

DriX surveys several offshore Windfarm sites along the US Atlantic coast to assess fish stocks.

For 22 days, the DriX vessel was operated to assess the fish stock around developing windfarm sites. The entire operation was supervised remotely from a control center located in Rhode Island, USA.

CHALLENGE

DriX OTH operation far from shore with no support vessel for several days at an offshore windfarm.

SOLUTION

DriX equipped with a SeapiX 3D sonar developed by Exail, two Simrad EK80 Single beam echo sounders from Kongsberg, and a Signature VM500 ADCP from Nortek. DriX using communication over the horizon via Starlink

RESULTS

Complete survey operations conducted from shore without intervention and in a complex environment.

PARTNERS



In October 2023, the DriX vessel was equipped with a SeapiX 3D echosounder (150 kHz), two Simrad EK80 single beam echosounders (38 and 120 kHz), and a Nortek VM Signature ADCP (500 kHz) to survey several offshore windfarms in Rhode Island, USA. The survey's objective was to assess the fish stock around developing windfarms before, during, and after their installation. The DriX was operated under 24-hour supervision from the shore, with a dedicated team of DriX engineers and surveyors.



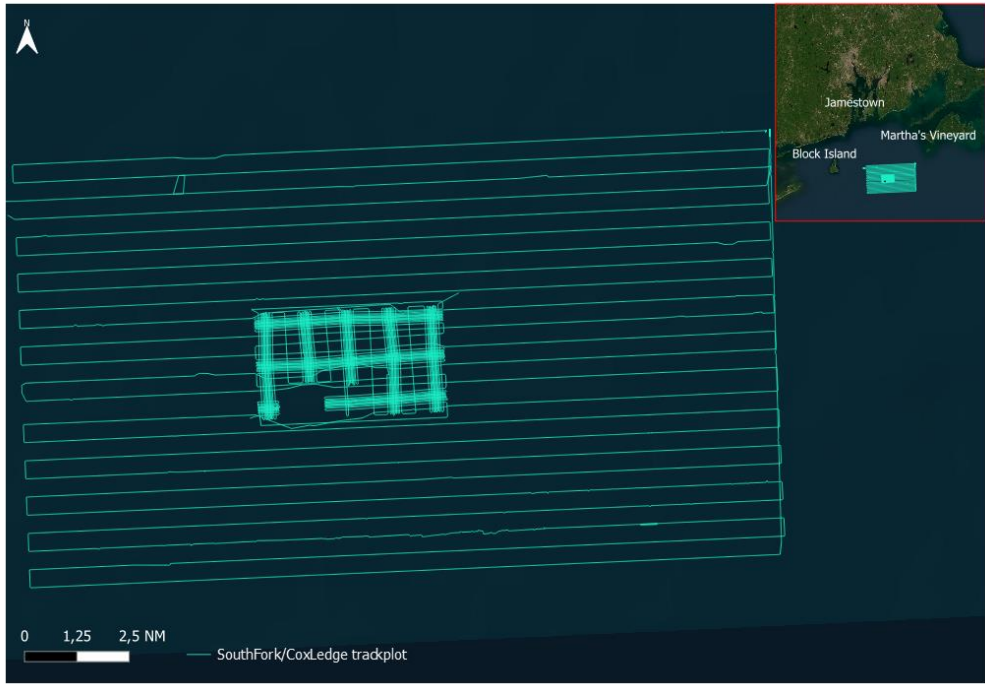
▲ Transects performed by DriX for the operation.

Multiple survey patterns were designed at the three windfarms sites: Block Island, SouthFork/CoxLedge and Vineyard Wind, from individual turbine scale pattern to broad-scale distribution with survey line spacing varying from 25 m to 800 m.

