# Native Fish Keepers, Inc.

## Case Study | May – August 2022

### Conducted by:

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### Company Background

Native Fish Keepers, Inc. is a fishery owned and operated by the Confederated Salish and Kootenai Tribes (CSKT) on Flathead Lake in northwest Montana. The facility employs about 16 tribal members for netting and processing. Started in 2017, the 501(c)(3) organization works to suppress invasive lake trout and lake whitefish operations through commercialized gillnetting and fishing derbies as an attempt towards conservation for the native bull and westslope cutthroat trout populations. Once harvested, the invasive species are then filleted and sold to local distributors/markets.

### Project Background

Once the fish is filleted, everything else from the fillet is considered waste and subsequently put back into Flathead Lake. Prior to this project, it was believed that somewhere around 50-67% of harvested biomass from fishing operations was considered waste after fillet production. Once data collection began, it was found that sometimes more than 80% is then waste. On average, about 1400 pounds of waste is disposed of for each production day. As the seasonal fishery operation is very costly and much of the fish being brought in was also being disposed of, it was of high interest to look into new possibilities for this waste stream to then become profitable to further finance suppression efforts.

Additionally, the fishery operation is fairly young, yet fish have been an integral part of the local diet for hundreds of years. Although a fairly substantial understanding of lake trout nutritional is known through global studies and local knowledge, no nutritional analysis has been done for Flathead Lake lake trout specifically. Along with this, the invasive Mysis shrimp was introduced in the 1980s to help the Kokanee salmon population. Mysis are now become an integral part of the lake trout diet. By finding correlations between sensory data of the fillets with site-specific nutritional values, a stronger understanding of how the lake trout's diet changes its fillet nutrition can be made along with how color and/or feel may signal nutrition fluxes.

### Recommendations

- Any waste reduction avenue could prevent 2.4mtCO2e and 272 gallons of fuel annually
- Waister equipment investment would produce ~1600 lbs/week of new profitable product
- Automated pinbone removal could prevent $32,000 of fillet from becoming waste
- Fish hydrolysate production could use all waste to produce an organic biofertilizer or livestock feed

## Field Photos

Blue Bay facility

Picking lake trout from gillnet

Counting fresh whitefish

## Solutions

### Installation of Waister Equipment

Use of this equipment would be costly up front but would possibly provide the most efficient and sustainable source of revenue for the facility. With an upfront cost of $200,000 (+ shipping from Norway) along with $5,000/year for maintenance, it is very expensive. The benefits is that all waste produced in a day would be converted to an nutrient rich powder within a couple hours, about 400 pounds. It would also not require extensive training or specialized employee as it is fully automated once started besides emptying the hopper. It would require 2900 BTU/kg water (0.85 kWh/kg water) along with 51 kW capacity. Each day would use about 4.16 kWh for the daily average of waste. Water from the facility could possibly be recirculated to further limit incoming resources.

### Production of Liquid Fish Hydrolysate Through Phosphoric Acid

Another method to make a locally wanted and more sustainable biofertilizer is through acidification and fermentation. This would also use all waste but can be difficult for long term storage due to microbial instability. The fish waste would require a grinder to 1mm to ensure acidification while 25% w/w phosphoric acid is added (~380L phosphoric acid/week). A 250-gallon stainless steel mixing tank, pump, and agitator would also be required along with phosphoric acid and antioxidants. It can then be pumped into a storage tank while mixing and checking daily to keep quality. This biofertilizer can then be marketed and sold as organic according to USDA guidelines once NPK analysis is done.

### Pinbone Removal System

Along with the filleting process, one step is to remove the pinbones. Currently, this step is done manually. Pinbone removers range from handheld to automated machines with six lanes. Use of equipment could result in 5-10% less loss per fillet, making less overall waste. Removed sections of fillets with pinbones make up about 10% of overall waste. Over the course of a season, this addition could result in over 4000 pounds less waste while making an additional $32,000 in fillet weight by wholesale price.

| Recommendation | Purchasing Cost | Utilities Cost | ROI (if known) | Implementation |
|---|---|---|---|---|
| Install Waister Equipment | $200,000 + shipping<br>$5,000 annually | $150 – power | N/A | Recommended |
| Begin fish hydrolysate production stream | $1000 – mixing tank<br>$500/day - storage | $0 – no pump | N/A | Recommended |
| Install pinbone remover | $20,0000+ | ~$35 – water (handheld) | <1 year | Recommended |