

Importance of water quality in aquaculture

Matthew A. Smith
Aquaculture Boot Camp
07/14/2018

CFAES



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Recirculating Aquaculture Tank Production Systems: Aquaponics—Integrating Fish and Plant Culture

James E. Rakocy¹, Michael P. Masser² and Thomas M. Losordo³

Interpretation of Water Analysis Reports for Fish Culture

Nathan Stone¹, Jay L. Shelton², Brian E. Haggard³, and Hugh K. Thomforde¹

Interactions of pH, Carbon Dioxide, Alkalinity and Hardness in Fish Ponds

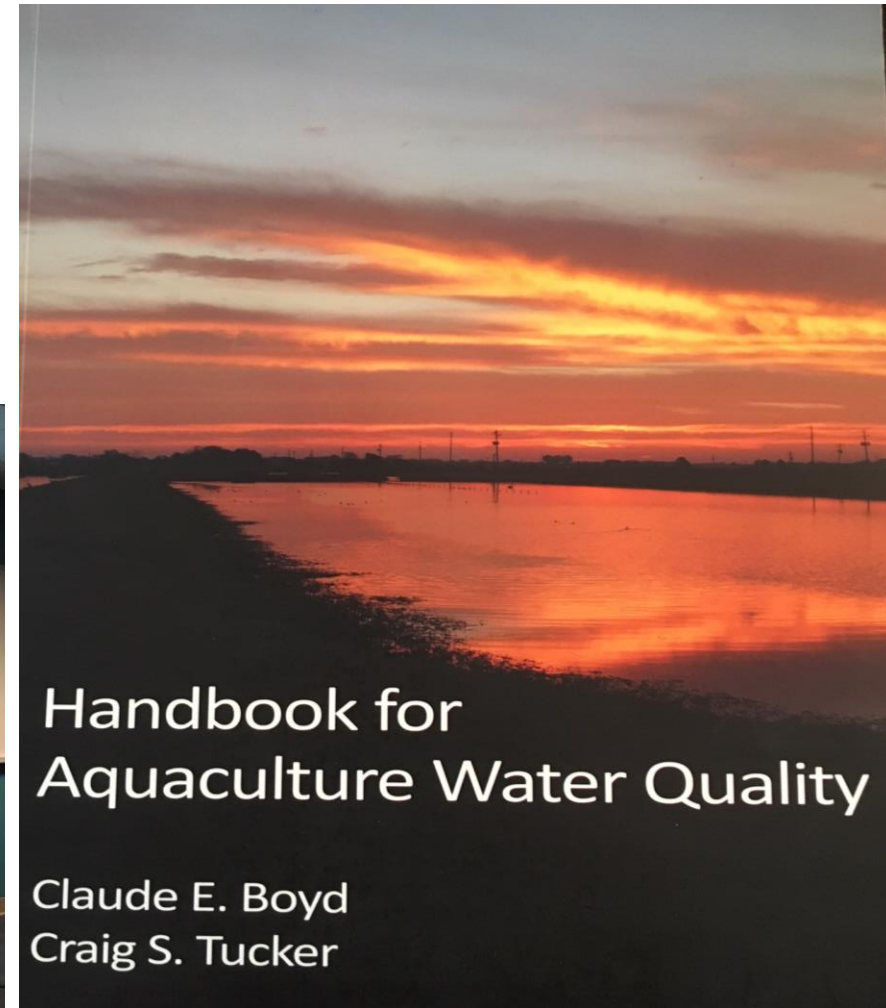
William A. Wurts and Robert M. ...

Ammonia in Fish Ponds

Robert M. Durborow¹, David M. Crosby² and Martin ...

