Underwater Robotics in Thunder Bay

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Students from Ella White Elementary of Alpena Public Schools have been challenging themselves and their engineering skills by building underwater Remotely Operated Vehicles (ROVs). Their engineering excellence and creativity in applying their underwater robotics experience toward enhancing their local environment has gained them the opportunity to work alongside Great Lakes scientists – along with some impressive national recognition achievements!

In collaboration with Thunder Bay National Marine Sanctuary, 4-H Youth Development Programs, and the Alpena Robot Factory 4-H Club, these students engineered and built their own ROVs. Each student learned about the ROVs framework, electrical wiring, soldering, and buoyancy calculations to make sure the ROV does not sink or float. ROV construction, however, was not the only task for these fifth grade students. Their ROVs were tested in more ways than one, including an Engineered Lake Trout Delivery System and the 2015 Great Lakes Regional MATE ROV Competition.

The Engineered Lake Trout Delivery System project began thanks to Ella White Elementary teacher and Robot Factory 4-H Club leader, Bob Thomson. Thomson's class has been a long-term partner with Michigan State University Extension and Michigan Sea Grant through the Northeast Michigan Great Lakes Stewardship Initiative (GLSI) network, establishing the Thunder Bay Watershed Project – where students engage in a variety of watershed science and studies, including monitoring water quality, tracking populations of aquatic invasive species, and restoring native fish species in collaboration with US Fish and Wildlife Service and Michigan Department of Natural Resources.

Applying technology and creative engineering minds, students used a 3-D printer to produce a system (adapting a plastic soda bottle) attached to their ROVs to release their young lake trout to their underwater reef habitats. This project was the recipient of a $10,000 prize via the Teach for the Planet Challenge after being selected as a finalist in the grades 3-5 bracket. Through this project, students raised native lake trout eggs in their classroom, in connection with a Lake Huron reef habitat restoration project. With Great Lakes scientists, they studied Great Lakes ecosystems and fish habitat issues, and on May 7, 2015, the students embarked on a lake trout release mission onboard the *Lady Michigan*. With their ROV and lake trout fry in tow, the students successfully maneuvered their ROV to an artificial reef in Thunder Bay and released all of the lake trout fry directly onto the reef. Previously, the method of lake trout release was on the surface of the water, directly above the artificial reef. This strategy can prove problematic as predators can quickly grab the lake trout fry as they try to find shelter. With this new delivery method, the lake trout are delivered directly to the reef, removing the time it takes for them to find shelter, thus greatly increasing their survivability.

After the success of the Engineered Lake Trout Delivery project, the students moved forward to the 2015 Great Lakes Regional MATE ROV Competition coordinated by community partner, Thunder Bay National Marine Sanctuary. At the competition, students used their ROVs to complete various missions related to underwater ice exploration, and they took 1st, 2nd, and 3rd places overall in the Scout Class, showcasing that these students really have what it takes to engineer their own robotics.