PRELIMINARY STOCKING STUDY OF JUVENILE WHITE RIVER CRAWFISH AND RED SWAMP CRAWFISH IN BRACKISH-WATER PONDS

W. GUTHRIE PERRY AND WILLIAM C. TRIMBLE

Reprinted from THE PROGRESSIVE FISH-CULTURIST
Vol. 52, No. 2, April 1990
Made in United States of America

The Progressive Fish-Culturist 52:112–116, 1990

Preliminary Stocking Study of Juvenile White River Crawfish and Red Swamp Crawfish in Brackish-Water Ponds

W. GUTHRIE PERRY

Louisiana Department of Wildlife and Fisheries
Grand Chenier, Louisiana 70643, USA

WILLIAM C. TRIMBLE[1]

Trimble Corporation
Weber Building, Room 610
Lake Charles, Louisiana 70601, USA

Abstract.—A study was initiated on rearing juvenile white river crawfish (*Procambarus acutus*) and red swamp crawfish (*P. clarkii*) to marketable size in brackish-water, nonvegetated ponds at Louisiana's Rockefeller Wildlife Refuge. Three 0.1-hectare earthen ponds were stocked at a rate of 11.0 juveniles/m^2 with a ratio of 5.9:1 for white river and red swamp crawfishes, respectively. The ponds were filled and maintained with filtered brackish water with salinities ranging from 0.8 to 1.5‰. A 25%-protein pelleted ration was administered on weekdays and adjusted at 3-week sampling intervals. After 129 d, all ponds were seined and drained to determine production. The combined production of white river and red swamp crawfishes averaged 290.3 kg/hectare. A low average survival rate (18%) for white river crawfish and possible recruitment of red swamp crawfish influenced feed conversion (amount fed/weight gain) which averaged 5.4. At harvest, production and average weight of white river crawfish was about twice that of red swamp crawfish.

Generally, pond production of juvenile red swamp crawfish (*Procambarus clarkii*), commonly called red crawfish, provides adequate crops for market and brood stock when conventional culture methods are used (LaCaze 1970; Avault 1973; Huner and Barr 1984); however, numerous atypical conditions suppress yields. For example, mortalities of juveniles and brood stock may occur in burrows and oxygen-deficient ponds. Predation, levee washouts, forage depletions, pesticide drifts, and other causes may also lower production. Additionally, newly constructed ponds may lie idle awaiting spring stocking when conventional crawfish culture methods are used.

Some of the problems of conventional crawfish culture could be eliminated by stocking and feeding juvenile crawfish to marketable size. Juveniles for grow-out may be obtained by seining ponds and, eventually, from hatcheries as a result of research on crawfish reproduction (Perry 1970; Nelson and Dendy 1979; Black and Huner 1980; Konikoff and Gaudé 1984; Trimble and Gaudé 1988). Although feeds have been considered uneconomical for Louisiana's crawfish crop (Romaire and Avault 1982), numerous trials have shown production potential for feeding crawfish (Smitherman et al. 1968; Clark et al. 1974; Huner et al. 1974; Romaire et al. 1978). Grow-out of crawfish with feeds would free ponds for crop rotation with other crustaceans or fish during the spring and summer months and would eliminate the need to keep ponds empty to rear forage plants for crawfish during these months.

Several producers of red crawfish have expressed interest in growing white river crawfish (*P. acutus*), locally called white crawfish, in Louisiana's fresh and brackish-water marshes. Bean and Huner (1978) reported that white crawfish grew larger than red crawfish when polycultured at five different ratios in freshwater containers. On the other hand, more recent studies in freshwater plastic or earthen ponds have indicated that red crawfish can dominate white crawfish (C. G. Lutz, Louisiana State University, unpublished data; J. V. Huner, Southern University, unpublished data).

The purpose of this research was to evaluate the polyculture of red and white crawfishes stocked in brackish-water, earthen ponds as juveniles and fed a commercial diet.

Methods

The polyculture study with red and white crawfishes was conducted in three 0.1-hectare earthen ponds on the Rockefeller Wildlife Refuge, Grand Chenier, Louisiana. Average depth of the ponds ranged from 0.8 to 1.0 m; they were filled and replenished weekly with brackish canal water filtered through 52-mesh saran. Pond bottoms had a high organic content identical to that of the surrounding chenier plain marshes. The soil most closely resembled a muck–mineral type (Chabreck 1970). Before stocking and daily between 0700 and 0730 hours after stocking, oxygen was mon-

[1] Present address: Corpus Christi State University, 6300 Ocean Drive, Corpus Christi, Texas 78412, USA.

itored with a model 57 oxygen meter (Yellow Springs Instruments Corp.). Salinity was measured with a model RS-5 salinity meter (Beckman Instruments).

