Amberjack (*Seriola rivoliana*) Nursery Fingerling Production, Year 1*

General Information

Reporting Period January 1, 2004–September 30, 2004

Funding Level

Year	Amount
1	**$100,000**

Participants

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The Oceanic Institute (OI)

Objectives

The goal of this project is to increase the density and efficiency of longfin amberjack fingerling production to meet fingerling demands for grow-out operations (offshore cage and onshore) in Hawaii. In addition to being reliable, these systems must be economically viable and environmentally responsible. Specific project objectives are as follows:

1. Determine the maximal stocking density for nursery production systems under advanced partial water reuse system technologies.

* After this proposal, originally titled "Greater Amberjack (*Seriola dumerili*) Nursery Fingerling Production," had been written, it was discovered that kahala actually represents two different species of fish. The species the industry in Hawaii works with is the longfin amberjack, *Seriola rivoliana*.

2. Disseminate project findings through on-site working sessions and via a full written nursery protocol for industry dissemination.

Anticipated Benefits

This is part of an ongoing effort to diversify the Hawaiian aquaculture industry, with emphasis on developing aquaculture technology of higher-value species such as the longfin amberjack. Hawaii has a select advantage over competing regions such as Japan, the Mediterranean region of Europe, and even the mainland United States due to ease of access to pristine waters of the open ocean with relatively constant year-round temperatures. However, to make offshore cage production economically viable, it is necessary to significantly increase the fingerling production capacities of onshore hatchery production facilities while working to minimize water use and waste discharge. Funding through other sources is supporting the Oceanic Institute (OI) in its drive to develop year-round seedstock supplies and improvements in hatchery technologies for amberjack as commercial suppliers are starting to come on-line. However, in order to scale up production to meet the requirements of offshore and larger onshore grow-out operations, it is also necessary to significantly increase the efficiency and intensity of nursery operations.

Work Progress and Principal Accomplishments

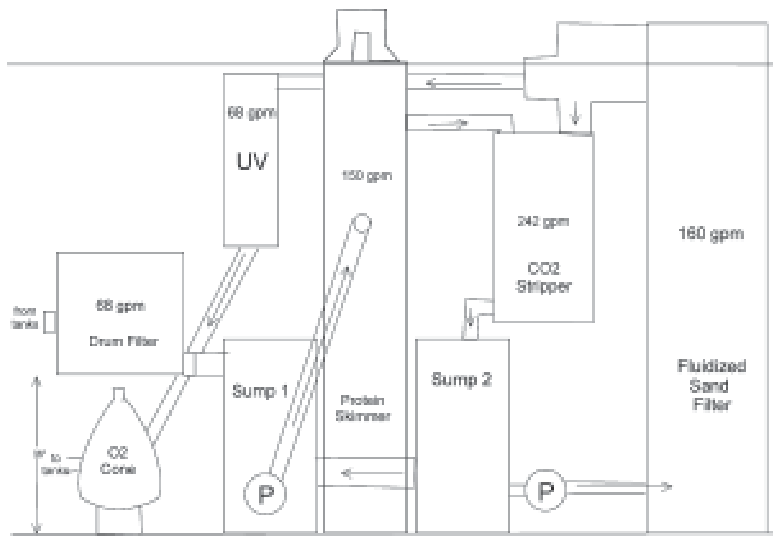
Maximization of Nursery System Stocking Density

Objective 1: Determine the maximal stocking density for nursery production systems under advanced partial water reuse system technologies.

The nursery production system design and tank setup has been completed.

System design and tank setup for the nursery experiment has been completed. The system is composed of six treatment groups with three replicates of each treatment. The control fish will be raised using a flow-through water supply as is currently operated at the OI production hatchery and nursery facility, with fish densities well below 10 kg/m^3. The remaining treatments will examine the effect of fish densities (five treatment groups) using recycled water.

The test system is composed of eighteen 180-gallon round flat-bottomed tanks purchased from Polytank (model # PT5228) and are currently onsite. Filtration (see diagram) will consist of a pass through a microscreen drum filter (PRAqua model #RFM3218, currently on-site), which removes solids prior to their reaching the sump tank. Water will then be pumped through a protein skimmer (RK2 model # RK150-PF, currently on-site) and allowed to fall through a CO_2 stripper (PRAqua, to be shipped) and into a second sump. Water from the second sump will be pumped through a fluidized sandbed biofilter (Marine Biotech Cyclobio 36, currently on-site) and into a head tank attached to the filter. Water from the head tank will either be sent back through the CO_2 stripper and into the second sump or to the holding tanks, passing through a UV sterilizer (Aqua UV model # Viper 400, currently on-site) and an O_2 cone (Maine Biotech 12", on order).



Nursery Experiment Filtration

Written Nursery Protocol and Public Workshop

Objective 2: Disseminate project findings to the industry through on-site public working sessions and a full written nursery protocol for industry dissemination.

The technology transfer components of the project will be initiated upon completion of system setup and planned experimental trials as outlined under Objective 1.

Work Planned

1. Complete system installation.
2. Test system operation.

3. Produce large batch of longfin amberjack fingerlings for nursery trials.
4. Run nursery trials examining the effect of fish density and water reuse systems on nursery performance of longfin amberjack.
5. Develop written nursery protocol.
6. Conduct public workshop.

Impacts

Amberjack is one of several emerging marine finfish species thought to have outstanding aquaculture potential in the United States. A substantial market has already been developed for the species in Europe and Asia where it is well recognized for its fast growth and high market value. Difficulties in obtaining reliable seedstock supplies (i.e., viable spawns), and low hatchery survival have generally forced the industry in Japan and Europe to rely on the collection of fingerlings from the wild to stock tanks and cages. These resources are not available in Hawaii and are not sustainable in other areas of the world where wild sources of amberjack fingerlings are already depleted. In contrast, OI began developing amberjack broodstock and larval rearing technologies in the mid-nineties, with the establishment of the first natural spawning stock in 1999. In 2001, OI succeeded in closing the life cycle for the species in captivity with the establishment of year-round spawning stocks of domesticated broodstock. Although more effort is needed in both reproductive and larval hatchery technologies to attain commercial levels of reliability and hatchery output (to be addressed in Years 2 and 3), bottlenecks in nursery phases just prior to stocking in offshore cages are quickly becoming a limiting factor to industry start-up. Pilot-scale procedures currently in place for Pacific threadfin production are simply insufficient to meet the growing demand of offshore cage production facilities, and this situation will only get worse as the industry begins to intensify to obtain economies of scale necessary for commercial success. It is expected that current “low-tech” approaches that are currently being stretched to deliver 100,000 threadfin fingerlings can be intensified so that the same tank and water resources can reliably deliver two to four times the current fingerling supply.

Publications in Print, Manuscripts, and Papers Presented

None to date.