



BEST MANAGEMENT PRACTICES

BEST MANAGEMENT PRACTICES: BIOSECURITY, RAS, AND PONDS



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BIOSECURITY AND FISH HEALTH

Principles of Biosecurity

1. Reduce the risk of pathogen introduction into the facility
2. Reduce the risk of pathogen spread throughout the facility
3. Reduce conditions within the facility that increase susceptibility to infection and disease

Pathogen Introduction: sources

- Water
- Introduced fish/eggs
- Feed
- Vehicles
- People
- Unwanted critters



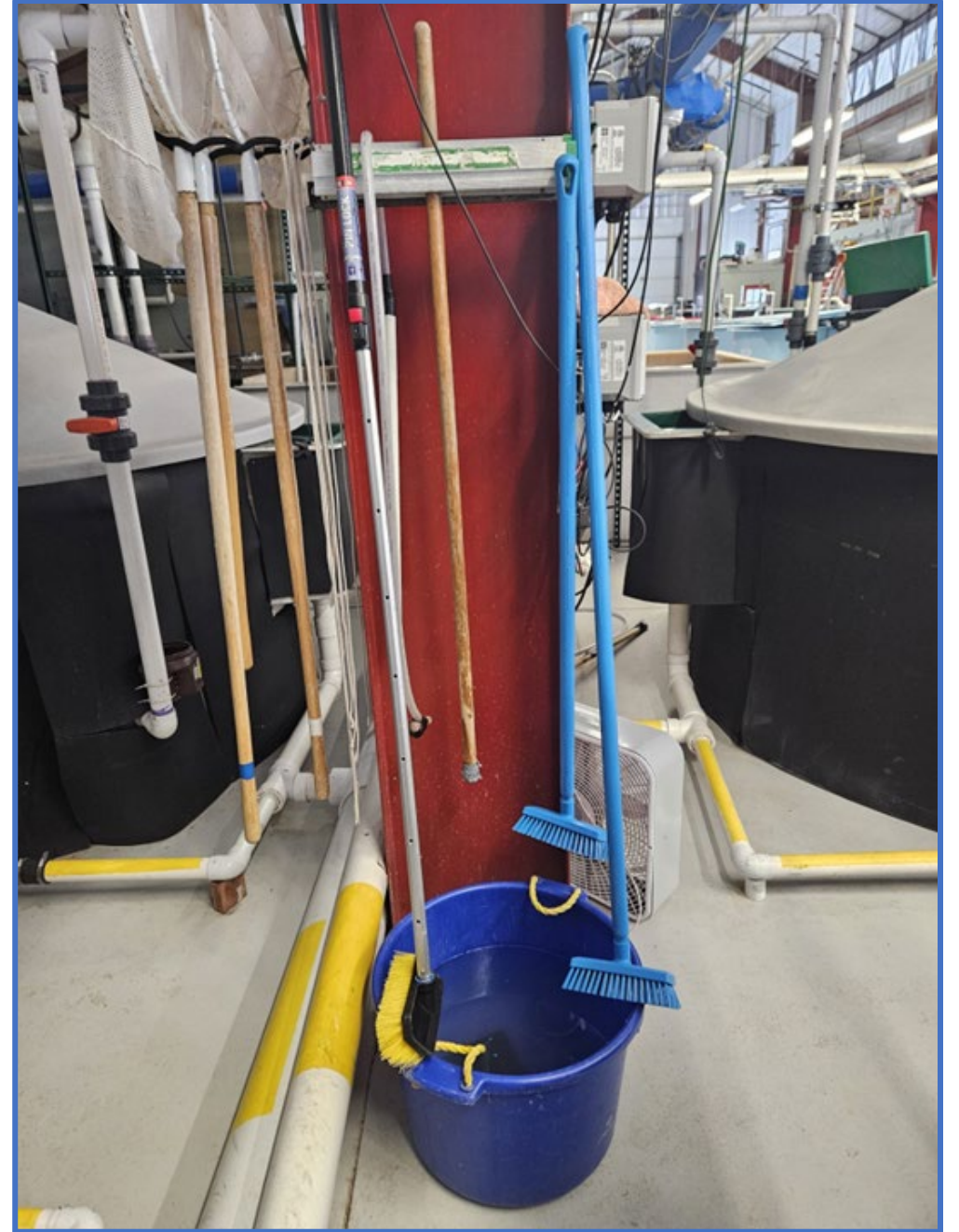


- Only import certified fish
- Disinfect eggs before arrival onsite (or after stripping from broodstock)
 - 100ppm 10mins after water hardening



