

Division of Marketing
Agricultural Development and Diversification (ADD) Program

1998 Grant Final Report

Grant Number 13037

Grant Title Bottom Draws - Study on the Positive/Negative Effect of Bottom
Draws on Commercial Fish Ponds (Phase 1)

Amount Awarded \$12,700.00

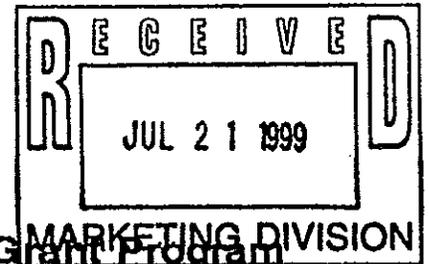
Name David Gollon

Organization Gollon Bait & Fish Farm
Dodgeville

E-Mail gollon@chorus.net

WEB

Department Contact: DATCP - Marketing - ADD Grants
PO Box 8911 Madison, WI 53708-8911
Tel: (608)224-5136
<http://datcp.state.wi.us>



6-30-99

Agriculture Development and Diversification Grant Program
Grant Round 10

Fourth Progress Report (Due July 1, 1999)

**STUDY ON THE POSITIVE/NEGATIVE EFFECT OF BOTTOM DRAWS
ON COMMERCIAL FISH PONDS**

Gollon Bait & Fish Farm

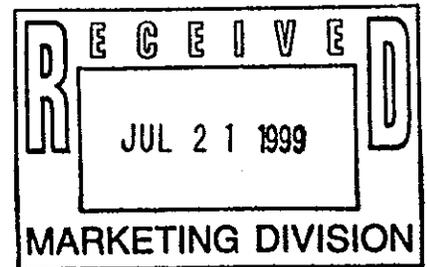
Summary

We have continued collecting data regarding temperatures at various depths within the production ponds. In addition dissolved oxygen and total ammonia levels have been recorded. Effluent samples have been collected and analyzed for various parameters including: temperature, dissolved oxygen, total ammonia, biological oxygen demand, suspended solids, and phosphorous. The data collection and additional work was performed during this period, and analysis was performed on some samples at En Chem Laboratory, Madison, Wisconsin. We will submit a report on the preliminary findings in the form of a written document to Wisconsin Department of Agriculture, Trade & Consumer Protection, ADD program administrators within two weeks. We feel this grant will contribute to a re-thinking of water quality issues on fish farms, and this will assist in Wisconsin Aquaculture's progress.

Ponds are presently being retro-fitted to function as bottom draws. We anticipate the need to purchase a water flow meter for additional data collection during year II of this grant.

We will make making arrangements for the scheduled Summer quarter visits. No difficulties are for-seen in completing the short-term or long-term goals of this proposal.

Interestingly, the Wisconsin Department of Natural Resources has proposed hiring 2 LTEs at a cost of between \$31,099.00 to \$36,859 over the next biennium to collect water quality data related to ponds. We applaud their efforts, however seriously question why this effort was not pursued prior to attempting to require aquaculture ponds in Wisconsin to all be reconstructed to bottom draw.



Preliminary Findings (6-30-99)
**Bottom Draws: Study on the Positive/Negative Effects of Bottom Draws
on Commercial Fish Ponds**

Gollon Bait & Fish Farm
Dodgeville, Wisconsin

Executive Summary

Management practices on aquaculture production ponds is very important factor in affecting water quality of the effluent. The management of the feed, fish densities, construction of these ponds, among other factors, can affect the quality in the ponds and the effluent. The use of water for rearing fish does not necessitate water quality problems to the ponds or the receiving waters. In Wisconsin aquaculture is very diverse, and more diverse than most states. We rear many species and fish farmers use water in very different ways (raceways, tanks, ponds ...) to rear fish. In the efforts to address the regulatory issues of water quality effluent discharge the management of water in the commercial fish ponds must be understood. Additionally, the water quality of the receiving waters must be accurately understood.

Preliminary evidence of this study indicates no significant benefits to water quality of the receiving waters would result from bottom draw opposed to top draw pond drains in commercial fish ponds comparable to those under investigation in this study.

