

# Hatchery Design 101

Greg Fischer

Facility Operations Manager

University of Wisconsin Stevens Point

Northern Aquaculture Demonstration Facility

# KEY ITEMS FOR A SUCCESSFUL FACILITY

- Proper Funding and Support for the long term
- Proven Business and Marketing Plan
- Water In and Water Out Plan
- Proven Biological and Performance Information
- Tested Design and Equipment for selected species
- Correct Permitting and Zoning









# Water In and Water Out



UWSP NADF Facility



# Water In and Water Out Effluent Management



# Water In and Water Out Final Treatment-Polishing



UWSP NADF

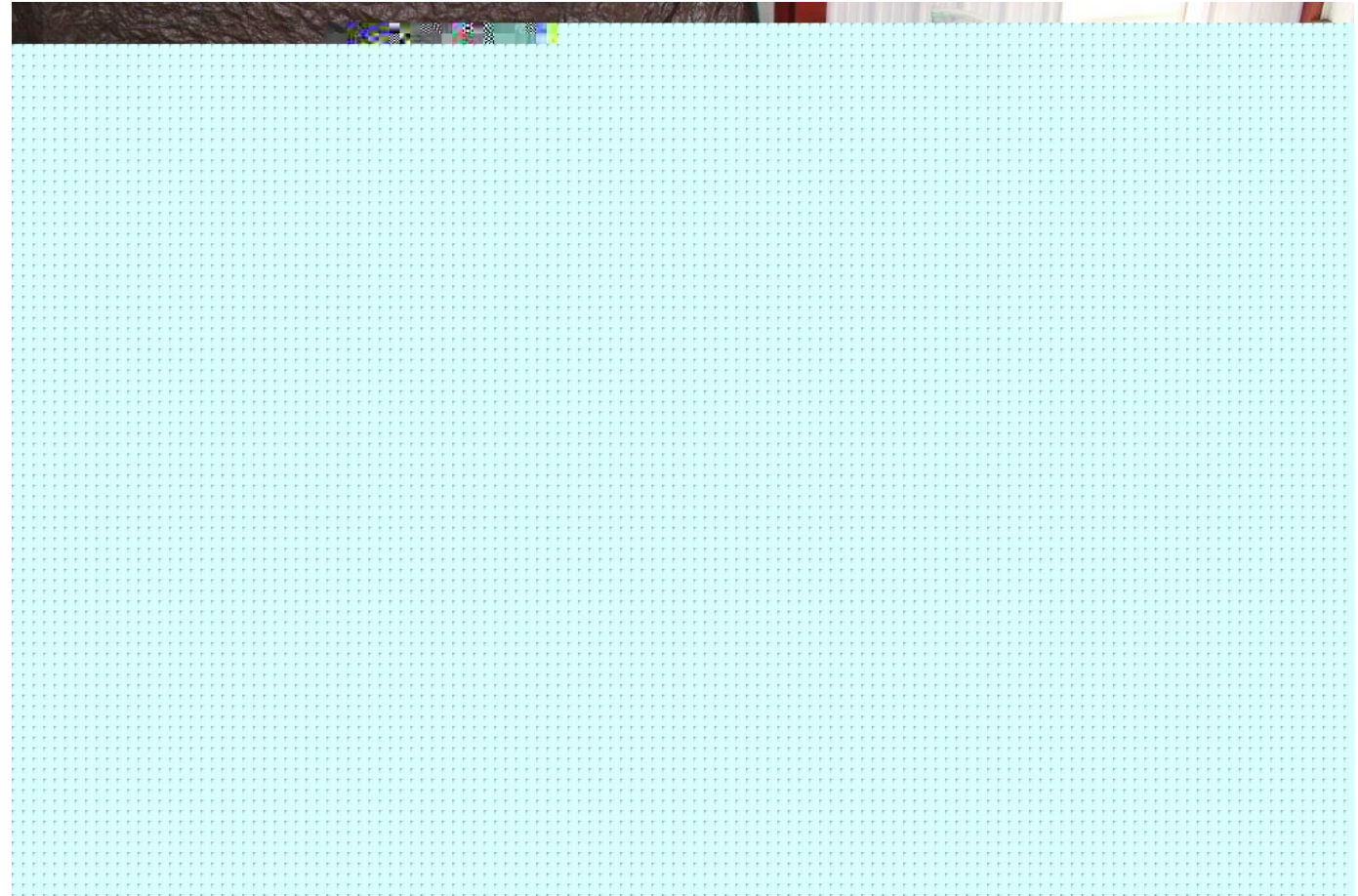






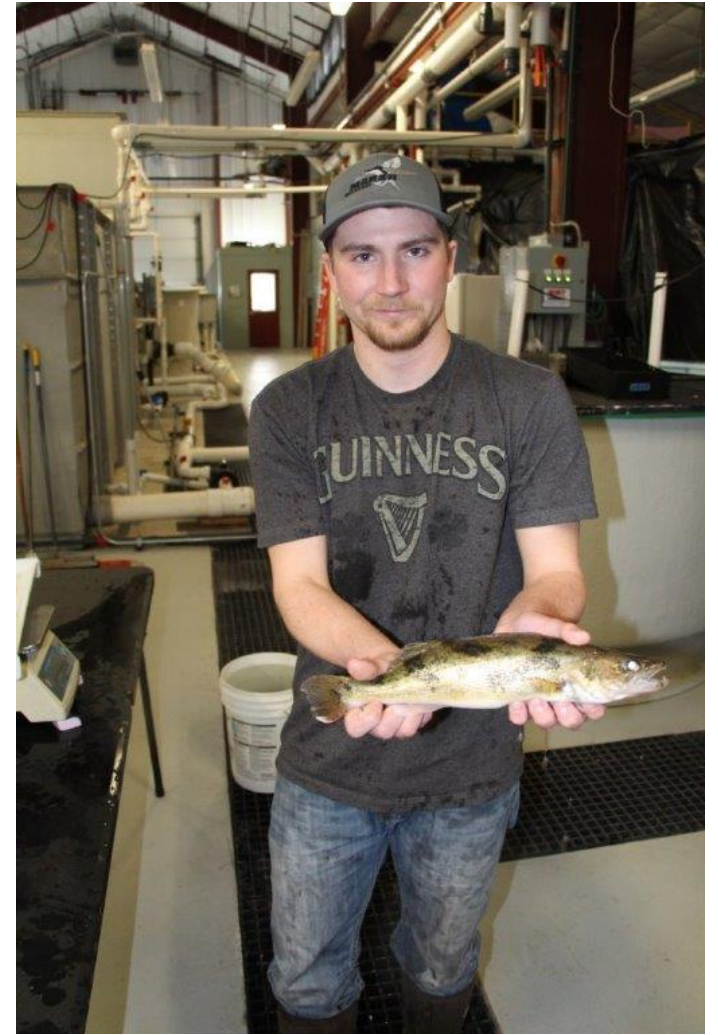
# Proven Biological and Performance Information

1. Understand the Biology of the fish species you are rearing!
2. *Understand the **Performance** of the fish species you are rearing!*



