EXOTIC FISH PROBLEMS AND OPPORTUNITIES IN THE SOUTHEAST*

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In order to keep today's discussion within the allocated time frame, we will rely upon Webster's International Dictionary definition of an "exotic" species as one that is "introduced from a foreign country." It may be appropriate at this point, however, to acknowledge that "transplants" of native species within United States waters pose many of the same "problems and opportunities" and, in some respects, may be considered analogous to foreign introductions.

A review of current popular and scientific literature indicate that there is a great deal of controversy associated with the topic of exotic fish introductions. Depending on the point of view espoused, proponents of exotic introductions either wore white hats—and traveled the high road of "innovative" fisheries management and problem-solving, or wore black hats—and were charging recklessly down the low road leading to certain environmental degradation. However, further reflection suggests that the time may be ripe for a grey hat, middle-of-the-road exploration of the pros and cons of exotic introduction. A brief review of the scope of exotic fish introduction in the Southeast may be helpful for perspective. The introduction of exotics can be divided into two distinct categories: (1) purposeful introductions to accommodate alleged fisheries management needs, and (2) inadvertent introductions.

At last tally, some 26 exotic species plus 5 hybrids are believed to have established spawning populations in the southeastern states (primarily in Florida). Inadvertent introductions accounted for the majority (23 species and the five hybrids) of the exotic species known to have reproduced successfully in the wild. Most of these species have been associated in some manner with the ornamental aquarium fish trade. Dispersion and subsequent establishment of these species in open waters has been effected as a result of escapement from fish farms, discard by aquarium hobbyists or, in some instances, as a result of illegal transfer by ill-advised anglers and/or escape from bonafide research stations. With the exception of blue tilapia, which have become rather widely established in Florida (12 counties and the St. Johns River) and a few Texas cooling reservoirs, little documentation of the impact of exotics on indigenous fauna is available.

The Sport Fishery Research Foundation currently is funding a pioneering research project at Texas A & M University documenting the response of largemouth bass and other indigenous species to a mass mortality of blue tilapia (standing crops up to 2,000 lbs./acre) in a Texas cooling lake following a shut down at the power plant for repairs this past winter. Successful reproduction of largemouth bass, carp, and other species was noted this spring for the first time in several years.

Florida Game and Freshwater Fish Commission fishery biologists are evaluating the effects on the sport fishery of a commercial haul seine program for underutilized species which resulted in the removal of 850,000 pounds of blue tilapia in 1975 (gutted fish were sold for 14 cents/lb. by the seiners). Florida biologists believe that the effective commercial removal of tilapia probably accounted for the lack of reports of stunted populations of this exotic species. Evaluation of a concurrent largemouth bass stocking program initiated in the spring of 1976 for tilapia control is also under way.

A considerable body of speculative literature (both popular and in scientific journals) suggests that other recently established exotic species have, or can be expected to adversely impact native fish stocks. However, it seems apparent that more long term, ecologically-oriented research is needed to properly assess the actual impact of these species on native fishes.

The need for better control over the importation and interstate shipment of exotic fishes is obvious. Suggestions for control as voiced jointly by the American Fisheries Society and

the American Society of Ichthyologists and Herpetologists in 1969 and, most recently, by Resolution of the Board of Directors of the Sport Fishing Institute, in May, 1976, should be accorded serious consideration by all appropriate state and federal offices.

Purposeful introductions of exotic species have been made to satisfy a variety of well predicated (for the most part) objectives. These objectives include the desire to provide greater diversity of sport and/or food fishes, to achieve aquatic "weed" control, and to provide for more effective utilization of new ecological niches created by man's growing propensity for habitat manipulation (reservoir construction, thermal discharge, etc.). Over the years, some 9 exotics have been purposely stocked in open-water situations by one or more fisheries or natural resource management agencies in the southeastern states (brown trout, carp, goldfish, peacock fish, Ohrid trout, grass carp), and three species of tilapia. Of these introduced species, only the carp, goldfish, and brown trout (all introduced many years ago) have thus far been successful in establishing substantial self-sustaining population in the wild in this region. Grass carp have done so in Mexico.