Pathogen spread in facility:

- Develop daily cleaning and disinfection SOPs
 - Inspect and clean all parts of the system regularly
 - Treat floors as contaminated and clean frequently
- Treat each tank/system as it's own rearing unit and do not use same equipment for each






Reducing Pathogen susceptibility:

- Monitor systems to ensure optimal environment
- Avoid frequent disturbances to your fish
- Know how to identify stress in your species
- Have an explicit protocol for when fish should be treated or euthanized
- Have a relationship with a vet that you can consult when issues arise



The background of the slide features a close-up, underwater photograph of two fish, likely trout or salmon, swimming in dark water. The fish are positioned diagonally, with one in the upper left and another in the lower right. Their scales are detailed with a mix of brown, grey, and reddish-pink hues. Numerous clear, spherical bubbles of varying sizes are scattered throughout the scene, particularly concentrated around the fish, creating a sense of movement and depth. The lighting is soft, highlighting the textures of the fish's skin and the clarity of the water.

RECIRCULATING AQUACULTURE SYSTEMS

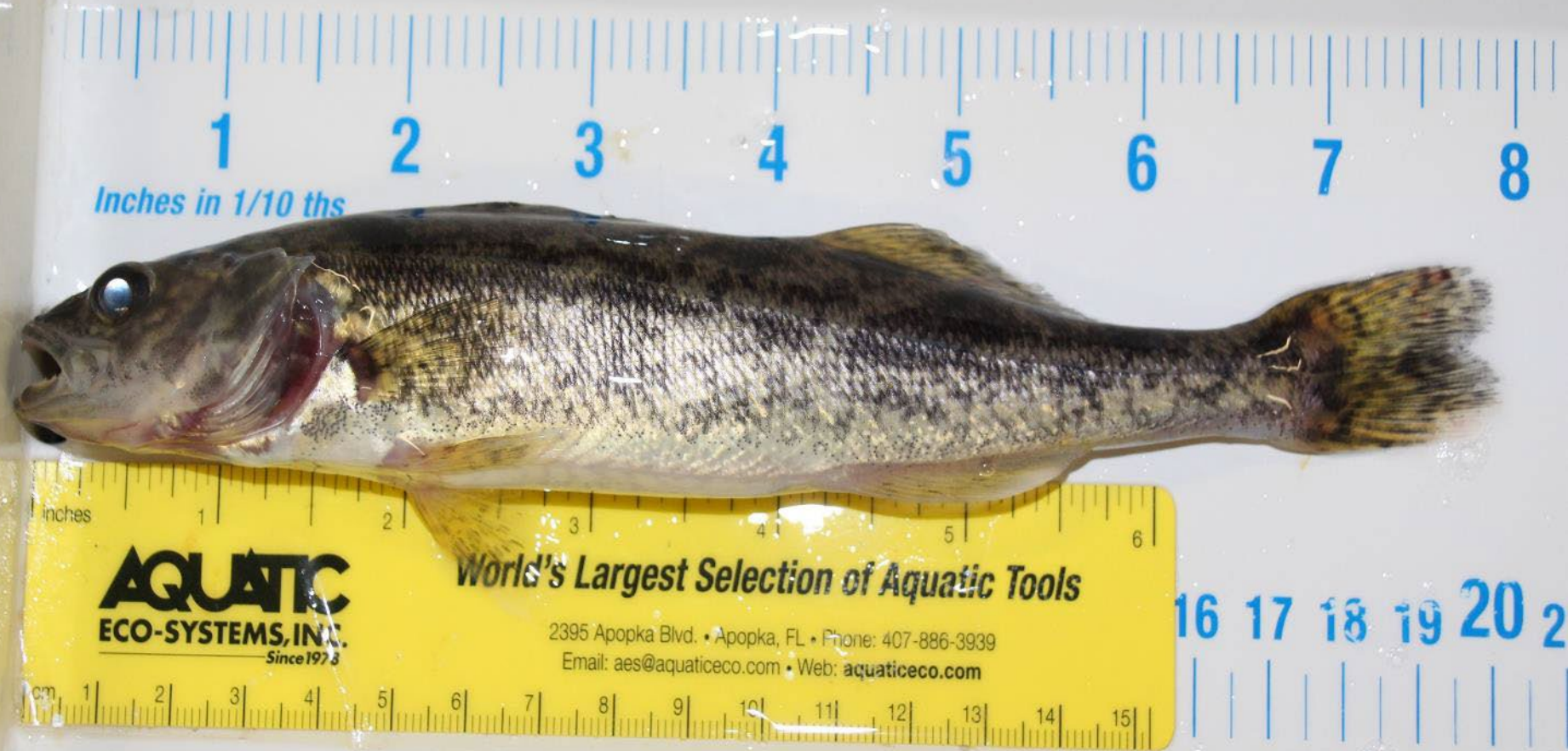
RAS

Best Management Practices





- Fish Care
 - Bioplan
- Daily water quality monitoring
- Biosecurity



Fish Sampling

SYSTEM	DATE	°C	O ₂	pH	NO ₂	NO ₃	TAN	U _N I _{ON}	CO ₂	TSS	TGP	ALK
1 Fish: NOTES: CWRAS	11/17/24	12.5	10.67	7.5	0.003	2.2	0.04					86