# Proven Biological and Performance Information

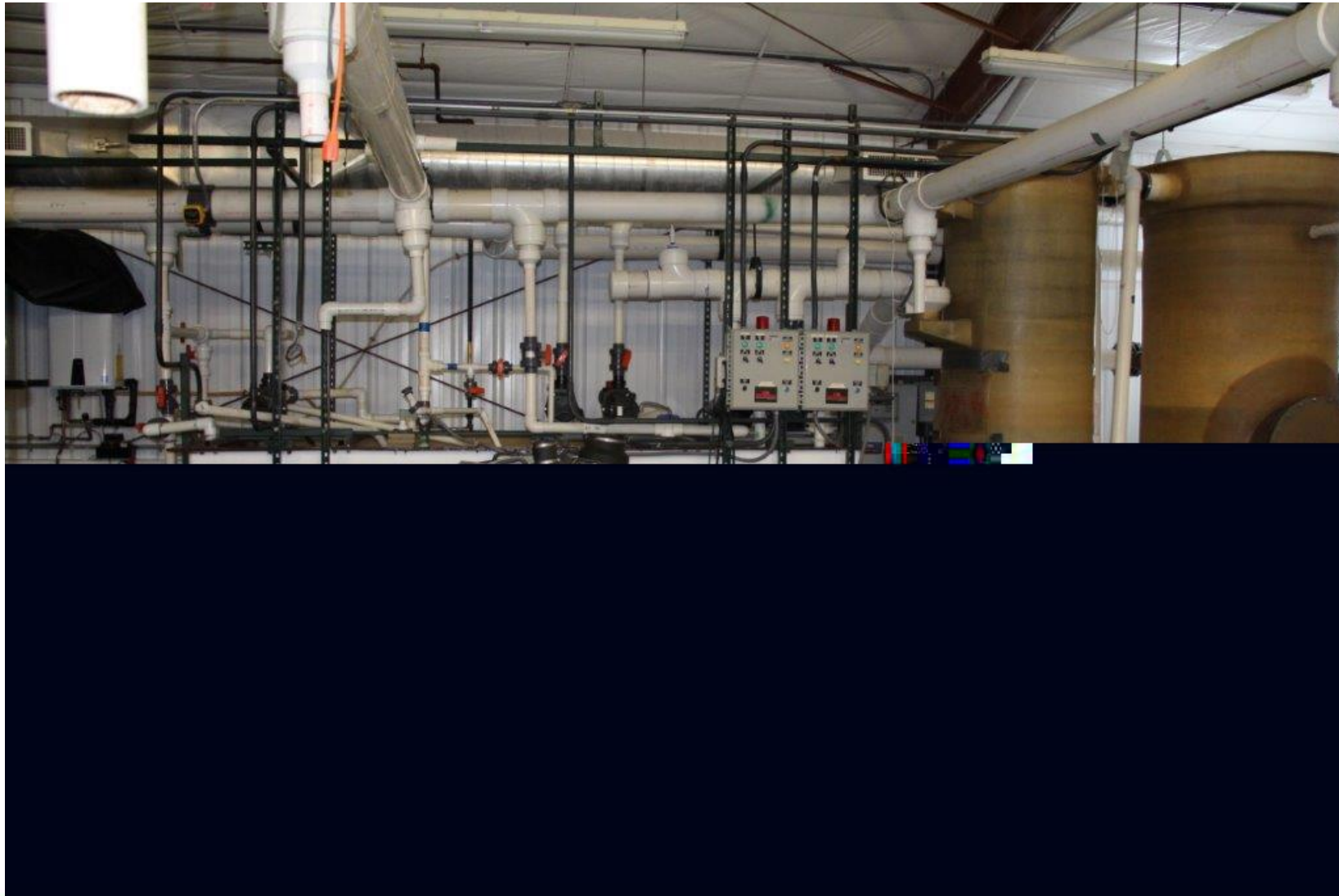
1. Understand the Biology of the fish species you are rearing!
2. Understand the Performance of the fish species you are rearing!
3. *Understand the Fish Rearing systems and how to optimize with number 1 and 2!*



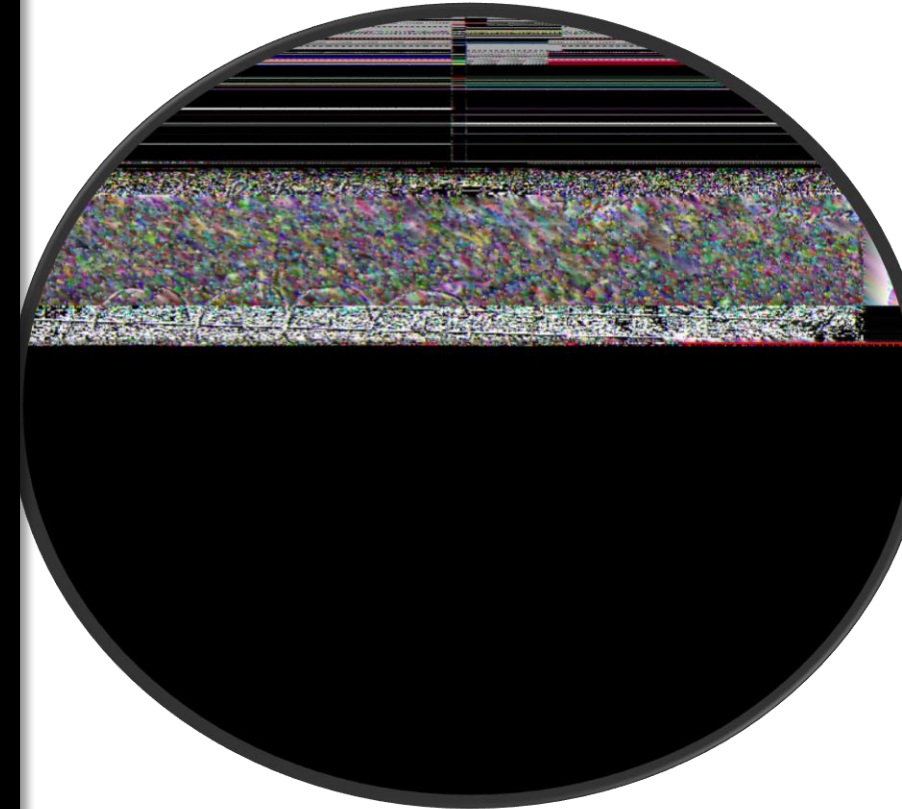
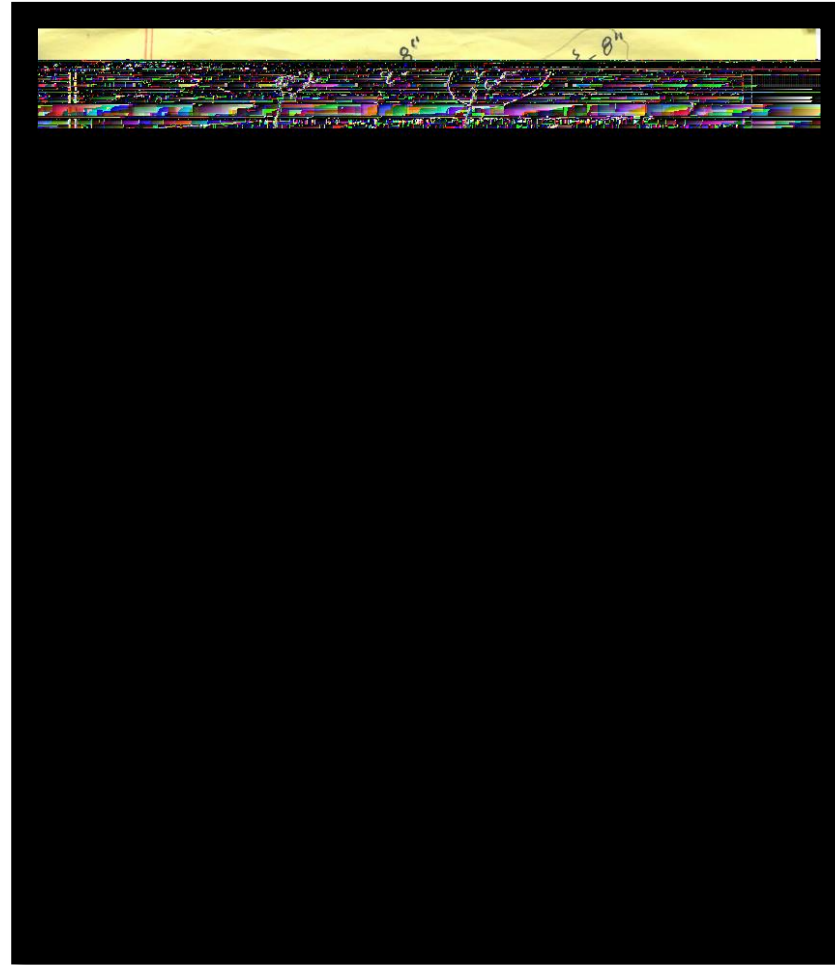
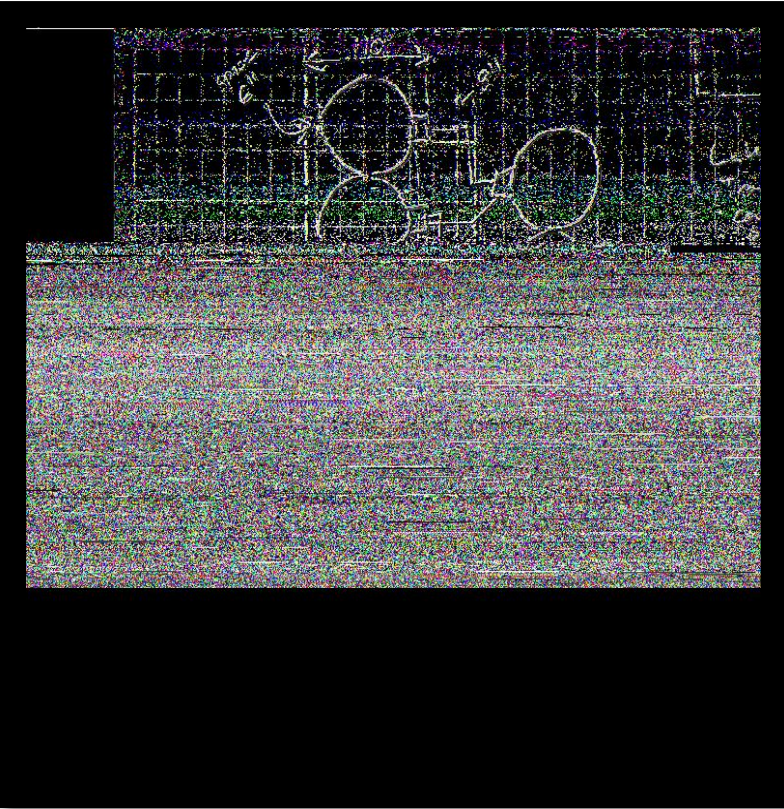




