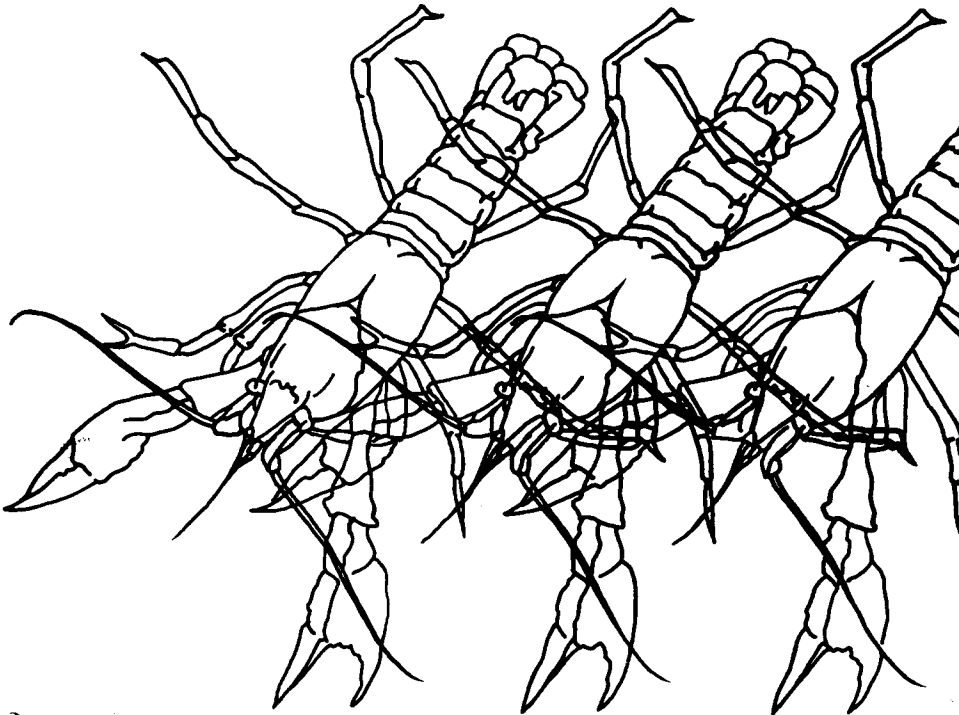


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PRODUCING CRAWFISH FOR FISHBAIT

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INTRODUCTION

Millions of pounds of crawfish are cultivated annually in Louisiana, where they are a popular food item. However, the market for this crop is localized, and the prices are determined largely by abundance of wild harvests. Average wholesale prices of live crawfish have ranged from 30 to 60 cents per pound (live) in recent years, with higher prices corresponding to periods of scarcity. Pond harvesting generally ceases when prices fall below 30 cents per pound unless the landowner can retail them locally at a higher price. Another potentially lucrative outlet for crawfish exists, however, which is nationwide in scope: crawfish as fishbait. This bulletin deals with raising bait crawfish and, specifically, raising bait crawfish in Louisiana.

Whole bait crawfish (live or frozen) may bring wholesale prices ranging from \$1.50 to \$15.00 per pound depending on the area of the country and seasonal demand. Retail prices range from 25 cents to \$3.00 per dozen. Bait crawfish are generally small--two to three inches long. (Crawfish for eating are more than three inches long.) Bait crawfish are used mainly in fishing for catfish and large- and smallmouth bass. Frozen, unpeeled tails from larger crawfish are also in demand as bait at per pound prices comparable to peeled tails and are excellent bait for sunfish and catfish. Limited markets also exist for inch-long crawfish in the Great Lakes region, where they are used to catch yellow perch. Crawfish also prove excellent bait for estuarine species such as the red drum (red fish) and sheepshead.

A specialized market exists for soft-shelled crawfish (live or frozen) in most midwestern states. Like crab, shrimp, and other crustaceans, crawfish have a hard shell that must be periodically shed to permit growth. In this soft-shell stage, they are superior as fish bait and bring premium prices.

Markets

Before a crawfish farmer decides to raise bait crawfish, he must locate or establish markets. The normal growing season typically runs from September when ponds are flooded through May when ponds are drained in Louisiana. However, frozen crawfish could be stored for sale during other periods as well. The principal existing markets located in the Midwest enjoy peak demand from March through October.

In the Deep South there is at present a limited market because mild winters allow active sport fishing throughout the year. However, potential markets for live bait crawfish have been identified in Texas, Louisiana, and Mississippi, primarily during spring.

A farmer interested in going into the bait crawfish business could establish marketing contact in midwestern states through existing distributors, state game and fish agencies, or cooperative extension services. Several distributors from Ohio have expressed considerable interest in Louisiana crawfish but have not been able to obtain suppliers. For markets in other areas, contact distributors of other live baits (minnows, worms, etc.), state game and fish agencies, or cooperative extension services. Finally, place advertisements in trade journals seeking jobbers and distributors. The keys to developing markets for bait crawfish are to define the market and to provide a satisfactory product in adequate quantities at appropriate times.

RAISING BAIT CRAWFISH

Different techniques are required for raising bait crawfish, depending on whether they are to be sold as unpeeled tails, whole with hard shells (two to three inches), or whole with soft shells (two to three inches). Each of these will be treated separately.

