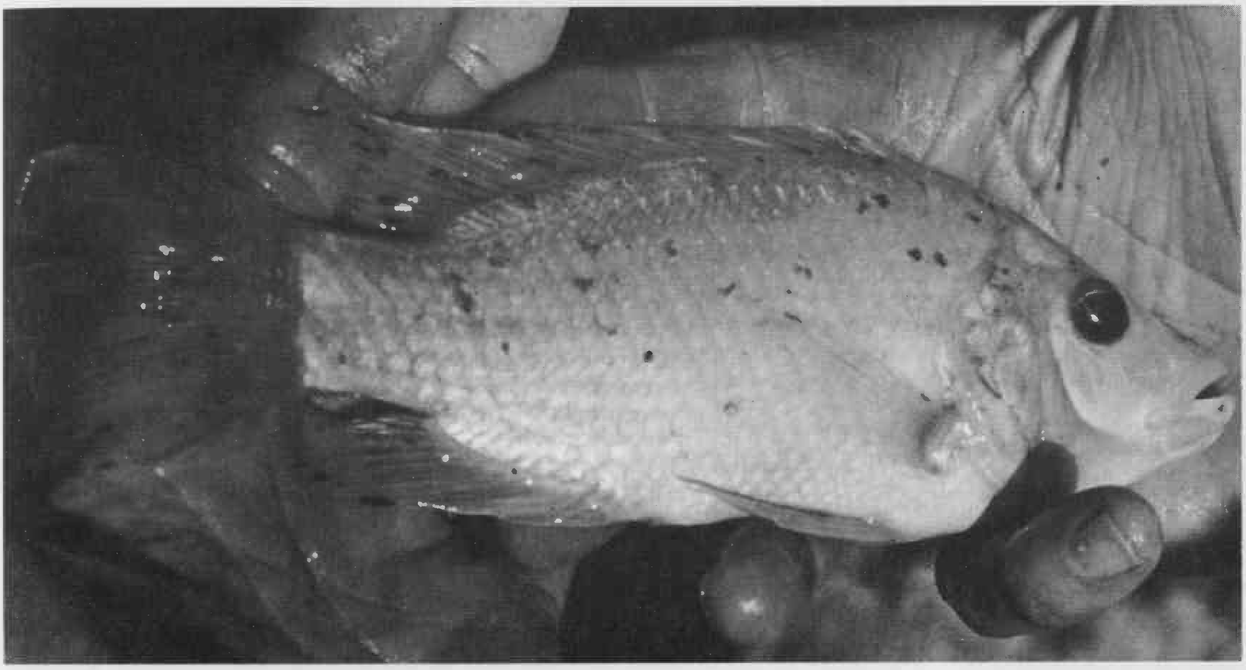

Fish Farming in Arizona: Double Duty From Irrigation Water

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In the parched desert between Gila Bend and Yuma, a few farmers are growing a surprising crop: fish.

Fish farming offers the temptation of getting extra value out of irrigation ditches, canals and farm ponds in this and other areas of Arizona. It also presents several problems, serious enough that only a few of the fish-farming ventures started in Arizona have survived commercially.

Farmers of any sort get used to problems, though. Gary E. John and Jim Haggard, who farm about 30 miles west of Gila Bend, turned to fish to help solve the common problem of high irrigation costs.

"The water has gotten pretty expensive, and I needed something to help pay for it," said John. Last summer, he stocked thousands of 2-inch fingerlings into his concrete-lined irrigation ditch. They grew in the water he pumped for a crop of oats.

This spring, John and Haggard are netting and selling hundreds of those fish. Many of them topped one pound by mid-April.

They raise tilapia, a hardy African type of fish used in America for controlling aquatic weeds as well as for food. They also have a few channel catfish, and plan to add more.

Catfish make up the biggest share of the fish-farming business nationwide, which has more than doubled in volume since 1975. The amount of fish that Americans eat has been growing, too. Fish farms produced more than 300 million pounds of meat last year, but the nation consumed more than 10 times that weight of fish and other seafood.

Arizona has 13 fish farms licensed by the Arizona Game and Fish Department. Some of those are inactive or nearly so, said Dr. Bruce

Photograph: This young Arizona Golden Tilapia swims at Arnold Burr's Arizona Hybrid Fish Farm in north Scottsdale. (Photos by Guy Webster.)