The ecological and fisheries management implications of the establishment of these purposefully stocked species are still only imperfectly understood and/or documented. Generally speaking, the establishment of brown trout has been considered beneficial in the southeast, although there has been considerable concurrent displacement of indigenous brook trout populations in a few areas—which has been considered undesirable by some fisheries managers and anglers. On the other hand, the establishment of carp and goldfish generally has been viewed with disfavor. The presence of carp in relatively shallow reservoirs, lakes, and bays (particularly in waters managed for centrarchids or waterfowl) has been considered detrimental.

Food competition and excessive water turbidity generated by large populations of carp in such shallow water situations has been found to effectively reduce the production and standing crops of more widely sought-after native species. In relatively deep reservoirs and large, naturally turbid waters, however, there has been little evidence of ecological damage or suppression of fish communities attributable to the establishment of carp. In fact, carp are avidly sought by some anglers in these situations, and angler acceptance of carp is expected to improve in future years.

Locally abundant populations of several species of tilapia were temporarily established in a few Alabama state-owned lakes some years ago, but failed to establish self-sustaining populations because of complete winter-kill. Perfunctory attempts in the southeast to establish both the Orhid trout (Kentucky) and the peacock fish (Florida) proved unsuccessful. In both cases only a single attempt, involving the introduction of a limited number of fingerlings or fry, was made. No fish from either experimental introduction survived.

Although no evidence of successful wild spawning in U.S. waters by extensive and repeated stocking of grass carp has been documented to date, it is certainly possible (if not inevitable) that this species will soon be added to the list of exotics which have established a firm foothold in the southeastern states. The response of various fisheries scientists and managers to the challenge posed by consideration of the introduction of the grass carp has run the gamut from enthusiastic endorsement to utter rejection. Likewise, this species, probably better than any other exotic on the current scene, epitomizes both the potential "opportunities" and "problems" posed by exotic introductions in the southeast. On one hand, the grass carp promises to offer a substitute for costly chemical control of millions of acres of weed-infested waters (excellent control has been obtained in Arkansas). The other hand raises the spectre of an uncontrollable population increase of this potentially prolific species at the expense of more desirable indigenous sport fish species and waterfowl. The jury is still out regarding the eventual disposition of the case for or against the introduction of the grass carp. However, there seems to be little doubt that the premature release and/or escapement, as the case may be, of this species in the wild, prior to adequate, long-term evaluation, was most unfortunate at best.

Two additional exotic species, the Nile perch and the peacock fish, currently are under active consideration for purposeful introduction in Texas cooling reservoirs. Texas biologists believe that these tropical species will be more effective than available native

species for controlling and/or utilizing the large populations of prey and non-sport fish species which typically develop in these artificial temperature-enriched situations. Both species are undergoing vigorous long-term evaluation and will not be released in open-water situations unless the investigative results are favorable. Other exotic species (silver carp, bighead, and black carp) are also being held at various state and federal facilities in Alabama and Arkansas, as well as by private hatcheries. There are no current plans for purposeful stocking of any of these species in open waters. However, there always remains the possibility of inadvertent escapement.

Fisheries scientists have learned from long (and sometimes bitter) experience that successful introduction of any extraneous organism within a given biological community cannot be accomplished without some repercussion. The nature of the response may vary from insignificant to either highly beneficial or highly destructive, depending on the character of the introduced species and the biological and physicochemical parameters of the target environment. Almost certainly, however, an exotic introduction will involve trade-off between "benefits" and "costs." Thus, the ultimate effect of an exotic introduction inherently is fraught with uncertainty. It therefore behooves the prudent fish manager to insist upon as full an accounting (translate as long-term research findings) as possible of the implications of proposed introductions prior to irrevocable commitment.

At the same time, the great potential benefit from judiciously selected, evaluated, and executed exotic stocking programs cannot be denied, and a responsible fisheries manager will not dismiss out-of-hand this valuable management tool.