CASE STUDY 1.5:
The importance of continuous monitoring in Aquaculture

SUMMARY

The practice of aquaculture has been around for centuries. From the primitive methods of trapping fish in shallow, flooded ponds to sea-based net-pen operations, and the current shift towards land-based systems, the methodology of aquaculture farming has been steadily evolving. The usage of sensors in these land-based and fish transport operations (such as RAS facilities and well boats) has also become more prevalent to ensure that water quality is meeting required standards.

Timeseries measurements in land-based aquaculture are helpful to detect when there are small changes in water quality parameters that could develop into larger issues. The traditional method of spot checking, while helpful for immediate real-time data, does not capture conditions between sampling events. For this reason, it is now more common to collect measurements

MAKING MEASUREMENTS

INTRODUCTION

The health of fish in aquaculture settings is highly reliant on the quality of the water being used in the system. Even small changes in parameters such as the carbon concentration or total gas pressure can have large impacts. Changes in the water quality can lead to symptoms such as acidosis (a drop in blood pH) or gas bubble disease (bubbles in the vascular system), which in turn can cause large mortality events. Aquaculture farmers should be regularly monitoring the state of their systems to prevent events like these from occurring.

The way water quality parameters are monitored falls into one of two categories: spot checking or continuous monitoring. Spot checking involves manually collecting measurements or dipping a sensor for a short period, generally a few minutes. Continuous measurements are collected by deploying a sensor, or other piece of equipment, that can log or transmit data for a prolonged period. Both methods have pros and cons depending on the scenario, however continuous measurements are generally preferred in aquaculture today.

Figure 1 (above): Example of continuous monitoring in an indoor aquaculture facility.
Figure 2 (left): Worker spot checking various gas levels at a hatchery facility.

CASE STUDY 1.5:
The importance of continuous monitoring in Aquaculture

CONTINUOUS VS SPOT CHECKING DATA

Figure 3 (below) shows an example of continuous (lines) and spot checking (yellow circles) data being collected for carbon dioxide (CO_2). The continuous monitoring shows samples taken every few minutes where the spot check measurements were taken once a day.

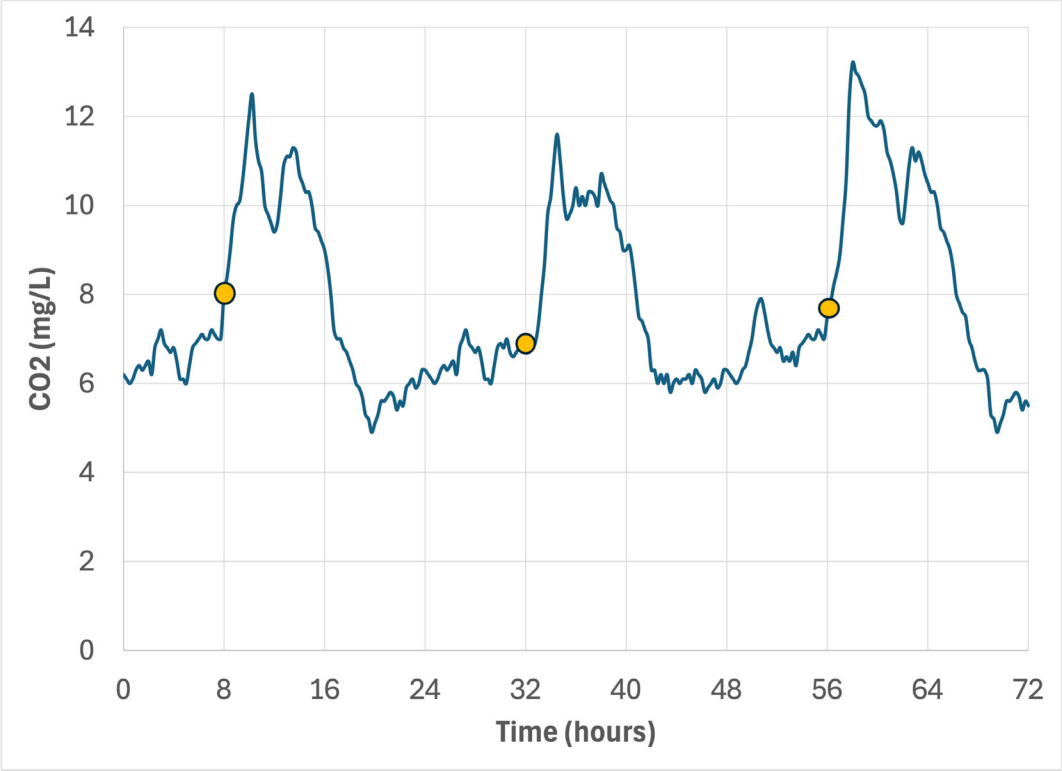

Figure 3: Example of continuous and spot checking for CO_2 data collected at a land-based hatchery.

The continuous CO_2 data reflect a diurnal cycle, with concentrations varying by over 6 mg/L throughout the day. The minimum and maximum CO_2 values observed with continuous monitoring would be missed entirely if data was only collected via the spot checking method. Additionally, depending on the species being farmed a difference in the CO_2 concentration of ~6mg/L over nine hours could be detrimental to fish health.

Overall, while both monitoring methods can be useful, continuously monitoring the water quality parameters in an aquaculture setting provides more valuable and insightful data than just spot checking. Pro-Oceanus offers several sensor options to help with continuous monitoring including our Solu-Blu TDG and CO_2 sensors. For more information, or for any questions on how we can help improve your monitoring setup, contact us at sales@pro-oceanus.com.

PRO OCEANUS Dissolved Gas Sensors

80 Pleasant Street,
Bridgewater, Nova Scotia
Canada B4V 1N1

Phone +1-902-530-3550
sales@pro-oceanus.com
Pro-Oceanus.com