Unpeeled Tails

Standard crawfish cultivation techniques may be employed in producing crawfish from which unpeeled tails are to be obtained. The general sequence of activities is as follows:

- 1) New ponds are flooded in May and June and stocked with brood crawfish at rates ranging from 25 to 50 pounds per acre in areas having natural crawfish populations up to 50 to 100 pounds per acre in areas without natural populations;
- 2) Water is drained gradually and ponds are dried by mid-June (crawfish burrow underground to reproduce at this time;
- 3) Annual grasses and semiaquatic plants such as smartweed, alligator weed, and water primrose are allowed to grow in the ponds, and the ponds are reflooded in mid-October (young crawfish emerge from burrows but reproduction continues into late winter). In many cases millet and rice are planted during the summer months immediately after drainage.
- 4) Harvesting begins during mid-December and continues June, when ponds are drained again.

Not all crawfish are trapped out since they are expected to establish sustaining populations. Thus, well-managed ponds should not need restocking. Adjustments to permit rice farming call for drainage by mid-May. The field is then planted in rice, which is harvested in September and ponds are reflooded. Sources of information are:

- 1) State Cooperative Extension Service (through your county agent).
- 2) State Game and Fish Agency
- 3) U.S. Soil Conservation Service
- 4) State Sea Grant Program

- 5) Louisiana Crawfish Farmers Association, c/o Dr. James Fowler, Secretary-Treasurer, La. Cooperative Extension Service, Knapp Hall, Louisiana State University, Baton Rouge, La. 70803. A list of pertinent publications will be found at the end of this publication.

Determine whether your market wants crawfish tails raw or blanched prior to freezing, and process them accordingly. Freeze the meat in small amounts of water to prevent freezer burn.

Overpopulated ponds frequently produce stunted crawfish (less than three inches long). These are sold at very low prices (if at all). Such crawfish, sold for bait, might mean the difference between a pond's financial success or failure.

Bait-Sized, Whole Crawfish (2 to 2 3/4 inches long)

Bait-sized, whole crawfish are generally available in managed ponds from about six weeks after fall flooding into February. After that, most have reached commercial-food size. These crawfish can be caught as available and frozen for later resale. However, current markets for live, bait crawfish require them during the period from March through October. Louisiana crawfish ponds are normally dry from June through August, so the usual culturing cycle involving October flooding and June draining must be modified to provide smaller, live crawfish when needed.

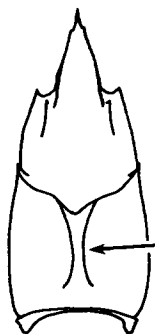
Considerations related to producing and marketing these smaller crawfish during the prime season include Pond Size, Stocking, Water Management, Food, Harvesting, Preparation, and Shipping.

- 1) Pond Size. Ponds for bait crawfish production ideally range in size from a tenth of an acre to one acre. Advantages of these ponds include rapid flooding and draining--an important consideration in controlling bird predation; ease in controlling vegetation growth during dry periods--too much will, upon flooding, rot rapidly and produce oxygen-depleted (black) water; higher production than larger ponds; and use of seines for harvesting, made possible by control of grass. In any event size should not exceed five acres because extended production of bait crawfish depends on differential flooding and high population densities. Average depth should be at least eighteen inches to inhibit bird predation, and ponds must be drainable. Pond construction can be reviewed in LaCaze (1970).

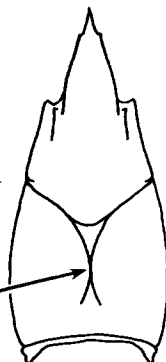
- 2) Stocking. The red swamp crawfish, is preferred for stocking. The other important species, the white river crawfish, Procambarus acutus acutus (Girard), does not do well in most crawfish ponds when the red swamp crawfish is present. Differences between the two species of crawfish are shown in Figure 1.

WHITE RIVER

RED SWAMP



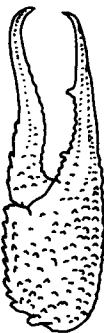
Note separation between two halves of carapace (head).



No separation.



Note difference between shape of the end of the sperm transfer organ of the two crawfish.



In mature male white river crawfish the claw is more cylindrical than that of the red swamp crawfish.



Fig. 1. Basic differences between red swamp crawfish and white river crawfish.

The color of young red swamp crawfish is light olive green (sometimes shading into brown) with a faint but darker stripe along the upper surface of the tail. Mature adults have dark red sides and a reddish-black upper surface. The change from olive green to red-black is gradual and takes place over a period of six to eight weeks.

Young white river crawfish are light sandy white with numerous black spots over the upper surface, head, and tail. Adults are a very light brown with a wide black/brown stripe down the upper surface of the tail. Adults that have not molted for several months assume a deep purple color, but the dark stripe remains.

In general, both species of crawfish are very "dark" if they come from clear, dark waters, or they are very "light" if they come from muddy water.

Ponds are usually stocked during late April through late May when brood stock can be obtained at lowest prices. Ponds in areas having existing crawfish populations should be stocked at a rate of about 50 pounds per acre. In other areas, up to 100 pounds per acre may be stocked, depending on price and availability. Pond-spawned crawfish are preferable to swamp or spillway crawfish (obtained from the Atchafalaya Spillway) because they are less likely to migrate from the pond after stocking.

