

Improved Long-range Sonar Tested Successfully

Scientists from the Habitat Research Group (HRG) are conducting studies to identify the essential habitats of eastern Bering Sea species. This includes work to identify suitable predictor variables for quantitative habitat models and to develop tools to map these variables over very large areas. The Klein 7180 long-range side scan sonar (LRSSS) is a new technology that was purpose-built for fish-habitat research. It is distinguished from all other sonar systems by its ability to collect fully adjusted quantitative information about seafloor characteristics and is thus ideally suited for modelling applications.

The very large swath coverage (to 1.0km) and high maximum tow speed (12kts) of the LRSSS greatly increase the efficiency of survey operations, thereby reducing costs and the time required to complete missions. The broad swath coverage of the integrated bathymetric subsystem may also improve the efficiency of hydrographic reconnaissance in the Arctic and could be a safer alternative to launch-based surveying in near shore areas.

Abundance estimates from annual bottom trawl surveys are being combined with synoptic environmental data to produce basin-scale continuous-value habitat models that are objective and have quantifiable uncertainty. The resulting quantitative relationships not only satisfy the Congressional mandate to identify and describe essential fish habitat (EFH), they may also be used to gauge the effects of fishing-gear disturbances, to enhance fish-stock assessments, and to predict the redistribution of species as a result of environmental change.

One of the two LRSSS systems used by the HRG was recently upgraded to improve performance and the quality of data produced for EFH characterisation and mapping. Most importantly, the system provides calibrated backscatter across the entire survey area. This is accomplished with a "cascade calibration" that uses overlapping swaths of data to transfer the calibrated backscatter from a simple downward-looking sonar (altimeter) to the other acoustic subsystems covering the nadir (under the towfish) and the outlying side-scan regions. This Mills-cross type altimeter is easily removed for tank calibration and can then be reinstalled in a fixed position as needed for periodic recalibration of the LRSSS system. Bathymetric data from the LRSSS are used to produce a digital elevation model that is the basis for one form of backscatter correction. The improved LRSSS now acquires these data using the process of interferometry, as opposed to a more complex solution based on an integrated multibeam echosounder. Both the original and improved systems also acquire calibrated 38kHz single-beam backscatter and basic water-quality measurements (chlorophyll-a, concentrations of dissolved organic matter, and turbidity) while acquiring the primary backscatter (180kHz) and bathymetry data. These ancillary data are being investigated for use in the next generation of our eastern Bering Sea habitat models.

The improved LRSSS was tested from 24 to 30 March 2012 during sea trials conducted in Port Madison, Puget Sound, Washington, on the U.S. Navy vessel USNV *Battle Point* YTT-10. During the sea trials, performance expectations were confirmed, system characteristics such as pitch, roll, and yaw offsets were measured, and operator training was provided by a system engineer with the LRSSS manufacturer. Groundtruthing devices that the HRG use to interpret acoustic backscatter were also exercised as part of the preparations for a major Bering Sea cruise this summer on the NOAA ship *Fairweather*. This project will compare the cost-benefits of the LRSSS with more conventional sonar, including two hull-mounted hydrographic-quality multibeam echosounders and another high-resolution side scan sonar system. Although primarily a scientific experiment, the FISHPAC project will also provide hydrographic-quality bathymetric data to the NOAA Pacific Hydrographic Branch for updating nautical charts in areas with outdated or non-existent information. Strategic partnering is an important element of this Integrated Ocean and Coastal Mapping (IOCM) project involving three branches of NOAA (National Marine Fisheries Service, Office of Marine and Aviation Operations, and National Ocean Service), with significant technical support provided by the Naval Undersea Warfare Center Division Keyport, L-3 Communications Klein Associates, and Dr. Lloyd Huff, a private consultant to the HRG and design authority for the improved LRSSS.

<https://www.hydro-international.com/content/news/improved-long-range-sonar-tested-successfully>