Introduction

This study is intended to investigate the effects of top draw versus top draw drain pipes in commercial fish farms on water quality. Gollon Bait & Fish Farm wanted to investigate the water quality of their production ponds, their farm effluent, and the receiving stream. This study should benefit the Wisconsin Aquaculture Industry and contribute to meaningful regulatory decisions. Some of the reasons why Gollon Bait & Fish Farm felt the need to investigate this issue included:

- potential regulatory requirements from Wisconsin Department of Natural Resources (WDNR)
- concern that fish farms contribute to pollution of streams
- concern by WDNR that top draw drains contribute more to water degradation/pollution than bottom draw drains

Protocol

Sample collection was performed by Dr. Myron Kebus, Wisconsin Aquatic Veterinary Service, Madison, Wisconsin. Testing was conducted twice monthly from August to October, and March to June. It was conducted monthly from November to February. Dissolved oxygen was measured using Yellow Springs Instruments Model 58 dissolved oxygen meter. Total ammonia nitrogen, and temperature were measured using Hach (Loveland Colorado) Test kit equipment. Total suspended solids, biological oxygen demand, total phosphorus were measured by Enchem Laboratories, Madison, Wisconsin.

Subjective Findings

There was no significant visible evidence of debris or large particles in the waters tested during any sample times. The receiving stream did not contain significant debris other than varied quantities of cattle manure from animals pastured on either side of the stream. The clarity and appearance of the effluent appeared better on every sample day compared to upstream or downstream observations. In addition to fish, aquatic animals such as frogs and turtles were often observed in the fish farm effluent flows.

Objective Findings

• **Temperature**

For most periods of the year, there is no detectable difference between the temperature between top and bottom water of the commercial fish ponds investigated in this study. The greatest difference in temperature between top and bottom water of the largest ponds was 3⁰F. The temperature between top and bottom water of individual fry ponds did not vary

significantly. During winter months effluent temperature was occasional cooler than stream temperatures (up to 3⁰F). Effluent water temperature were as great as 16⁰F warmer than the upstream temperatures yet the downstream temperature was elevated by only 1⁰F. Stream temperatures varied up to 3⁰F between difference stretches of the stream.

- **Oxygen**
- **Total ammonia nitrogen**
- **Total Suspended Solids**
- **Biological oxygen demand**
- **Total phosphorus**

The values recorded for the above five additional water quality parameter, were overall, more favorable to support aquatic animal life than the values recorded from the receiving stream, and neighboring streams in the vicinity.

Assessment

- **Temperature**

The lack of great difference in temperature between top and bottom water of the broodstock ponds (3⁰F) makes the benefit of engineering bottom draw drains questionable. Stratification, the difference in water temperature from top to bottom, does not occur to a significant extent in aquaculture ponds such as those investigated in this study. The receiving stream is not significantly altered, even during periods such as hot weather. Bottom draws would be of no value from a temperature standpoint in fry ponds similar to those in this study. Drawing water from the bottom during winter months shows virtually no value from a temperature standpoint in the study pond effluent temperature was occasional cooler than stream temperatures (up to 3⁰F). Stream temperature variation is greater than temperature variation caused by aquaculture effluent in this study.

- **Oxygen**
- **Total ammonia nitrogen**
- **Total Suspended Solids**
- **Biological oxygen demand**
- **Total phosphorus**

The quality of the fish farm effluent was mainly better than the quality of the receiving stream. The benefit of bottom draw versus top draw drains in commercial fish ponds like those investigated in this study are not evident based on year I results. The results recorded for the above five additional water quality parameters support this assessment.

Additional Comments

- There are factors other than pond depth which affect the difference in temperature (stratification) between top and bottom water in Wisconsin aquaculture ponds.
- There is significant variation in stream water temperatures within relatively short stretches of a stream.
- The aquaculture pond effluent temperature, investigated in this study, has limited impact on stream water temperatures.
- Water parameters suggested as important indicators of pollution by the U. S. Environmental Protection Agency are very low in the effluent of the aquaculture ponds investigated in this study.
- Aquaculture industry needs to continue to characterize the nature of the water on and leaving their farms, as well as the receiving waterways.

To our knowledge this is the most extensive study of water quality of a commercial aquaculture facility in Wisconsin. Apparently, no equivalent study has been conducted by the Wisconsin Department of Natural Resources (WDNR) on aquaculture facilities. The WDNR duties include water quality regulations.

Plan

The plan is to design, construct, and install bottom draw equipment for the study ponds. Water quality measurements will be performed from July 1999 to July 2000. Similar protocol will be used for water quality testing. A final summarization report will be conducted in 2000.