Real-time Kelp Farm Monitoring with Smart AZFP-nano Equipped Spotter Buoy

Tom Campbell of West Coast Kelp showing off his newly seeded Macrocystis sp. seedlings at the kelp farm in Barkley Sound.

As a company, we aim to provide scientists and resource managers with accessible, low-cost, and effective tools for studying marine ecosystems. Through collaborations with clients and researchers, we're often introduced to emerging technologies that support these goals. Recently, we partnered with SOFAR Ocean and the Bristlemouth initiative to develop a real-time echosounder smart mooring—our first demonstration of satellite-transmitted, condensed AZFP data. Built using the Bristlemouth protocol for rapid underwater data and power transmission, the system is designed to be scalable.

To test the concept, we deployed the smart mooring at a kelp farm in Barkley Sound, operated by Tom Campbell of West Coast Kelp. In discussions with Tom, we explored whether an echosounder could visualize kelp growing on submerged lines—potentially enabling future measurements of biomass growth and signaling optimal harvest or outplanting times. The Spotter buoy, which houses the satellite and cellular modem, also includes sensors that monitor wave height, sea surface pressure, and wind speed—key parameters for assessing local conditions and managing storm risk. After a month of deployment, the system continues to transmit acoustic and oceanographic data to an online server, where it is used to generate plots.

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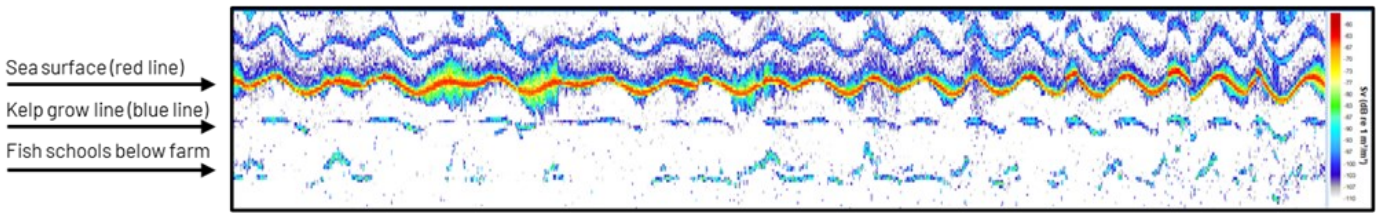

Ten day time-series (April 17-April 28) of acoustic backscatter a kelp farm. The echosounder is situated on the seafloor, facing upward, in about 15 m depth of water. The kelp line is submerged approximately 4 m below the surface.

Smart AZFP-nano equipped Spotter Buoy deployed at the West Coast Kelp farm in Barkley Sound.

An additional benefit of measuring acoustic backscatter is that we can assess how fish use the farm throughout the season. Wild kelp forests provide critical habitat services for a wide range of fish species in BC and there is some growing evidence that kelp farms provide shelter and habitat for species like herring. In fact, Tom recently found that pacific herring had spawned on macrocystis grown at his farm over the winter (LinkedIn Post). Looking toward the future, systems like this may help farmers growing kelp at large scales to effectively monitor growth, and habitat use, and oceanography from the comfort of their home or office.

Are you interested in using such a system for your own studies? We are actively seeking partners for further developing this technology and would love to hear your ideas and feedback. Get in touch with Dr. Julek Chawarski, our Biological Oceanographer at jchawarski@aslenv.com

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