Culture of Largemouth Bass Fingerlings

James T. Davis
Texas Agricultural Extension Service

Joe T. Lock
Texas Agricultural Extension Service (retired)

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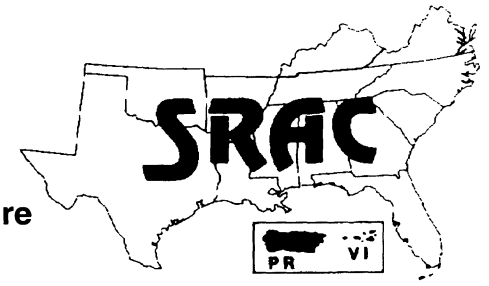
Southern Regional Aquaculture Center



Selection of Brood Fish

Producers of largemouth bass fingerlings and stockers should be aware of the genetics of their brood stock. Though there may be a desire to use brooders from off-hatchery sites, they should be from the local area under most situations. Strain selection depends on market demand and suitability for your market area. Florida strains are popular in warmer southern areas because they usually grow to a larger maximum size. There are conflicting data on growth rates of Northern and Florida strains. This is particularly true for growth during the first year. In addition, pure Florida strains are subject to winter-kill, especially in shallow culture ponds during prolonged sub-freezing weather. The use of scale counts along the lateral line and/or coloration are not reliable techniques for differentiating between the two sub-species. Positive strain identification requires sophisticated electrophoretic techniques. Contact the state Extension service for information on electrophoretic testing and strain recommendations.

Largemouth bass broodfish can be collected from wild sources, carried over from year to year by the producer or purchased form other commercial producers.* Contrary to popular myth, broodfish can be collected by electrofishing without causing reproductive damage. Fish caught from the wild will usually spawn during the first year of captivity, but are not as dependable as bass adequately fed in culture ponds. A thick tail, relatively small head, and chunky appearance usually indicate good body condition. Good condition is essential because spawning and nest protection for several weeks without food is stressful, and fish in poor condition often die before the cycle is complete.

The size of broodfish to use depends on facilities available. The broodfish should be sexed during the late winter and males separated from the females. Normally, smaller broodfish are easier to handle and maintain. Males under 1 pound tend to mature earlier and grow faster than females. Above this weight, females are normally larger for fish of the same age. Some producers use older females for genetic reasons but fish 2 to 3 years of age and 12 to 18 inches in length are normally the most dependable spawners.

Broodfish commonly lose 10 to 30 percent of their body weight during the spawning period. Adequate food during the previous year is essential when the eggs are developing and for a buildup of fat and muscle in the males. Supplemental feeding of live forage (baitfish) is usually necessary unless the broodfish have been trained to take pelleted feeds. About 7 pounds of live forage per pound of body weight is needed for annual maintenance. For growth, 10 pounds of forage per pound of bass growth is required. Bass will eat almost any fish that they can swallow. The depth of the body of the forage must be smaller than the size of the mouth of the bass. Tilapia*, goldfish, and carps are commonly used because they can be produced in large quantities at low cost. When stocking forage fish for bass, stock at intervals. Otherwise, the forage may grow to be too large for the bass to swallow. Goldfish and carps often introduce anchorworm and other parasites.

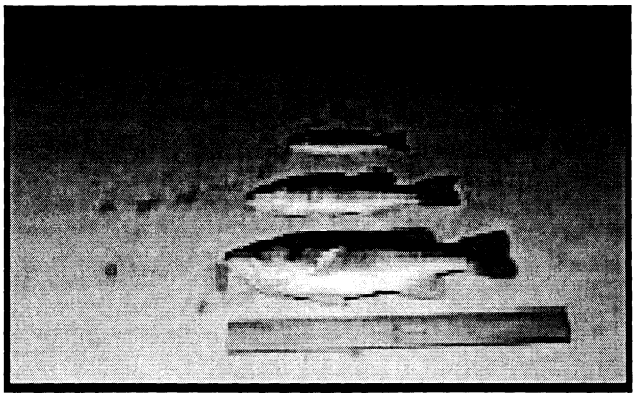


Figure 1. These largemouth bass are all 1 year of age. Growth rate is largely dependent on available food.

*Check local regulations on collection and possession.

*May require a permit or be illegal in some states.