Sexually mature crawfish in a ratio of at least one female to one male should be used; a ratio of one male to three or four females will insure heavier reproduction. Mature males can be identified by enlarged claws and prominent hooks at the bases of the second and third pair of walking legs (not counting the claws; see Fig. 2). Males also have modified abdominal appendages that serve as sperm-transfer organs. The females have a sperm receptacle located between the walking legs. Mature crawfish are usually much darker than young crawfish, with hard shells.

Ponds containing fewer than fifty pounds per acre at the end of the season should be restocked to this level prior to drainage in June. To insure adequate stock for the next season, harvesting should stop when trap catch falls below a half pound per trap per day at the end of the season.

An unharvested pond managed in the standard manner or one only lightly harvested could be used to supply stock. A well-managed one-acre pond will normally produce over 500 pounds of bait-sized crawfish, with enough crawfish remaining to produce young for the next season.

3) Water Management. In heavily stocked ponds, flooding in mid-August, mid-September, or mid-October will produce live crawfish two to three inches long within six weeks after flooding and will continue to produce crawfish of this size into the spring from subsequent hatches.

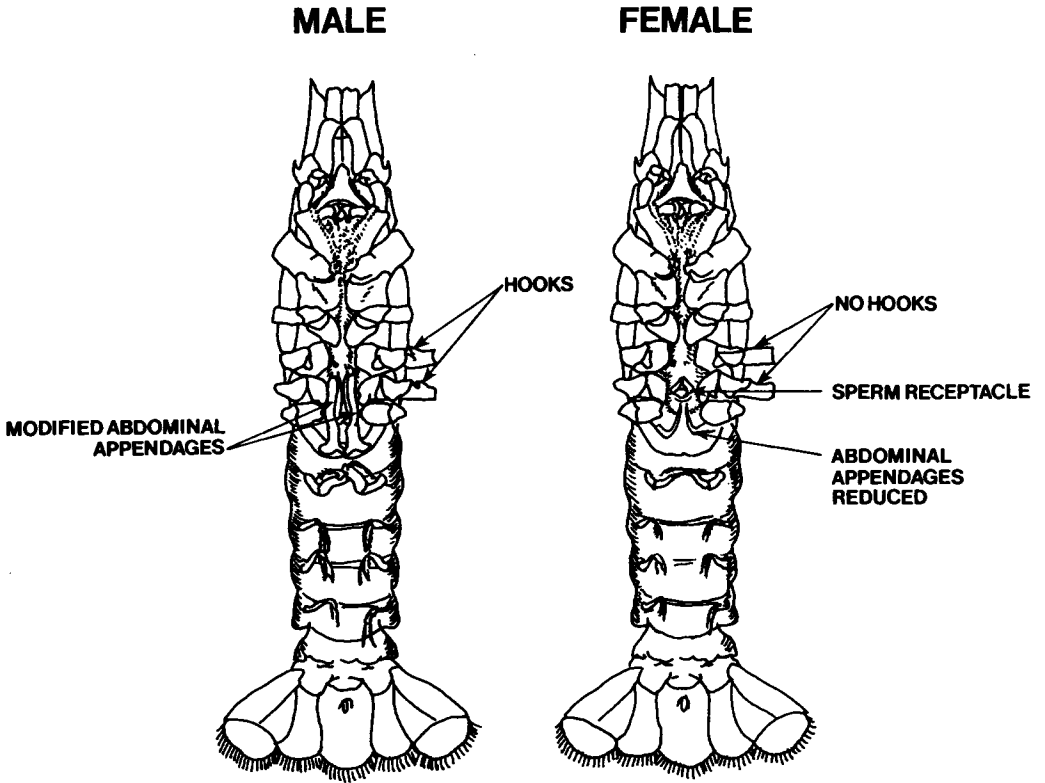


Fig. 2. Identifying sex of crawfish. Sexually inactive males do not have hooks.

In addition, crawfish in ponds flooded in November and early December will attain this size during the spring. Cold weather with water temperatures less than 60°F slows crawfish growth. Thus, staggered flooding of several ponds should insure abundant small crawfish through the regular Louisiana crawfish season.

Growth stops at the 2 to 2 3/4 inch range when density is too high. Once maturity is reached and crawfish stunt, they become hard and red. These are less desirable as bait than the tender, "green" shelled immature crawfish. The pond manager must attend his ponds closely to insure that his crop does not mature and harden before it can be harvested and processed or sold.

Pond draining should begin in mid-May and proceed no faster than two to three inches per day. Cover in the form of rooted, semiaquatic vegetation (smartweed, primrose, alligator weed), hay or brush should be present over at least 25 percent of the pond bottom to provide protection for burrowing crawfish.