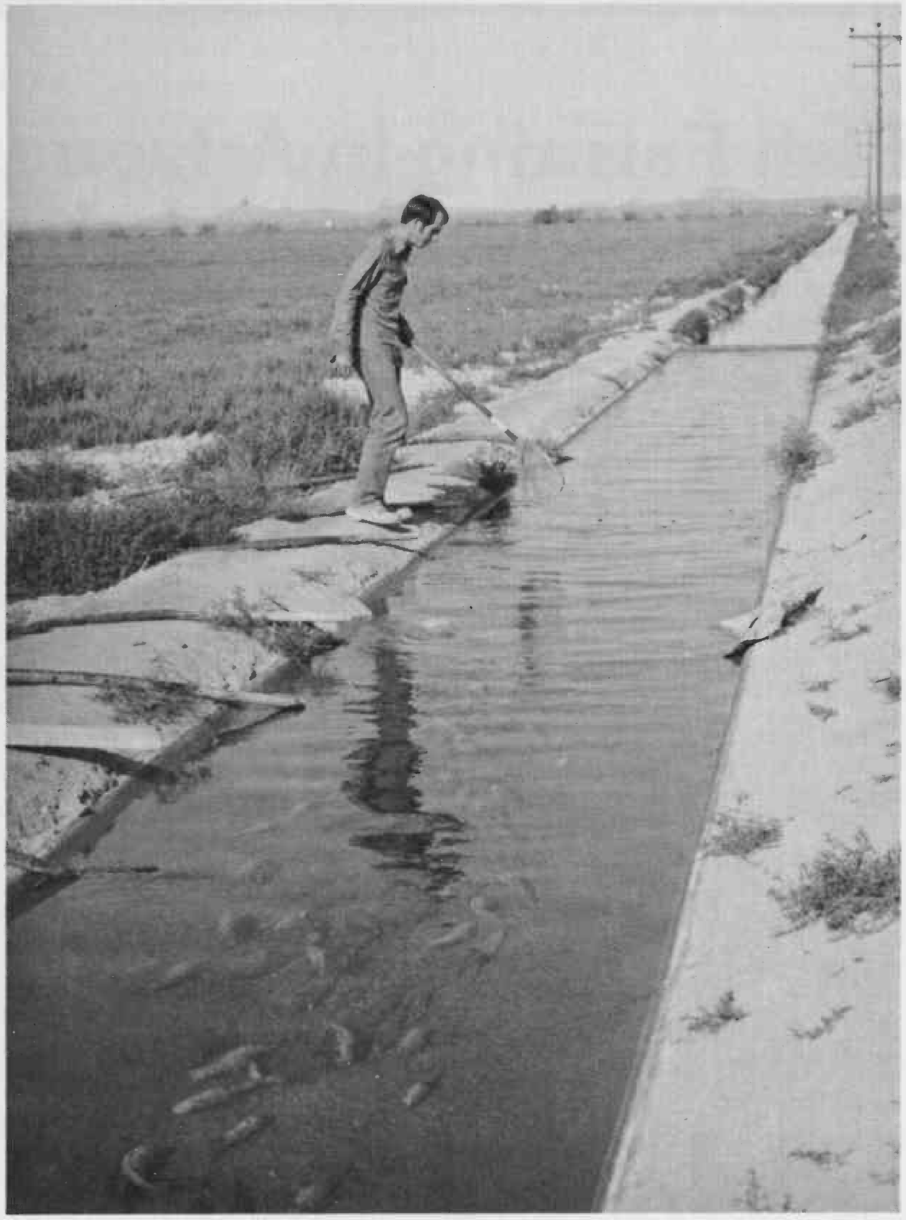
Taubert, supervisor of the department's Fisheries Branch. The number licensed vacillates from year to year, but has not steadily climbed or dropped in the past decade, said Taubert.

The Arizona farms raise a wider assortment of aquatic creatures than you will find on your favorite seafood restaurant's "fisherman's platter:" trout, bass, bluegills, crappies, carp, minnows, bullfrogs and freshwater prawns, as well as catfish and tilapia.

Fish and Jojoba

The farms vary in production methods, too. At Gary John's farm, the fish swim freely in a ditch several hundred yards long. A few miles further west, Kip Willis of Hyder Jojoba Incorporated has built large cages to grow fish in a holding pond for pumped groundwater. The water irrigates a 1,100-acre plantation of young jojoba bushes.

Willis made his submersible cages of plastic mesh around a frame of rigid plastic tubing 12 feet long, 8 feet wide and 4 feet deep. Similar



Fish in the foreground avoid Gary John's net in the irrigation ditch for his farm near Hyder. The ditch supplies water to the field of oats on the left.

cages are common for pond-raised catfish in the major fish-farming areas of the Southeast. The cages keep the fish in clean water, off the bottom, and they ease harvesting.

Mark Harwell of Safford runs a fish farm near Safford that supplies more than a ton of cleaned, dressed catfish weekly to 3 major supermarket chains in the Phoenix and Tucson areas. His fish grow in 10 round, 20-foot-diameter tanks called raceways. Water from artesian wells flows through the raceways fast enough to keep them clean.