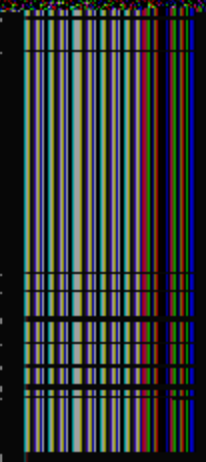
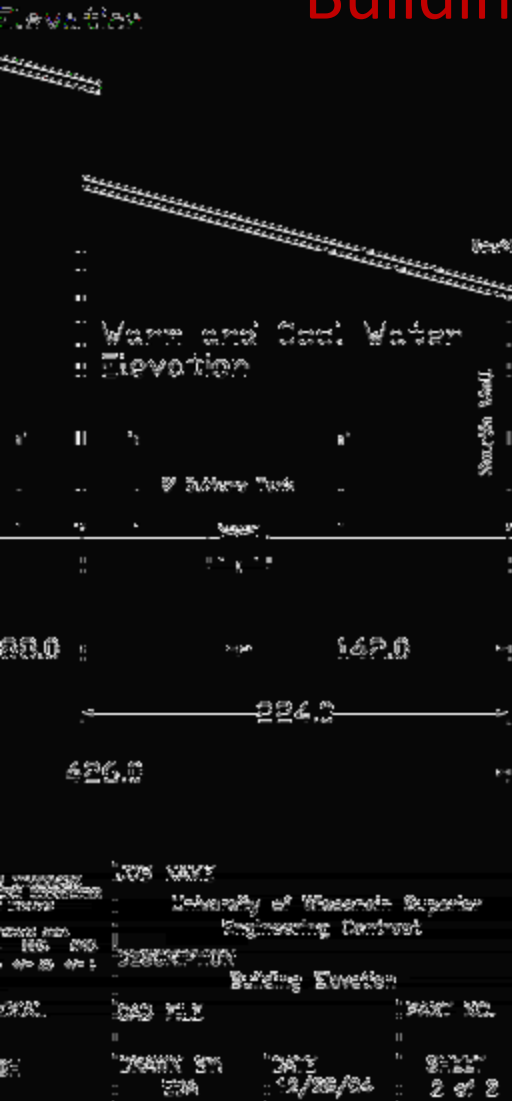
# System Information



# Why Proper Engineering is Important From Concept to Final Design



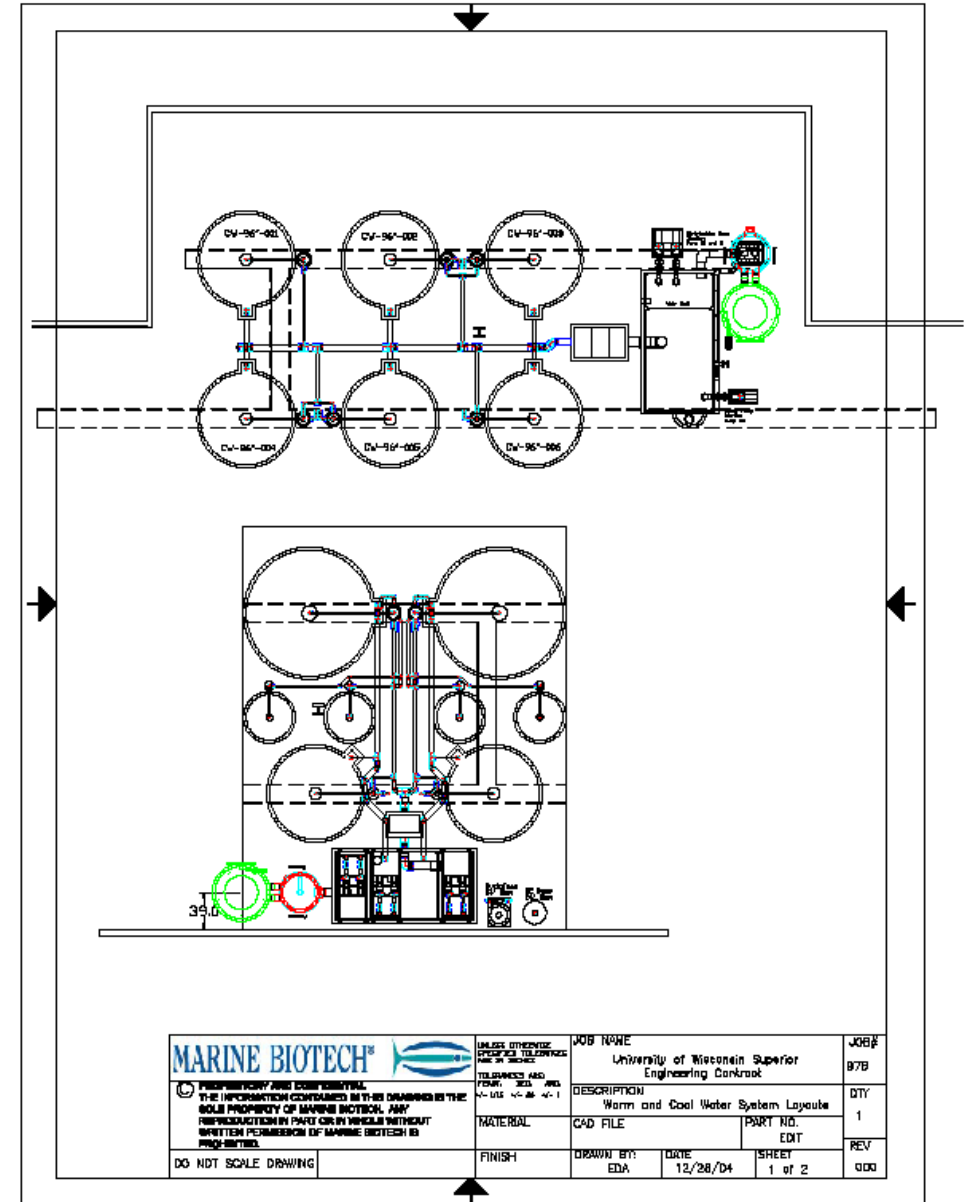
# Why Proper Engineering is Valuable Building Design

