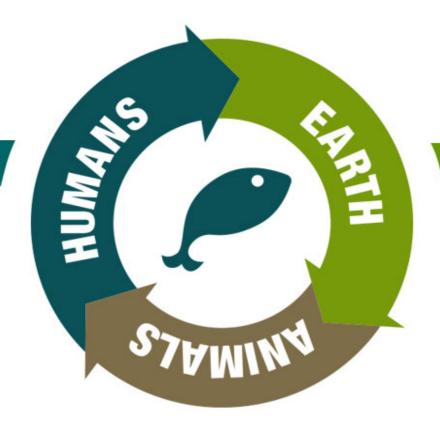


### A Sustainable Future through Fish

Fish raised to meet protein demand of humans



Fish waste becomes Earth food

Earth produces food for Fish



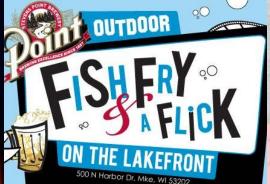


### A Model for the Future?

- Vertically integrated from hatchery to grow out
- Sustainable approach through no waste philosophy
- Diverse product offering fish, feed, fertilizer
- In-house research and development in fish nutrition and health
- Extensive knowledge gained through implementation

**GETTING STARTED**THE FISH



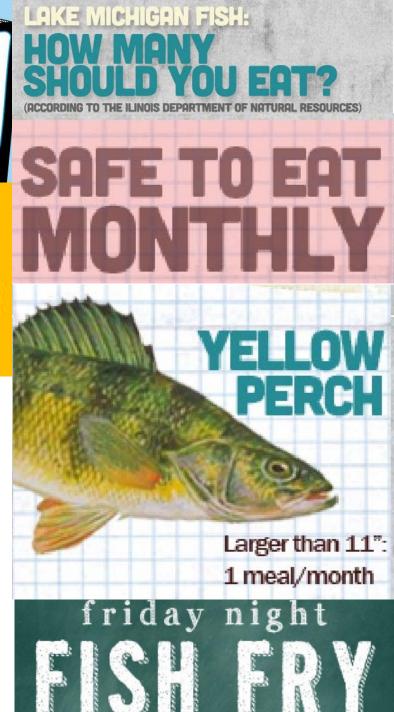


IT'S FRIDAY NIGHT IN MILWAUKEE...

DO YOU KNOW WHERE YOUR FISH FRY 15?

# Why Perch?

- Local market demand the Midwest eats perch
- Gap in supply Great Lakes fish supply not adequate
- Research and funding in place to support





