

▶ Acoustic Wave Glider

UNDERWATER NOISE

What is the Impact of Seismic Testing?

Humans have altered the ocean **soundscapes** in the course of fishing, shipping, transportation, offshore energy exploration, military activities, and recreation. Seismic surveys for oil and gas development are among the most disturbance-inducing manmade sounds, altering fish catches and whale migrations.

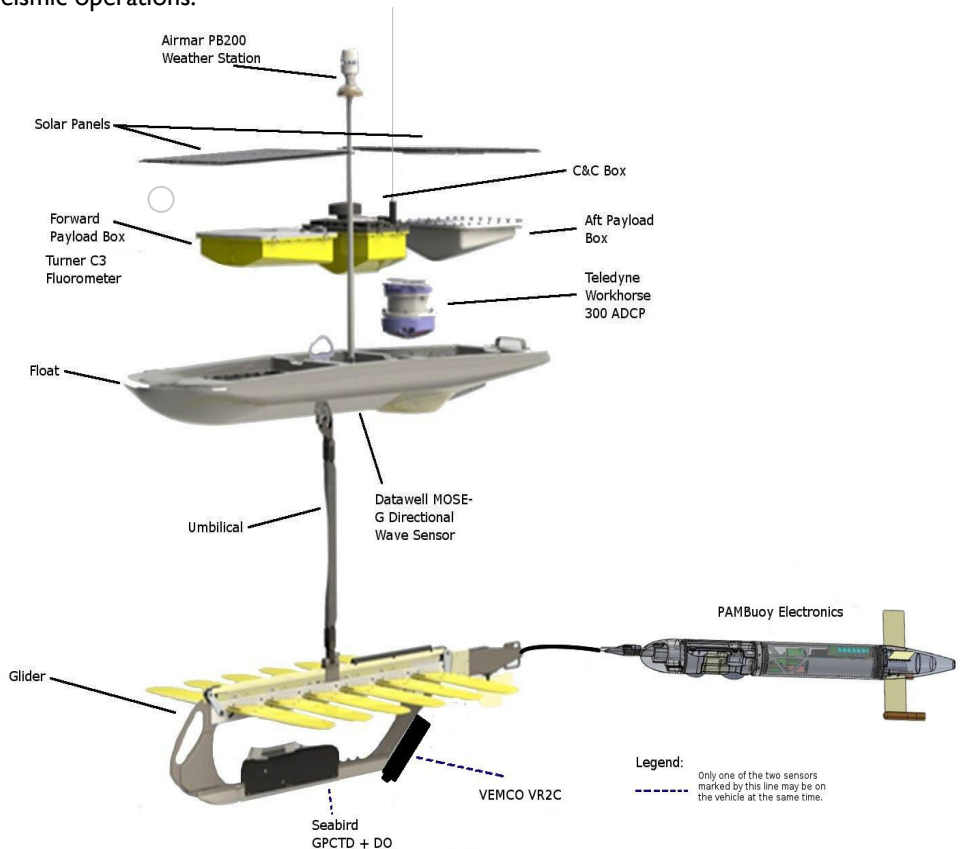
Low-frequency (< 10 kHz) sounds are emitted by marine animals, with species specific patterns of pulses or frequency modulation (called **soniferous species**), which include marine mammals, over 800 species of fishes, and some invertebrates. These sounds are either intentionally produced for underwater communication, or are incidental to swimming and feeding, and have been used to gain information on the behavior and location of the sound-producing animals.



The **Acoustic Wave Glider** is a new acoustic research instrument that has been acquired by East Carolina University to examine impacts and monitor proposed seismic operations.

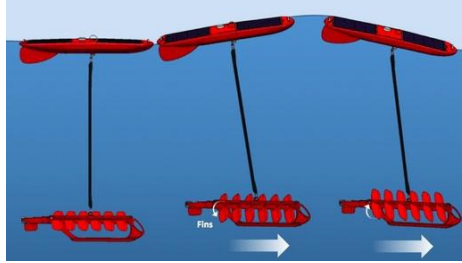
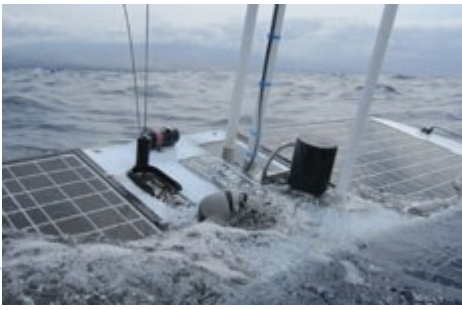
- Measures ocean soundscapes offshore (calibrated levels)
- Detects animals that are sound-producers (red drum, speckled trout, bottlenose dolphin)
- Detects tagged fishes in survey area (bluefish, tuna, flounder, red drum, speckled trout)
- Detects endangered right whales and Atlantic sturgeon
- Persistent sampling for weeks or months where seismic testing has been proposed
- Reports and sends alerts in real time to website by satellite link
- Funded by National Science Foundation Major Research Instrumentation Grant

WAVE GLIDER CAPABILITIES

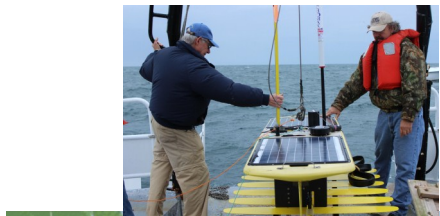


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Wave glider is propelled by wave action. Solar panels provide electrical power for sensors and communications.



A wave glider was tested off NC in Jan and Feb 2013. It successfully navigated up and down the coast, detecting tagged sand tiger sharks and Atlantic sturgeon (endangered).

Acoustic Wave Glider

General Specifications

Model	SV2
Manufacturer	Liquid Robotics, Inc
Weight	196 lbs (89 kg)
Water Speed	1.3 knots
Endurance	1 year at sea

Command and Control Electronics

Command and control (C&C) computer	Controls course waypoints, rudder and sensors remotely
AIS (Automatic Identification System)	Marine traffic receiver avoids ship collisions
Airmar CS4500 Ultrasonic Water Speed Sensor	Water speed (m/s)
Iridium satellite data modem	Communications with AWG, receives commands, transmits data reports and alerts

Sensors Available

Airmar PB200 weather station	Meteorological data: air temperature, wind speed, direction, barometric pressure, with WAAS GPS
Datawell MOSE-G Directional Wave Sensor	Wave height
Turner C3 fluorometer	Plankton Pigments, Chlorophyll a, turbidity
Acoustic Doppler Current Profiler (ADCP, Teledyne RDI WHM300)	Water Currents at depth
Seabird Conductivity Temperature and Dissolved Oxygen sensor (GPCTP)	Temperature, Conductivity, Salinity, Dissolved Oxygen
VEMCO VR2C	Active tag-acoustic receiver, detects presence of acoustically tagged fishes
Reson TC-4014-5 (high-frequency) hydrophone	Recording underwater noises from air guns, ships, and marine animals (fish, whales, dolphins). Frequency 15 Hz—480 kHz
Pambuoy Passive Acoustic Module (PAM) in Towbody	256 GB digital recording space Uses algorithm to detect and report on species of whales