

# Nutrient Reduction Through Food Production



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Physical Science/Botany

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2021 extern at Decorah Fish Hatchery

# Part I: Overview of Workplace

## **Decorah Fish Hatchery and Fisheries Bureau**

Decorah Hatchery is part of the state of Iowa's efforts to stock rainbow trout in the cold water streams predominately in N.E. Iowa. Decorah stocks approximately 150,000 catchable rainbow trout per year. Daily work involves all facets of aqua culture to maintain a healthy, growing fish population. The end result of this is the stocking of trout in the streams located in Mitchel, Howard, Winneshiek, and portions of Allamakee county.

Fisheries side assists in management of all bodies of water. Intense population studies and testing of physical characteristics of the water are only a small portion of the work required. The office is located at the hatchery. Their work primarily occurs away from the hatchery site.

In both sides a workflow is developed and staff from either area assist the others in the implementation of the weekly, monthly, and long term goals.

## Part II: Workplace Focus

The hatchery is a dynamic system. It is dependent on the spring at the hatchery for all of its water. The Trout Run watershed is 51 mi<sup>2</sup> of karst topography. It is the 2<sup>nd</sup> largest watershed within the Upper Iowa watershed. It accounts for the largest erosion loss of soil within the watershed.

(Data:<http://northeastiowarcd.org/uirw/files/Appendix%20J%20GIS%20Analysis%20of%20the%20UIRW.pdf>)

# Workplace Focus

- **The hatchery and fisheries staff consist of the following.**
  - Regional Manager (oversees all three hatcheries and all staff)
  - Hatchery Manager
  - Fisheries Biologist (Two)
  - Two Full time fisheries technicians
  - Three seasonal staff
  - One watershed position focused on the improvements to Trout Run watershed.

## Part III: Introduce the Problem

*H.S. -LS2-7 Ecosystems: Interactions, Energy, Dynamics, Design, Evaluate, and refine a solution for reducing the impacts of human activities on the Environment and Biodiversity.*

*Problem:* Large amounts of N,P,K coming into the hatchery and being moved through the system to the final settling ponds. In addition the biological waste of the fish only add to the nutrient load.

Design a hydroponics system to grow food on the settling pond. Using available nutrients for food production. List of variables TBD

## Problem Introduction continued

System must be financially feasible, wildlife proof, weather tolerant, and easily managed.

The end goal is to take the knowledge gained and scale it up to a system that can reduce the nutrient load before it gets to the fish or during the stages of water movement at the hatchery.

*The public product:* Students will present their project details and suggestions going forward to the hatchery staff by the end fall 2021 semester.

## Part IV: Standards, Driving and Essential Questions

*H.S. -LS2-7 Ecosystems: Interactions, Energy, Dynamics, Design, Evaluate, and refine a solution for reducing the impacts of human activities on the Environment and Biodiversity.*

We want to solve a problem. Everyone can identify that nutrient management in Iowa is a personal decision of each land manager. No oversight or requirements from the state on the agricultural practices of any individual landowner. (excluding manure management plans).

## Part IV continued

The use of hydroponics to grow food from the N-P-K in the spring water plus metabolic waste of fish allows us to potentially design a system to help mitigate the n-p-k that is coming into the hatchery via the spring.

A bonus would be a system that reduces the nutrient load while providing a funding stream that is non traditional.  
(i.e. water cress)



## Part V: Extern Host Role

Role: Provide Technical assistance to students as needed. Grant access to site and needed location for testing. Finally, listen and critique designs as appropriate.

Hatchery Phone: 563-382-8324

Brian Malaise- Decorah Hatchery Manager

Brian.Malaise@dnr.iowa.gov

Caleb Schnitzler- Hatchery Technician

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## Part VI: Student Learning

### **Do they have some level of voice and choice?**

Yes, all students presented with the problem. If students have other locations in mind to test the design that is encouraged.

### **Are there opportunities for revision?**

Based on water temps at the hatchery and cool season plants we should be able to run multiple longitudinal trials, allowing for revision and new learning.

### **Are there opportunities for reflection along the way?**

Students will keep a journal. Students will present project results to hatchery staff. A final reflective paper is the capstone.

# Brad Johansen Contact

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