CASE STUDY

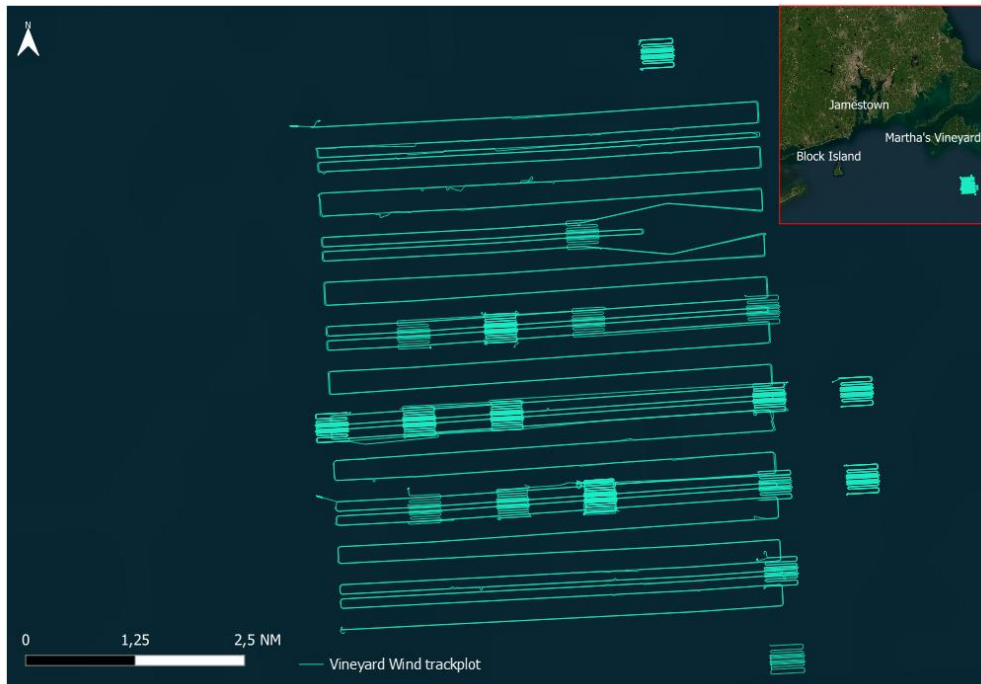


▲ Block Island trackplot



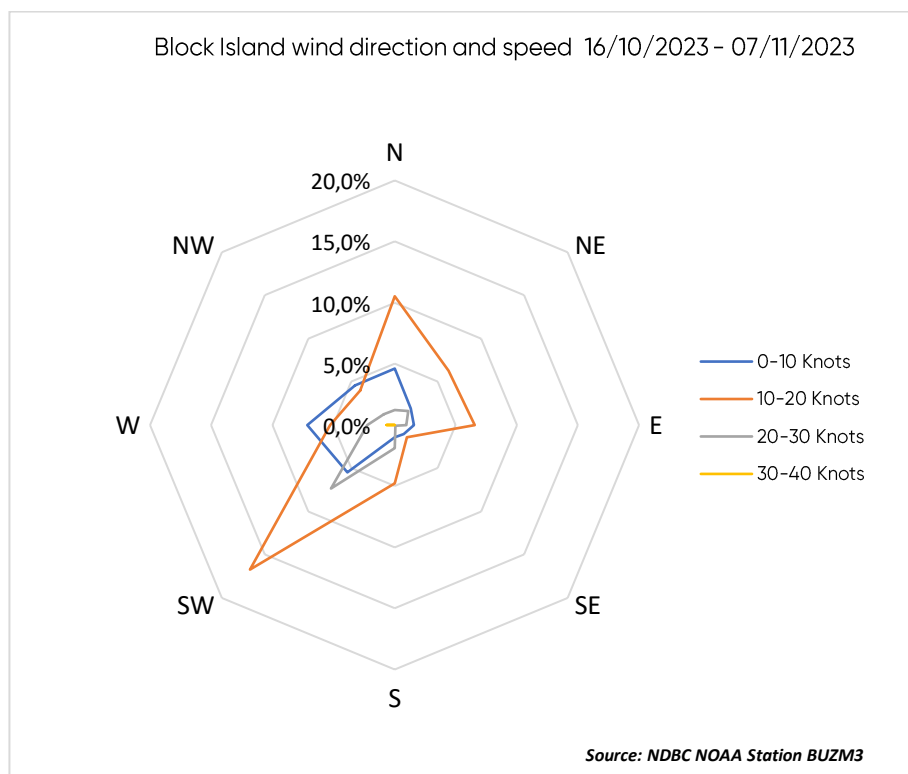
▲ SouthFork/CoxLedge trackplot

CASE STUDY



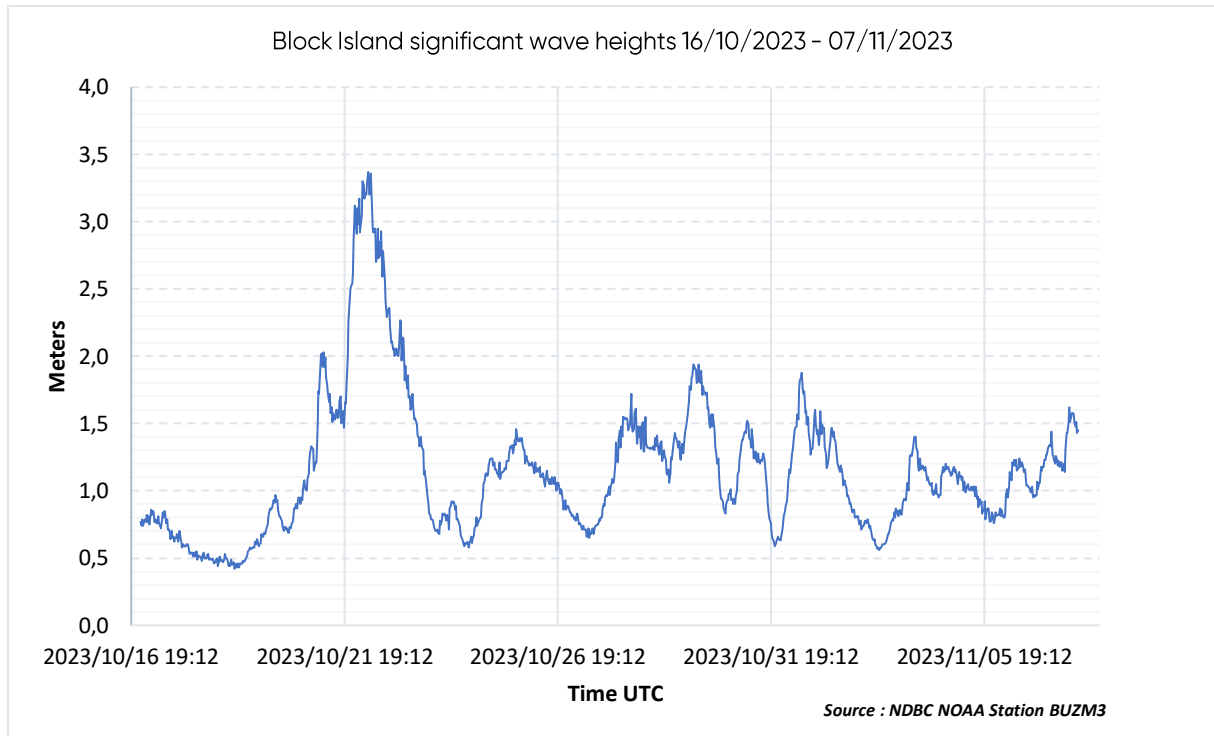
▲ Vineyard Wind trackplot

DriX was operated in a particularly challenging environment, sailing 20 m around wind turbines and monopiles. During the entire period of the survey operation, weather parameters such as wind speed, direction as well as wave heights were checked online thanks to the monitoring buoy owned and maintained by the National Data Buoy Centre (NDBC NOAA – Station n°44085 BUZM3). Average wind speed, recorded at the survey site, was between 10 to 20 Knots, with days of up to 40 Knots. Significant wave heights varied from 0,5 m to 3,5 m.



