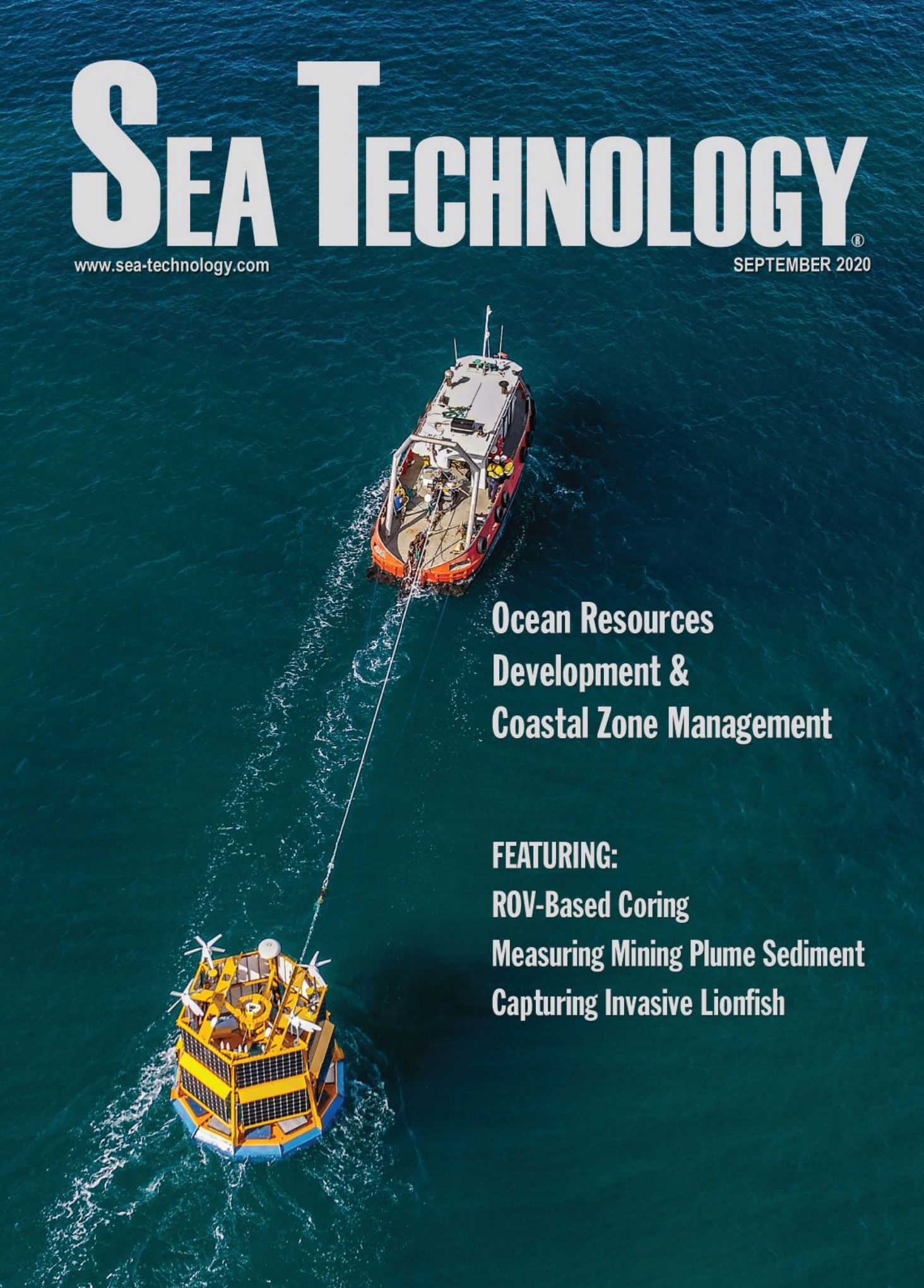


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**Ocean Resources  
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**Measuring Mining Plume Sediment**  
**Capturing Invasive Lionfish**

# environmental monitoring

## Metal Pollution in Baltic

Environmentally hazardous metals in the waters and sediments of the Baltic Sea is a major problem. Marcelo Ketzer and his research team from Linnaeus University conducted an expedition to map metal pollution and methane gas in the seabed. They are studying the levels of arsenic, mercury and cadmium in the sediments, and examining the amount of methane in the seabed and how much of that is emitted from the seabed into the water and air, thereby, increasing greenhouse gas in the atmosphere.