Unlike John, Haggard and Willis, Harwell raises fish as a full-time business, not as an add-on to other farming. The water he uses, however, does irrigate alfalfa and cotton on two nearby farms.

Whatever the size or shape of their home waters, commercially raised fish eat a carefully formulated diet made from grains, cottonseed meal and other ingredients. Catfish and tilapia gain about 9 to 10 ounces in weight for every pound of feed they eat, a more efficient meat-making ratio than any landlubber livestock can claim.

Some fish growers concentrate on producing fish to stock lakes or other fish farms. One is Arnold Burr, manager of Arizona Hybrid Fish Farm in north Scottsdale. Burr specializes in the light-skinned Arizona Golden Tilapia, which he sells for stocking as well as for the direct food market.

Chancy Business

Carl Manley of Camp Verde raises several types of fingerlings and larger fish for stocking. The water through his assortment of ponds and raceways also irrigates field crops.

Selling fingerlings for the past 5 years has kept Manley in touch with other fish growers. "In that time, I've seen a lot of these operations come and go," he said.

Al Essbach of Phoenix, retired former fisheries chief for the Game and Fish Department, agrees fish farming can be chancy, but feels it has good growth potential in Arizona. He works now as a private consultant to fish growers.

"Your success in this business in Arizona depends on your marketing effort," said Essbach. For example, the Arizona Golden Tilapia has a marketing advantage over darker-skinned tilapia because consumers appear to prefer light-colored fish, he said. Both types have the same firm, white meat under the skin.

Harwell, the Safford catfish grower, has invested heavily in marketing in the past year. "We've developed a market for catfish by demonstrating them in stores 5 days a week," he said. The demonstrators hand out taste samples and information in supermarkets.

"Seventy-five percent of the people who taste our samples say they have never tasted catfish before, but 95 percent of them say they liked it," he said. Farm-raised catfish are milder flavored than wild ones.

His promotions have paid off in doubling of his sales in the past 6 months. That makes him optimistic enough to plan 20 new raceways.

Harwell called fish farming "a high-risk, high-yield farming proposition." He has been in and out of the business several times since his first try at raising fish in 1948 near Parker.

Water Quality

Water quality ranks with or above marketing as a critical factor in fish farming. Fish have to survive and grow before they can sell.

Jim Haggard (left) and John harvest and weigh some of their fish crop.

At the Arizona Hybrid Fish Farm, fishery consultant Al Essbach (right) shows construction of a cage for hatchlings to John Stair of the UA Cooperative Extension Service.

The quality of water needed to raise fish differs in some ways from the quality required for irrigating crops of cotton, vegetables or other plants. For example, plants do not need oxygen in their water, but fish certainly do. Plants tolerate certain pesticides that would kill fish. On the other hand, some freshwater fish can live in water salty enough to hurt most crop plants.

Also, each species of fish has an optimum temperature range for growth and reproduction. A few degrees of difference for some varieties can make them stop eating or kill them outright.

Several Arizona fish farmers, including Harwell, John and Burr, use water that is geothermally warmed underground to constant temperatures in the 80-degree range.

Even in areas without this resource, southern Arizona's mild winters may give it an advantage over other states for year-round production of warm-water fish such as catfish, bass and tilapia. Cold-water varieties, such as trout, are farmed at higher elevations in Arizona and in northern states such as Idaho.

Fisheries scientist Charles D. Ziebell of the University of Arizona Cooperative Fisheries Research Unit has stressed that farmers considering fish production should know about variables in water quality that affect fish. "We need to do more research on whether we can use tailwater ponds, because we've got a lot of those ponds on farms in Arizona," he said at a recent conference.

Pioneer Spirit

Without more research about using irrigation water for fish farming in the state, he said, "it's pretty much a hit or miss enterprise."

Most types of fish grown in crowded conditions of commercial production are susceptible to major losses from disease. Tilapia resist almost all diseases, but their survival ability ironically has disadvantages, too. Taubert of the Game and Fish Department said, "Tilapia have the potential to degrade the sport fisheries in the state. They can reach higher population levels than other fish, and their populations can boom."

Despite the potential problems in raising fish, enterprising Arizonans keep testing the waters of the fish-farming business. They can get some guidance from successful examples, consultants, journals, and from public agencies such as the Arizona Game and Fish Department, the U.S. Soil Conservation Service and the University of Arizona Cooperative Extension Service.

They have to provide their own pioneering spirit. Partners Gary John and Jim Haggard have that attitude.

"There's no question that we're getting a phenomenal growth rate from these fish," said Haggard. He predicts a 150,000-pound annual harvest of fish from expanding their system to include more ditches and a small pump for circular flow. That is only a little higher than the amount of catfish Mark Harwell is already selling.

"This is just a pilot program, but it's going excellently so far," said John. "We haven't even started to reach our potential on this farm."

Or, maybe, in this state.