Nitrite in Fish Ponds

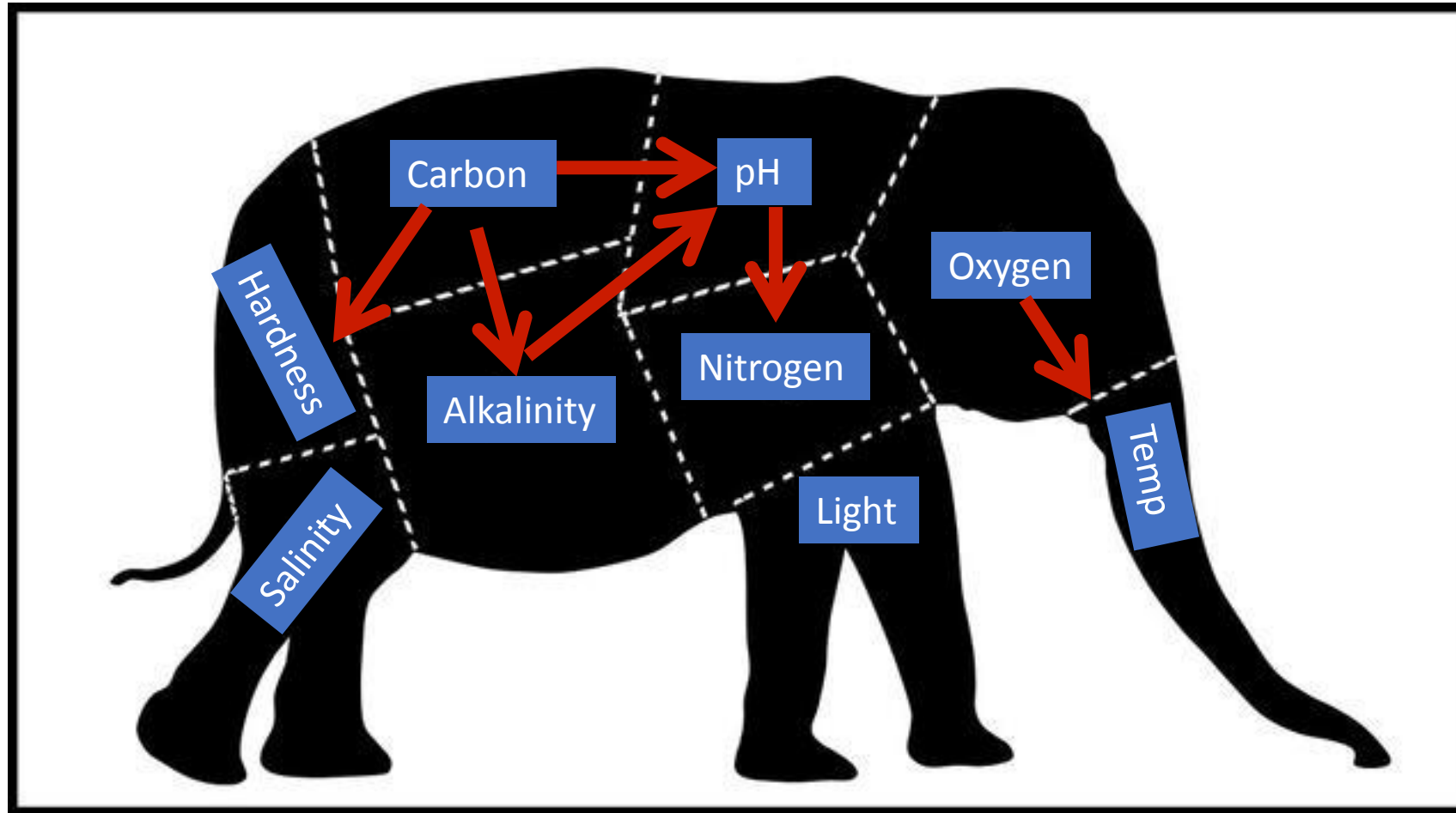
Robert M. Durborow¹, David M. Crosby² and Martin ...



Handbook for Aquaculture Water Quality

Claude E. Boyd
Craig S. Tucker

How do you eat an elephant?