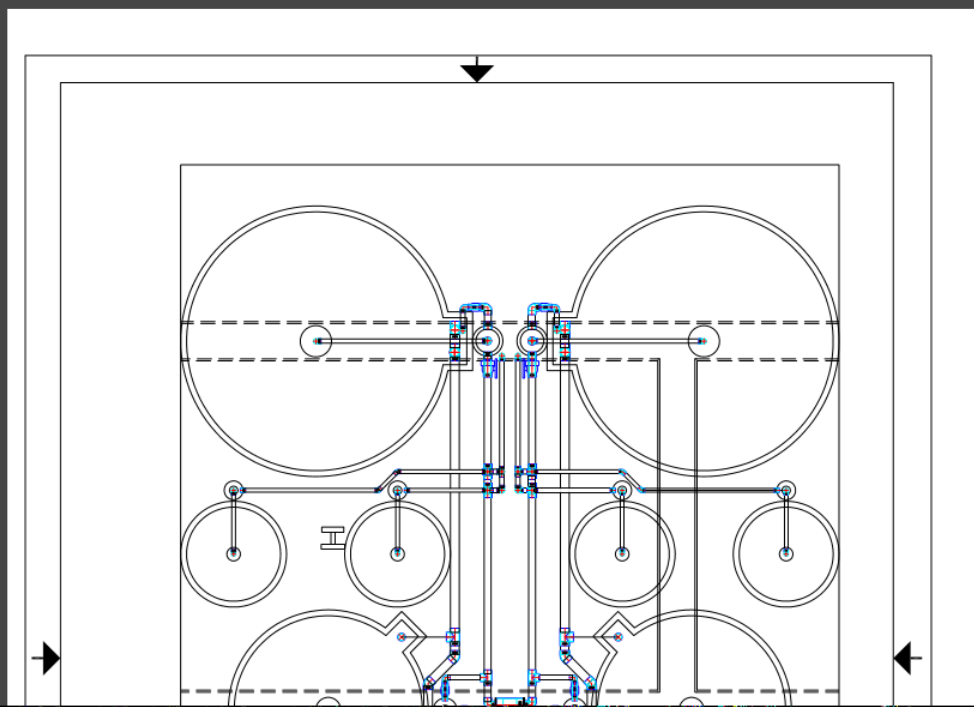


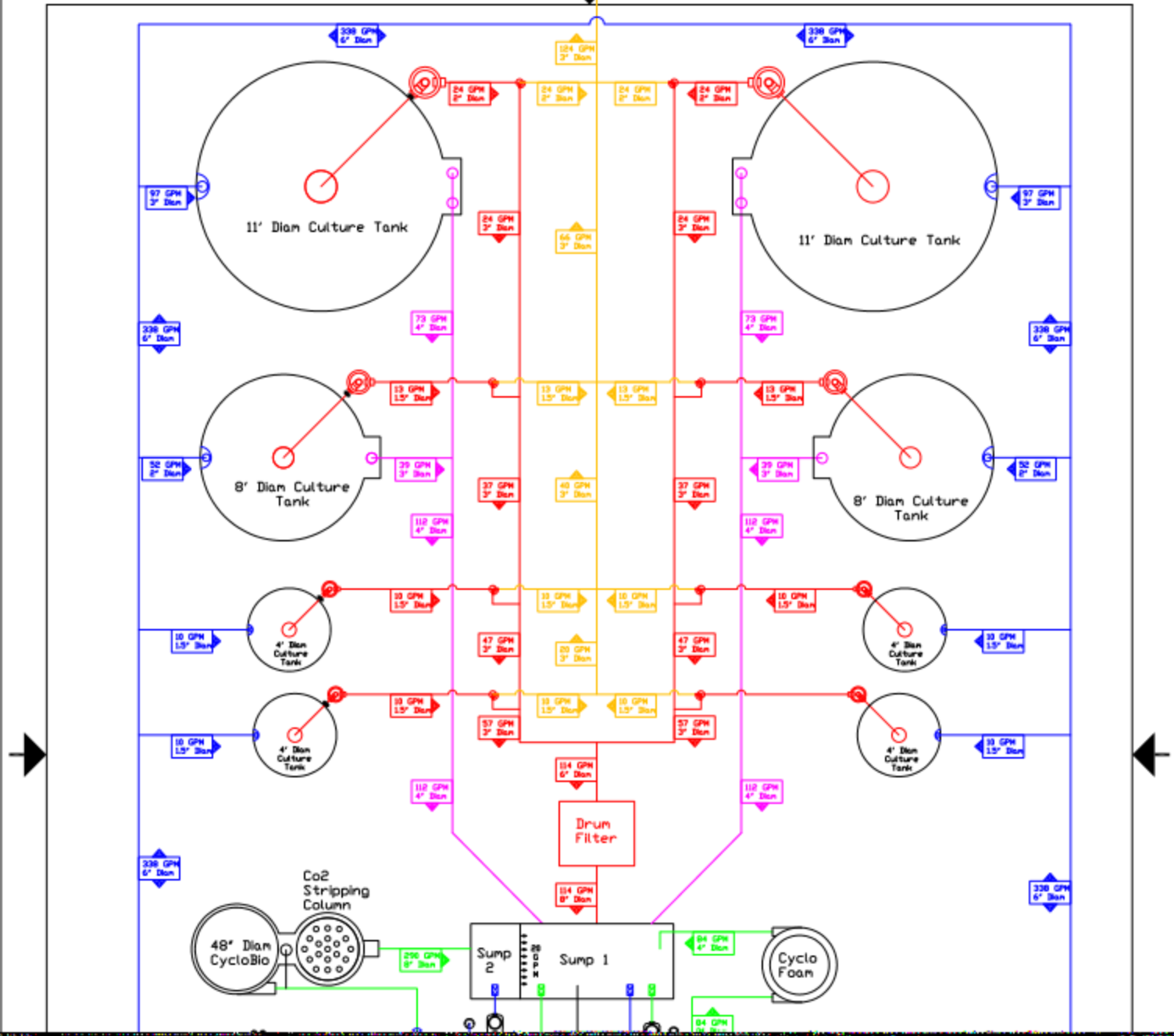


# Why Proper Engineering is Valuable

- Spatial layout for systems- does it all fit?
- Proper elevations and hydraulic profiles
- Proper piping sizing and pump curves
- Understanding how much water is going where; ie pipe velocities, tank r values, etc.











LTTB Tribal Fish Hatchery,  
Michigan



University of Wisconsin  
Stevens Point

**Fischer Biological Consulting, LLC**  
"Where the fish come first in design!"  
Greg Fischer  
Lead Biologist  
79655 Vialer Road  
Washburn, WI 54891  
Phone: 715-209-0011  
Email: gregfisher12@yahoo.com

Stevens Point  
ce

# Rearing Tanks

- **Fiberglass**
- **Round**
- **Dual drain**
- **Cornell Style**

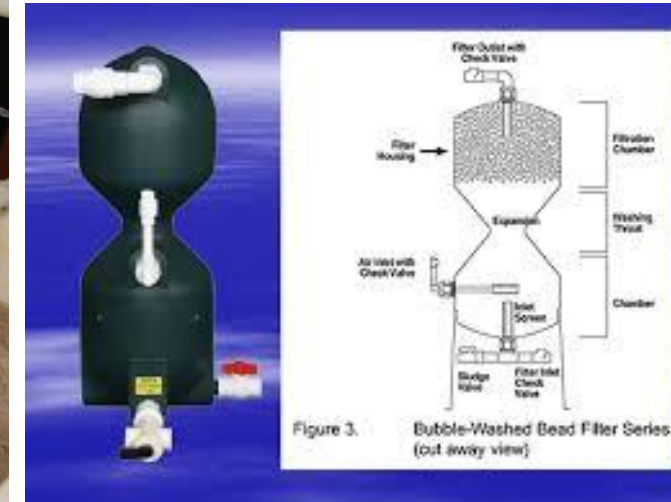
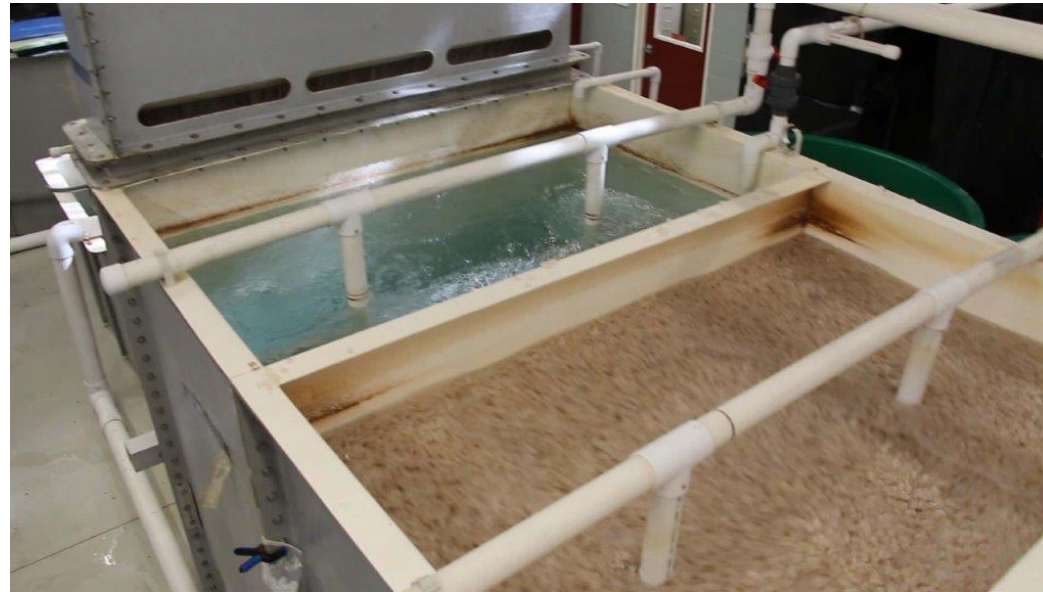
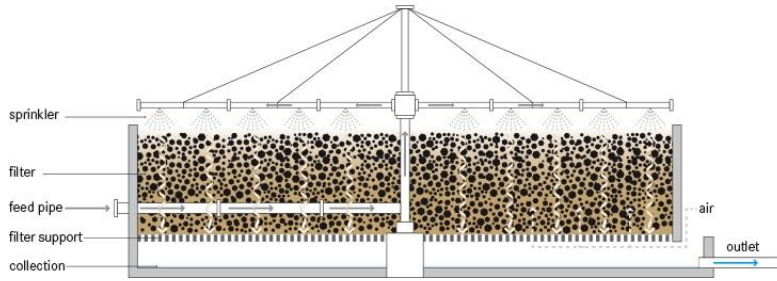