Water quality should be good and fish should be screened out. Description of various screens and filters can be found in Viosca (1966) and LaCaze (1970). A County Agent or local Fishery Biologist can arrange to have a potential water source analyzed. Specific water quality recommendations include dissolved oxygen, at least 3 to 4 parts per million; pH, between 6.5 and 8.5; total hardness, at least 50 ppm with 100 to 150 ppm being preferable. Good crawfish production has been achieved from brackish water ponds with salinities up to 3 to 4 parts per thousand. If well water having enough iron to produce a red scum when it comes out of the ground is used, it should be run through a vegetated settling pond or an open ditch prior to entering the production pond. One must always be on the alert for careless use of pesticides in the vicinity of his pond and water source if surface water is used. Water from a surface source should not be used if dead or dying fish are evident. Ponds should be constructed in such a manner to permit water circulation and rapid flushing if low dissolved oxygen becomes a problem.

In small ponds, one frequently sees small granules on crawfish shells. These are eggs of a water insect, the back swimmer. The adult back swimmer eats young crawfish. The insect reaches a length of about 3/8 inches and swims on its back. One should be careful when handling these insects as they can inflict a very painful bite despite their small size. They can be controlled by applying a well-mixed 50:50 mixture of diesel fuel and cottonseed oil or crankcase oil at a rate of up to one gallon per surface acre. The mixture should be sprayed on the pond so that the wind spreads the mixture over the surface. Back swimmers are air breathers and when they pop to the surface for air, their breathing tubes clog up. Back swimmers can be a problem during all warm months. Call a County Agent if you suspect this problem.

4) Harvesting. Growth should be monitored by periodic sampling with small-mesh dip nets or minnow seines until crawfish reach a length of about 1 1/2 inches. At that time they start foraging, and growth can be checked by collecting them in traps. However, since more young crawfish will be hatched after the first group reaches 1 1/2 inches, periodic sampling throughout the season with dip nets or seines is recommended.

Standard crawfish traps are made from 3/4 inch chicken wire and are approximately three feet long. Several shapes are popular; each has advantages. Pillow-shaped traps may be set flat on the bottom or propped up partly out of water so that crawfish breathe air when water oxygen is depleted. Cylindrical "stand-up" traps may be set upright with about a third or half the trap out of water. Stand-up traps are open at the top, since crawfish do not climb above the water surface, and are easy to empty. Both types of traps retain crawfish longer than three inches; entrance is through funnel-shaped openings. Metal traps may be coated with rust-preventing materials.

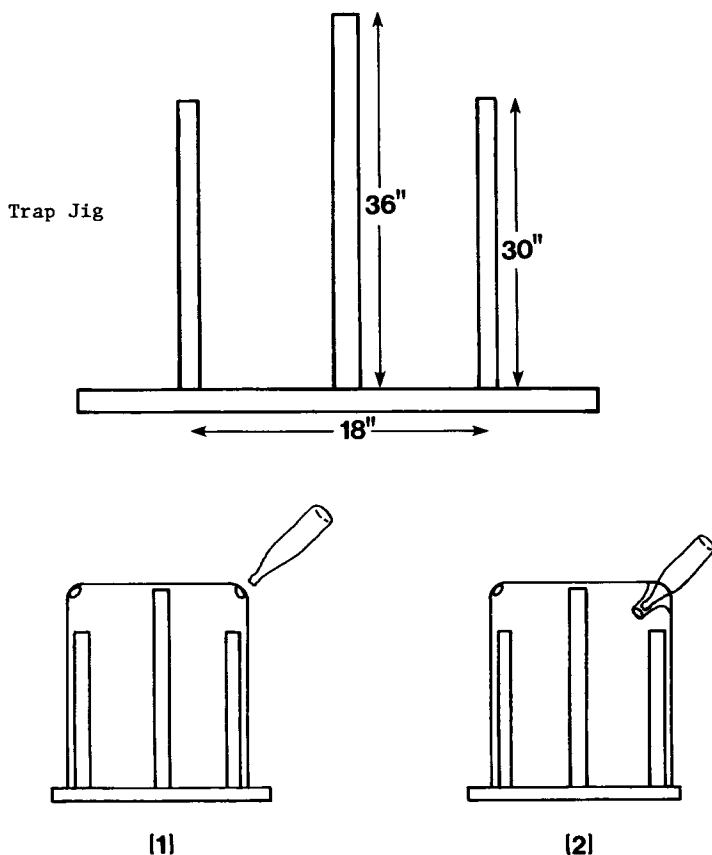
Traps for bait crawfish may be of similar construction but made of material with 1/4 to 1/2 inch mesh, which will retain 1 1/2 and 1 3/4 inch crawfish respectively. The type of trap--pillow or stand-up--depends on individual preference when water depth is shallow. However, use of the stand-up trap is limited to shallow-water situations.

Traps may be constructed from hardware cloth or plastic mesh material.* Pillow traps made from 1/2 inch hardware cloth or plastic have separate funnels cut out and wired into place. Hardware cloth of 1/4 or 1/8 inch is, however, flexible enough to make the so-called "pop bottle" trap. A 30- to 36-inch long cylinder about 18 inches in diameter is formed with one closed end. One-inch openings are crimped at opposite sides close to the closed end. The cylinder is placed on a jig having a 30- to 36-inch center post and two 26- to 30-inch side posts (Fig. 3). Funnels are made by forcing in the wire at the opening with a pop bottle (a 6 1/2 ounce Coco-Cola bottle works fine). Such a trap may be left open at the top and, with a prop stick, used as a stand-up trap. Or the open end may be closed, producing a pillow trap. Hardware cloth of 1/8 inch mesh is much more flexible than 1/4 inch, but it is also more expensive.

