THE LOUISIANA CRAWFISH INDUSTRY— ITS PROBLEMS AND SOLUTIONS

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ABSTRACT

Cultural technology is adequate to produce crawfish in ponds with water quality a main consideration. Occurrence of small stunted crawfish has been reduced by increasing trapping frequency. A mechanized harvester and more efficient traps and bait are needed to relieve labor problems. The processing industry must have a mechanical peeler and utilize traditional shrimp freezing technology to extend shelf life and markets. Marketing is a key to sustained pond production. Prices of crawfish will increase as processors and live market sales compete for the raw product. Expansion of the market for both imports and exports will be on a national and international scale.

For centuries crawfish have been a food of French immigrants in South Louisiana. The red swamp crawfish, *Procambarus clarkii*, and the white river crawfish, *P. acutus acutus*, are the commercially important species occupying 90 percent and 10 percent of the commercial catch respectively. The term crawfish in this paper is to include the above-mentioned species.

Louisiana produces 99 percent of the crawfish in the United States and consumes 85 percent locally (Gary, 1973). The local nature of the market, lack of production records from the Department of Agriculture or National Marine Fisheries Service, and the cash nature of the crop make it difficult to assess the magnitude of this important Louisiana industry. The industry is valued at $6 million by the Louisiana Department of Agriculture.

Future expansion of Louisiana's crawfish industry will depend in part on resolving existing problems in such areas as supply, biology and pond management, harvesting, processing, marketing, price structure and market expansion.

SUPPLY

Historically, the bulk of Louisiana's crawfish harvest has been from the Atchafalaya Basin. This 121 km long, 24 km wide semiwilderness area in south-central Louisiana is a floodway for the Atchafalaya River-Mississippi River complex.

Crawfish harvests from the Basin have fluctuated from 90,800 kg in 1959 to 4,500,000 kg in 1965 (Broom, 1963; LaCaze, 1966), depending on water levels and temperatures. Production each year has been uncertain and unmanageable. Bumper crops have been produced in the Basin about two years out of five (Avault, 1972).

Pond crawfish farming was developed to prevent erratic supplies of crawfish, assure more controlled conditions in water management and predator control, and to take advantage of high prices from restaurants before the Basin crop was harvested. Unfortunately, even ponds are subject to weather conditions such as unseasonably cold temperatures resulting in late crops and extremely wet summers when ponds cannot be drained.

South Louisiana has over 325 ponds and North Louisiana 7 ponds (Gary, 1973) for a total of 18,200 ha in crawfish production. Pond crawfish farming presently supplies 40 percent of the crawfish market, supplies a substantial restaurant trade as early as November and has stabilized the industry.

BIOLOGY AND POND MANAGEMENT

Penn (1943, 1956) reported the basic life history and distribution of the red swamp crawfish in various natural habitats throughout the state. Major research efforts over the past 10 years have been in studying the life history and production of crawfish in ponds (Avault, et al., 1970).

Most of the life history and pond management techniques (LaCaze, 1971) are adequate but a void exists in population dynamics research in various pond types.

Penn (1943) concluded that reproduction of *P. clarkii* was completed by mid-fall with the peak period in late summer. Recent population dynamics research in commercial ponds (de la Bretonne, 1976) shows that pond crawfish exhibit constant recruitment with peaks in October (61 percent) and smaller peaks (15 to 18 percent) in December and January. Constant recruitment complicates management and necessitates almost daily harvest to ensure maximum production.

Water management is the key to good crawfish production. Ponds with small, inadequate pumps generally have high mortality of the September-October newly hatched crawfish (due to low oxygen conditions from rotting vegetation) and must rely on the December-January or later hatches for young. The common pond management problems are described by Avault, et al. (1975). Ponds with high production generally recirculate water at least two times a week during fall flooding and in warmer months when oxygen levels are low.

Problems have arisen in 3 to 4 year old ponds with populations of mature crawfish which are small (60 mm.). Large numbers of small crawfish put pond farmers at a disadvantage in marketing their crop in competition with Basin crawfish (over 100 mm.). Consumers prefer large crawfish on the live market and buyers generally "shy away" from buying small crawfish when large ones are available.