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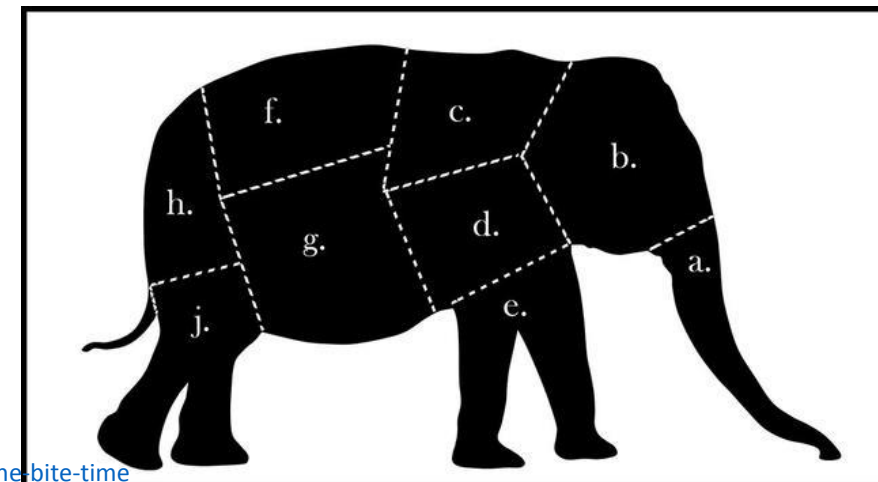
Why even eat an “elephant”; learn?

- Not because it’s fun, but because it directly affects profitability and offers the farmer a piece of mind
- “I’m not sure why they are sick and/or dying” is an easier “strategy” than monitoring regularly
- However, farming is a business and it’s up to each business to decide what level of commitment to have
- Time = \$\$\$ of course



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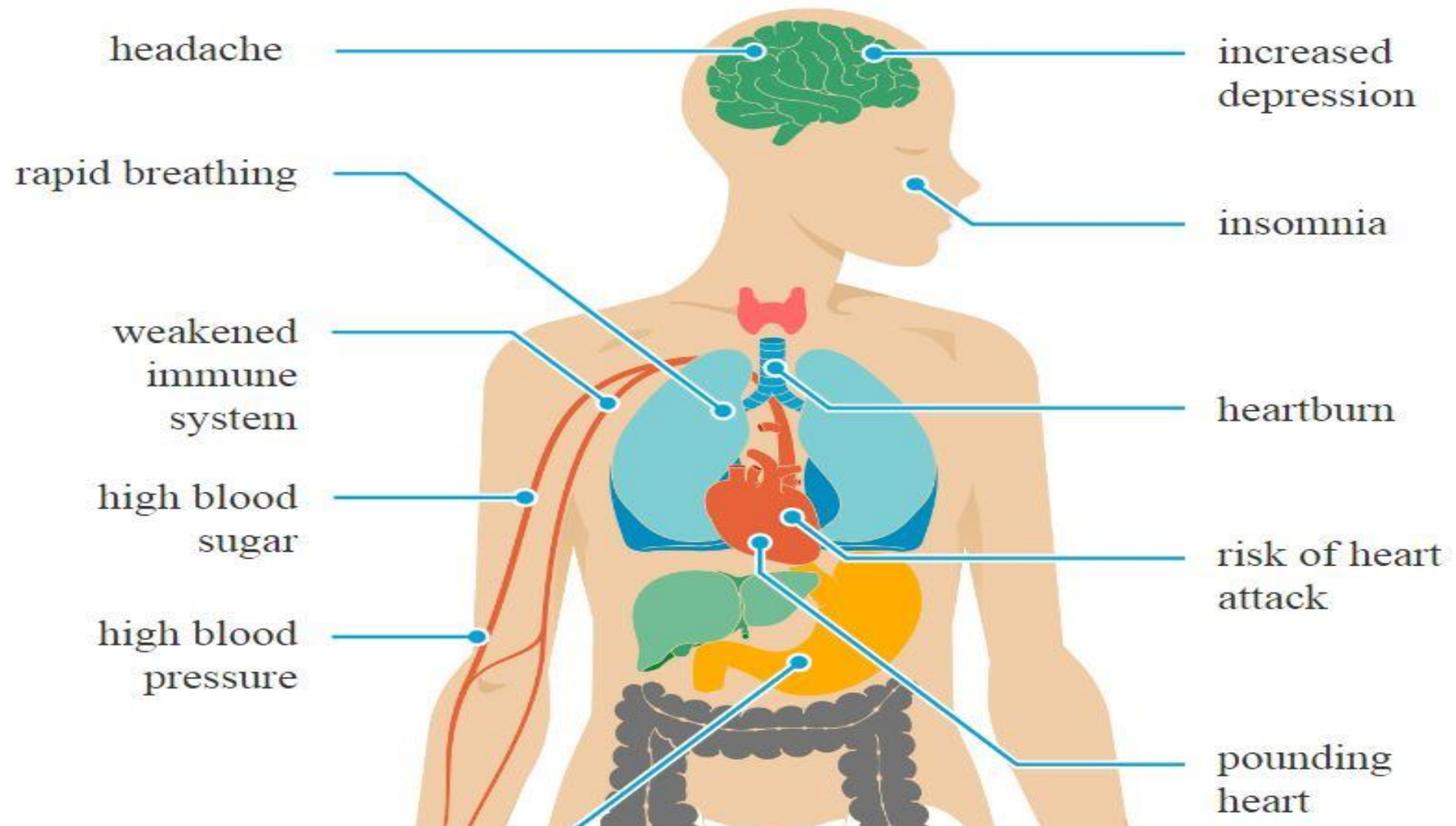
<https://www.atl.org.uk/latest/blog/how-do-you-eat-elephant-one-bite-time>

