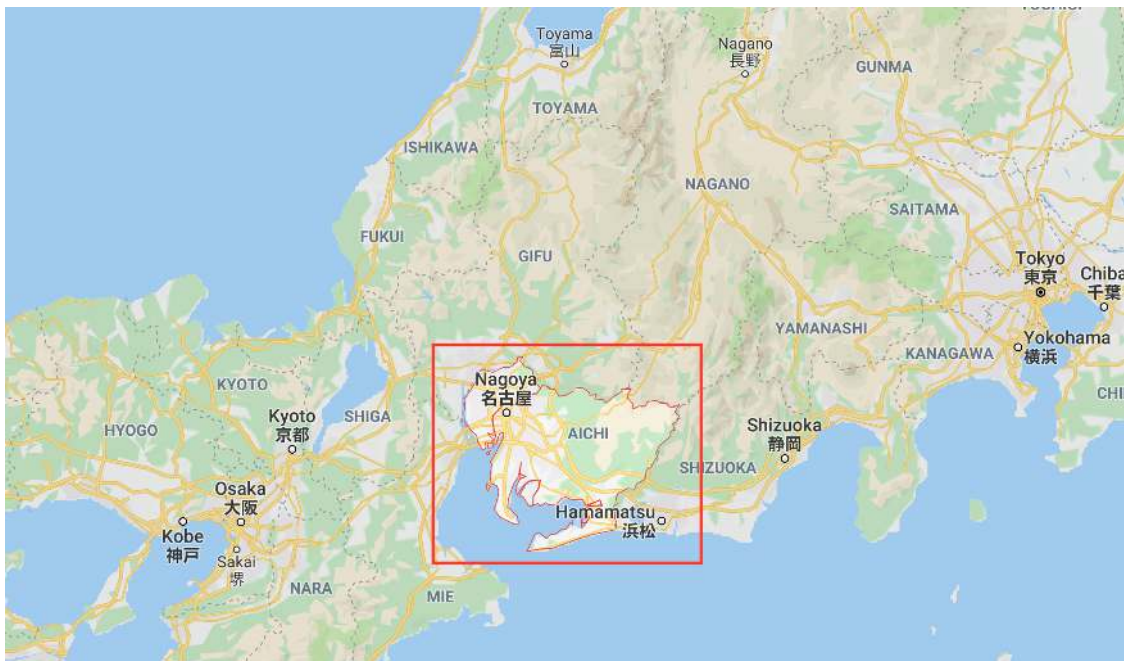


# Aichi Environmental Award 2019

## Won by Nagasaka Eel Farm using Anzai Nanobubbles

### Case Study Highlights

Aichi is a Japanese prefecture in central Honshu Island and an area known as a top producer for farmed eel. Eel is a very popular food in Japan, with the high eating season in the summer months. In 2015, in order to **increase productivity and reduce energy costs**, Nagasaka Youman (Nagasaka Eel Farm) in Nishio City, engaged Anzai Kantetsu to install its patented Nanobubble technology.



One of the biggest problems facing the eel farming industry is loss of stock, or 'farming loss'. Farming loss is generally made up of a combination of mortality and undersized stock. From the eel that survive, around 70% reach a weight suitable for market, leaving 30% too small for sale. This undersized stock is usually disposed of by farmers because it can take up to four more years for these smaller eels to grow to market size and only then with the assistance of growth hormone chemicals.

Nagasaka Youman's business is unusual because it is a farm that collects these undersized eels from around 300 other eel farms, and over the following years nurtures them to a size where they can be sold.

Historically, the farm operated a system that continuously pulled local seawater into the facility and then discharged it to keep the eel tank water clean. Eels are more oily than other fish, so oil from their bodies filled the water being discharged and caused frequent filter blockages in the system, resulting in constant maintenance.

As eels prefer to live in warm water, the tank water also needs to be warmed by oil powered heaters, so the constant discharge of oily water was inefficient, costly and bad for the environment.

