habitat parameters. The analysis showed temperature and salinity were important factors for shallow dwelling species while light, oxygen, and pH were important for deeper species. The general pattern showed shallow fauna experienced a greater change in habitat conditions than the deeper fauna with features such as light and oxygen as potential driving forces for latitudinal-depth distributions.

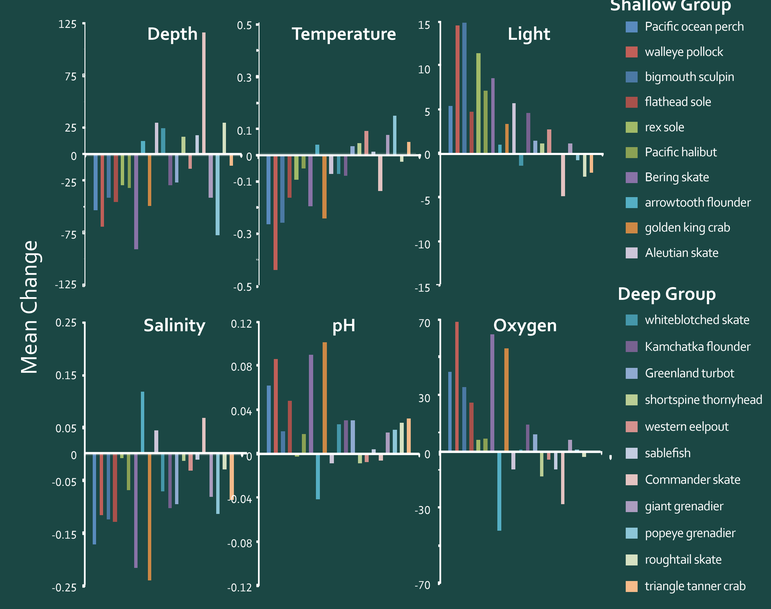






Temperature (°C)	3.7	3.2	2.9	2.6	2
pH (U)	7.9	7.8	7.7	7.6	7.5
Light (relative)	82	54	37	28	20
Oxygen (µmol/l)	300	243	92	54	16
Salinity (ppm)	34.3	33.7	33.4	33.1	33.0





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