We do not know whether small pond crawfish are the result of one or a combination of the following factors:

(1) genetics—We lean toward negative genetic selection by trapping and selling the fastest growing individuals.

(2) overcrowding—By following proper management techniques for draining and flooding, both adult and constantly recruited, newly hatched young will have good survival. We do not know the effect of overcrowding stress factors in overall pond dynamics.

(3) lack of food—No summer planting of rice or millet and/or no aquatic vegetation will result in less substrate and food.

(4) poor water quality—Oxygen levels decrease due to poor source water or decaying pond vegetation.

(5) insufficient trapping—Farmers quit trapping when crawfish size and price decreases. Pond farmers who trap every day will have at least 50 percent greater production as compared with farmers who only trap on weekends.

(6) pond size—Small ponds, i.e. smaller than 4.5 ha, appear to produce more crawfish than larger ponds (Huner, 1976). This statement is misleading because small ponds tend to overpopulate and stunt just as large ponds do if not harvested.

Generally, small ponds are more easily harvested by one person, have better water quality when flooded, and are influenced by a local non-fluctuating market (as a local seafood market, grocery store, or bar that can move a small daily volume). This arrangement encourages trapping and results in a fresh product for the retailer in small volume. Economic analysis of crawfish ponds by Goodwin (1970) indicate small ponds may not be economical because of construction costs.

Large pond farmers must move a tremendous volume of crawfish and tend to be influenced by larger city markets that demand crawfish on Thursday, Friday, Saturday, and Sunday. During the early part of the week, "you can't give them away." We are able to produce the animal but cannot harvest every day to obtain maximum yields due to the nature of the market and consumer demand patterns.

Taking all factors, for example management techniques used by the farmer, pond type, water supply, marketing, etc. a statewide crawfish production figure of 233 kg/ha is accepted. Some farmers produce 1750 kg/ha and others only 58 kg/ha.

HARVESTING

Trapping techniques have improved little since the 1930's when Comeaux (1972) reported the switch from meat at the end of a string to lift nets and pillow traps. In open

ponds, the stand up trap has been more efficient and easier to empty, but it cannot be used in deep ponds or the Basin. Traps are usually baited with gizzard shad, when available, because shad have been traditionally accepted as the best bait for attracting crawfish. However, improvement should be made utilizing artificial attractants to increase trap efficiency.

Large ponds are harvested by commercial fishermen from January to March. Ponds are fished on a 60-40 percent or 50-50 percent basis, depending on the harvesting equipment supplied. When the Basin starts producing, the professional fishermen may leave the pond (eliminating the 40 to 50 percent paid to the pond owner) for greater catches of large crawfish per trap in the Basin. This leaves many pond owners without fishermen and thus unable to harvest their pond. This generally results in a stunting of the remaining crawfish and reduced production.

The most reliable large-pond fishermen have been those who do shift work at a construction or petrochemical plants or attend school parttime and "run" their traps before or after their regular job. This type person will usually stay with a pond farmer until the pond is drained in May.

Ponds in the sugarcane belt of southcentral Louisiana have survived because of the availability of field hands who work in ponds when not "working" cane. In the rice belt of southwest Louisiana, where rice can be double cropped with crawfish (Hill and Cancienne, 1963), less labor is available for crawfish harvest due to the small number of field hands needed to harvest rice. A mechanical harvester is needed to relieve this labor problem. Rice field culture offers an immediate expansion of crawfish acreage and production with little additional investment since rice farmers already have ponds, pumps and water.

PROCESSING

Previous investigators (Lovell, 1968; Hudson and Fontenot, 1970, 1971; Blades, 1975) have profiled the peeling industry as a non-profitable, backward, small family business, lacking in technology and run as a salvage operation for the live crawfish market.

With a more constant, non-seasonal crawfish supply, less price fluctuations and greater consumer demand for convenience foods, the demand for peeled tails has increased. St. Martin Parish alone has over 20 family-run, hand-peeling plants strictly for the fresh ice-pack trade. Ice-packed tails have a shelf-life of one week, and the price of peeled tails fluctuates with the live market and consumer demand.