Tilapia cost less to produce and do not normally transmit parasites, but are not available in the winter and spring. See SRAC-141, *Forage Species Production Techniques*, for culture information on these and other forage fishes. If pelleted feeds are used, at least 1 percent of the body weight of the brood bass should be fed daily including warm days during the winter.

Spawning

Sexing is easiest in late winter or early spring. Ripe females have a distended, soft belly and a red, swollen vent. The scaleless area surrounding the vent is pear-shaped in females compared to circular in males. The easiest and surest way to identify males is by squeezing the abdomen. Ripe males will emit a small amount of creamy white milt. Do not confuse milt with clear urine emitted by both sexes. If absolute certainty is necessary, carefully insert a small capillary tube into the vent to detect eggs or milt.

Broodfish should not be subjected to low oxygen conditions or sudden temperature changes when handling. To lessen stress to the fish, add salt to the hauling water at about 2 pounds per 100 gallons. Handle the fish with soft, untreated, wet nets or by the lower lip as much as possible and handle them gently, particularly the gravid females.

Largemouth bass begin spawning in early spring when water temperatures stabilize near 60°F. Reduced spawning can occur in late spring and early summer. Bass spawn as early as January in central Florida and February in southern Texas, but most spawning occurs in March and April in the southern United States. Separating the sexes and holding them until the water stabilized above 60°F produces a more uniform spawn.

Stocking Broodfish

Stocking rates depend on whether the fingerlings will be sold directly from the pond, or the fry will be transferred to other ponds for further growth. Stocking 30 to 50 pounds (10 to 40 fish) of broodfish/acre to produce 20,000 to 50,000 fingerlings of 1.5- to 2-inch (marketable) size in the same pond is commonly practiced in private fish hatcheries. This method requires fewer resources and less labor and technical expertise. Approximately equal weights of males and females should be stocked, which usually results in a higher number of males. Fingerlings are harvested by seining small schools with a 1/8 inch mesh seine or trapping and then subsequently draining the pond.

Broodfish are normally left in these ponds until harvest of the fingerlings. Therefore, the broodfish are expected to be in the ponds for about 65 days before being returned to the broodfish holding ponds. Some predation on the small bass by the adults is expected. In addition, the earliest spawns will normally devour any spawns that hatch later. Unless larger fingerlings are to be produced, do not stock forage fish in the spawning ponds as they interfere with bass reproduction and are difficult to separate from bass fry at harvest.

If the maximum numbers of fingerlings are desired, the rearing-pond technique is usually used. Up to 125 pounds of broodfish per acre are stocked, and the fry are transferred to separate rearing ponds when they are 1/2 to 3/4 inch in length. Other management techniques are the same. When the number of fry being captured becomes economically unfeasible, the ponds are drained and the broodfish transferred back to the holding ponds. The major advantage of this method is that the culturist can take advantage of multiple spawnings. It is critical that even-aged fry are stocked in the rearing ponds to lessen cannibalism.

Preparation of Spawning or Rearing Ponds

Ponds should be rectangular, free of obstructions an no more than 6 feet deep to facilitate harvesting. The ponds should be drained in the fall and completely dried to eliminated predacious insects, fishes, and diseases. The pond should be disked and sown to winter rye, which will furnish a source of organic fertilizer following spring flooding. Apply agricultural lime according to a soil test if the pond bottom soil is acidic. Heavy lime applications, over 4 tons per acre, will also harden soft soils and reduce mud and associated toxins in the harvest seine. Filamentous algae commonly interfere with fry harvesting and must be controlled.

Fill the pond with well water or surface water filtered through 52 mesh/inch saran socks. The pond should be filled only a few days (up to 14) before stocking to reduce the buildup of predacious insects. Spawning ponds should be fertilized when spawning activity is first noticed. This goal is zooplankton production (copepods and cladocerans). Zooplankton is produced from organic materials added to the rearing pond or from feeding on phytoplankton. Inorganic fertilizers are usually added to stimulate phytoplankton growth but are not essential if enough organic fertilizers are applied regularly. Some culturists do not use inorganic fertilizer because it can stimulate filamentous algal growth. Others believe phytoplankton blooms, resulting from added nutrients, enhance fry survival because of reduced visibility.