The first improvement was the introduction of an RAS (Recirculated Aquaculture System) that stopped the need to discharge. However, this system requires a method of cleaning the water before/as it is recirculated. The solution to this challenge was to use Anzai's Nanobubble technology to keep the water rich in oxygen, clean and eradicate the need for a protein skimmer.



The Nagasaka Eel Farm facility

The usual farming cycle/period to bring eels to market is around ten months. For undersized eels, it can take up to four years. After the introduction of Anzai's Nanobubbles, the ordinary eels were of a marketable size in only four months and the undersized eels grew to market size in ten months. What's more, there was also a reduction on feed costs.

Before the introduction of Anzai's Nanobubbles, Nagasaka's farming loss was 17%. This was made up of 11% mortality and 6% of the eels being too small for market. Once Anzai's Nanobubbles system was fully operational, the mortality rate reduced from 11% to 6% and the under-sized stock reduced from 6% to 2% giving an overall breeding loss reduction from 17% to 8%, an improvement of almost 53%.

What is even more impressive is that this was achieved at the same time as an increase in the bio mass (density/breeding numbers) in the tanks which is now five times greater than previously farmed.



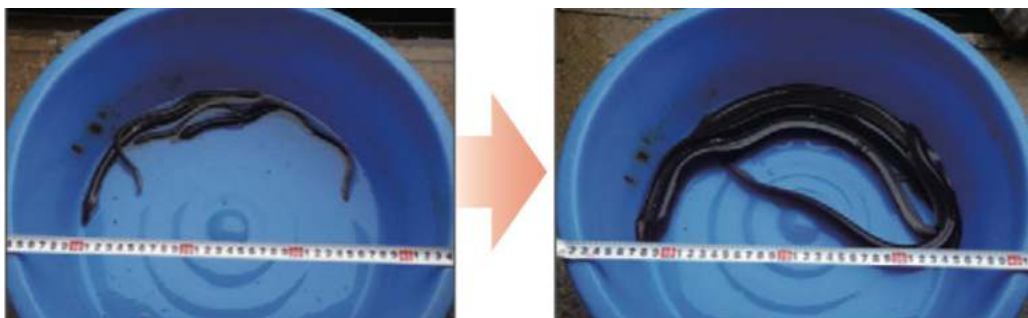
Anzai 100 A/Sl-Line Nanobubble Unit

The Nanobubble unit used for this project was the 100 A/Sl-Line Nanobubble generator which delivers 20 litres of gas per minute with a water flow of up to 1.5 m<sup>3</sup> per minute.

In addition to the increase in the number of eels being produced and the health and quality of the stock, the other main objective of introducing Anzai's Nanobubble technology was to reduce costs.

On this front, savings made on heating the water were the equivalent of 350,000 litres of heavy oil per year resulting in a saving of 28,000,000 Japanese yen (around US\$250,000 or £200,000). Savings on the emissions of CO<sub>2</sub> was around 950 tons over the same period.

This means that for each eel there was a saving of 80% of the heavy oil price and 25% of the electricity costs.



Undersized eels grow to market size in standard time without the use of chemicals.

Conclusion:

**Nagasaka Youman won the Aichi Environmental Award 2019, using Anzai Kantetsu's Nanobubble Technology, which achieved the following headline results:-**

- Breeding Density = 5 times higher
- Fuel Costs = 80% less (per eel)
- Electricity Costs = 25% less (per eel)
- Breeding Losses = (-17%) to (-8%) reduced by 53%
- Sedimentation = 75% less

**An environmental and commercial success on every level!**

IMPORTANT NOTE:- Anzai's Nanobubble technology is now making an impact across a large number of industries and applications and winning awards. This is because it has been meticulously and rigorously developed and refined, over a period of ten years, both in operational applications and trials with industry, universities, independent laboratories and Government departments, all of which provide a solid scientific basis for use of this particular method of producing Nanobubbles, in Aquaculture, Water Remediation, Farming and numerous areas of mining and heavy industry.



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