	12/8/24	12.5	10.6	7.66	0.001	1.53	0.032					56
	12/20/24	12.5	10.82	7.80	0.004	3.6	0.020				99	110
	1/1/25	12.5	10.40	7.82	0.007	4.8	0.031		3			94
	1/14/25	12.5	10.51	7.80	0.007	3.1	0.036					78
	2/2/25	12.5	10.21	7.76	0.004	3.0	0.018		2			108
	2/17/25	12.4	10.16	7.58	0.003	2.2	0.020					122
2 FISH: Walleye NOTES: WWRAS Sys II FT until March	11/17/24	8.15	11.5	8.15	0.001	5.82	0.02					95
	12/8/24	8/5.5	11.39	8.03	0.001	3.50	0.024					60
	1/3/25	9.0	11.20	8.10	0.001	3.00	0.020					98
												112
3 Sys A w/ AC NOTES:	11/17/24	7.7	11.1	7.0	0.003		0.08					94
	12/8/24											

- Weekly water quality
- Trends give you time to make changes.
- Know your species water quality parameters.



Prepare for the worst case scenarios

- Double Pumps
- Quick swapping
- Bi-Weekly Cleaning



- Drum filter maintenance
- Powerwash screens
- Chemical treatment
- Grease fittings



UV system maintenance

- 10,000 hour bulb replacement
- Twice a year sleeve clean
- Visual inspection



Biofilter & CO2 column Maintenance

- Monthly cleaning
- Yearly cleaning
- Sand addition



POND CULTURE

A photograph of a pond with a fountain in the background and a pipe discharging water into the pond in the foreground. The text is overlaid on the pond.

“POND CULTURE IS AN ART
NOT A SCIENCE...”



BMP 1. Pond Construction

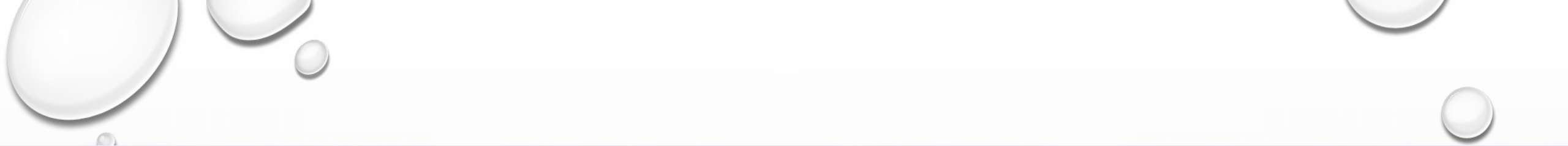
✓ Drainable Ponds

Size and Slope

- 0.5 to 2 acres
- Rectangular 2:1 (L:W)
- Bottom slope $<0.5\%$
- Steep side slope (3:1 in clay)