What are your goals?

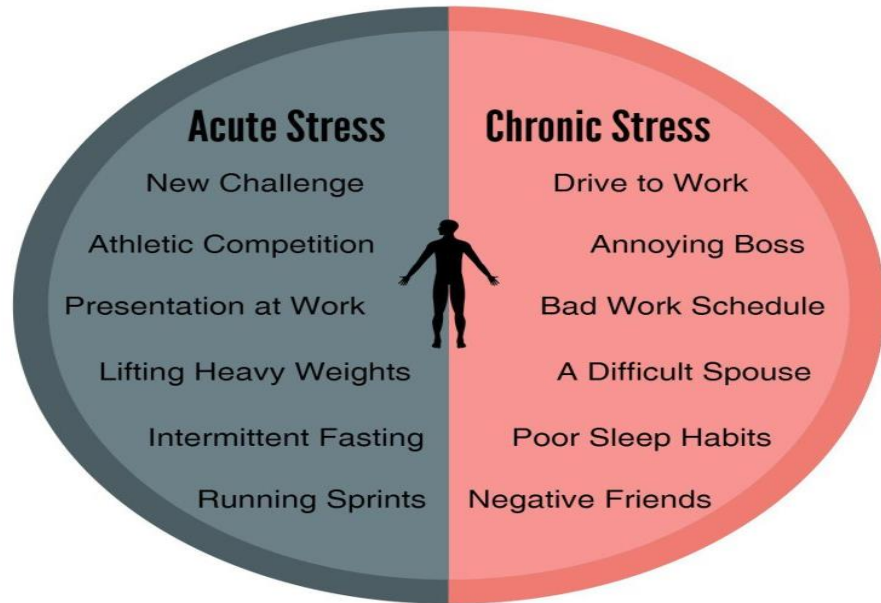
- Your goals are going to tell you how much time and energy to invest in water quality
- Full-time venture?
 - Likely higher # fish and plants
 - More worried about survival/stress
 - Higher (appropriate) feeding rates
 - An investment
 - More recording of parameters!
 - Plenty of stress on the farmer



