

## **Key Results:**

Harmful Cyanobacteria were reduced by 91% at the end of the 14-week study. The most abundant species, was Raphidiopsis which was controlled by the fourth week of ultrasound exposure.

- Harmful Green algae were reduced by 61% at 14 weeks.
- Beneficial Diatoms increased in abundance by 70%. A • change in species dominance was observed during treatment.
- Improved water quality: Exposure to ultrasound ٠ significantly improved water quality by allowing the growth of beneficial microalgae. This contributed to a more diverse and balanced phytoplankton community.
- Shrimp survival and growth were optimal, with no ٠ negative effects on their health according to histological analysis of shrimp tissues.

### **Conclusion:**

The use of ultrasound in shrimp culture ponds proved to be an effective solution to control harmful algae and improve water quality, without affecting the health and growth of shrimp. In 14 weeks after the Pulsar4400™ was installed there was a 91% decrease in Cyanobacteria. This technology not only helps maintain a healthy aquatic environment, but also promotes species diversity, benefiting both shrimp and growers.

A clear demonstration of how technology can transform aguaculture and ensure a more sustainable future for the industry!



Shrimp survival and growth were optimal, with no negative effects on their health



Weight and abundance of shrimp in the pond with ultrasound

#### Total cyanobacteria abundance

# University Of Florida Research Project – Pulsar Controlled Blue-Green Algae While Not Impacting Any Other Organism

## Eureka Digital Blue-Green Algae Monitoring



Highlights: The four mesocosms were side by side. The mesocosms with the ultrasound unit killed 65% of the Blue-Green Algae while the mesocosms with no ultrasound unit showed an increase in BGA counts by 34% during the test from August 3, 2022 until September 6, 2022 while not impacting any surrounding zooplankton, fish or birds.

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Algal abundance report: Lake EcoNatura.

Report date: 05/08/23. Sampling date. 25/08/23. Sampling hour 09:26. °T: No data. No presence of blooms. Water color: Clean. Sampling site: Site 1. Samples taken 186 days after ultrasound installation. Contacto: Brenda León. Soluciones Ecológicas del Desierto. Samples sent with incomplete labels and data.

The sample from site 1 was very clean, with very little sediment visible to the naked eye. The trend for the month of August shows that the abundance of the algal community is declining. The structure of the algal community remained practically identical in July and August (Table 1 and Figure 1), with *Merismopedia* and *Microcystis* dominating, however, a decrease in the abundance of the blue green alga *Merismopedia* can be observed, as well as a reduction by an order of magnitude in the abundance of *Microcystis* (Table 1) compared to July. It is important to highlight the fact that all the blue green algae species are of the order *Chrooccales*, all unicellular (species that do not develop the strategy of fixing atmospheric nitrogen). The diatom group (*Denticula*), as well as the green algae group (*Chlorella*, *Tetrastrum* and *Coelastrum*), remain rare species given the dominance of *Merismopedia* and *Microcystis*. At sampling point 1, the ultrasound equipment has kept the different species of algae under control at the surface level and the trend indicates that the algal community structure is being reduced to a group of blue green algae and a reduced group of green algae that appear in increasingly lower abundances.

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Algae	Cell/mL	Algae	Cell/mL	Algae	Cell/mL	Algae	Cell/mL	Algae	Cell/mL
Synechococcus	1.55E+06	Synechococcus	1.14E+06	Microcystis	2.68E+05	Merismopedia	4.63E+05	Merismopedia	3.48E+0
Pseudanabaena	4.14E+05	Microcystis	1.15E+05	Synechoccystis	8.83E+04	Microcystis	1.21E+05	Microcystis	5 9.10E+0 4
Gomphonema	8.62E+04	Navicula	5.07E+03	Aphanothece	1.38E+04	Cyanodiction	7.72E+04	Cyanodictium	5.24E+0 4
Selenastrum	6.90E+04	Aphanothece	7.10E+04			Chrooococcus	1.93E+04	Chroococcus	1.10E+0 4
Trachelomonas	6.03E+04	Lagerheimia	2.03E+04			Gloeothece	8.27E+03	Gloeothece	5.52E+0 3
Navicula	4.31E+04					Chlorella	5.52E+03	Chlorella	2.76E+0 3
Limnothrix	4.31E+04					Coelastrum	2.76E+03	Denticula	2.76E+0 3
Oocystis	3.45E+04					Denticula	2.76E+03	Tetrastrum	2.76E+0 3
Aphanothece	2.59E+04					Tetrastrum	2.76E+03	Coelastrum	2.76E+0 3
Cylindrospermum	1.72E+04								
Lagherheimia	8.62E+03								

Table 1. Abundances of algal species from sampling site 1 of Lake Econatura. Sampling August 2023.



Figure 1. Abundances of algal species from sampling site 1 of Lake Econatura. Sampling August 2023.