USFWS Genoa Fish Hatchery

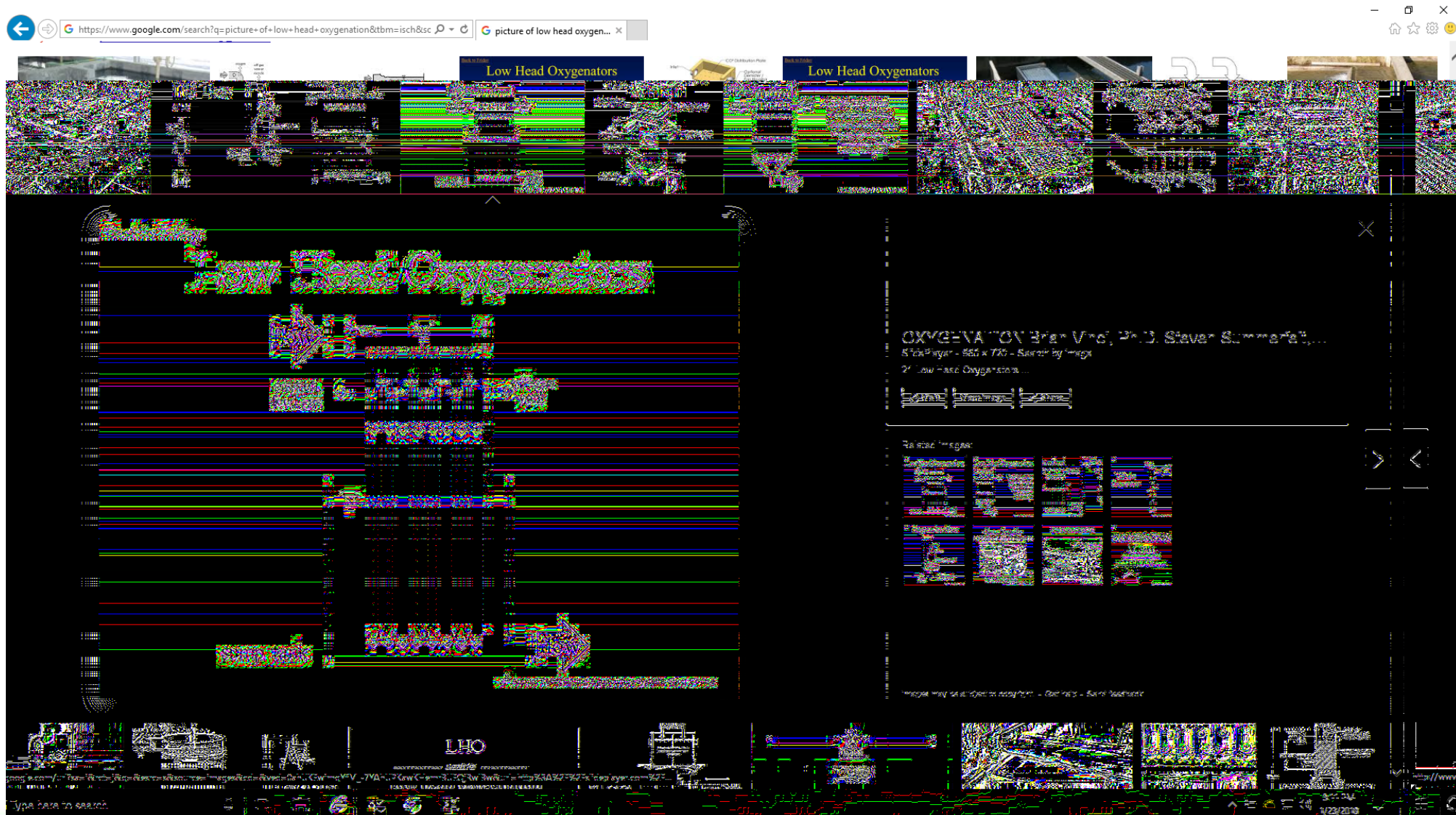


# Biofilters

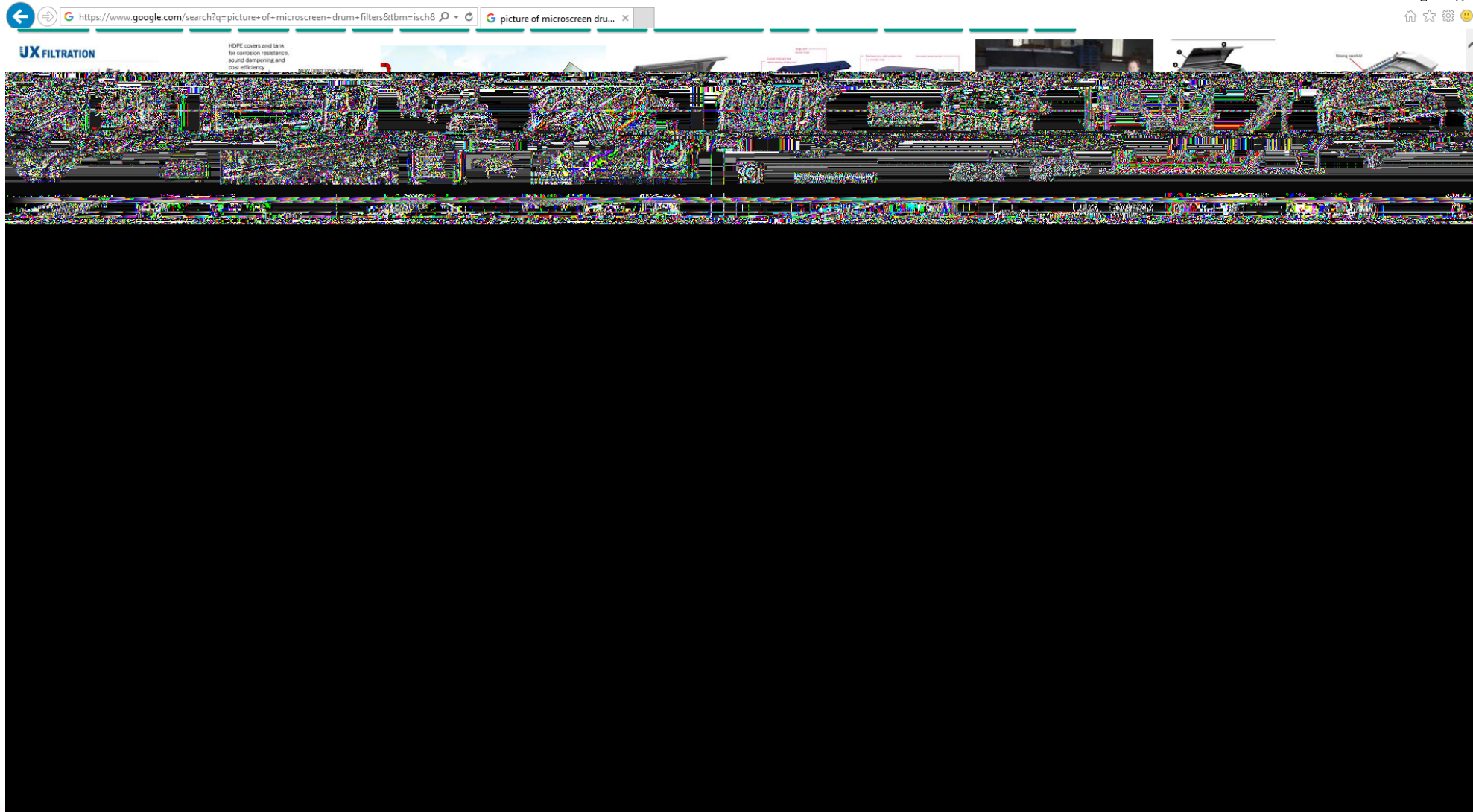




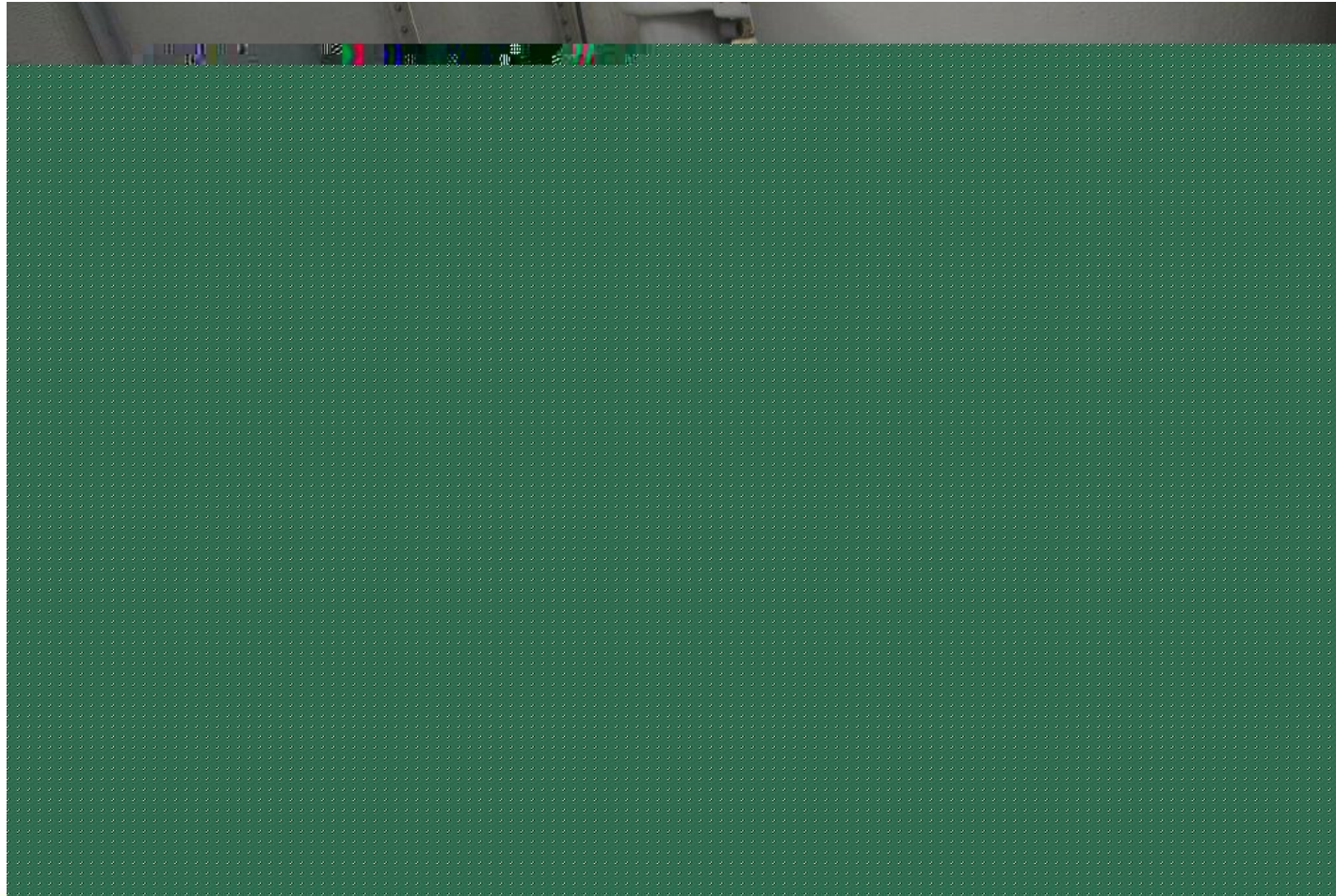
# Oxygenation



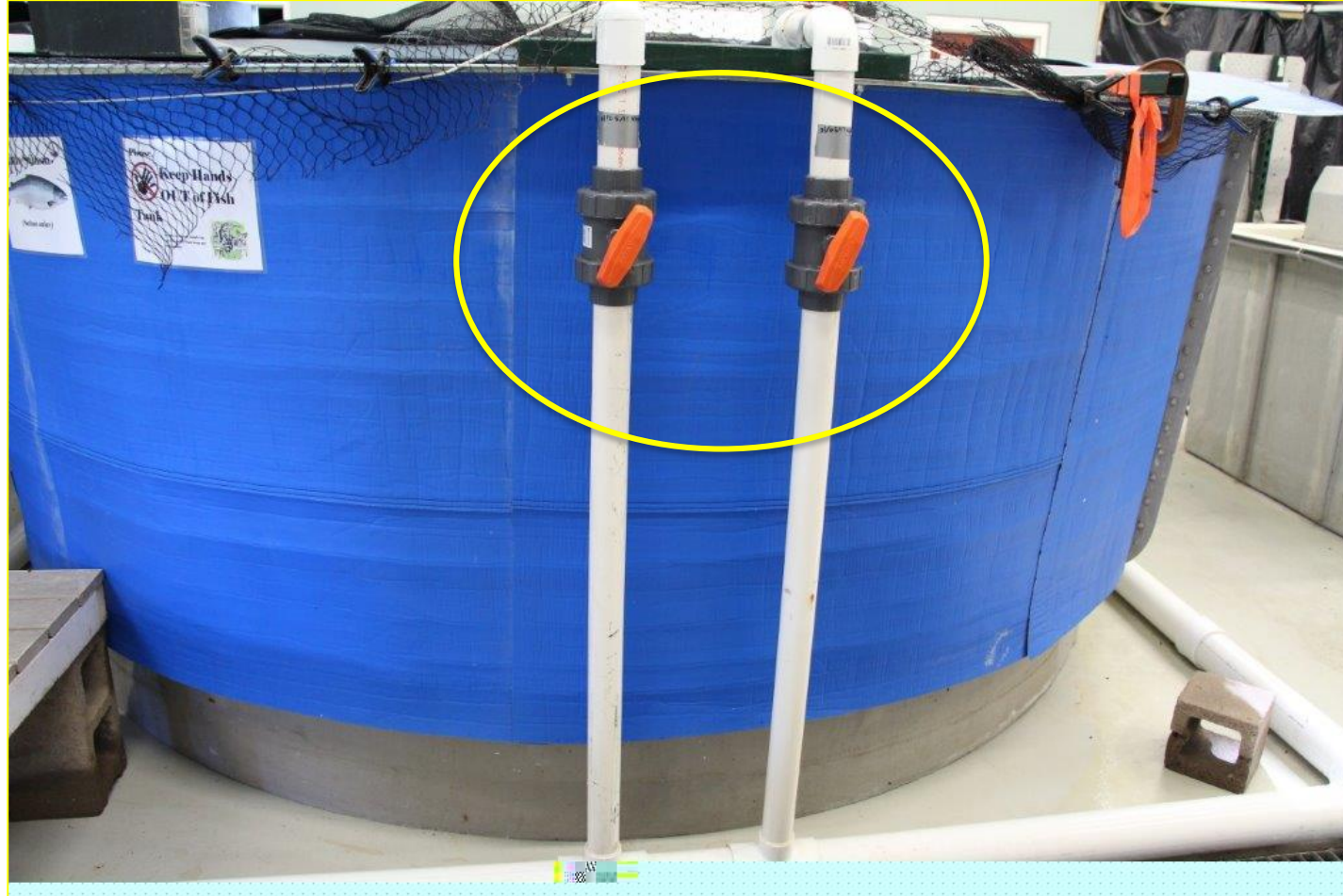
# Solids Removal



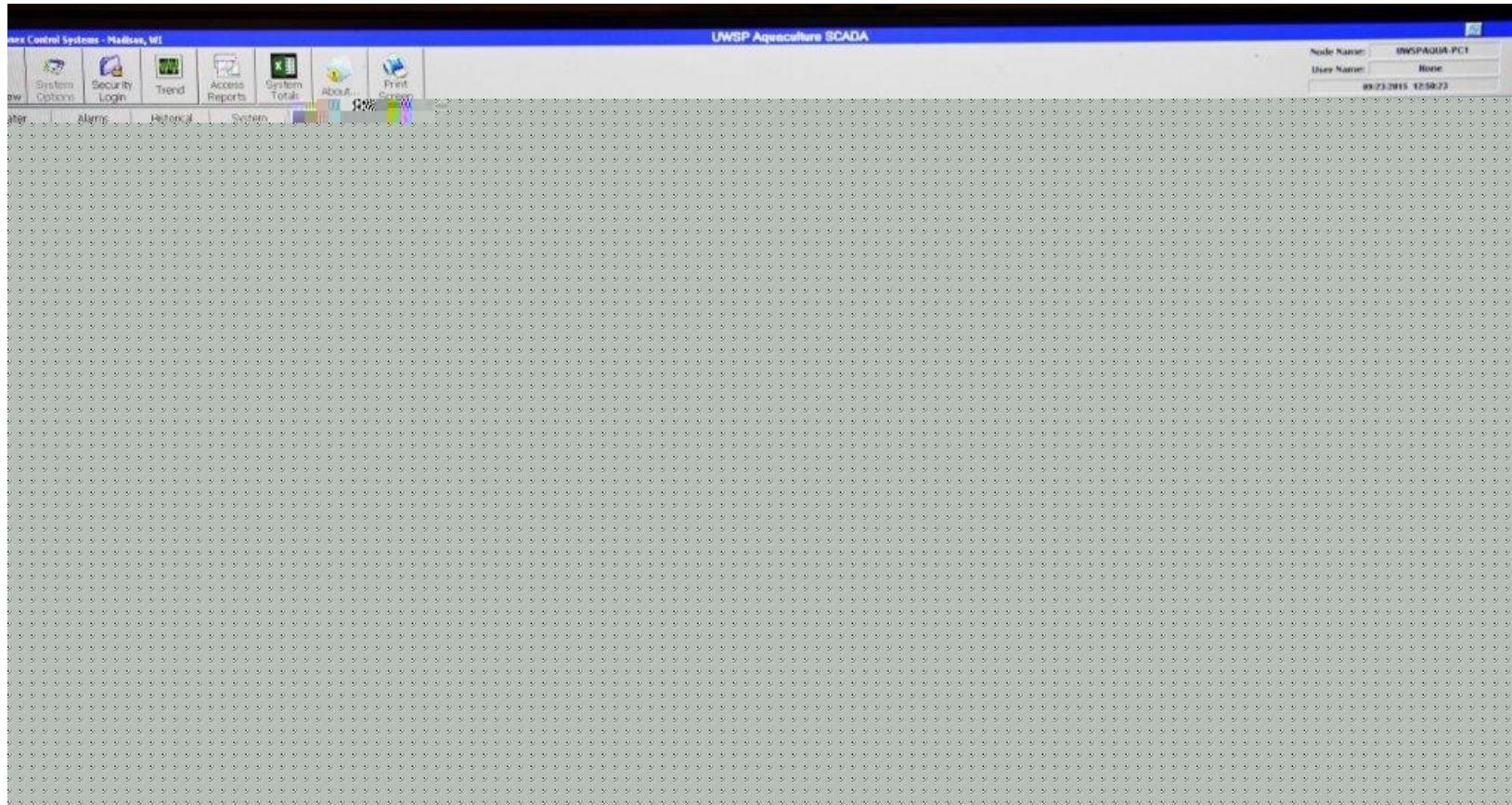
# Duplication



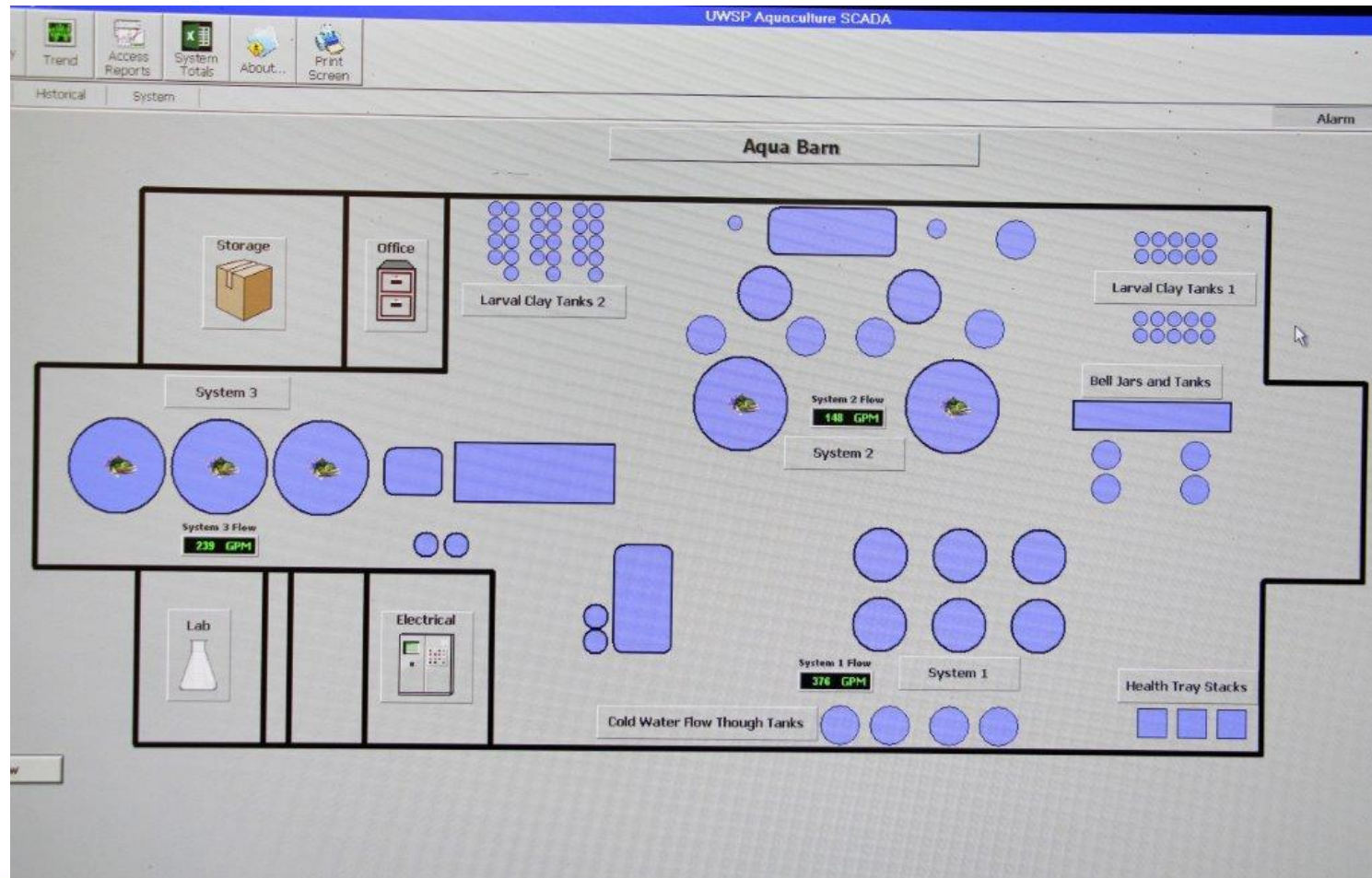
# Good valves= good flow control



# Alarms and Monitoring



# Alarms and Monitoring



# SCADA /Monitoring/Water Quality

| Parameter                                   | Well #1 | Well #2 | Well #3 | Well #4 | Fish Culture Standards <sup>1</sup> |
|---|---------|---------|---------|---------|-------------------------------------|
| Alkalinity (as CaCO <sub>3</sub> )          |         |         |         |         | 10-400                              |
| Hardness (as CaCO <sub>3</sub> )            |         |         |         |         | 10-400                              |
| pH (in situ)                                |         |         |         |         | 6.5-8.0 SU                          |
| Total Dissolved Solids                      |         |         |         |         | <400                                |
| Total Suspended Solids                      |         |         |         |         | <10                                 |
| Salinity (ppt)                              |         |         |         |         | 0-32                                |
| Total Ammonia-Nitrogen (NH <sub>3</sub> -N) |         |         |         |         | <0.02                               |