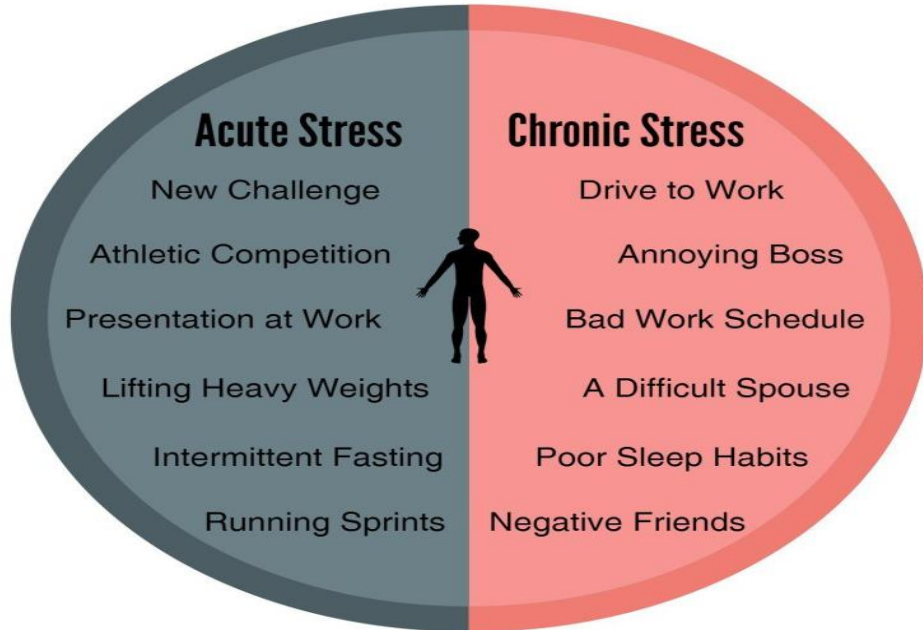
Stress



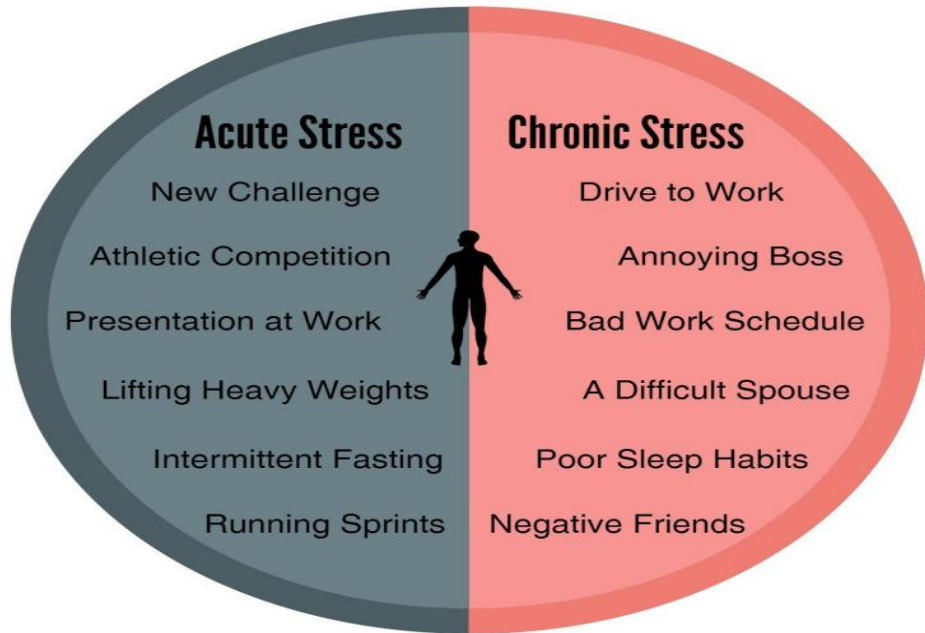
Stress in humans | Acute vs. Chronic



Stress in humans | Acute vs. Chronic



Stress in humans | Acute AND Chronic



Fish are often lost because of a combination of acute and chronic stress related to water quality



Imagine your hobbyist timeline...

- You purchased feed-trained YP in June 2018 for your small RAS in the backyard
- You feed them every single day and even have friends to come over and watch them feed in the tanks
- They grow and grow and by the spring of 2019 you have a buyer for July 2019
- Another 100 degree heat index hits and your tank water is very hot, meaning dissolved oxygen saturation is low
- You feed and leave; fish don't eat; ammonia elevates
- Low survival means you no longer have fish to sell for a profit
- Same can happen on a larger scale...



