# HOW BLUEGILLS AND TECHNOLOGY ARE PROTECTING OUR WATER SUPPLY

Blue Sources LLC, a veteran-owned small business founded in 2015 has a mission to protect our drinking water. The company bought licenses for a family of five patents for an aquatic biomonitor from the U.S. Army Center for Environmental Health Research, discovered at a technology transfer tradeshow, which can detect thousands of acutely toxic chemicals in the water supply long before they would be harmful to humans. As an analogy, bluegill fish can detect toxins in water just like canaries used to detect the presence of methane gas in coal mines. It does this by monitoring bluegill fish and detecting stress changes in their breathing using a specially designed neural network. The patent license purchase provides an exclusive license to offer the biomonitor commercially.

## CHALLENGES

The original biomonitor was created almost two decades ago by the U.S. Army. There have been some upgrades, but many components were still from the original design and no longer available. Also, the original product was designed more as a prototype rather than a ready-for-production product. The original biomonitors are still in use today, but are getting difficult to keep operational due to parts wearing out and obsolescence. Some documentation was available, but it was incomplete. With a target customer base of 150,000 public water utilities, 9,000 of them large utilities, it was imperative that the system was designed for manufacturing to keep up with demand.

In addition to the typical electrical and mechanical requirements, it also has plumbing and biological requirements (i.e. the bluegill fish). As one may suspect, water utilities are not usually equipped to properly handle fish, so that also needed to be addressed.

## THE SOLUTION

Blue Sources teamed up with ACDi to redesign the biomonitor for commercial availability. Blue Sources briefed ACDi on how the product worked; ACDi analyzed how to proceed. Several decisions were made on how to move forward, including:

- **Design a baseline system with current functionality and a minimum of five year's parts availability to make it available for purchase as quickly as possible**
- **Make it upgradeable to add new features as water utilities' needs change**
- **Break down the system into component subassemblies which will be easy to clean, maintain, and upgrade**
- **Offer Monitoring as a Service (MaaS) to completely take the requirements of equipment and fish maintenance off the water utility's hands; including biomonitor use, supplying a new set of fish every two weeks, cleaning and maintaining the equipment, and service calls**

During the obsolescence re-design, several things were upgraded to improve performance, including noise reduction, consolidating small-signal amplifiers, relays, and LEDs onto a single PCB

> "As a startup, it was important to find a local manufacturing company with engineering services. ACDi's professional staff came up with creative ways to lessen the cost of production and kept the administrative burden to a minimum. I am glad I found them and am looking forward to a long, productive relationship."

**Terry Collins,**
CEO and Co-founder
Blue Sources

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assembly, resulting in significant size reduction, rugged case, and better routing of electrical and plumbing components. More improvements are planned for the future which will be simpler to upgrade due to the system's modular design. The biomonitor, officially named the Fish Biomonitor System, is now commercially available and has won the Excellence in Technology Transfer Award by the Federal Laboratory Consortium. Focus group input has been very positive and members are anticipating procuring units for their facilities.

By providing MaaS and by complying with the U.S. Army animal handling protocol, no fish are harmed in their service in the Fish Biomonitor System. Blue Sources realizes the bluegill can't be effective as sensors unless they are healthy and happy.

## RESULTS AND BENEFIT

Blue Sources now has a commercially viable product with a clear target market and go-to-market strategy where they maintain all intellectual property.

**Blue Sources asserts that the benefits of working with ACDi include:**

- **Geographic proximity made meetings and prospect visits convenient**
- **Product development was a smooth process due to ACDi's knowledge, expertise, and agility**
- **Administrative burden was minimal, which was important as a start up**
- **Engineering team's creativity resulted in a reduced cost of production**

Together, their partnership has made the Fish Biomonitor System a viable cost-effective solution to protect the nation's water supply and will only improve as the product and MaaS rollout continues.

For more information on Blue Sources, the Fish Biomonitor System and MaaS subscription service, visit www.bluesources.com.

## ABOUT ACDI

As an electronics manufacturing services (EMS) provider, ACDi provides a one-stop shop where customers can bring their products to market in an efficient and cost-effective manner. This can range from simple obsolescence redesign to concept development, including electrical and mechanical design, PCB design and assembly, prototype manufacture, testing services, follow-on support, and complete production services. Our range of experience allows us to provide engineering services on a variety of products, from very simple boards that can be designed in a couple days to very complex, multi-disciplined ones that require a full engineering design process.


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