Approximately 11-12 pounds of tail meat is obtained from 100 pounds of mature crawfish, since the majority of the weight is in exoskeleton and chela, whereas 18 pounds of tail meat can be obtained from immature crawfish with thinner exoskeletons and small chelae. Hand peelers generally complain about small crawfish because large crawfish yield large tails with the same unit of effort, even though the tail-to-exoskeleton ratio is less.

Freezing of tails generally occurs in late May and June so supplies to restaurants may be met during the off season (July to October). Small family businesses always run out of the frozen product and could sell their summer inventory several times over. A lack of freezer space, freezing technology and capital for inventory restricts the small processor.

Frozen tail processing should be increased to meet outside market demands and supply meat on a year-round basis, thereby allowing a more stable price structure for greater processing profits. Automated modern freezing techniques and citric acid dips that are commonly used in the shrimping industry are lacking because of the additional investment needed for freezing equipment and inventory.

Another major hurdle for expansion of the processing industry, as pointed out by Lovell (1968) nine years ago, is still with us today—mechanization. Hand labor is expensive and limits production. A machine capable of peeling both large and small crawfish would help expand the market and help increase production per acre. With a method of freezing and peeling, small crawfish could be fished and sold to processors, just as small shrimp are presently machine peeled. Larger crawfish could be sold live or peeled for fried tails. Location of the peeling plant should depend on the supply of crawfish from all sources, both ponds and Basin.

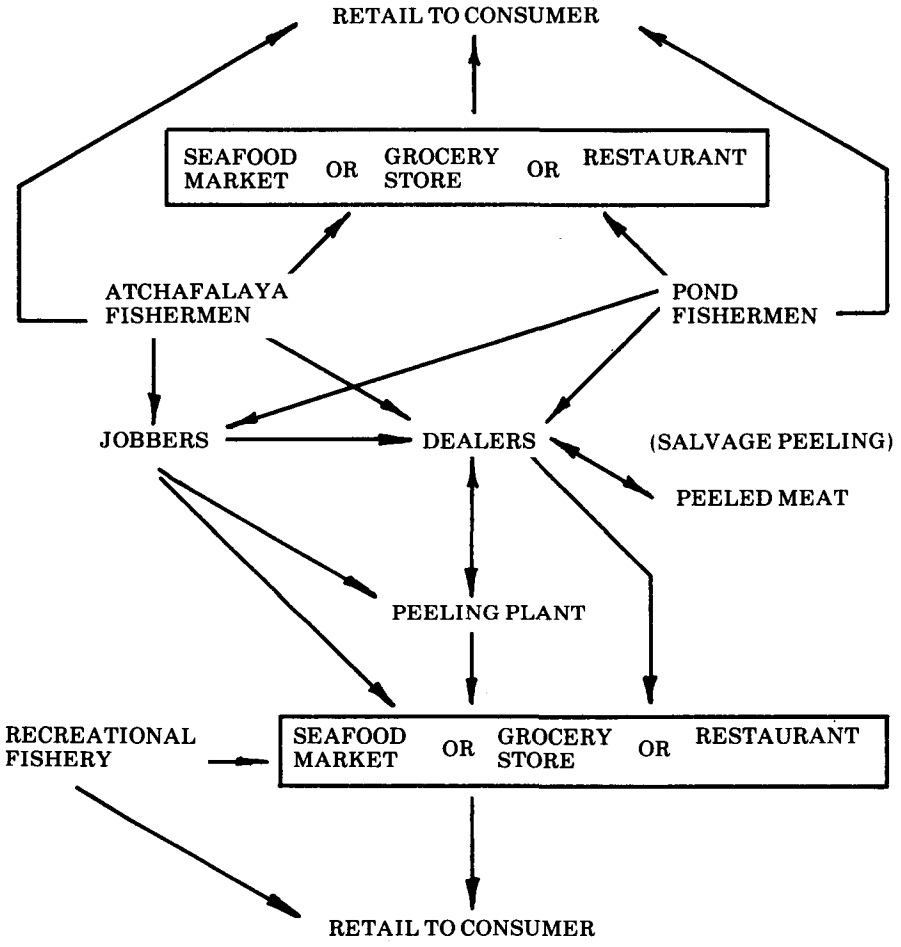

Figure 1. Flow of crawfish in the present Louisiana market

MARKETING

Crawfish pond owners are generally in some type of agriculture and tend to handle crawfish just as their other agricultural crops. Pond farmers prefer to sell to a buyer who picks up the harvested product at the pond and may supply bait for the next day. The farmer, being a basic producer, cannot handle such other aspect of the crawfish industry as transportation, fluctuating markets and retail sales. In most cases, the crawfish pond represents a minor diversification of a total farming operation and the major crops, i.e., rice, sugar cane, etc. have priority.

