HYBRID STRIPED BASS PRODUCTION IN KENTUCKY

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Introduction

Commercial landings of striped bass diminished from approximately 15 million pounds caught in 1973 to about 1 million pounds caught in 1986. Striped bass populations were further reduced by water pollution and the loss of suitable spawning and nursery habitat in rivers and in estuaries. Following the restricted fisheries of the 1980's and 1990's, striped bass populations are now recovering along the Atlantic and Gulf coasts. Currently, annual Atlantic coast landings of striped bass are expected to reach their maximum yield at about 6 million lbs.

During the 1980's, the rapid decline of the commercial striped bass fishery left an open market which fish farmers began to supply. Profitable food fish production was not successful until recent years because of the long and complex life cycle of striped bass. Striped bass production techniques proved to be labor intensive and costly with unpredictable yields. Hybrid fish originating from a striped bass female x white bass male (original cross), or the more commonly used, reverse cross (referred to as the reciprocal cross) are hardier culture fish, grow faster, have increased resistance to disease, and have been shown to be acceptable market substitutes for the striped bass.

Striped bass and its hybrids are commonly stocked as game fish in salt and fresh waters. Hybrid striped bass can easily be distinguished from striped bass by their irregular lateral stripes and deeper shaped body.

Market Outlook

In 1999, 9.7 million lbs of hybrid striped bass were produced in the U.S. Approximately 5 million lbs of fish were grown in the Southern U.S. worth an estimated $12.5 million. There are approximately 69 U.S. growers and three operations produce 58% of the fish. Tank culture accounts for 45% of the hybrid striped bass production, while 55% are produced in ponds.

Markets have largely been limited to white tablecloth restaurants and live sales to Latino and Asian customers. Approximately 11% of the hybrid striped bass produced in 1999 were sold live. Some mid Atlantic states are also selling fish for stocking recreational ponds.

High fish production costs have limited sales to supermarkets, food service industries and other retail markets. Per pound pond production cost for hybrid striped bass is estimated at approximately $1.75, while fish produced in tanks have an estimated cost of $2.30 lb.

Price decay caused by increased

production and limited market expansion has reduced the wholesale price of hybrid striped bass from $2.85/lb to $2.50 /lb during the past ten years. Market competition is also strong from other commercially caught species.

Currently, there are 12 major fry and fingerling producers in the U.S. In 1999, about 185 million fry are produced and 35 million are exported to foreign producers. U.S. growers will be challenged to lower production costs in the future. This will be necessary to compete with foreign producers which often have lower labor and utility costs and are less regulated with regards to issues such as drug usage and pollution discharge.

Hatchery Methods

Along their native Atlantic and Gulf coasts, striped bass migrate up streams and rivers where they release semi-buoyant eggs which hatch as they drift downstream. Juvenile fish spend their first 1-2 years of life in rivers, estuaries, and bays; moving to more open water as they mature.

Researchers are making progress in the development of domesticated broodstock and holding facilities for producing the hybrids. Domestic broodstock would reduce the dependence on spawn taken from native stocks. However, domestic sources of sexually mature fish are not always available. Currently, the supply of hybrid striped bass fingerlings is limited. When fingerlings are most available in the spring, the cost is often $0.10 or more, for each fish 1-2 inches in length.

Female striped bass may require 5-8 years to sexually mature. The availability of mature female striped bass has often limited production of the original cross hybrid. Mature white bass of either sex are fairly easy to obtain, while mature striped bass males are more readily available than females. Each state has different laws (where, or if collection is permitted) regarding the number, size, season, location, and the method used to collect striped and white bass.

Production of the reciprocal hybrid takes advantage of the earlier maturing striped bass male; bred with the more common white bass female. Although more commonly produced, the reciprocal fry are smaller and tend to have poorer survival than original cross fry.

Hatchery production of the original cross hybrid requires hand stripping of mature eggs from female striped bass, which occurs 1-2 days after receiving a hormone injection. The male white bass is also injected with hormone for sperm collection. The eggs are fertilized with sperm and placed in McDonald incubation jars. Eggs hatch after two days at water temperatures of 64-67 degrees F. Fry will absorb their yolk sacs in 4-5 days and will be ready for stocking into nursery ponds.

White bass eggs are adhesive and must be treated to prevent egg clustering during incubation. Following dry fertilization, the eggs are treated in a mixture of 20 g salt (NaCl), 15 g urea and one drop of anti-foaming agent dissolved in 1.25 gallons of hatchery water. The next treatment consists of placing the eggs in 0.75 g tannic acid mixed in 1.25 gallons of hatchery water. Vigorous aeration is required (7 -12 minutes) during the treatment process.

Following proper treatment, the eggs may be incubated in standard hatching jars. A 50% egg hatching rate is average, while 60-80% is considered good.

Fingerling Production

Hybrid striped bass culture can be divided into three phases of production. Phase I culture, the hatchery phase, where the hatched fry are grown for 30-60 days to produce fingerlings 1-3 inches in length. Phase II begins where phase I fish are grown for 5 to 9 months and reach lengths of 3 to 10 inches. Phase III is the grow-out stage of fish to market weight of 1.5 to 2.5 lbs, or to the adult stage.