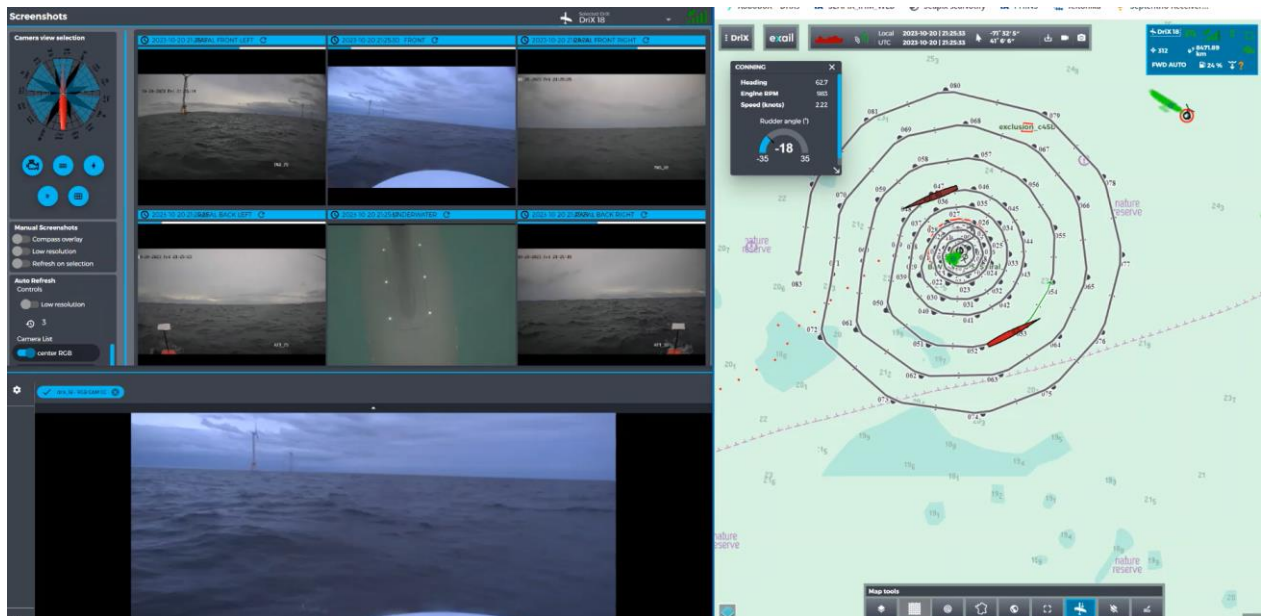
▲ Block Island average wind speed and direction recorded by the station BUZM3 (NDBC -NOAA)

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▲ Block Island significant wave heights recorded by the station BUZM3 (NDBC -NOAA)

In total, DriX sailed 1912 nautical miles over 22 days at an average speed of 7 knots, consuming less than 150 L of diesel for each leg. Scheduled maintenance and refuelling of the DriX was performed 4 times over the duration of the operation.



▲ DriX following a Spiral pattern at Block Island Windfarm (HMI with radar overlay (right), RGB camera screenshots and videos (left))

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The high bandwidth provided by Starlink, allowed to monitor the presence of Dolphins in real-time thanks to the video streams and camera screenshots on the DriX.