Basin fishermen also sell to buyers, but may also retail to consumers (Figure 1).

Most buyers would prefer to move crawfish live in the sack, charging 2-5 cents per 454 g. mark-up, depending on transportation distance, volume and market (whether to dealers or retail customers).

Because of the perishable nature of live crawfish, buyers must move their product within three to four days. When consumers do not buy crawfish, buyers must drop prices to stimulate demand. In addition, rain, cold weather and day of the week can also drastically affect this supply and demand market.

Buyers may peel crawfish not sold on the live market strictly as a salvage operation. Because of the preference to move live crawfish by the sack, the peeling industry has lagged far behind other seafood industries.

PRICE STRUCTURE

Historically, when the Basin produced crawfish, prices began an immediate decline. Today, with greater pond production, inflation, increased harvesting expenses and greater markets, the price rarely gets below 18 cents per 454 g. but market price is still determined by supply and demand.

Price fluctuations will become less severe as more processors begin freezing tails rather than dealing in live crawfish or ice-packed tails. In late winter and early spring, processors must pay a premium price (50 cents per 454 g.) for crawfish to peel. It is difficult for a processor to have any margin of profit with a 50 cents per 454 g. animal yielding 10 percent tail meat selling at $4.50 to $4.80 per 454 g. Generally, the early market is to supply restaurants who pride themselves in having fresh crawfish early in the season. During the season peak (April-May), live animals are bought for 20-25 cents per 454 g. and peeled tails sell for $2.25 to $2.50 per 454 g. with a volume profit structure. Prices on restaurant menus remain constant throughout the year.

Rather than fighting daily market fluctuations and not knowing what the price will be until they return to the landing with their catch, many farmers and fishermen would prefer to have a contract to sell all crawfish caught year-round at a stable price (for instance, 32 cents per pound). This system will be hard to initiate because of the large number of parttime, recreational and cash commercial fishermen who sell to buyers for lower-than-market prices. Buyers generally take advantage of this situation to drop market prices.

Generally speaking, the crawfish business is a volume business with the jobber-dealer making 5 to 10 cents per 454 g. on the product. This is a small profit margin considering the cost of transportation from different landings in the Basin and from ponds statewide plus the loss involved in handling the live product.

The recreational fishery in the Basin, composed of weekend fishermen, seven-day-on-seven-off workers and sport fishermen, may harvest as much as 20 to 30 percent of the reported Basin landings and represents an important factor in crawfish price fluctuations. Generally, these fishermen fish for recreation and tend to sell their catch at 5 to 10 cents per 454 g. less than market price to local buyers, neighbors, friends, etc., which depresses the overall market price during periods of high supply (i.e., such as weekends).

MARKET EXPANSION

Since the 1950's, annual commercial production has expanded approximately 18 fold, in large part due to increased output from commercially managed ponds (Gary, 1973).

As more people from other areas of the country move south to Louisiana with various oil-petrochemical industries, taste the savory crawfish and are transplated to other areas, the demand will increase.

Foreign countries are looking to south Louisiana to produce large mature crawfish in 2 to 3 months, rather than the 2 to 3 years and longer required in colder climates. Exports are increasing.

A main factor to limit expansion of the industry is capital. Large food companies and institutional buyers have not entered the market due to the erratic supply of crawfish. Local processors have not proceeded along traditional seafood outlets in other states to sell their product since they can sell all they can produce locally. It is easier and less expensive to fight local price fluctuations than to strike out on your own to get markets in other states or countries. Usually, the small orders to other parts of the country are not worth the time involved in packaging the product and driving to an airport for shipment.

The seasonal nature of the crop is gradually disappearing, and consumers expect to pay more per pound of peeled meat or per serving in a restaurant.