Standard crawfish bait is cut fish, with gizzard shad being the preferred type. Marine fish such as menhaden (pogies) and croaker may be used, but they are not as effective as gizzard shad.

Seining to harvest crawfish is most effective when vegetation is sparse, generally after December. Seining is a satisfactory technique

*One type is VEXAR™, available from Dupont Co.



Instructions: Make an 18-inch cylinder of hardware cloth or crawfish wire. Close one end, leaving 1-1 1/2 inch diameter holes at each corner. Put cylinder on jig and make funnels by pushing a cold drink bottle into the holes. Note: A jig is cheap; hardware cloth or crawfish wire is not. Make a model of the trap to see if the measurements suit your needs.

Fig. 3. Construction of "pop bottle" traps.

when crawfish are to be processed/frozen immediately. However, it is not a technique for crawfish to be sold live, since it picks up crawfish ready to molt, just molted, and soft as well as those with hard shells. High mortality will result from hard crawfish eating the soft and molting crawfish. However, most crawfish caught in traps are hard, thus mortality during holding is not so severe.

5) Food. Supplemental feeding is not recommended when the pond manager wants to keep crawfish small and slow-growing. Annual grasses that grow in the pond when it is dry provide adequate sustenance for bait crawfish. Crawfish use the decomposing grass for food. This grass should be fertilized according to recommendations for hay crops in the area. It should be mowed or bush-hogged at least monthly. The final cutting should be done just before flooding. Stands of grass 5 to 10 feet wide should be left in the direction of the prevailing wind. Cross-paths mown across the stands every fifty feet or so will facilitate water circulation. The standing grass provides cover for small crawfish and an access to the water surface if dissolved oxygen levels get too low (less than two parts per million).

6) Preparation. The three most common methods of preparing crawfish for market are:

a) Frozen Crawfish. Freeze crawfish in water. Dry frozen crawfish do not retain good quality long and are subject to freezer burn. Crawfish should be frozen as quickly as possible. They should be frozen according to the buyer's/jobber's instructions. Remember, whole crawfish will not retain good quality if they must be thawed, repacked, and refrozen. Farmers may find, in some instances, that it is more convenient to ship live crawfish to out-of-state dealers so that they could freeze to their own specifications.

b) Live Crawfish. Live crawfish can be held in shallow trays in very high numbers for two or three weeks without feeding. They should be graded to insure that the size range between the largest and smallest crawfish in the container is not more than one inch. They can be held at 70 per square foot for one to two inch crawfish and about 45 per square foot for two to three inch crawfish. Water levels in the trays should be maintained to barely cover the bases of their legs. A circulating system should be set up to insure complete water change ten times during the first day of captivity and at least four times daily afterwards. Dead crawfish can be removed periodically, although live ones will usually eat dead or dying crawfish. The holding container should be washed with disinfectant and thoroughly flushed after each use.

c) Preserved Crawfish. Whole, hard-shelled crawfish (one to three inches) may be preserved in a formaldehyde solution of one gallon Formaldehyde 37% USP to 24 gallons of clean water. Make this solution in clean containers and pack the crawfish loosely so that they can be stirred enough to insure complete saturation. After 72 hours in the

solution they are ready for packing in smaller containers. Small amounts of anise oil added to the solution will make the bait more attractive to game fish. Amounts used are trade secrets, so trial and error experimentation may be required by the packer unless a jobber gives specific instructions.

7) Shipping. Live crawfish should be shipped at the same packing densities as they are held in. They should be packed in layers several inches apart, with damp coarse sawdust or sphagnum moss around them. The large styrofoam boxes used for shipment of tropical fish are good, as are wax-impregnated cardboard boxes. Supports should be placed between layers, and partitions should be made of hardware cloth or other stiff material with enough holes to permit air movement. The sides of the boxes should also have small holes for air circulation. Crawfish should be protected from freezing, and ice should be added in plastic bags if the crawfish are to be exposed to temperatures above 75°F for more than six to eight hours. A mortality rate of less than 5 percent for two days can be expected under such conditions. Survival is best at lower temperatures. Crawfish should be permitted to purge themselves of body waste for at least 24 hours between harvesting and shipping.

Crawfish may also be shipped in heavy-duty plastic bags (18" x 36") at about the same rate used for minnows (6 pounds crawfish per 14 pounds of water--air space filled with pure oxygen). A packer might try lowering volumes of water since crawfish have much lower oxygen requirements than minnows.

One producer has successfully shipped two-inch crawfish in onion sacks, the same as live food crawfish. However, the greatest time in transit was 12 hours.

Crawfish can breathe out of water as long as their gill chambers, located between the body and the outer shell on the sides of the carapace (head) are moist. While handling them from pond to holding point, the producer only needs to keep them damp.

Production of Soft-Shelled Crawfish

Crawfish must periodically shed their old shells. In the soft-shelled stage immediately after shedding, they bring premium prices, especially if they are alive. Normally, crawfish harden within about twelve hours after molting, but they can be maintained alive in the very soft condition under refrigeration at around 50°F for as long as three days. In addition, if they are held in deionized water (no calcium) they will reach a so-called papershell stage and harden no further. They can be kept alive in this state for about three weeks without feeding. (Food would provide calcium for hardening.) If they are to be frozen, they can be frozen at any degree of hardness the buyer wants.