The researchers took part in an ocean expedition on the new RV *Svea*, led by Stockholm University and Geological Survey of Sweden. The expedition started ran from the far north to the far south of Sweden, sampling in 14 sites along the route to study water temperature, salinity, oxygen levels, sediment, methane gas, organic material and other chemical parameters.

## Report on PAM in High Tidal Flow Environments

The Pathway Program has published a new report incorporating international expertise on passive acoustic monitoring (PAM) in high tidal flow environments. It was compiled following an online workshop in April 2020 that brought together over 40 PAM experts from Canada, Denmark, the U.K. and the U.S.

The Pathway Program is a multi-year collaborative initiative between the Offshore Energy Research Association and the Fundy Ocean Research Centre for Energy to improve understanding of fish and marine mammal interactions with tidal energy devices by defining, testing and validating an environmental monitoring solution for the in-stream tidal energy industry and increasing regulatory confidence in monitoring capabilities. One goal is to develop a toolbox of methods to be applied, with fine tuning, to as wide a range of applications as possible. The report advocates the need for open dialogue between regula-

tors and the research community, and that deployment methodologies and data processing algorithms should be adjusted based on the specifics of a given site or application and regulatory requirements.

The report can be downloaded at: <https://tinyurl.com/y34m4n9f>.

## Global E-Waste Mounting

A record 53.6 million metric tonnes (Mt) of electronic waste was generated worldwide in 2019, up 21 percent in just five years, according to the UN's Global E-waste Monitor 2020, which predicts global e-waste (discarded products with a battery or plug) will reach 74 Mt by 2030, almost a doubling of e-waste in just 16 years. E-waste is fueled mainly by higher consumption rates of electric and electronic equipment, short life cycles, and few options for repair.

Only 17.4 percent of 2019's e-waste was collected and recycled. This means that gold, silver, copper, platinum and other high-value, recoverable materials conservatively valued at \$57 billion, were mostly dumped or burned.

According to the report, Asia generated the greatest volume of e-waste in 2019, some 24.9 Mt, followed by the Americas (13.1 Mt) and Europe (12 Mt), while Africa and Oceania generated 2.9 Mt and 0.7 Mt, respectively.

E-waste is a health and environmental hazard, containing toxic additives or hazardous substances such as mercury, which damages the human brain and/or coordination system.

## Measuring pCO<sub>2</sub> via Glider

The ocean is a net sink for anthropogenic CO<sub>2</sub>; without this oceanic uptake, atmospheric CO<sub>2</sub> would be significantly higher today than what is currently observed.

The impact of ocean acidification can already be perceived, and current projections suggest those changes will persist.

ALSEAMAR has integrated the mini CO<sub>2</sub> sensor from Pro-Oceanus

into the SeaExplorer glider rated to 1,000-m depth, which uses infrared detection to measure the partial pressure of CO<sub>2</sub> gas dissolved in water. In order to strengthen the understanding of CO<sub>2</sub> dynamics in the ocean, a SeaExplorer performed a campaign in the northwestern Mediterranean Sea during the first half of 2020. The glider was also equipped with a GPCTD-DO from Sea-Bird Scientific. This mission aimed to study the seasonal distribution of CO<sub>2</sub> at sea in both winter and summer. The data show temperatures and pCO<sub>2</sub> were lower in winter and higher in summer, with a measured increase of about 50 µatm.

This campaign highlights the potential of measuring pCO<sub>2</sub> with a glider for the scientific community.

## COVID Marine Soundscape

AutoNaut has helped the Flanders Marine Institute (VLIZ) to seize upon the quiet of COVID lockdown to map the underwater soundscape of the Belgian section of the North Sea. Using its near-silent AutoNaut USV, VLIZ recorded current noise levels, which will be compared with the marine soundscape once normal sea traffic and marine activities restart.

This will help to determine the impact of man-made noise on natural sea life and the marine environment.

## ADCPs Monitor Krill

Today, one-third of commercially important marine fish stocks in the ocean are suffering from the effects of overfishing. As krill is becoming an important supplement for fisheries looking to harvest new resources, sustainable management of krill fisheries has come to the fore.

Scientists at NOAA's Southwest Fisheries Science Center are working to understand the interactions between krill, their predators and the fishery by using a suite of moorings equipped with Nortek's Signature100 ADCPs and gliders deployed in the Antarctic Peninsula's waters. The moorings generate near-complete time series of biological conditions in the vicinity of fishing areas. **ST**