As processors increase freezing technology and freezing operations are established to ensure a year-round supply of crawfish to out-of-state markets, competition for traditional live market crawfish will be great. As the demand for crawfish increases, so should the price structure. The overall industry has seen tremendous improvements in the past 3 years.

The requests for information and the interest from all parts of the country have been unbelievable. The ease of culture (relatively standard-type ponds with low levees, non-intensive management, absence of high feed costs, high demand and relatively high natural production) has suddenly captured the eye of the investing public as the only large scale, economically feasible crustacean aquaculture venture in the U.S.

LITERATURE CITED

Avault, James W. 1972. Crayfish farming in the United States. p. 239-250 in Sture Abrahamsson, ed., Freshwater crayfish; papers from the First International Symposium on Freshwater Crayfish, Austria, 1972. Lund, Austria, Studenlitt. 252 p.

Avault, James W., Larry de la Bretonne, and Edmonde Jaspers. 1970. Culture of crawfish, Louisiana's crustacean king. American Fish Farmer 1 (10):8-14 and 27.

Avault, James W., Larry de la Bretonne, and Jay Huner. 1975. Two major problems in culturing crayfish in ponds, Oxygen depletion and overcrowding. p. 139-144 in James W. Avault, ed., Freshwater Crayfish; papers from the Second International Symposium on Freshwater Crayfish, Baton Rouge, Louisiana, USA, 1974. LSU Division of Continuing Education, Baton Rouge, Louisiana. 676 p.

Blades, Holland C., Jr. 1975. The distribution of south Louisiana crawfish. p. 621-628 in James W. Avault, ed., Freshwater Crayfish; papers from the Second International Symposium on Freshwater Crayfish, Baton Rouge, Louisiana, USA, 1974. LSU Division of Continuing Education, Baton Rouge, Louisiana 676 p.

Broom, J.G. 1963. Natural and domestic production of crawfish. La. Conserv. 15(3/4):14-15.

Comeaux, Malcolm L. 1972. Atchafalaya swamp life. Geoscience and Man Series 2. School of Geoscience, Louisiana State University, Baton Rouge, Louisiana.

de la Bretonne, Larry Jr. and James W. Avault, Jr. 1976. Egg development and management of *Procambarus clarkii* (Girard) in a south Louisiana commercial crawfish pond. Third International Crayfish Symposium on Freshwater Crayfish, Kuopio, Finland, August 5-8, 1976. (In Press).

Gary, Don L. 1973. A geographical systems analysis of the commercial crawfish industry in South Louisiana. M.S. thesis, Oregon State University. 123 p.

Goodwin, James D. 1970. Expected costs and returns of crawfish farming in Louisiana. Address presented to the Louisiana Crawfish Farmers Association Meeting, Cezan Lake, La. 13 p.

Hill, Lewis Carroll, and E. A. Cancienne. 1963. Grow crawfish in rice fields. Louisiana State University Agricultural Extension Div. Bull. no. 1346. 11 p.

Hudson, James F. and Wildon J. Fontenot. 1970. Profitability of crawfish peeling plants in Louisiana. Louisiana State University, Dept. of Agricultural Economics and Agribusiness, Res. Rept. no. 408. 57 p.

Hudson, James F. and Wildon J. Fontenot. 1971. The crawfish peeling industry in Louisiana. Louisiana State University, Dept. of Agricultural Economics and Agribusiness, Res. Rept. no. 421. 20 p.

Huner, J. V. 1976. Raising crawfish for fresh bait and food: A new polyculture crop with fish. The Fisheries Bulletin 1(2): 7-9.

LaCaze, Cecil G. 1966. More about crawfish. Louisiana Conservationist 18(5/6): 2-7.

LaCaze, Cecil. 1971. Rev. ed. Crawfish farming. Louisiana Wild Life and Fish. Comm., Fisheries Bull. no. 7 27 p.

Penn, George H. 1943. A study of the life history of the Louisiana red crawfish, *Procambarus clarkii* (Girard). Ecol. 24(1): 1-18.

_____. 1956. The genus Procambarus in Louisiana (Decapoda, Astacidae). The Amer. Mid. Nat. 56(2): 406-422.