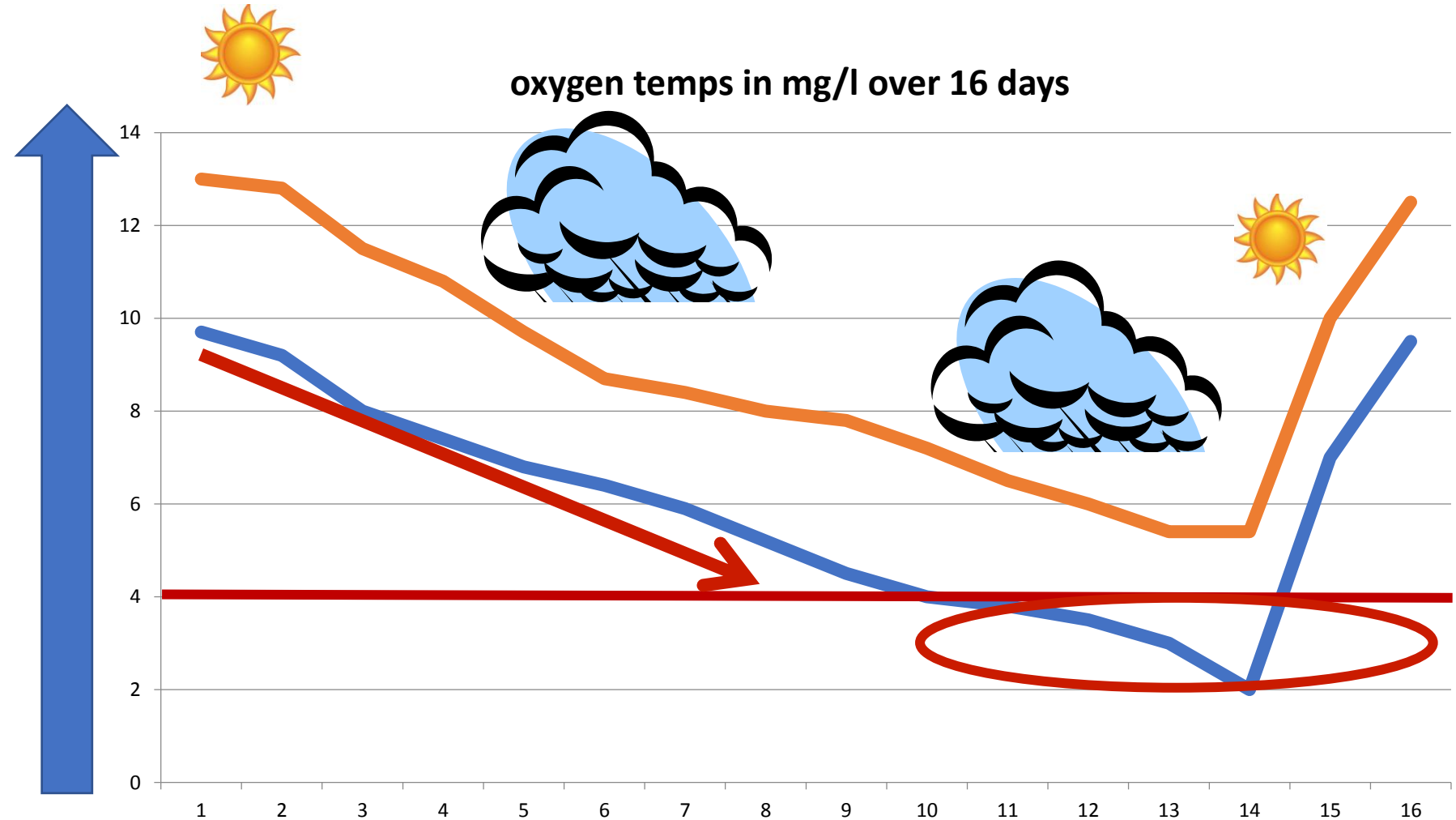
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Oxygen example

- 16 days, blue line (bottom line) is morning oxygen temps and orange line is afternoon temps
- June 2018 weather for example
- How would we know without testing?

Probable cause of the drop??



