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Quarterly Report

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To: CALFED Bay-Delta Program

Project: B81581, Delta Smelt Culture, State Water Project site - Byron

Date: 4/8/99

The objective of this project is to develop methods to culture the threatened fish, delta smelt. Numerous researchers are looking for a supply of smelt for basic and applied research, such as toxicology testing and improved fish screen design work. We are funded by CALFED for the first year of a three year grant. Emphasis in the first year is on improving the physical facilities at our site, optimizing spawn performance and larval culture procedures. Developing methods for the capture of post-larvae from the field for culture will be a minor emphasis this year.

This progress report briefly summarizes the progress from July 98 to present, and indicates the progress made in the current quarter: Jan - Mar 99.

I. Task 1: Physical improvements at the site, and development of method to sterilize the delta water; Jul 98 - Jan 99

Previous work:

- Electrical wiring is completed in the new hatchery lab- providing lighting and capacity to install the new water chilling unit recently purchased.
- Hatchery lab is plumbed to provide water and drain lines to all tanks.
- Hatchery is partitioned to accommodate culture of the following life stages of delta smelt: eggs, larvae, and post-larvae to juvenile stages. Room has been allocated for rotifer and *Artemia* cultures.
- Research and development of a disinfected water supply - continuous ozonation of the delta water.

Current Quarter; Jan - Mar 99. Task 1 extended to Jun 99 with CALFED agreement.

- Equipment for an ozone tower, tank for removing ozone, and water storage tank have been purchased and installed.
- Disinfected water supply is produced with an ozone generator and oxygen supply (rental equipment) and plumbed to service incubating eggs, larval rearing tanks, post-larval rearing tanks, and rotifer and *Artemia* cultures.
- New water chilling unit installed, provides temperature control of ozonated delta water.
- Re-circulating water supply with bio-filtration is now operable.

Rearing trials with larvae will include use of both a disinfected water supply (ozonated) in a flow-through system, and a "mature" re-circulating water supply. Use of a mature supply of water has shown some advantages with some larval species.

II. Task 2: Collection and maintenance of broodfish, testing of larval systems, and initiation of rotifer culture; Nov 98 - Jun 99

Previous work:

- Collection of broodstock was accomplished quickly in late October - 360 fish in four trips. Mortalities have been minimal over the winter. Daily maintenance of broodfish since capture.
- Bacterial inoculation of the bio-filter for the re-circulating water supply was done in mid-December to establish the mature water supply.
- System preparations for rotifer culture complete: system built to circulate warm (in-line heater) and salted (10ppt NaCl) water through hatchery and back to a storage tank. Water passes through UV light and water filter in plumbing loop.
- Order initial culture of rotifers beginning of March

Current Quarter; Jan - Mar 99

Broodfish have survived well over the winter and are beginning to spawn. Rotifer culture is up and running at anticipated capacity for fully operative hatchery. We are conducting a preliminary test of our two water types for egg incubation and larval rearing trials.

Broodfish and Rotifer culture:

- Daily maintenance of broodfish continues through the spring. Tanks are siphoned, wiped down and fish fed. Dead fish are removed and weights and lengths recorded. Fish are treated as necessary with nitrofurazone and formalin to prevent spread of disease.
- Rotifer culture has been steady at 15-20 million/day since mid-March. Daily maintenance includes 5 feedings of Bakers yeast/day, harvesting, straining and washing of rotifers and re-inoculation of one tank/day on a rotating schedule. Rotifers counted (#/ml) and inspected daily from all tanks.

Egg and larval systems:

- Egg incubation trough houses initial spawns from captive broodfish.
- Eggs are developing nicely in the ozonated delta water.
- The larval rearing tanks are complete and water and airflow systems have been tested.

Preliminary egg and larval trial:

- Several spawns were available from delta smelt stripped after collection at the Tracy Fish Screens (CVP) allowing a preliminary rearing trial.
- Embryos were incubated in the ozonated delta water and hatched at the SWP site.
- 2000 larvae were distributed to four 20-liter tanks. Larvae are growing well at three weeks and feeding on live prey. They are feeding and growing in both the re-circulating water system and the ozonated delta water.
- Initial rearing trial allows development of maintenance procedures and training of personnel.
- Best methods to date include: rotifers (density 10/ml) and algal suspension added five times /day, two siphonings of each tank/day - includes the inspection of siphon water for live (returned to tank) and dead larvae. Water flow rates to the larval tanks are 200 ml/minute.

We are on-track with the schedule and tasks proposed. We will begin larger larval fish rearing experiments and short-term larval feeding experiments, scheduled for the 4th quarter, as we obtain more spawns.

Current CALFED funding ends June 30 1999. We have submitted a proposal (CALFED PSP, Feb 99) to continue our Delta Smelt Culture Project. We are also requesting "bridging", or interim, funding from the State Department of Water Resources and the U. S. Bureau of Reclamation for three months. Should we receive this bridging funding and continued CALFED funding we should be in good shape to rear the current cohort of fish up through metamorphosis to juveniles, gaining a full years information on rearing techniques. In the event that we do not receive additional funding we will have to bring the project to an abrupt halt and lose all animals in June. Trained personnel would be let go. Year-round funding and a multi-year grant would accelerate the research on developing successful delta smelt culture methods.