| Nitrate-Nitrogen (NO <sub>3</sub> -N)       |         |         |         |         | 0-3.0                               |
| Nitrite-Nitrogen (NO <sub>2</sub> -N)       |         |         |         |         | < 0.1 in soft water                 |
| Aluminum (Al)                               |         |         |         |         | <0.01                               |
| Arsenic (As)                                |         |         |         |         | <0.05                               |
| Barium (Ba)                                 |         |         |         |         | <5                                  |
| Beryllium (Be)                              |         |         |         |         | <0.01                               |
| Cadmium (Cd)                                |         |         |         |         | <0.0005 <sup>2</sup>                |
| Calcium (Ca)                                |         |         |         |         | 4-160                               |
| Chloride (Cl)                               |         |         |         |         |                                     |
| Chromium (Cr)                               |         |         |         |         | 0.03                                |
| Copper (Cu)                                 |         |         |         |         | <0.006 <sup>2</sup>                 |
| Iron (Fe)                                   |         |         |         |         | <0.1                                |
| Lead (Pb)                                   |         |         |         |         | <0.02                               |
| Magnesium (Mg)                              |         |         |         |         | <15                                 |
| Manganese (Mn)                              |         |         |         |         | <0.01                               |
| Nickel (Ni)                                 |         |         |         |         | <0.1                                |
| Phosphorus (P)                              |         |         |         |         | 0.01-3.0                            |
| Potassium (K)                               |         |         |         |         | <5                                  |
| Selenium (Se)                               |         |         |         |         | <0.01                               |
| Silver (Ag)                                 |         |         |         |         | <0.003                              |
| Sodium (Na)                                 |         |         |         |         | 75                                  |
| Sulfate (SO <sub>4</sub> )                  |         |         |         |         | <50                                 |
| Sulfur (S)                                  |         |         |         |         | <1                                  |
| Vanadium (V)                                |         |         |         |         | <0.1                                |