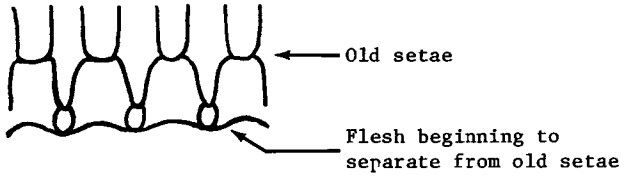
A grower can produce his own soft-shell crawfish or he can ship small, rapidly growing hard shells to dealers in other areas who would molt the crawfish themselves. The following discussion describes how soft-shelled crawfish can be produced.

Steps include: (1) obtaining crawfish in the premolt stage (ready to molt stage), (2) holding them in large cages suspended in slowly exchanging (twice a day) aerated deionized water, and (3) removing soft crawfish as they molt. Specific details are as follows.

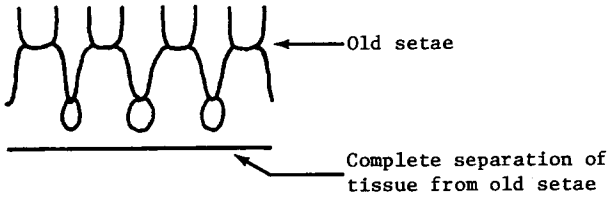
Obtaining premolt crawfish. During molting, most of the old shell dissolves and a new, soft shell forms under the old one. These changes are readily apparent halfway through the premolt stage. The crawfish becomes dark--the new shell is visible through the old one--and when the tip of the claw is broken a new, soft claw tip is present (3 to 2 days before molt at 80°F). The old shell becomes brittle to the touch between 2 to 1 1/2 days before molt at 80°F, and just before molt (1 1/2 days before molt at 80°F) a whitish waste appears between the carapace and abdomen. The premolt can be detected somewhat earlier by observing the edge of the tail fans (uropods) under a microscope at 100 X magnification. At such time, one can see the beginning of the formation of new tail hairs (called setae--see Fig. 4). At first, flesh will separate from the base of the old setae. This will slowly recede until there is a large gap between the edge of the flesh and the old setae. Shortly thereafter (5 to 4 days before molt at 80°F) tubes within tubes will form (new setae); this is even before a new shell appears. First indication of the new shell is presence of a new soft claw beneath the tip of the old hard claw. These tubes within tubes remain until molt. At this point crawfish stop eating and they can be safely placed with molting crawfish. A trained operator can easily examine 100 crawfish per hour with a microscope; and with 6 weeks to 2 months of experience he can dispense with a microscope altogether. Two-inch crawfish can molt as often as every 8 to 10 days when conditions are favorable, growing about 1/4 inch after each molt.

Seines used under appropriate conditions catch any crawfish that are in the premolt stage. Note that once crawfish reach maturity, they stop molting until they have reproduced--6 weeks to 6 months. Watch for signs of maturity as discussed above under stocking.

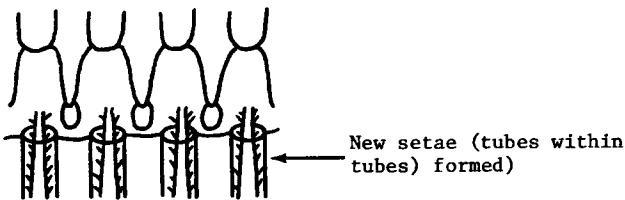
Container trays. Premolt crawfish are handled in container trays much the same as described for handling live crawfish. The trays should be covered or constructed to prevent the crawfish climbing out. If crawfish are taken from cold water they should be kept outside the trays to warm up in 75° to 80° room temperature (it should take three to four hours to warm up from 50° to 75°). There should be no more than a 5° differential between crawfish and water temperature. Crawfish must be submerged, but water depth need not be more than three inches. Trays should contain about ten crawfish per square foot.



Premolt beginning.
Crawfish can prevent
molt at this stage.



Premolt in full progress.
Molt will take place in
5 to 7 days.



More advanced premolt.
Molt will occur in 4 to
5 days. At this time use
other cues as described
in text.

Fig. 4. Formation of new setae in the edge of the tail during premolt at 100 X magnification.

Removal of crawfish. Some markets prefer very soft crawfish. These should be removed from molting cages as soon after molt as possible and frozen in water. Other markets prefer the very flexible, soft crawfish called paper shells. This stage of development is reached in about 12 hours in those crawfish kept in deionized water. They can be maintained alive as long as three weeks without food, if barely covered by deionized water and separated to prevent cannibalism. Such crawfish can be shipped alive in this manner if prices justify the effort; otherwise they can be frozen.

Crawfish must be removed from molting cages within 12 hours after molting or else they will start eating more recently molted crawfish. Old shells must also be removed to prevent crawfish from eating them as they are rich in calcium.

Induced Molting

Rapidly growing, young red swamp crawfish will generally molt within 10 days after being brought indoors if maintained in warm (80°F) water and well fed. A commercially prepared ration such as Purina Trout Chow should be fed at a rate of about 3 to 5 percent of estimated body weight per day; however, the material breaks down quickly in water, so the water must be changed after daily feeding to prevent fouling. In addition, molters must be separated from nonmolters.