Levee style ponds similar to those used in the commercial catfish industry would be best suited for hybrid striped bass production. Watershed ponds may also be stocked at lower densities due to problems associated with harvesting and maintaining adequate water quality. Indoor water-reuse or recirculating aquaculture systems are used to produce hybrid striped bass in northern climates. This is prevalent particularly in the New England states which are close in proximity to traditional markets for striped bass products.

If possible, nursery ponds should be filled 3-14 days prior to stocking to prevent large hatches of predaceous aquatic insects. Water standing for longer periods should be reclaimed with rotenone and allowed to recover before fry are stocked. Hybrid striped bass are best cultured and withstand handling stress in waters with a calcium hardness of 150 mg/L or greater. Ponds which contain soft water will require agricultural limestone, gypsum, or rock salt to increase the ionic content of the water.

Nursery ponds are fertilized with organic and inorganic fertilizers to promote dense populations of zooplankton which the fry utilize as food. Organic fertilizers such as Bermuda hay, or alfalfa pellets should be added to the pond 1-2 weeks before stocking at rates of 200-500 lbs per acre. Two weeks following stocking, organic fertilizer should be applied at a rate of 25 lbs per acre. Liquid inorganic fertilizers such as ammonium nitrate and phosphoric acid should be applied 3 times a week before stocking, and twice a week for three weeks following stocking. Original cross hybrid fry feed on larger zooplankton, while the smaller reciprocal fry feed on smaller organisms. Reciprocal hybrid fry tend to have a lower rate of survival when compared to original cross fry, likely resulting from their smaller size and dependence on smaller food organisms.

Fry are stocked into ponds at 50,000-200,000 per acre. Survival of fry to fingerlings may range from 0-80%. Water quality must be maintained by effective methods of aeration and circulation. Fry should be stocked into ponds when water temperature is 65 degrees F. Hybrid bass grow best slightly at water temperatures (72-82 degrees F.) slightly cooler than channel catfish.

Hybrid striped bass can be grown in recirculating or flow-through fish production systems. Fry may be produced in small tanks or aquaria for approximately 10 days at stocking densities of 4,000 fry per gallon.

Fry are then divided and stocked into circular tanks depending on the rate of

water flow. Adequate biological and mechanical filtration is required to grow hybrid striped bass in recirculating production systems.

Fingerlings are trained to accept artificial feeds when they reach about 1 inch in length. Approximately 3-4 weeks are required for the fish to convert from natural to artificial feeds. A salmon starter mash consisting of 45-50% protein, is offered 1-6 times daily, at a rate of 1-5 lbs per acre per day for the first week. Thereafter, feed may be offered at 10-15 lbs per acre per day. Larger, floating pelleted feeds are offered as the fish grow. The fingerlings are often moved to raceways where they are graded to reduce the incidence of cannibalism, starvation, and size variation in nursery ponds. Phase 1 fingerlings (200-300/lb) are stocked in ponds at a rate of 15,000 to 20,000 fish per surface acre. A high protein diet (35-50%) should be fed at a rate as high as 20% of total fish body weight for the first 30 days following stocking. The rate of feeding should be reduced monthly so that the fish are fed 3-4% of body weight by harvest. Wholesale feed (bulk) costs approximately $0.30 per lb. Feeds are broadcasted from the pond levees twice a day by methods similar to those used in catfish production. Feed conversions average 2.0 lbs of feed to 1 lb of hybrid bass .

Phase II fingerlings, 3 to 10 inches in length, are graded mechanically and split into densities of 3,500-4,000 fish per surface acre and stocked into finishing ponds.

Food fish production

Optimum market size for hybrid bass ranges between 1.5 - 3.0. Levee ponds with well capacities of 30-50 gallons per minute per acre could support fish densities of 3,500-5,000 lbs per acre. Some growers have reported yields of 5,000 lbs/acre and 90% survival. Deeper watershed ponds may be able to produce 1,000-3,000 lbs per acre. Hybrid bass are usually handled during cool weather, or at night to reduce stress. Complete pond harvests are preferred to partial harvests; so that injured or stressed fish are not left in the pond.

Hybrid bass weighing 1-2 lbs have a 40% yield when filleted with the skin left, 18% of body weight is lost when the viscera, head and scales are removed. The break even cost of hybrid striped bass production in Kentucky will likely range between $2.00-3.00 lb.

Profitable production of hybrid striped bass in Kentucky will depend on the following factors: the development of domesticated broodstock or a year-round source of affordable fingerlings, suitable land and water resources, market development, and the ability to compete with other states and countries in terms of production costs.

Competitive marketing opportunities, appropriate for small scale Kentucky farmers, need to be identified before hybrid striped bass production can be seriously considered. Formulated feeds must be available at reasonable cost. Less expensive and more reliable fingerling supplies will be needed for further industry development. Since optimal land and water sources are

limited in much of Kentucky, the economic feasibility of low density hybrid bass production in watershed ponds should also be examined.

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