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Supporting Online Material for

A Wave Glider Approach to Fisheries Acoustics: Transforming How We Monitor the Nation's Commercial Fisheries in the 21st Century

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FIELD PERFORMANCE OF A PROTOTYPE SYSTEM

The Wave Glider approach to fisheries acoustics described in this paper is based upon our experience while developing a prototype system (Figure S1) that attained Technical Readiness Level 7^1 by the end of our field trials. The prototype system used an earlier Wave Glider model, the SV2. The tow body and tow cable (Video S1 and Video S2) were similar to the ones described in this



FIGURE S1. Prototype system for fisheries acoustics using a model SV2 Wave Glider and a custom-designed tow body housing the two-frequency BioSonics DT-X digital split-beam echosounder.

paper; however, the tow body was shorter and only accommodated a two-frequency BioSonics DT-X digital split-beam echosounder. During field trials, we used it configured with either 70 kHz and 200 kHz or 38 kHz and 120 kHz transducers and electronics circuitry. Although we only used these two configurations, any two-frequency combination would be possible.

Acoustic data were collected to evaluate the prototype system's performance during a three-day field trial in Monterey Bay, California. Prior to the trial, Liquid Robotics Incorporated improved shielding in the umbilical cable to eliminate crosstalk, and BioSonics improved the echosounder's impedance-matching circuitry and digitization speed to reduce acoustic noise. During the trial, a single-beam, 38 kHz transducer and a split-beam, 120 kHz transducer were deployed inside the tow body. On the second day of the trial, a 10.5 h acoustic survey of Soquel Canyon was conducted (Figure S2). Because of the improvements, the echosounder's overall noise level was reduced by 5–10 dB from previous trials, allowing users to extend the usable range of data collection to a depth of 750 m at 38 kHz.

¹ A prototype system performing at or near its desired capability in an operational environment (http://www.nasa.gov/topics/aeronautics/features/ trl_demystified.html).





FIGURE S2. Acoustic data collected from field trials in Soquel Canyon, Monterey Bay, CA, on July 10, 2013. (A) Cruise track during collection of acoustic data. (B) Echograms for the 120 kHz (top) and 38 kHz (bottom) volume backscattering data collected from 1200 to 1345 local time are shown. The bottom is shown in black. Biological scattering layers, thought to be krill, and discrete high-intensity regions, thought to be fish schools, are evident. Color bar corresponds to acoustic backscattering strength in units of decibels (dB) re: 1 µPa.