Ease of monitoring

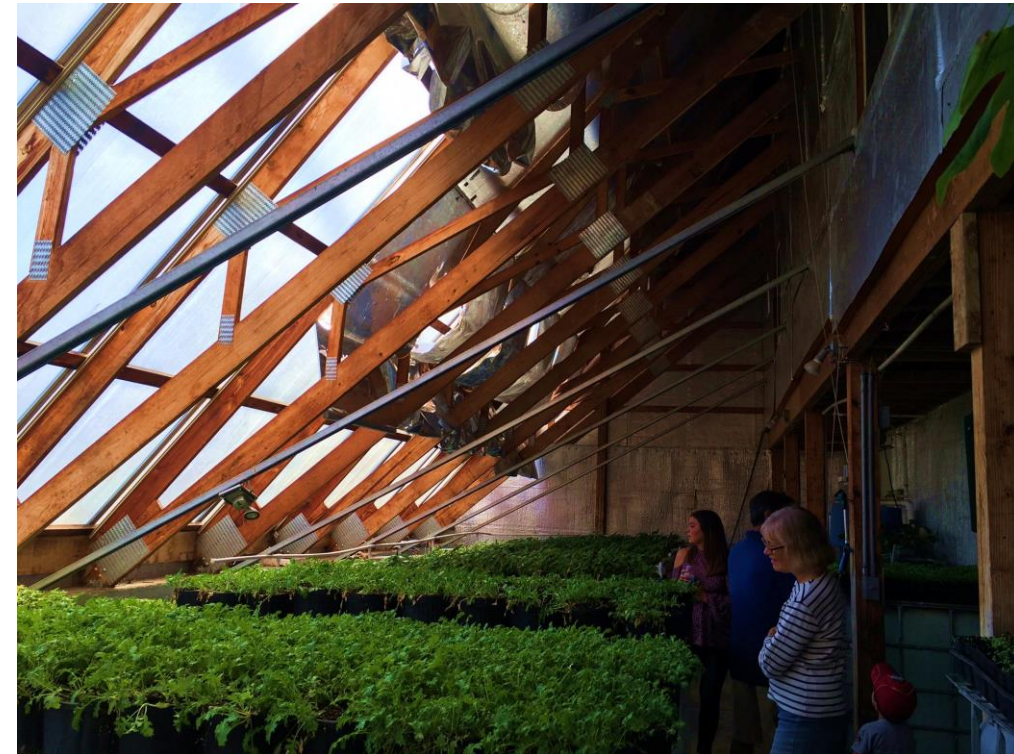
- Water quality monitoring is becoming easier and easier to do...
- Meaning excuses should be less and less! – takes a lot less time
- Many meters are becoming easier to calibrate and use
- Many titration methods have better/cleaner instructions
- YouTube videos



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Realities of checking water quality on farms in Ohio... and beyond

- Few farmers utilize meters or kits and regularly test/record water quality data
- Tested and/or recorded parameters usually stops at DO
- Those who haul fish are significantly more likely to at least carry a DO meter
- Memory of the farmer usually tested to know “status quo” of the systems
- Meters/kits do not mean anything if they are not accurate
- **Does it pay to routinely check and monitor WQ?**



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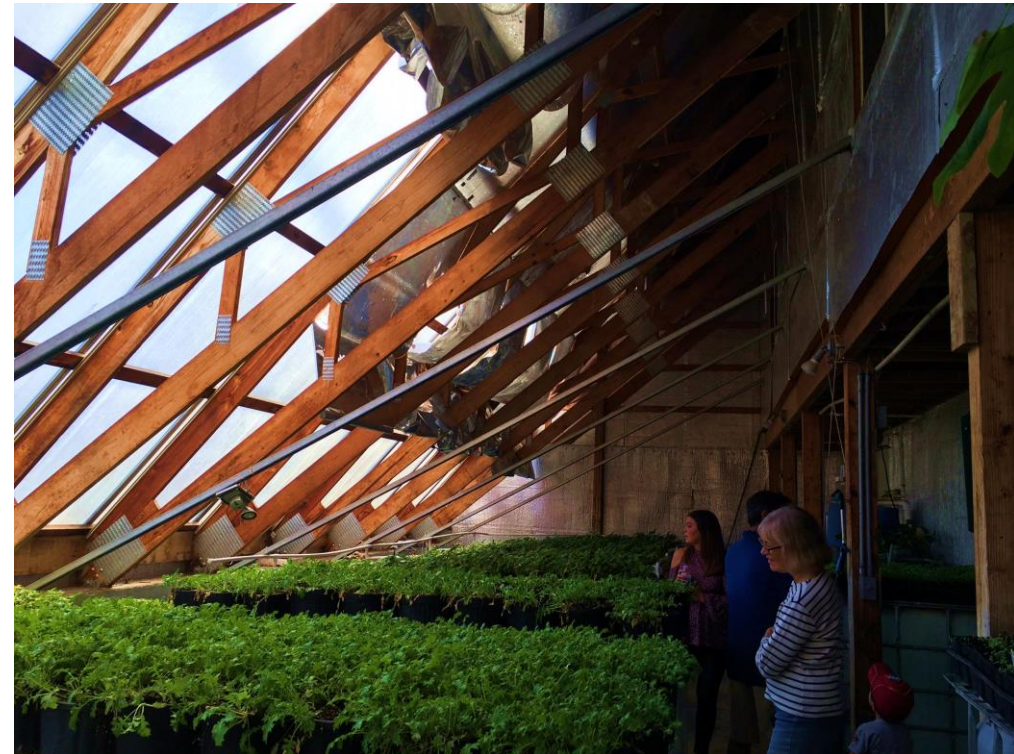
Final thoughts