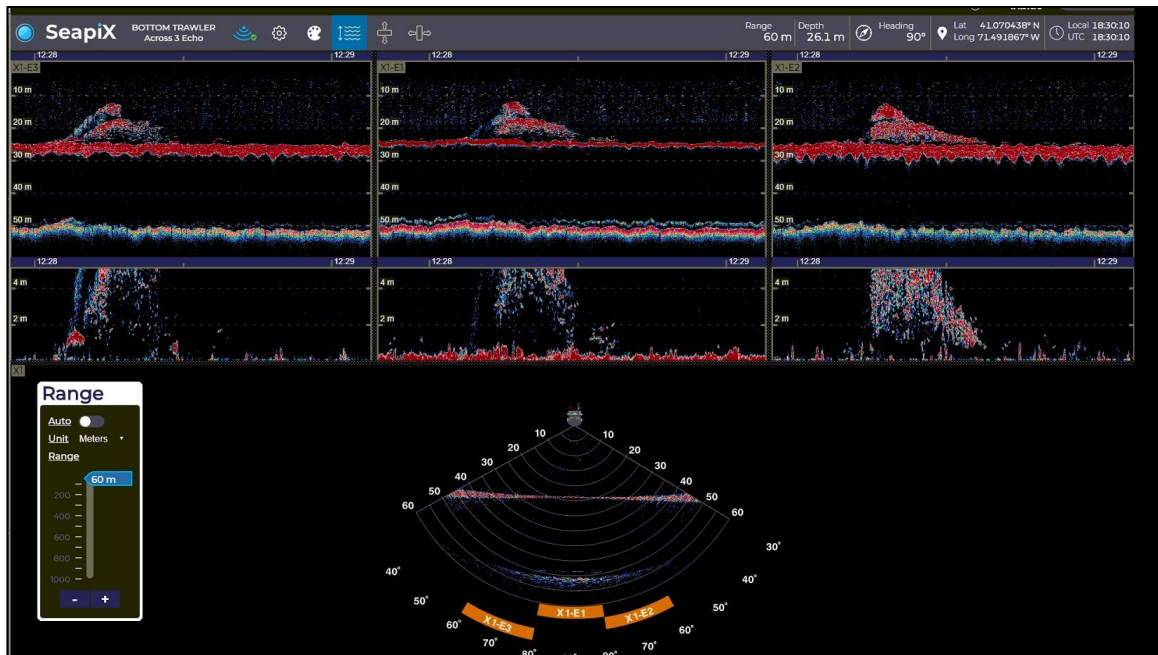
▲ One of the many dolphins that accompanied DriX during the operation.

The DriX was equipped with multiple echosounders operating at different frequencies to detect the presence of fish throughout the water column. Among these instruments was the SeapiX, a multibeam echosounder (MBES) developed by Exail, operating at 150 kHz. The SeapiX features an innovative architecture with a steerable symmetric Mills Cross configuration, enabling it to image both the water column and sea bottom in athwartship and fore-and-aft directions. Its steering capabilities in both transmission and reception allow for a wide volume coverage of $120^\circ \times 120^\circ$ beneath the DriX, with a beam aperture of $1.6^\circ \times 1.6^\circ$ on the antenna axis.

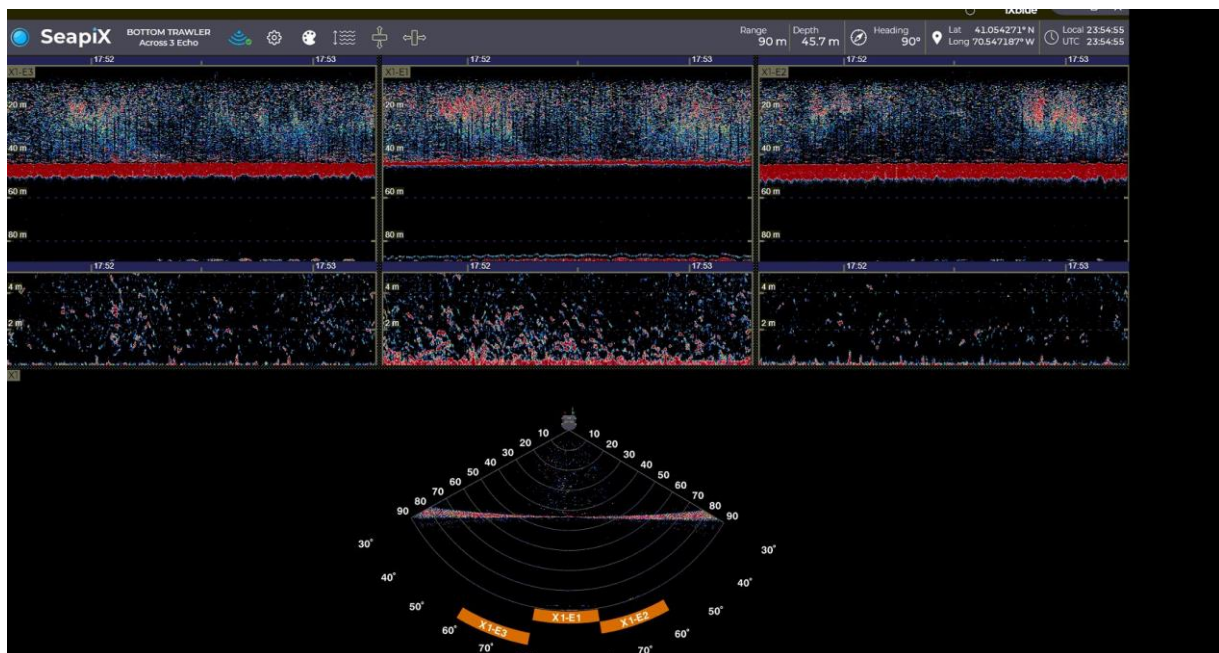
The SeapiX provides valuable additional data when used alongside standard single-beam echosounders, such as:

- 3D structure and shoal morphological characteristics
- Shoaling avoidance behavior in response to the approach of the DriX
- 3D bathymetric profiling and sediment type analysis
- Evaluation of bias in density estimation from single-beam echosounders

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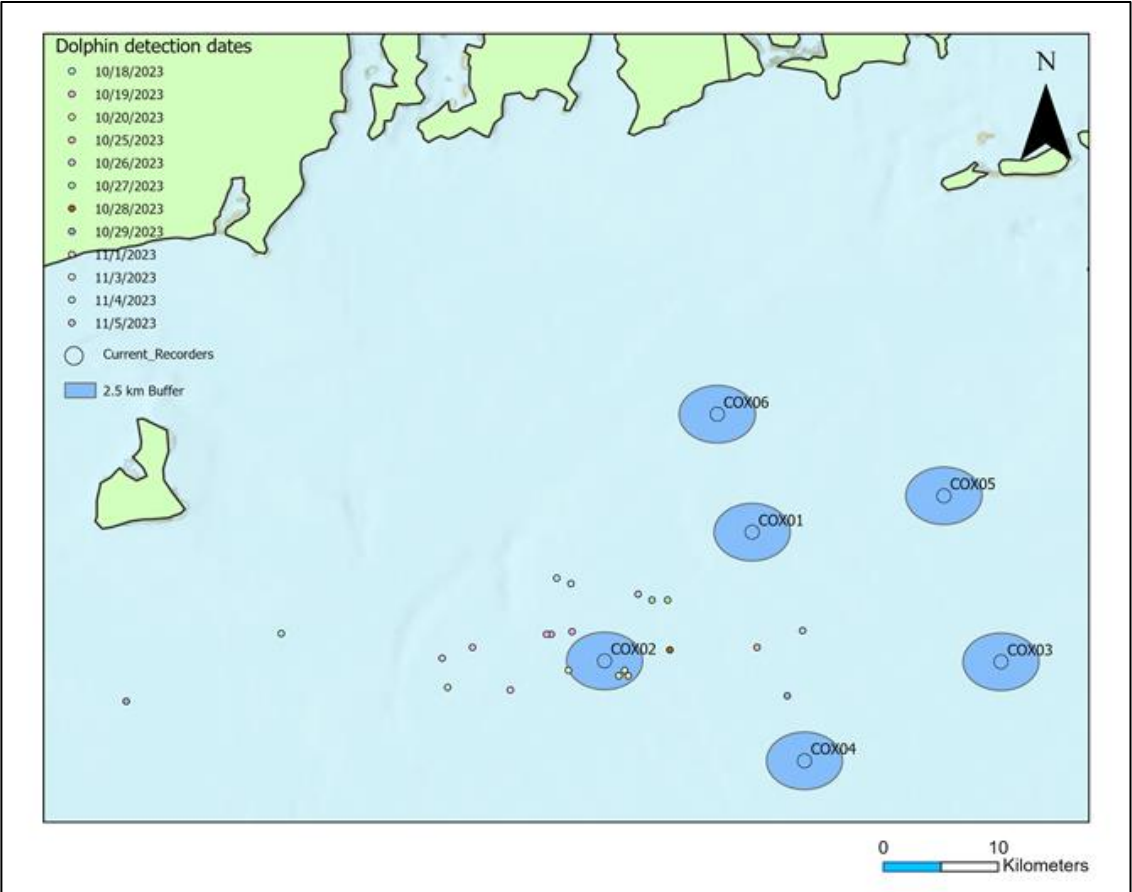
▲ SeapiX echogram showing large school of fish above the seabed.