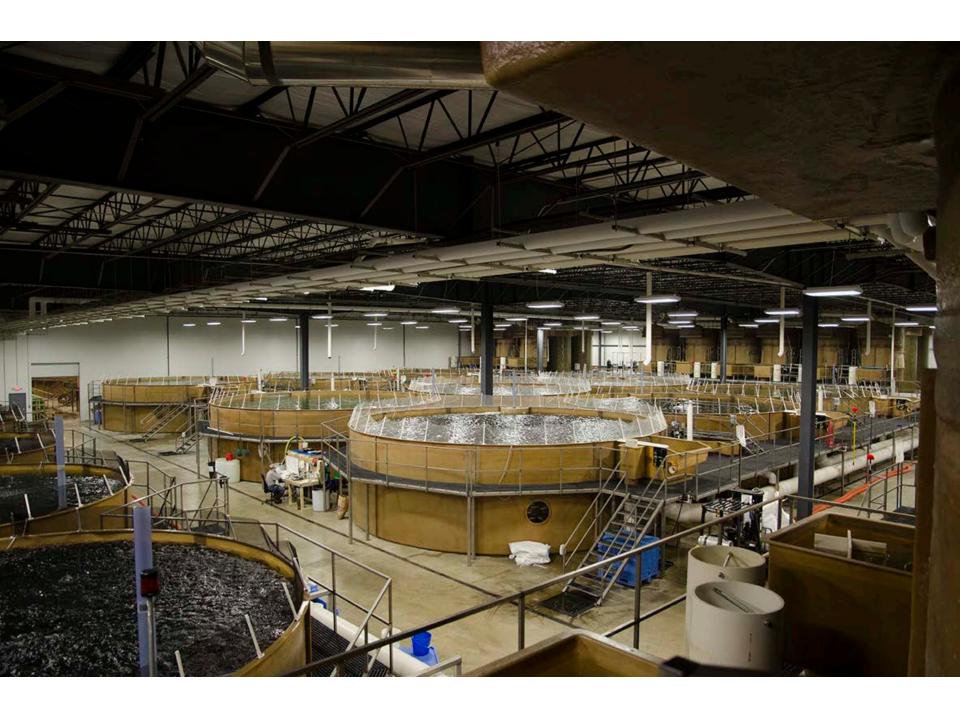
### The System Overview

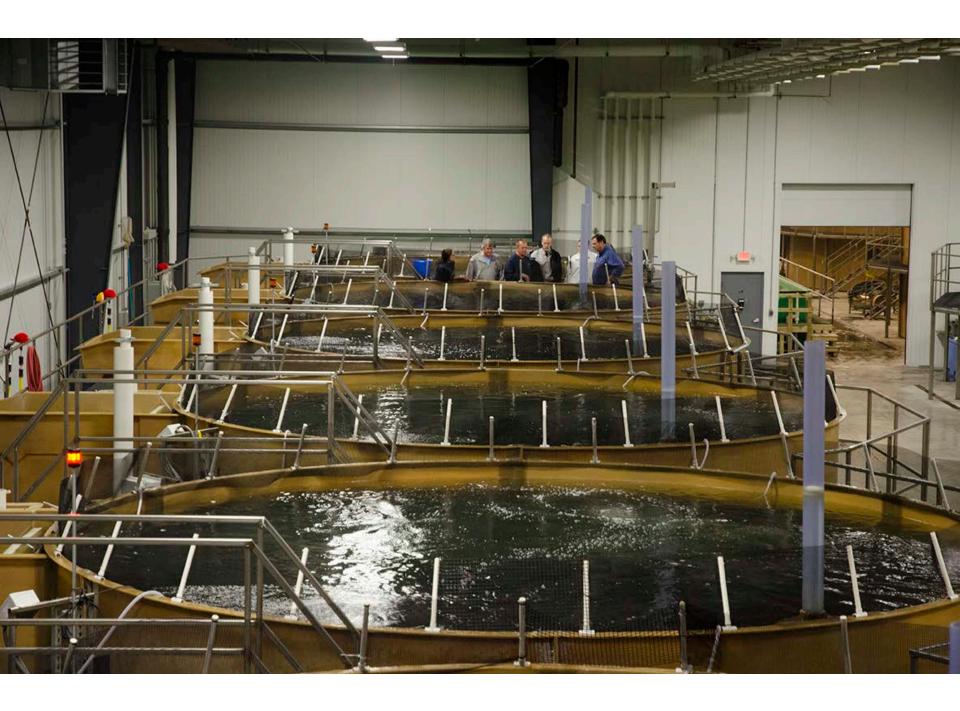
- Designed in conjunction with The Conservation Fund's Freshwater Institute & Aquaculture Enterprises, Inc.
- 1,000 metric ton indoor Recirculating Aquaculture System (RAS)
- 8 independent grow out systems (pods)
- 1 independent fingerling system
- 99.64% Re-circulated water on a flow basis
- Dual drain design waste capture

### The System Pods & Tanks

- Grow out pod
  - 3 tanks (268 m3)
  - Radial flow settler
  - Drum filter
  - Fluidized sand bio filters
  - C02 stripping column
  - LHO
  - Ozone

- Fingerling Pod
  - 6 tanks (90 m3)
  - Radial flow settler
  - Drum filter
  - Fluidized sand bio filters
  - C02 stripping column
  - LHO
  - Ozone













### In-House Processing

- Complete quality control
- Cost saving →outsourcing and transport
- HACCP Compliant
- Complete traceability



# We make every effort to "do it the right way"

- Our process has been rated Best
   Choice by Monterey Bay Aquarium
- We are a Certified Livestock Producer by the State of Indiana





### The Hurdles with Perch

- Yellow perch had never been raised successfully in a contained environment
- Yellow perch do not have the genetic history of other farmed fish
- No existing feed formulation
- Hatchery methods undeveloped
- Significant investment for size yield

### The Result

- All fish sold demand was higher than supply
- R&D costs too high
- Cost/Benefit Analysis
   →not worth the
   investment unless
   supported by
   government ARS



### Why Trout & Salmon?

- Genetic history
- Proven hatchery methods
- Proven feed formulations
- Research & funding available through ARS
- Proven data with RAS technology
- Availability of eggs through Trout Lodge, Target Marine (doesn't require in house broodstock)

#### The Hurdles

- More market saturation → Competition in the marketplace
  - Existing supply of farmed fish
  - Existing seasonal supply of wild fish
- Issues with our local market (Midwest) → trout/salmon are not fish of choice
- Developing better feeds to reduce fat and improve omega profile

# MAXIMIZING VALUE FROM THE WASTE STREAM THE FERTILIZER



### Product Development from Waste

- Our waste can be used to benefit the Earth
- Fertilizer from offal approximately 40% of fish is wasted after processing
- Fertilizer from fish waste take what is captured and reuse it as nutrient support for food production