- “My fish are eating and look fine”
- There are reasons for these presentations
- Come see me – practicing WQ testing/recording
- The truth
 - Most won’t test/record, at least not until already in trouble



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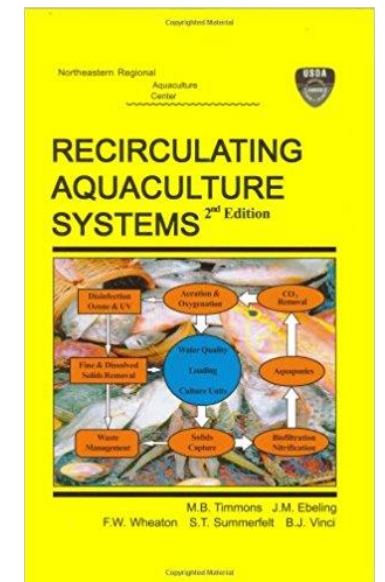
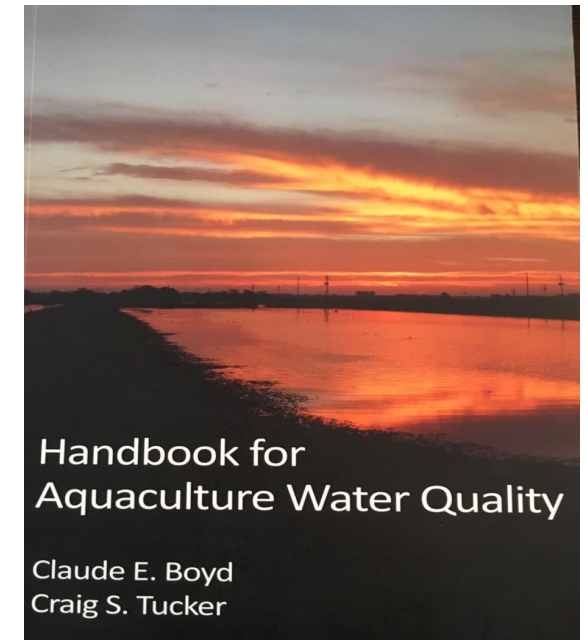


Readings

Southern Regional Aquaculture Center

Fact Sheets » Water Quality (460-471; 4600-4699)

- [SRAC 0460: Control of Clay Turbidity in Ponds](#)
- [SRAC 0461: Water Quantity and Quality Requirements for Channel Catfish Hatcheries](#)
- [SRAC 0462: Nitrite in Fish Ponds](#)
- [SRAC 0463: Ammonia in Fish Ponds](#)
- [SRAC 0464: Interactions of pH, Carbon Dioxide, Alkalinity and Hardness in Fish Ponds](#)
- [SRAC 0466: Algae Blooms in Commercial Fish Production Ponds](#)
- [SRAC 0467: Cost of Alternative Effluent Treatments for Catfish Production](#)
- [SRAC 0468: Carbon Dioxide in Fish Ponds](#)
- [SRAC 0469: Fertilization of Fish Fry Ponds](#)
- [SRAC 0470: Characterization and Management of Effluents from Aquaculture Ponds in the Southeastern United States](#)
- [SRAC 0471: Fertilization of Fish Ponds](#)
- [SRAC 4600: Toxicities of Agricultural Pesticides to Selected Aquatic Organisms](#)
- [SRAC 4601: Measuring Dissolved Oxygen Concentration in Aquaculture](#)
- [SRAC 4602: Pond Mixing](#)
- [SRAC 4603: Managing Ammonia in Fish Ponds](#)
- [SRAC 4604: Managing High PH in Freshwater Ponds](#)
- [SRAC 4605: Algal Toxins in Pond Aquaculture](#)
- [SRAC 4606: Interpretation of Water Analysis Reports for Fish Culture](#)



Aquaponic System Design Parameters:

Basic System Water Chemistry

Wilson Lennard PhD



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