

## EXPERIMENTAL CULTURE OF THE GIANT MALAYSIAN PRAWN

Robert E. L. Taylor, D.V.M.  
Veterinary Medical Center  
University of Nevada, Reno

### Abstract.

The feasibility of raising the Giant Malaysian Prawn (Macrobrachium rosenbergii) in cooling pond waters of the Fort Churchill Power Plant, Wabuska, Nevada is discussed. Methods for the production of post larvae and pond culture data are described. Shrimp averaging 17 grams were produced during the first five months of pond culture despite below optimum water temperatures, indicating the possibility of commercial operation in the warmer months of the year.

---

### INTRODUCTION

Sierra Pacific Power Company operates the Fort Churchill Power Station, a 220 megawatt plant at Wabuska, Nevada. This oil powered facility has 240 acres of cooling ponds, with an average depth of 3 m (10'). Water is recirculated through the plant raising the water temperature an average of 8°C (14°F). Cooling pond temperatures vary from summer highs near 43°C (110°F) to a low of 21°C (70°F) during the winter in the pond receiving the plant discharge. The cooling ponds have been stocked with several species of fish under an agreement with The Nevada Department of Fish and Game and fishing is allowed during part of the year. This precludes the culture of prawns directly in the cooling pond without the use of cages.

The Giant Malaysian Prawn (Macrobrachium rosenbergii) has been introduced into Hawaii by T. Fujimura, Hawaii Fish and Game and is presently being commercially produced in that state as well as Florida, Puerto Rico and Central America. Optimum conditions for prawn growth are fresh 28°C (83°F) water which produces prawns of 45 to 70 grams in a 6 to 9 month growing season. Larval stages require brackish water and a separate larval rearing facility is required. Specific culture requirements are presented in "The Aquaculture of Freshwater Prawns/Macrobrachium Species," by H.L. Goodwin and J.A. Hanson which is available from the National Technical Informational Service, U.S. Dept. of Commerce, Washington, D.C. 20230 (#PB246657) for \$5.00.

A grant was received from the Sierra Pacific Power Company in September, 1976 to explore the feasibility of raising these prawns in cooling pond waters at the Fort Churchill Power Plant.

### Methods

Adult brood stock was obtained from Hawaii Fish and Game and maintained in circular fiberglass tanks, 1.23 m (4') in diameter and .82 m (32") deep. A closed freshwater system using air lifts which recirculated water through a gravel bed was used.

Aquarium heaters maintained the water at 27 C (80°F). Four females were kept with each male and gravid females were allowed to remain in the tanks until after their eggs hatched. Free swimming larvae were removed from the tanks and placed in larval culture tanks containing brackish water (12‰ salinity) made from synthetic sea salts. (Aquarium Systems, Eastlake, Ohio).

Larval culture tanks were made of metal coated with epoxy in the shape of a cone to allow settling of debris to a central point. The 416.35 L (110 gallons) tanks had a threaded fitting at the bottom to allow emptying of the tank and gravity flow to the filtering system. A standpipe with screened openings allowed passage of water but prevented escape of the larvae. Water flowed from the tanks by gravity through a 10 micron GAF bag, (GAF Corp., Oakland, California) to an oyster shell biological filter and was pumped back into the larval tanks. Water within the larval tanks was maintained at 27-28°C (80-82°F), 12‰ salinity and constantly aerated.

Larvae were fed 24 hour brine shrimp nauplii supplemented with fresh fish eggs. The bottoms of the tanks were syphoned free of debris and the culture water completely exchanged through the filters once daily.

Two 1/4 acre dirt ponds were constructed adjacent to the main cooling ponds at the Fort Churchill Power Plant. Water was supplied to these ponds by pumping from one of two discharge tubes which carried water from the plant to the cooling ponds. Water to the experimental ponds was carried in 10.16 cm (4") PVC pipe at a maximum flow of 1419 LPM (375 GPM). A water depth of approximately .82 m (32") was maintained in the ponds by a standpipe welded to a culvert at the outlet end of the ponds. Total draining of the pond could be accomplished in about three hours by removal of the gate valve covering the culvert.

## RESULTS

### Post Larval Production

Using the methods described above, survival rates through the larval stages to post larvae varied from 21 to 68%, (Table 1). The highest survival rates occurred when water quality was carefully monitored and fish eggs were fed several times daily. Adequate numbers of brine shrimp (approximately 5/ml) improved rate of growth and survival. First post larvae generally appeared by 25 days and complete conversion to post larvae was accomplished in 35 days.

### Pond Stocking

Post larvae were held in the laboratory and stocked into the test ponds at weights ranging from .2 to 2 grams each. Originally two 1/4 acre ponds were stocked but because of problems in maintaining adequate water temperatures the shrimp were eventually combined into one pond. Periodic seining of the pond was used to obtain samples for weighing, (Table 2). A combination of trout pellets and Purina Marine-25 Shrimp diet was fed once daily. Shrimp were fed approximately 5% of their biomass daily.

Beginning at 90 days post stocking some prawns as large as 40 grams were observed despite an average size of only 5.3 grams at that time. During the 5 months grow out period 100 of these larger prawns were harvested for marketing studies.

TABLE 1.--SUMMARY OF M. ROSENBERGII LARVAE HATCHED WHICH  
 PROGRESSED TO POST LARVAL STAGE

HATCH NO.	NO. LARVAE HATCHED	NO. POST LARVAE RECOVERED	% SURVIVAL
1	4,000	1,480	37
2	11,680	5,800	50
3	19,000	13,000	68
4	33,000	7,300	21
5	17,500	7,900	45
6	39,000	13,670	35

TABLE 2.-- AVERAGE GROWTH RATE OF POND REARED PRAWNS

DAYS POST STOCKING	AVERAGE WEIGHT IN GRAMS
0	.2-2.0
34	1.46
64	4.1
90	5.3
106	7.5
135	11.0
142	13.0
157	17.0 (27/LB.)

Pond temperatures, (Table 3) dropped after October with colder ambient temperatures. Despite temperatures 7° C below optimum, prawn growth has still been significant.

### DISCUSSION

Since the pond has not been completely harvested and the total crop weighed, figures are not available for the yield per acre. However, using the initial numbers stocked and a 10% monthly mortality, a theoretical yield of 680 Kg (1496 pounds) per acre for 5 months can be computed. Yields in other areas producing shrimp are 909-1818 Kg/acre (2000-4000 pounds/acre) for a 6 to 9 month growing season. With the abundant land and water available at the Fort Churchill site commercial production during the 7 warmest months of the year seems feasible.

TABLE 3.--AVERAGE MONTHLY WATER TEMPERATURES OF PRAWN CULTURE POND

AUG.	80.0 <sup>o</sup> F
SEPT.	83.6
OCT.	83.0
NOV.	72.6
DEC.	73.1
JAN.	72.4