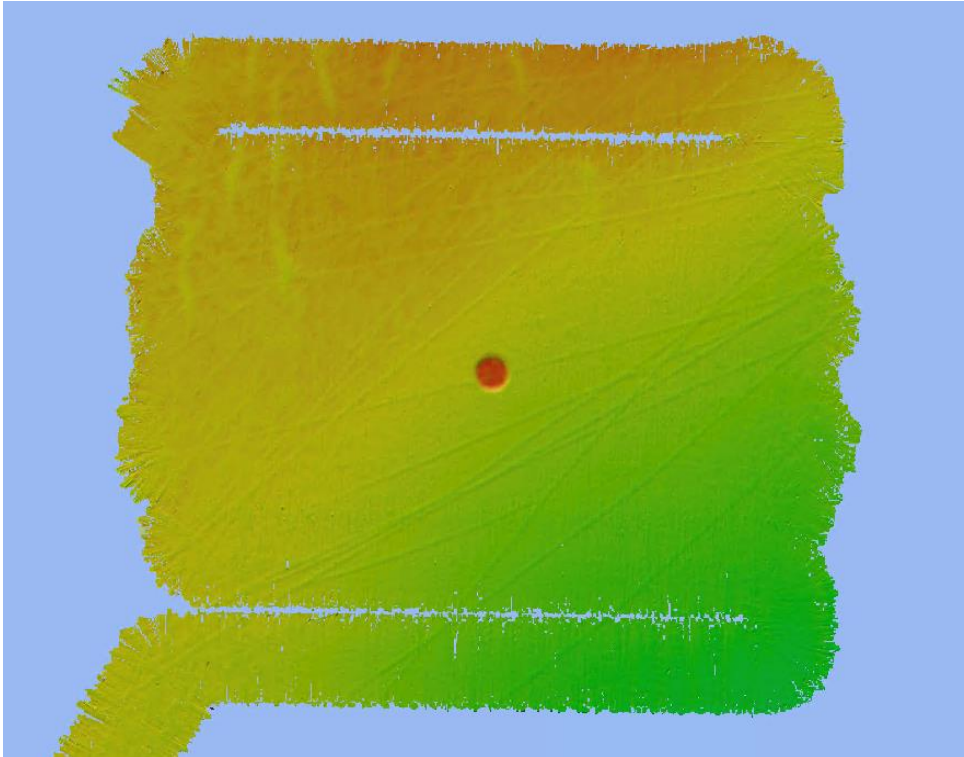
▲ SeapiX echogram showing individual fish above the seabed.

The detections recorded by the various echosounders on the DriX will be correlated with data from arrays of hydrophones deployed in the area by NOAA. In addition to the echosounder detections, the DriX's video stream will assist NOAA in identifying and interpreting cetacean species. Potential matches in detections are anticipated in the spring, once the hydrophone arrays are retrieved, and the data has been thoroughly analyzed and cross-checked.

CASE STUDY



▲ Dolphin detection with DriX versus NOAA hydrophone arrays



▲ Bathymetry results derived from the SeapiX acquisition