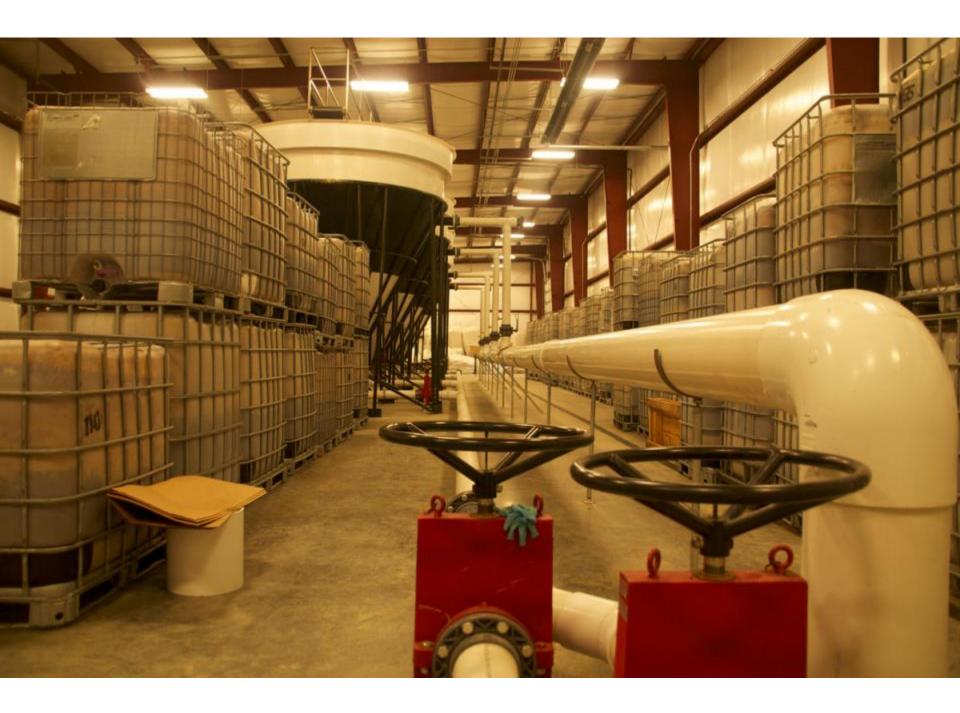


### Fish Rich™

- 2 years to develop proprietary process
- Initially targeted home gardener
- Recently targeting mid to large scale growers
- Positive results from consumer use
- Has not reached market maturity or saturation as of yet
- Some product variations depending on fish species input (fat content)

The only problem I have with your product is that much of my okra has grown to 9+ feet tall. I am 6'2" and it's hard to reach when harvesting...which is almost every day. — Ron, Tennessee





### **Worm Castings**

- In beginning stages of implementation
- First of its kind process

 De-watered fish waste to create food for worms resulting in high nutrient worm castings

Sells for \$1 per pound

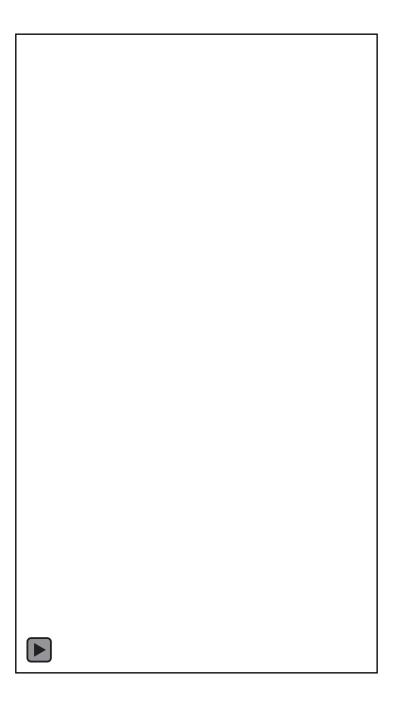




# Fish Waste De-Watering Process



# Fish Waste De-Watering Process



### The System: Biosolid Filtration

- The average concentration of fresh dewatered biosolids on the trailer was 31.9% dry weight, based on three random samples.
- Following are the concentrations of biosolids exiting the bottom cone of the gravity thickening settler as a function of time after opening the bottom drain valve:
  - 35.5% at 20-30 seconds (very thick and viscous barely flowed)
  - 4.74% at 2 minutes
  - 2.36% at 22 minutes
- Note that water passed through the screen/drum press was pumped back into the gravity thickening settler and recycled to dilute the concentration of biosolids.
- Note also that no new water is added to the gravity thickening settler during this process; it is off-line from the main treatment process.

Dr. Steve Summerfelt – Freshwater Institute

# **COMPLETE VERTICAL INTEGRATION**THE FEED

### **Implementation**

- Onsite relocated from existing location in Colorado in December 2013
- Opened July 1, 2014
- Began developing nutritionally profiled and result-targeted feeds (species, aquaponic)







### Success Highly Dependent On...

- Location market demand, market strategy & planning
- Fish genetics
- Strategic investment and planning around vertical integration
- System design mass balance calculations
- Continual investment needed into technology, research & development
- Partnerships critical









Thank you.





