2020 IN REVIEW

Newport Laboratory

NOAA FISHERIES

Alaska Fisheries Science Center

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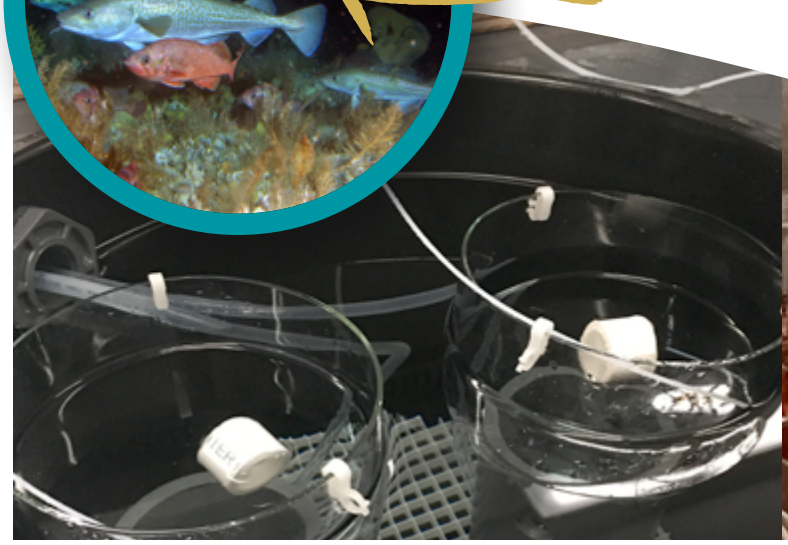
Alaska Fisheries Science Center's Newport Laboratory is home to the Center's Fisheries Behavioral Ecology Program. The Laboratory is part of the Oregon State University's Hatfield Marine Science Center in Newport, Oregon. Scientists conduct research on the biological responses of commercially important marine fishes and crabs to environmental factors. These environmental factors affect distribution, growth, and survival from egg to adult. Research also focuses on defining the factors affecting post-capture survival and mortality of fish that are caught as bycatch. The experimental laboratories consist of more than 17,000 cubic feet of tank space housed in over 18,000 square feet of wet laboratory space supplied with 500 gallons per minute of high quality seawater. The laboratory is among the few laboratories in North America that has capability to conduct experiments in a controlled Arctic environment maintaining seawater temperatures as low as 1.5°C below zero. Other specialized facilities include networked cameras and infra-red lighting systems for observation of fish behavior, automated CO_2 control culture systems, and the Marine Lipid Ecology Analytical Laboratory. Species of current interest include Pacific cod, walleye pollock, sablefish, northern rock sole, yellowfin sole, Pacific halibut, snow crab, Tanner crab, and Arctic cod.

2020 Highlights



Development of spawning habitat suitability index for Pacific cod

Our research demonstrated a narrow thermal hatch success for Gulf of Alaska Pacific cod (3 – 6 °C). These data provide insights into potential causes of the declines in Pacific cod abundance following the marine heat wave of 2014-2016. Pacific cod is an important commercial fish species in Alaska. Scientists and managers also used these data to develop an annual metric of spawning habitat suitability that is being used to inform fisheries management.

Effects of ocean warming on juvenile Bering Sea crab growth and condition

Our laboratory- and field-based data offered new insights into how warming and loss of sea ice over the Bering Sea is impacting snow crabs. In a laboratory experiment, juvenile crabs grown under warmer temperatures had higher growth rates but had lower rates of lipid energy stores (stored less fat) compared to crabs grown at colder temperatures, which may affect growth and survival rates. These responses were also reflected in new analyses of juvenile crabs collected from the Bering Sea in warm (2014) and cold years (2012). Chemical analysis of fatty acids (the building blocks of lipids) revealed a reduced contribution of energy from diatoms (a type of phytoplankton) to crab growth in the warm year. Understanding of the linkages between primary production in the surface waters and crab growth on the bottom is critical to predicting the effects of climate change on this species.

Experimental examination of ocean acidification on larval walleye pollock and northern rock sole

Increasing levels of CO_2 in the world's oceans are expected to have pervasive impacts on a wide variety of species, including Alaska's commercial groundfish. Researchers completed two studies of the effects of high CO_2 on early stages of walleye pollock and northern rock sole. While fish survived in high CO_2 conditions, the researchers found less obvious, but important "sub-lethal" effects. The observed effects on the formation of the swim bladder in walleye pollock and lipid composition in both species could have significant impacts regulating growth and survival later in life.

Upgrades make the experimental seawater system even cooler

We are continuing to improve the reliability and efficiency of seawater temperature control systems necessary for experiments on Alaska's Arctic and sub-Arctic resource species. We undertook re-plumbing of the glycol (refrigerant) distribution lines with new temperature and flow sensors. This will enable us to better monitor the system and quickly diagnose problems. We also installed automated, computer-controlled valves providing more precision in regulating experimental temperatures. This is critical for understanding how fish and crabs are responding to the changes occurring in the Bering Sea and Arctic ecosystems.

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