Organic fertilizers should have a low carbon/nitrogen ratio for quick decomposition. Cottonseed meal produces excellent results and is the most widely used organic fertilizer in bass rearing ponds. Some producers use alfalfa meal at 250 pounds per acre initially and then use 100 pounds per week to maintain the bloom. Cow manure and other animal manures will also give satisfactory results but care must be taken to ensure that fresh manure does not adversely affect

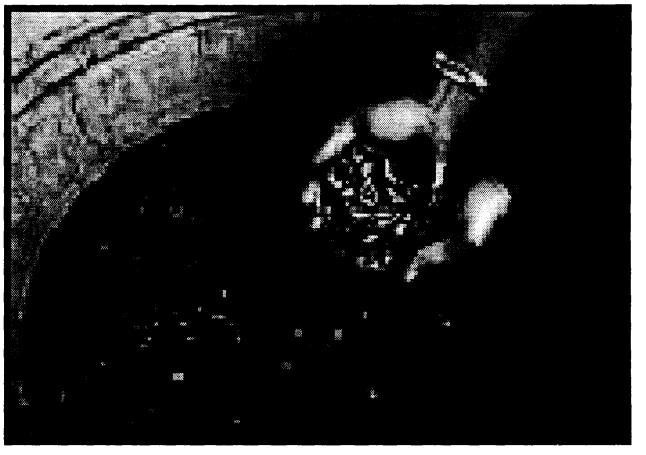


Figure 2. A mixture of live forage fish is used as supplemental feeding. For growth, 10 pounds of forage per pound of bass growth is required.

the ammonia concentration in the water. A general rule is to apply 50 pounds of cottonseed meal/surface acre/week. Reduce applications if filamentous or blue-green algae proliferate.

High phosphorus liquid inorganic fertilizers such as 10-34-0 stimulate phytoplankton. Dilute liquid fertilizers at least 10:1 with water to prevent sinking to the bottom and stimulating filamentous algal growth. Apply 1 gallon of fertilizer/surface acre and repeat as necessary to maintain a desirable plankton bloom. These are general recommendations and the producer must adjust fertilization rates based on pond conditions.

Fry Transfer and Rearing

Transferred fry are more uniform in size if individual schools are seined. All fry should be the same age, as nearly as possible, because fingerlings become cannibalistic at about 2 inches in length. Therefore, most fingerlings are sold before they reach this size. Growout to larger sizes is impractical for most culturists. The use of live forage for growout is expensive and survival of the bass to stocker size under this regime has been erratic.

Fry seines should be of 1/32- or 1/16-inch soft mesh. Mud lines are not recommended. Seines 10 feet long and 4 feet deep are sufficient to surround most schools. The fry are corralled into a seine pocket and then either dipped with a fine soft mesh net into a tub of water, or the seine pocket is reversed into the tub for transfer. Fry numbers can be estimated by water volume displacement or by weight-counting with accurate scales. Stock rearing ponds with 50,000 to 70,000 fry per acre to produce 1.5- to 3-inch fingerlings. Fry will normally remain in these ponds from 14 to 28 days depending on water temperature, and survival to harvest should be from 70 to 95 percent. The need for fry uniformity cannot be overemphasized. Stocking mixed sizes results in poor survival due to cannibalism.

Use of Artificial Food for Growout of "Stockers"

Largemouth bass do not normally accept artificial feeds, but can be trained to do so. This method has not been widely practiced by commercial producers, but is useful in culturing larger fingerlings and "stocker" bass of 4 to 8 inches in length. The demand for this size fish is fueled by requirements for remedial stocking of ponds and lakes. It has been reported that bass fed on pelleted rations will normally not grow above 10 inches in length without other feed being available.

Fingerling bass of about 3/4 to 1 inch long must be crowded in tanks, raceways, or cages for feed training. Crowding promotes competition for food and better acceptance of pelleted rations. Grade closely to prevent cannibalism. Good water quality and disease prevention are essential

Fingerlings should be fed 1.0 to 2.5 mm diameter moist pellets at least 8 times per day including night feedings, 7 days per week. Mixing ground fish with the feed sometimes improves acceptance. By gradually reducing the amount of ground fish, the fish can be weaned to a prepared diet. Researches at San Marcos National Fish Hatchery and Training Center found that Biodiet® produced excellent results. Feed at least 15 percent of body weight daily during the training period. Grading is periodically necessary to maintain uniformity and minimize cannibalism. Pellet size can be increased corresponding to fish growth. From 65 to 95 percent of the initially stocked fish