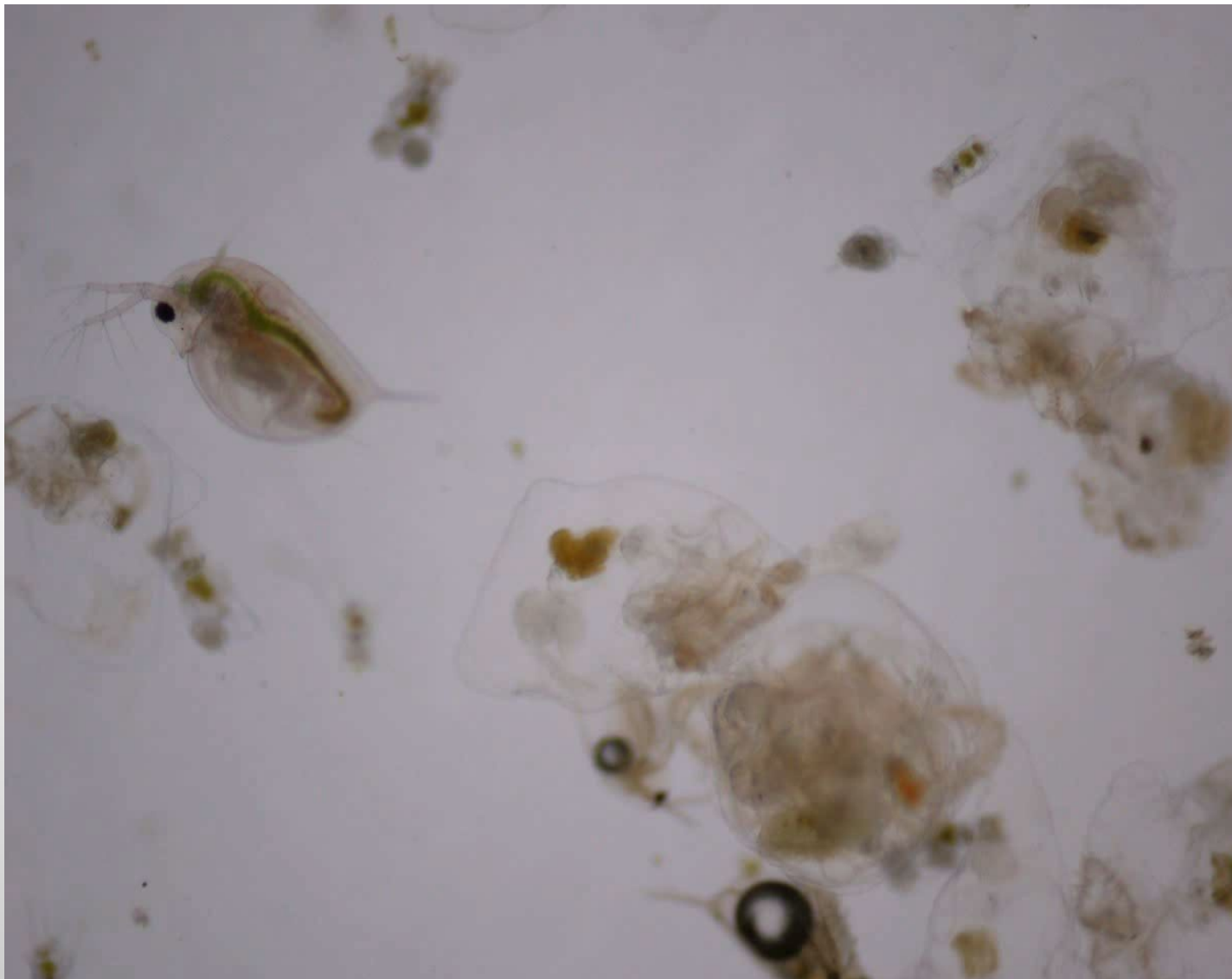
BMP 2. Fertilization & Monitor Regime

- ✓ Inorganic & Organic Fertilizers
- ✓ Fertilize when sunny & breezy





- ✓ Sample Plankton Levels
- ✓ Secchi Disk Reading Daily (12-18")



