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PRESIDENT'S MESSAGE

I suppose one's parting words when leaving a position of leadership should be an inspiring message to one's successors to carry on nobly and to aspire to bigger and better things. I consider the inspirational message unnecessary, because your new president, Paul Shafland, will be an effective leader of the Introduced Fish Section. In fact, he has been for some time, as he showed by running (from all accounts) a very interesting meeting at the Alaska AFS meeting. He took my place when I canceled out at the last minute to document the effects of the invasion of predatory squawfish into a river system my research team has been studying for some time. One reason I felt I could miss the meeting was that I knew Paul would be there! One of the best things about working with Paul the past two years is to know that we can disagree about many issues but use the disagreements to spark debate rather than acrimony. I hope debates will continue in future issues of the newsletter and that members will feel free to contribute their opinions, no matter how bad! I know that I will continue to contribute, provided someone says something that gets me irritated enough. Why not you?

FROM THE EDITOR

I have enjoyed being your Newsletter Editor. Unfortunately, I was unable to incorporate all the published material, newspaper articles, talk abstracts, et al. that were sent to me. I sincerely thank each contributor for providing the excellent material they did; this sure made my job easier.

One comment that I received repeatedly regarding our Newsletter is its value as a forum for exchanging differing ideas and opinions. Primarily with Peter Moyle's encouragement we have begun some exchanges and others are beginning to join in (see letters to editor). Since this is my last 'From the Editor' column, I will finish up with a few thoughts on why there seems to be a schism between natural resource managers and some academicians who teach natural resource courses when it comes to the topic of purposefully introducing fishes.

Societal realism is encountered to a greater extent by idealistic (naive) natural resource managers than their idealistic counterparts in academia. While we all sometimes wish for the days when fish and wildlife communities existed undisturbed by white men, managers learn quickly that few are willing to give up their modern day conveniences for the physical demands of living 'naturally or not at all'. The knowledge, yes even wisdom, that natural resource managers glean from these forced exposures to societal realism is admittedly difficult for non-managers to appreciate or even recognize. Some discount the value of this knowledge base, choosing instead to accept intuitively satisfying, intellectually acceptable but unverified hypotheses largely as fact.

One hypothesis sometimes considered as fact is that ALL introduced organisms are inherently detrimental (even catastrophic) simply because the responsible dispersing agent is man. Most do not take this or any other 'all' statement seriously; yet many have uncritically accepted and repeated portions of this notion based on the logical but poorly tested reasoning of those espousing it. Forced exposures to societal realism (i.e., exposures to naive but penetrating questions that can make one see their subject from an entirely new perspective) places resource managers in the unavoidable position of challenging the 'all introductions are evil' hypothesis; a challenge worthy of more serious consideration than some have given it. All but the most closed minded observer concedes that some purposeful introductions have had very positive socioeconomic and biological effects. From where the manager sits, lumping accidental (illegal) introductions with well-planned purposeful introductions is like comparing apples to oranges.

The increasing socioeconomic and political importance of exotic fishes in U.S. aquaculture is forcing natural resource managers to take another major dose of societal realism. If fisheries professionals ignore aquaculture or fail to deal with it realistically, we will lose the opportunity to influence its development in the manner most compatible with the natural resources we all want to protect and preserve. We can ill afford this scenario.

Introductions can and have had detrimental effects on native species but such effects should not be assumed because of the mere occurrence of an introduced species. Recognition and respect for differing perspectives is the beginning of better perspectives. Because academicians and natural resource managers have different perspectives on introductions, they will not always agree; however, working together and learning from one another will result in a better understanding of these events than either group can achieve alone.

SHIPMENT OF ENDANGERED GIANT CATFISH SEIZED

In July 1989 U.S. Fish and Wildlife Service personnel seized a shipment of nearly 100 pangasiid catfishes at the Dallas-Fort Worth airport. These fish appeared somewhat different from Pangasius sutchi commonly imported and sold in the pet trade as Siamese or iridescent shark. Three specimens (197-227 mm TL) were sent to Texas Parks and Wildlife Department's Heart of the Hills Research Station, Ingram, Texas for identification. These individuals were determined to be P. sanitwongsei, which is included on the federal endangered species list. A previous shipment was recently detected in New York.

Thai giant catfish of 3 m in length have been reported in Thailand. Pangasius sanitwongsei differs from other pangasiid catfishes by the presence of two pair of barbels; the presence of a white humeral spot; long ray extensions on the dorsal, pectoral, pelvic, anal, and caudal fins, and a crescent-shaped band of vomero-palatine teeth.

--Bob Howells, Texas Parks and Wildlife Department, Ingram.