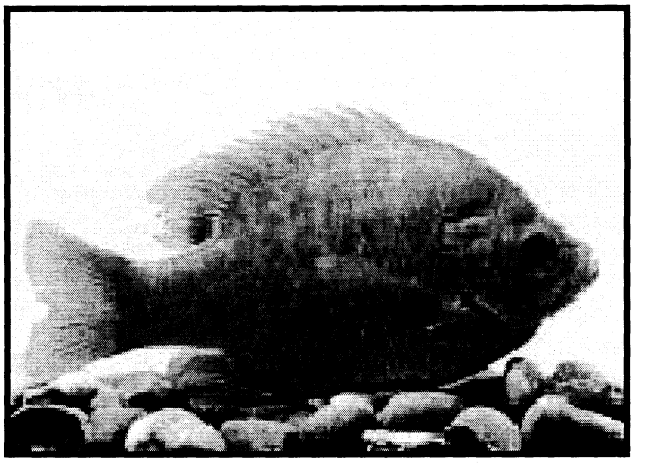


Figure 3. Bluegill make excellent continuous forage for bass.

should learn to take prepared feeds and should double in weight before transferring to growout ponds.

Feed-trained fish can be stocked in growout ponds at rates of 10,000 per acre or more depending on the size of "stockers" desired. They can also be grown out in raceways or cages. Stocking density in these intensive culture systems varies with water exchange rate, oxygenation, and filtration.

Floating mats, hay bales, flowing water, or other methods to concentrate fish for feeding accelerates in-pond feed acceptance. Feed a 2 to 3 mm pellet several times per day for a week or more. Feed all that the fish will eat which should be about 15 percent of stocked weight daily. The rate will gradually drop to about 5 percent daily. When the fish reach about 4 inches, a high quality dry ration can be substituted to reduce cost. Bass should average 6 to 8 inches in length in about 100 days. More than 80 percent survival and 1.5:1 food conversion can be expected.

Though fingerling largemouth bass are fairly easy to move, with few death losses, the larger grown out "stockers" require much more care in handling and transporting. Information on these techniques is available in SRAC-390 through 394.

Economics of Fingerling Production

Largemouth bass fingerling production can be profitable if markets are available. Most fingerlings from commercial hatcheries are sold directly to fisheries managers to stock private lakes or to pond owners to stock their ponds. Competition from public hatcheries limits these markets in some states. Some producers market bass wholesale to fingerling distributors and avoid the challenges of dealing with fish sales to individuals.

Since 1- to 2-inch bass fingerlings are subject to severe cannibalism, it is critical to harvest and sell them as soon as they reach marketable size. Wholesale arrangements must be made in advance if all the production cannot be sold on the retail market in a short period of time.

Production costs vary with the techniques used. Bass production is normally only a part of a sportfish fingerling operation. Costs must be prorated among species to estimate return on investment. Market success and price largely determine profitability.

The following is a sample budget for a 1-surface-acre bass production pond. Equipment costs are prorated for a 20-acre sportfish fingerling operation. A simple production system of stocking broodfish and rearing fingerlings in the same pond is used. This technique gives variable results but is usually successful using minimal labor and technology. The production is sold wholesale. Selling retail would more than double returns.

Projected Income and Expenses from Largemouth Bass Fingerling Production in 1-Surface-Acre Pond

Projected Income
30,000 1.5- to 2-inch fingerlings at $0.15 = $4,500

Expenses

Variable costs		*Fixed Costs*		*Net Return to Management $1,998*	
Broodfish (40 lbs @ $8/lb)	320	**Depreciation**		**Other costs**	
Cottonseed meal (500 lbs @ $30/100 lbs)	150	Pond construction ($4,000-10 years)	400	Insurance	50
Water pumping (4 ac ft @ $30/ac ft)	120	Truck, one ton	200	Taxes (except income tax)	10
Labor (75 hrs @ $5/hr)	375	Service roads	10		
Fuel	100	Well/pump	200	Interest on capital outlay	500
Total variable costs	**$1,065**	Seines	10	**Total costs**	**$2,502**
		Transport tank	2		
		Holding facility	50		
		Other equipment	5		
		Total fixed costs	**$877**		

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