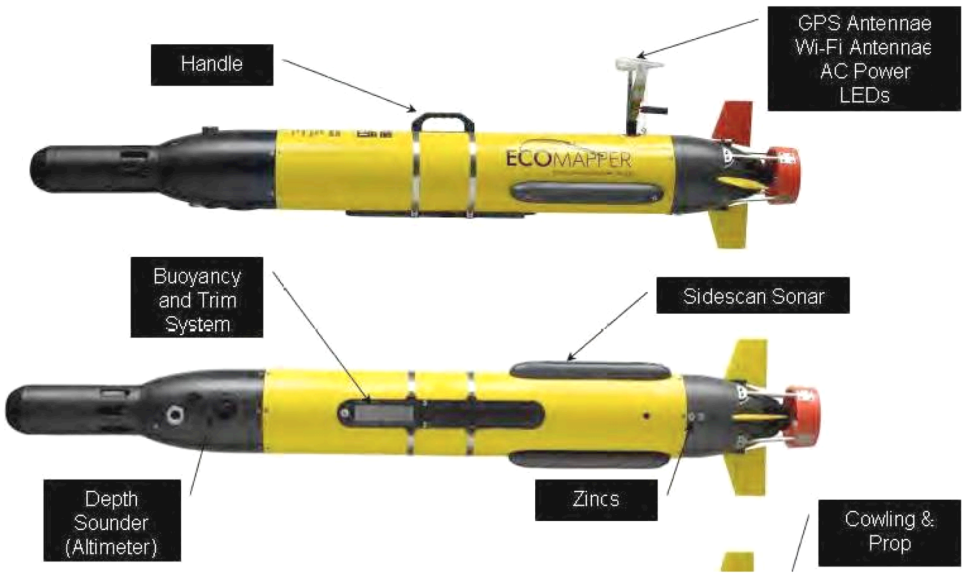
The EcoMapper:

An introduction to a technical piece of equipment that is used in research on Harmful Algal Blooms

Some species of microscopic phytoplankton can cause harmful algal blooms, commonly known as HABs. These can be detrimental to marine life and other animals, even to humans. HABs can cause large fish kills, can kill marine mammals and birds, can disrupt the marine food chain, and can cause humans to become very sick, and possibly die. Because HABs can be so dangerous, it is important that the public be made aware of them as soon as possible. For this important public awareness to occur, data regarding our oceans needs to be collected and analyzed on a consistent basis. Instruments to monitor our oceans can be static, such as offshore oceanographic buoys, or they can be mobile, like the YSI EcoMapper.

The EcoMapper is a useful tool for scientific research and perhaps one of the most important uses is the ability to map a lake bed with sonar and obtain water samples simultaneously. While the sonar scan is being produced and sent to the accompanying laptop, the levels of chlorophyll, blue-green algae, pH, dissolved oxygen and temperature are all being recorded. This data allows the scientists to see a “snapshot” of the entire physical and chemical make up of the body of water.



The EcoMapper is a unique AUV (autonomous underwater vehicle) capable of collecting high-resolution maps of water quality and bathymetry mapping applications. It can collect up to 10 water quality parameters in large water bodies. Key applications of the EcoMapper are baseline monitoring, source water mapping, event response, bottom mapping, point source and non-point source mapping.

The Sonde bulkhead that is part of the EcoMapper AUV provides the user with multiple sensors to measure water conditions as well as the presence of different Blue-Green Algae and measure chlorophyll. In the realm of identifying and mapping HAB conditions, this sensor array can detect as low as approximately 220 cells per milliliter of Phycocyanin, an accessory pigment to chlorophyll for freshwater applications and down to approximately 450 cells/mL of the protein Phycoerythrin in marine environments, useful in detecting the presence of harmful algae.

Although the normal depth limit of the EcoMapper optical systems are approximately 61 meters (200 feet), users can opt for the 'deep water' option and measure down to 200 meters (660 feet).

The sensors for detection of algae both work based on the measurement of the florescence of chlorophyll. According to YSI specification sheets, this fluorescence measurement is the "only technique available that is sensitive enough to detect blue-green algae at natural levels without concentration or extraction" (sensor data sheet). One important item to note about these sensors is while they can only provide relative data of the biomass, and not quantitative measurements of the population (or as the data sheet says, "quantitative pigment concentration data").

While specific populations of phytoplankton can't be directly measured with the EcoMapper AUV, the data does provide the relative measurements allowing more specific testing to take place as necessary for identification. Additionally, by identifying the relative increase in an algae biomass, earlier awareness of a potential HAB and tracking of that biomass can lead to more effective public warnings.

Bibliography

EcoMapper brochure: EcoMapper brochure.pdf

Hanson, D., Martin, N., Cornwell, N. (n.d). *YSI Hydrodata: Monitoring the Environment*. Example EcoMapper Survey. Retrieved from http://www.ysi.com/media/pdfs/Example-Ecomapper-Survey.pdf March 30, 2011

Demonstration Video of Eco Mapper http://www.youtube.com/watch?v=WHjOzQDQwp8

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