Juvenile white and red crawfishes were obtained on 18 November 1986 by seining a freshwater pond owned by St. Martin Land Company, Henderson, Louisiana. During the day, the crawfish were held in an aerated, 379-L fish-transport tank containing fresh water and transported to the study ponds. Subsamples indicated that these crawfish were 85% white crawfish and 15% red crawfish. Altogether, 394 white crawfish and 70 red crawfish were individually measured for total length (mm) and weighed (to the nearest 0.1 g). The white crawfish averaged 28 mm in total length and 0.8 g in weight; red crawfish averaged 30 mm and 0.7 g.

Each of the three ponds contained a 0.9-m × 0.6-m framed bottom screen onto which the juveniles were stocked. Nine hours later, each screen was lifted and the dead crawfish were counted. The estimated mortality not attributable to predators was 10%.

A pelleted marine ration (25% protein; Ralston Purina Co.) was fed on weekdays according to techniques developed for prawns (Perry and Tarver 1984) and based on 70% overall survival. Initially, the crawfish were fed at 35% of their body weight per day, and the ration was adjusted so they were receiving 3% of their body weight per day at the conclusion of the study.

The crawfish were sampled with a 9-m × 1.2-m, 0.3-cm-mesh seine at 3-week intervals, and their total lengths were recorded. On 20 April 1988, the ponds were seined with a 60-m × 1.8-m, 0.6-cm-mesh bag seine. The remainder of the crawfish (approximately 10%) were dipped from the ponds after draining. All crawfish from each pond were weighed, and subsamples were taken to record sexes, total lengths, and individual weights with a Model PL 3000 electronic balance (Mettler Instrument Corp.). Male crawfish were classified as Form I (mature and reproducing) or Form II (immature).

Results and Discussion

As shown in Figure 1, water temperature was 20°C at stocking, fell to 4.4°C in January 1987, and reached 27.8°C in April 1987. Throughout the study, dissolved oxygen concentrations in the ponds exceeded 2 mg/L, and water levels were adjusted weekly. There were no drastic salinity fluctuations, and salinities ranged from 0.8 to 1.5‰.

White crawfish grew faster and to a larger size at harvest than red crawfish (Table 1; Figure 2). During the first month, lengths of white crawfish more than doubled and averaged slightly more than those of red crawfish. It was difficult to catch red crawfish for the January and February samples, though white crawfish were abundant in the seine samples throughout the study. After 108 d (March), average total length of white crawfish was

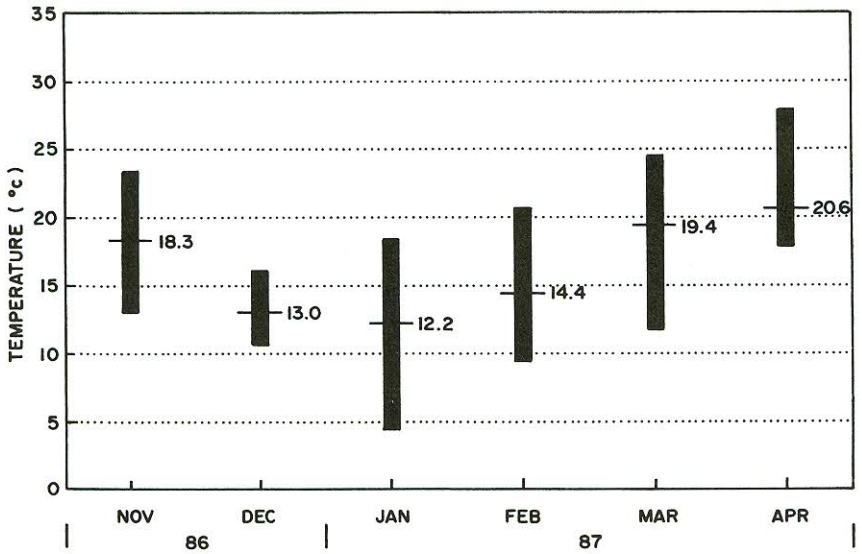

FIGURE 1.—Mean water temperatures (numbers) recorded at a depth of 0.8 m in brackish-water ponds used for crawfish production at the Rockefeller Wildlife Refuge, 1986–1987. Vertical bars represent ranges.