Liquid Robotics
Solutions
BioSonics Echosounder

Manage fish stocks with advanced technology from Liquid Robotics and BioSonics.

Up-to-date and accurate scientific data is critically important for fisheries management and establishing catch quotas. Stock assessments are the fundamental components to this system, yet rising costs of ship time have reduced fisheries survey capacity by government agencies and compromised their value to fisheries managers. Scientific uncertainty exists because of the lack of adequate input data, in terms of the quantity, quality, and type of data available.

Independent variables such as predation risk, time of day, and biological state can affect how fish may react to an approaching vessel and will differ among surveys. Such behavioral variability in reaction to survey vessels can introduce substantial positive and negative biases in abundance estimates of commercially important stocks. Stock overestimation threatens the sustainability of our living marine resources and underestimation affects the livelihood of fishermen.

Current approaches for data acquisition require acoustic surveys that are expensive, labor intensive, and often require long duration missions at sea. Once scheduled, harsh weather conditions and boat access can limit or preclude access for data retrieval, and limited budgets often limit the spatial-temporal robustness of surveys, leading back to scientific uncertainty.

The options available to fisheries managers to advance fishery independent surveys include, among others: reducing the cost and risk of operations; enhancing fishery-independent indices of abundance; and expanding affordable access to noise-reduced sampling platforms.

Autonomous systems represent a technological improvement that will improve efficiencies and reduce the overall cost of collecting data over vast distances and extended timeframes. The Liquid Robotics Wave Glider® is a proven platform capable of doing long missions at sea, recording in-situ measurements and delivering this data directly to the cloud in near-real time, anywhere in the world.

Acoustic surveys are generally used as an index tracking the trends in abundance in stock assessments. When equipped with a Biosonics DTX-Towbody, the Wave Glider® represents an advancement that improves survey capabilities in support of stock and habitat assessment requirements. The BioSonics DT-X SUB Echosounder System is a completely self-contained echosounder solution for autonomous deployments.

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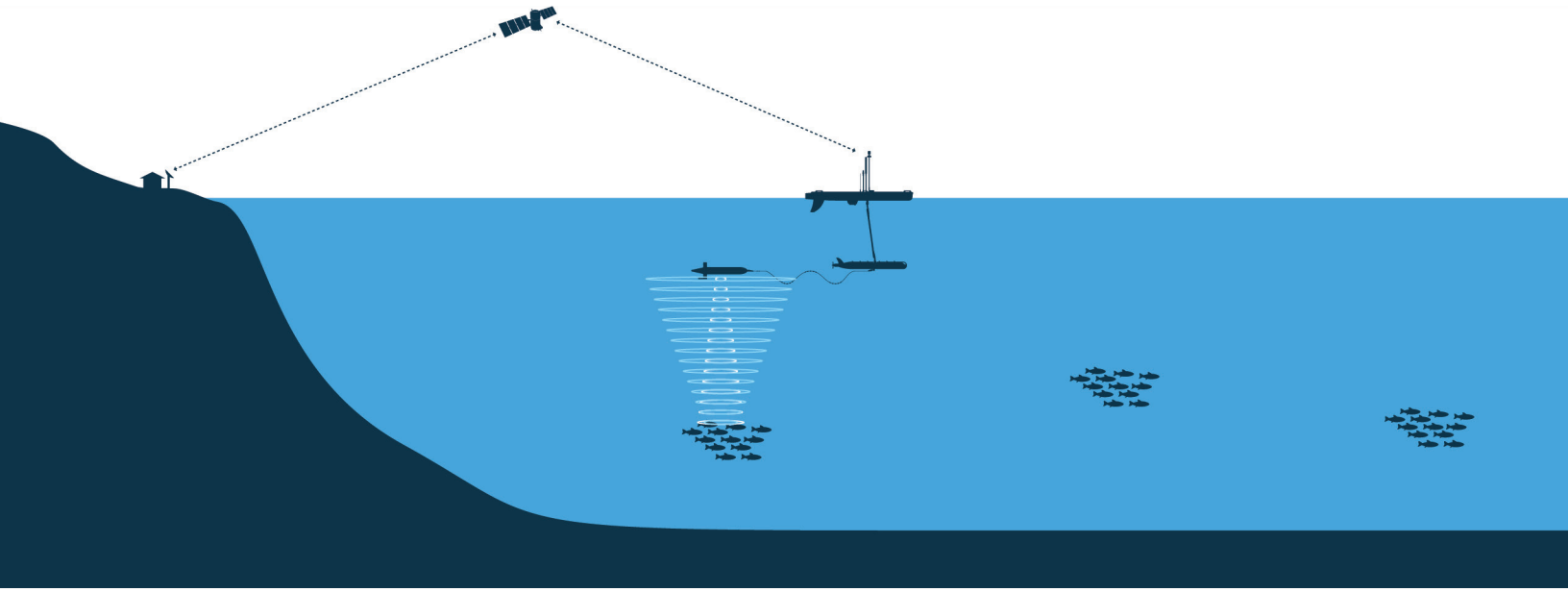

An autonomous, multi-purpose, noise-reduced scalable all-weather platform

Reduce the cost and risk of operations
- Operational efficiencies: no fuel, no emission - 24/7/365
- Collect widespread spatial and temporal distribution data: no personnel
- Programmable duty cycling for extended battery life and multi-month missions
- Ability to operate in fringe geographic regions reducing human risk and exposure

Proven Technology
- Travel to operational area, collect data and return autonomously
- World record holder for longest journey traveled by an autonomous surface vehicle
- 200+ Wave Gliders shipped
- 300,000+ nautical miles at sea collectively

Mobile, all-weather, persistent platform
- Operational through harsh weather conditions
- Navigated and communicated through 5 hurricanes and 3 cyclones
- Year-long persistence at sea
- Increase flexibility of shipboard surveys and adjust to moving fish schools

Reduce assessment bias caused by vessel avoidance
- Decrease the level of underwater radiated noise – no prop noise
- Small size minimizes displacement compared to conventional and noise-reduced vessels
- Deploy ahead of and behind conventional survey vessels to mitigate response to vessel noise

Enhance fishery-independent indices of abundance
- Collect more information on spatial and temporal distributions with robotic persistence.
- Reduce the variable bias among years.
- Improve credibility of abundance estimates mean value is of concern, and the model will be sensitive to both the mean bias and the variability among years.
- Conduct inter-calibration experiments when the survey transitions to a new vessel.

Integrate multiple data streams in real-time
- Quantify CTD and DO
- Measure chlorophyll, Turbidity, and CDOM to estimate primary production
- Evaluate weather conditions and wave height
- Get real-time snapshots of echograms for remote fish-finding
- Access data anytime, anywhere via the internet

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