The reduction of large algal populations using fish is the subject of a study being conducted by Dr. Jerome Shireman, Dr. Daniel Canfield and Dr. Karel Opuszynski. In six ponds adjacent to Lake Apopka, bighead carp (Aristichthys nobilis) will be used to control large algae, and grass carp (Ctenopharyngodon idella) will be used to control macrophytes. The study is being funded by the St. Johns Water Management District with SWIM funds.

--AQUAPHTYE. 1989. 9(1):3 Institute of Food and Agricultural Sciences, University of Florida, Gainesville.

CALL FOR CONTROLS IN JET-SETTING INSECTS

Airline companies should introduce tighter measures to prevent exotic insects and pests from traveling to other countries on board aircraft, a French scientist has warned. This follows the first reported appearance outside the U.S. of the screw worm fly (Cochliomyia hominivorax), which biologists identified this year in Libya (This Week, 18 February). The fly is an important vector for disease in both humans and domestic animals.

R. Chermette from the Alfort Veterinary School at Maisons-Alfort Veterinary School at Maison-Alfort near Paris revealed in the Veterinary Record (17 June, p 641) that a dog was treated for disease caused by the fly before the reported outbreak of cases in Libya. He warns that the increasing air traffic in live animals could enable the fly to establish itself in Europe or, for example, could allow the African tsetse fly to colonise the pastures of South America. "Recommendations for insect eradication on planes must be respected and every sanitary and medical measure emphasized before export or import of animals," he writes.

--New Scientist, 8 July 1989,
123(1672):31.

CHANGES AHEAD FOR TEXAS AQUACULTURISTS

AUSTIN, Texas--A bill regulating the importation, propagation, sale and possession of all species of "cultured fish" (farm-raised) and all "exotic fish" (species not normally found in Texas waters) has been signed into law by the governor and becomes effective Jan. 1, 1990.

SB 1507 also transfers certain authority regulating aquaculture from the Parks and Wildlife Department to the Department of Agriculture.

Changing the regulatory structure is seen as an acknowledgment that the Texas aquaculture industry is growing in importance. However, the transfer of authority, coupled with several amendments to the procedures for listing prohibited species, has resulted in a "potential regulatory nightmare" according to a PIJAC Pet Alert.

Among the questionable provisions of SB 1507:

1. Depending on interpretation, the law could lead to an outright ban or to an extremely limited number of species available for aquarium interest. While the banning of exotics is not required, the Parks and Wildlife Department could attempt such an action by declaring all exotics "potentially harmful."
2. If the law is interpreted literally, virtually every home aquarium, all fish wholesale operations and pet stores would be required to have fish farming licenses because aquariums maintain cultured and wild-

caught specimens, and propagation has been known to occur in such aquariums.

3. The bill requires the Parks and Wildlife Department to publish a list of harmful or potentially harmful exotic species not acceptable for fish farming except by permit.
4. Also required is a list of harmful or potentially harmful exotic fish, shellfish and aquatic plants for which a permit would be required if possession is allowed at all.

According to PIJAC general counsel Marshall Meyers, it's likely that the Department will revise and continue to publish a "dirty" list of harmful or potentially harmful species prohibited except perhaps by permit (as opposed to publishing a lengthy "clean" list), an approach supported by aquaculturists.

--Pet Business. October
1989 Issue, pages 16-17.

GREEN GURU ATTACKS 'CORRUPT' SCIENTISTS

Science has grown "fat, lazy and corrupt", says one of its best-known practitioners last week. It has become "a comfortable career for the mediocre" and is "no longer the vocation of mad men like me who could think of no other way of spending life", says James Lovelock, who shuns conventional scientific institutions and works from a laboratory attached to his home on the edge of Bodmin Moor.

Lovelock is the inventor of the increasingly influential Gaia hypothesis, which sees the biological and geological aspects of the Earth as a single interacting system.

He attacked the reductionist domination of science which separated science into "neat compartments where specialists and experts could ply their professions in complacency." He added: "It is not surprising that most scientists today regard Gaia as naive. Yet few of them would be able to offer a satisfactory definition of life as an entity or a process. Life is a systems phenomenon and quite beyond their reductionist vision."

The common revulsion among Greens towards modern science is justified, he said, "because they recognise instinctively that a sense of wonder, the sacramental side of science, has all but vanished."

The most malign influence on modern science, he says, is peer review, the "inquisition", which can "destroy the career of any scientist who rebels" and is a profound discouragement to creativity. "Imagine what it would be like in the arts if critics were anonymous and had the power if they did not approve to stop the book being written and published."

Only the greenhouse effect and other problems such as the destruction of rainforests will force scientists to think of our planet as a single entity, he believes, as they did before the trend to reductionism began in the 19th century.

--New Scientist, 30 September
1989, 123(1684):22.