The procedures listed above are unnecessary if crawfish in the premolt state can be obtained (see discussion in previous section). Remember that crawfish do not stop eating until about the middle of the premolt cycle, so early premolt crawfish should be separated from the more advanced and should be fed. However, at times premolt crawfish are not available, and other crawfish will not molt for reasons not yet understood. If these problems occur, molting can be artificially induced by removing the tissue that contains molt-preventing hormones, which is located in the eyestalk. This technique can generally be applied to all species of crawfish. Molt should occur in four to ten days after such treatment. Crawfish will eat voraciously after eyestalk removal and should be kept well fed.

Remove eyestalks with a pair of fine curved scissors. The eyestalks should be cut where they join the head. If they retract into sockets on the side of the head they can be easily reached with curved scissors (Fig. 5). The entire eyestalk, not just the eye, must be removed for this procedure to be effective. Place the crawfish in water immediately after the operation to speed clotting of blood in the cut tissues. One can expect a 5 percent mortality rate. Treated crawfish will molt successfully but will generally die four to ten days after molt. If not sold immediately, they should be frozen. They can be held alive in a refrigerator for three to four days or in deionized water (as explained in the preceding section).

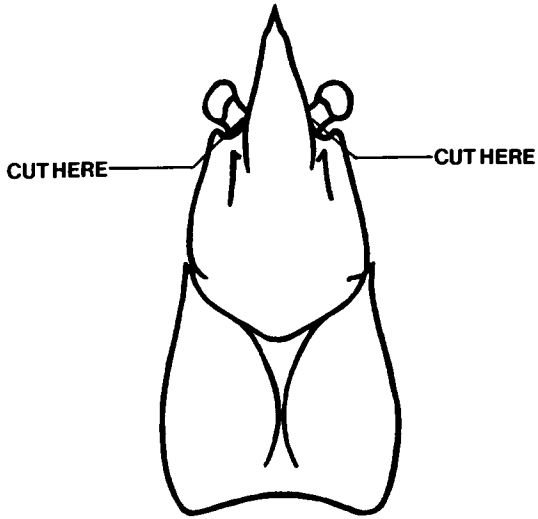
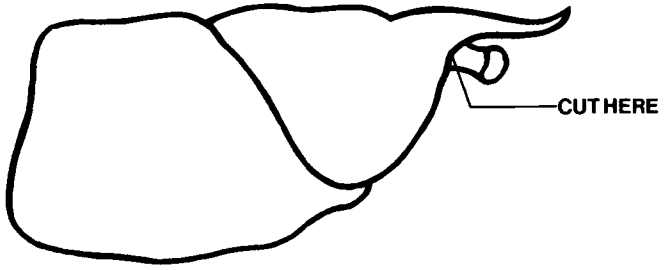


Fig. 5. Instructions for eyestalk removal.

PRODUCTION OF CRAWFISH IN AREAS OUTSIDE OF LOUISIANA

This publication is primarily concerned with production of bait crawfish in Louisiana using the red swamp crawfish, Procambarus clarkii (Girard); however, the basic principles described will apply to pond and swamp-dwelling crawfishes encountered elsewhere. The main differences will relate to growing seasons in other localities. In cooler climates ponds should be flooded during the summer and supplemental food such as hay or milling wastes may be required as a substitute for annual terrestrial grasses (Forney 1968). The United States may be divided into four areas of growing seasons (Fig. 6). Area I reaches from northern Louisiana to central Arkansas and stretches east and west to each coast. The growing season is fall, spring, and early summer. Area II reaches from central Arkansas to central Illinois and to each coast. Growing season is midspring, summer, to midfall. Area III goes up from central Illinois to northern Maine and to each coast. The short growing season is from very late spring, through summer to early fall.

Species that have good pond culture potential for various localities include Procambarus clarkii (from Deep South into southern Missouri, Tennessee, and California); Procambarus acutus acutus (from Deep South into southern Wisconsin, and east to the Atlantic coast); Procambarus alleni (south Florida); Orconectes immunis (midwest and equivalent latitudes on the Atlantic coast); and Orconectes nais (Missouri, Kansas, and surrounding states).

These species have been successfully cultured in ponds. Others with potential in the South and Southwest include Procambarus hayi, Procambarus fallax, and Procambarus simulans. Among the 300 species of crawfish in America, there are doubtless many others.

Before stocking crawfish, be sure of their identity. Consult local game and fish agencies for assistance in identifying crawfish. Mature males, those with hooks on their walking legs (Fig. 2), are needed for comparison with standard identification manuals.

If you cannot obtain assistance locally, preserve crawfish in 10 percent formaldehyde solution (mix one part concentrated formaldehyde to nine parts of water; consult a pharmacist for sources of formaldehyde) and send them to the Department of Invertebrate Zoology, National Museum of Natural History, the Smithsonian Institution, Washington, D.C. Make sure that you include the following information: your name and return address, date of collection, and place of collection (state, county, stream/lake/pond, and distance and direction to nearest town or post office).

