Effect of Nanobubble Ozonation on Health and Survival of Juvenile Red Drum

*Sciaenops ocellatus* Grown in Ponds

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**Background**

- Harmful algal blooms (HABs) and their associated toxins result in fish kills and off-flavor fillets, decreasing pond aquaculture profits.
- Copper algaecides are commonly used to mitigate HABs in aquaculture but introduce a harmful heavy metal to the environment.
- Comparatively, ozone has been successfully used in intensive aquaculture to eliminate wastes, hormones, dissolved organic matter, and pathogens, but it has a short half-life.
- New technology can infuse ozone into nanobubbles, which remain in solution longer than macrobubbles, delivering small doses of ozone to the water for a longer period.

**Objectives**

- Determine red drum survival and gill damage at ozone concentrations needed to mitigate algal blooms.
- Assess decrease in phytoplankton and zooplankton after ozonation.
- Determine percent decrease of dissolved organic carbon by ozonation.

**Method**

- Nanobubble ozone concentrations:
  - 0, 1, 4 ppm
- 3 0.25 ha ponds per treatment

- 3 cages per pond with 25 red drum per cage

**Significance**

- Increase in pond yields due to decreased fish mortality.
- Reduced off-flavor in fish fillets, increasing product quality to increase market value.
- Potentially eliminate fish parasites that cause mortality.
- Baseline data for an environmentally friendly mitigation strategy for HABs, allowing pond water to be reused. Model for other aquatic systems, such as retention ponds.

**How small is a nanobubble?**

Less than 200 nm, over 400,000 nanobubbles would fit on the point of a pin!

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**Literature Cited**