-Track Nutrient Ratios

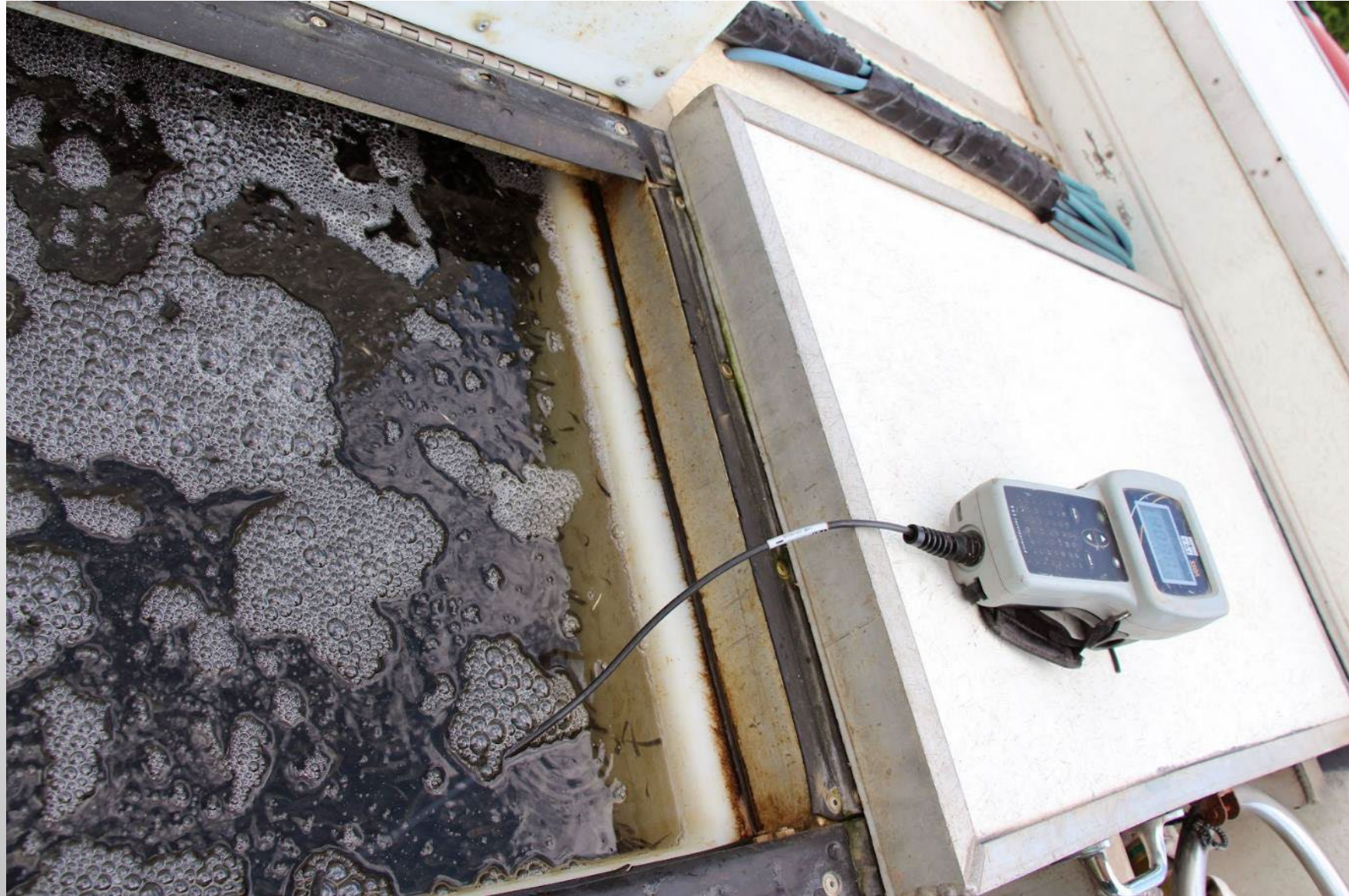


✓ Generally, 6lbs N and 0.3lbs P / acre



BMP 3. Fish Stocking

✓ **Tempering is critical: Fry, Fingerlings, Forage, etc.**



BMP 4. The Temperature & Oxygen Battle

✓ Take readings in morning





Kasco®

- ✓ Run diffusers/aerators at night during hot weather
- ✓ Ability to add fresh water critical

BMP 5. Fish Handling

- ✓ Check fish regularly for fitness
- ✓ Harvest/transfer fish when weather permits (mornings/cool/cloudy)



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THANK YOU!



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