If you are in a hurry to stock crawfish, obtain stock from a fish farm. Crawfish from such a source should be suitable for culture since they have survived in ponds at the fish farm. Remember, stock adult crawfish the year before you expect to start harvesting.

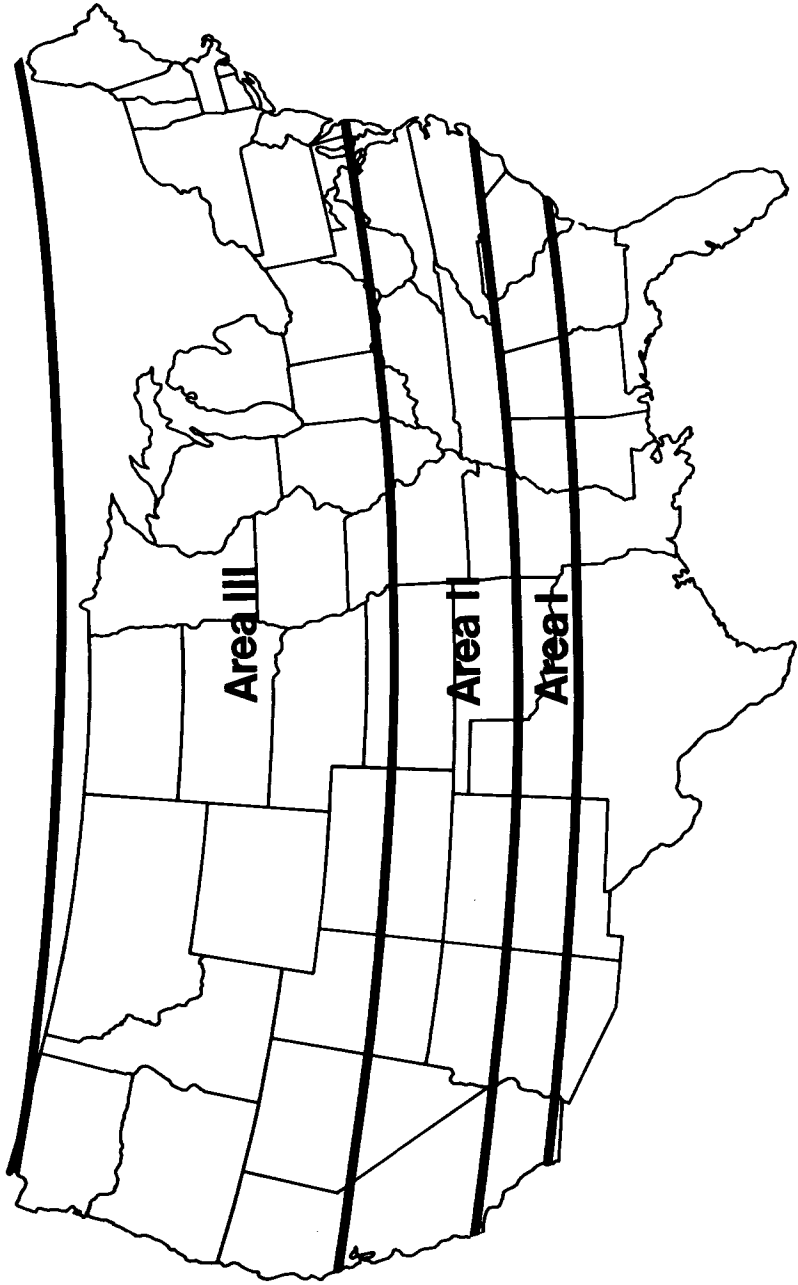


Fig. 6. Approximate crawfish-growing season in the United States.

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INTRODUCTION

Millions of pounds of crawfish are cultivated annually in Louisiana, where they are a popular food item. However, the market for this crop is localized, and the prices are determined largely by abundance of wild harvests. Average wholesale prices of live crawfish have ranged from 30 to 60 cents per pound (live) in recent years, with higher prices corresponding to periods of scarcity. Pond harvesting generally ceases when prices fall below 30 cents per pound unless the landowner can retail them locally at a higher price. Another potentially lucrative outlet for crawfish exists, however, which is nationwide in scope: crawfish as fishbait. This bulletin deals with raising bait crawfish and, specifically, raising bait crawfish in Louisiana.

Whole bait crawfish (live or frozen) may bring wholesale prices ranging from \$1.50 to \$15.00 per pound depending on the area of the country and seasonal demand. Retail prices range from 25 cents to \$3.00 per dozen. Bait crawfish are generally small--2 to 3 inches long. (Crawfish for eating are more than 3 inches long.) Bait crawfish are used mainly in fishing for catfish and large- and smallmouth bass. Frozen, unpeeled tails from larger crawfish are also in demand as bait at per pound prices comparable to peeled tails, and are excellent bait for sunfish and catfish. Limited markets also exist for inch-long crawfish in the Great Lakes region, where they are used to catch yellow perch. Crawfish also prove excellent bait for estuarine species such as the red drum (red fish) and sheepshead.

A specialized market exists for soft-shelled crawfish (live or frozen) in most midwestern states. Like crab, shrimp, and other crustaceans, crawfish have a hard shell that must be periodically shed to permit growth. In this soft-shell stage, they are superior as fish bait and bring premium prices.

Parm?

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