| Zinc (Zn)                                   |         |         |         |         | <0.005                              |
| Hydrogen Sulfide (H <sub>2</sub> S)         |         |         |         |         | <0.003                              |
| Total Petroleum Organics (TPO)              |         |         |         |         | <0.001                              |

<sup>1</sup>Source: Wedemeyer, 1997; U.S. EPA, 1979-80; Piper et al., 1982

<sup>2</sup>For alkalinity < 100 mg/L

Table 1. Water quality testing results from July 2011 sampling (ppm except where noted).



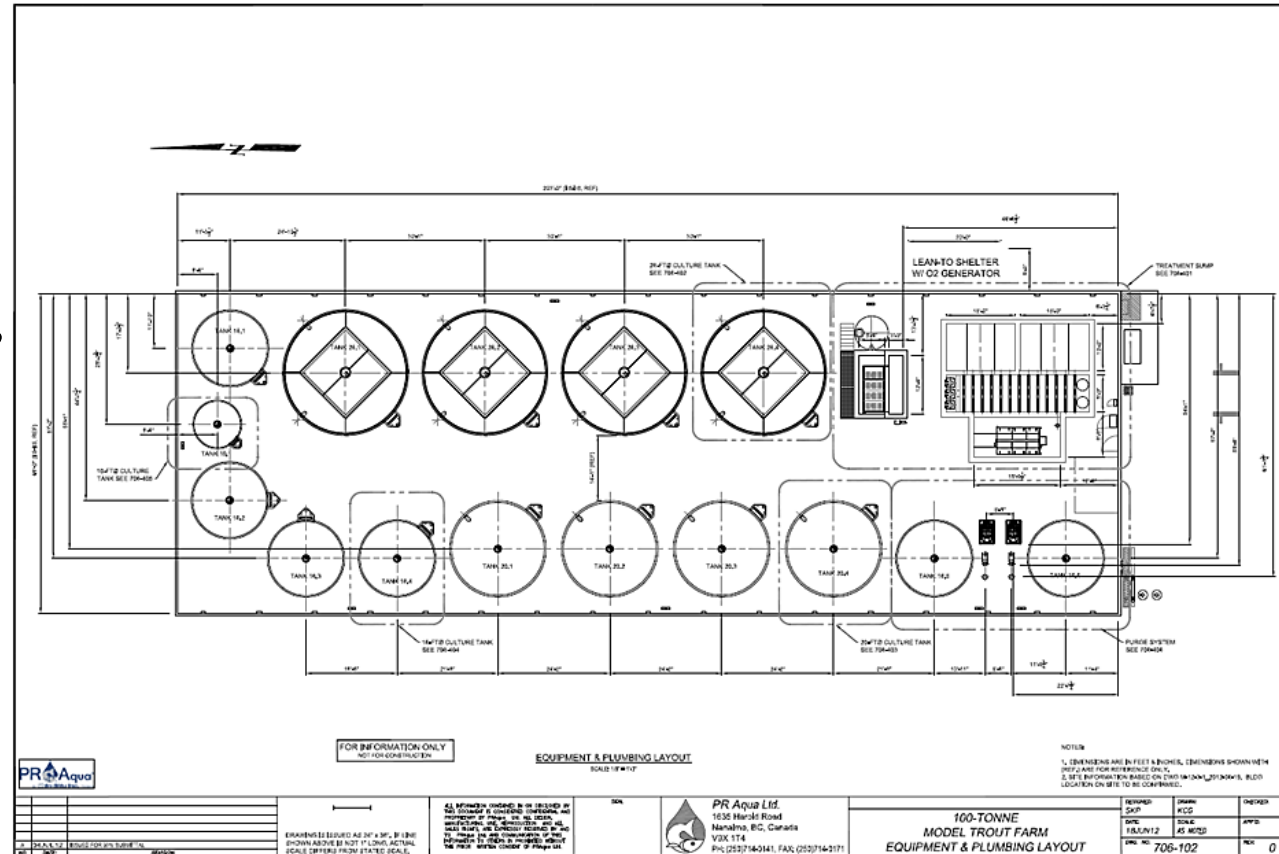
University of Wisconsin  
Stevens Point

Fischer Biological Consulting, LLC  
"Where the fish come first in design!"  
Greg Fischer Lead Biologist  
79655 Water Road  
Washburn, WI 54891  
Phone: 715-209-0011  
Email: gregfischer2@yahoo.com

Stevens Point  
ce

# ➤ Model Fish Farm Template

- 100MT
- Coldwater Model
- Bayfield County Business Park in Wis.
- Based on “Taste of BC”
- Modules:
  - Egg Incubation
  - Fry/Fingerling Rearing
  - Grow-out
  - Purge System



- ❖ In Cooperation with the Bayfield Economic Development Corporation and
- ❖ UW Extension-Bayfield County Agriculture Agent





# University of Wisconsin-Stevens Point Northern Aquaculture Demo Facility

Gregory Fischer  
Facility Operations Manager  
University of Wisconsin-Stevens Point  
Northern Aquaculture Demonstration Facility

36445 State Hwy 13

P.O. Box 165

Bayfield, WI 54814

Phone: 715-779-3461

[aquaculture.uwsp.edu](http://aquaculture.uwsp.edu)



[Subscribe to our Newsletter](#)