IMPACT OF EXOTICS ON THE INLAND FISHERY RESOURCES OF SRI LANKA

... it is important to point out that fin fish introductions, particularly some cichlids, have already paid rich dividends in Sri Lanka until now, with no apparent ill-effects on the indigenous fish stocks or the ecosystem in

general. Similar situations prevail in other countries. Nevertheless, it could be argued, possibly correctly, that 25 years is too short a time period for the ill-effects of introductions to manifest themselves in biological systems, even though such ill-effects caused by fish introductions, thus far reported, have manifested themselves in less than a decade; such as in the case of introductions of carnivorous species into central America and Philippine lakes.

The 'era' of haphazard floral and faunal introductions have long disappeared. Most countries have introduced legislature to prevent such events. Whilst the need for such legislature is conceded it has been pointed out that often such rules are quite arbitrary and are not based on scientific evidence. The time has, however, probably come for careful scientific evaluation and assessment of the impact of exotics in each country before 'intuitive feelings' of pressure groups begin to advocate the removal of exotics which presently provide a cheap source of protein to people who need it most, particularly in the Third World.

--Excerpts from paper by S.S. De Silva published
1987. Arch. Hydrobiol. Beih. 28:273-293.

OREGON TO TERMINATE MORONE STOCKING IN TENMILE LAKES

The Oregon Department of Fish and Wildlife has decided not to release the annual allotment of striped bass-white bass hybrids in Tenmile Lakes that was scheduled for August of 1989. The acting Chief of Fisheries, James T. Martin made the decision because of the extent of straying from the Tenmile system to other rivers in the State. That straying is against the policy of the Department which says that exotic fishes cannot be introduced into any body of water in Oregon without going through the basin planning process and public review.

Martin said, "We can not allow the observed level of straying to other rivers to continue. Unfortunately, there does not appear to be any way to stop the straying except by not releasing these fish into waters that have outlets to the ocean or other rivers."

"We will not release any hybrid bass into Tenmile Lakes this summer", he said, "and we will ask the Commission to terminate the program when they consider the Fish Management Plan for Tenmile Lakes this fall. However, we will continue the hybrid bass program in Ana Reservoir, a closed system in South-East Oregon."

The hybrid bass program in Tenmile Lakes was started in 1982 and releases have been made annually except in 1986. Strays have moved to the Coos and Umpqua rivers. Recently one was also caught in Siltcoos Lake and three were caught in the lower Willamette River.

"We regret the need to make this decision because this program has been such a good one within the Tenmile Lakes system", Martin said. "A valuable fishery developed on the lakes and these fish provided enjoyment for many people who came to Lakeside from around the State and even from outside of Oregon. I understand the record of 11 pounds 4 ounces was caught by someone on vacation from California."

Martin added, "Warmwater fishes are an important part of fishery management at Tenmile Lakes, and we will maintain a commitment to a balanced program between salmonid and warmwater fishes. The decision to end the hybrid bass program was not based on any actual or perceived problems within the Tenmile system. The hybrids did not reduce the runs of wild coho salmon in the system, and they do not appear to have had any adverse impacts on any other

species. The hybrid bass program was conceived in 1982 as a controlled experiment for Tenmile Lakes that could be terminated if any unforeseen problems developed."

"In my view the program has been a success except for the straying", Martin concluded. "Unfortunately, our tagging studies and reports from other parts of the country have not suggested any possibilities to reduce the straying. These fish are just highly mobile."

--Tenmile Fish News, Oregon Department
Fish and Wildlife, No. 12, 14 July 1989.

OREOCHROMIS MOSSAMBICUS IS NOT UNIVERSALLY A NUISANCE **SPECIES: THE SRI LANKAN EXPERIENCE**

O. mossambicus is now found in virtually every kind of water body--ponds, ditches, canals, etc. It was introduced into or has invaded small bodies of water such as the temple ponds of India where, after a few generations, it began to get stunted. Such factors have perhaps resulted in it being considered a nuisance species.

Where the species has been introduced into sufficiently large water bodies, and where an adequate food supply is available, as in the case of Sri Lankan reservoirs it is a very desirable and a favorable species. There is evidence from Papua New Guinea also that O. mossambicus supports a very profitable fishery in the Sepike river and its flood plain lakes. Hodgkiss and Man (1977) also reported that O. mossambicus was not stunted in the Plover Cove Reservoir in Hongkong.

In this paper an attempt is made to highlight the importance of O. mossambicus as a protein source for poor people with special reference to Sri Lanka. On the average, O. mossambicus accounts for nearly 85% of the total estimated yield of 27,000 and 30,000 t and in the individual reservoirs, the contribution of this species ranges from 55 to 99% of the fish production.

--Excerpts from 1988 paper by S.S. De Silva and K.A.D.W. Senaratne, pages 445-450 in R.S.V. Pullin, T. Bhukaswan, K. Tonguthai and J.L. Maclean (eds.). The Second International Symposium on Tilapia in Aquaculture, ICLARM Conference Proceedings 15, 623 p.

EXOTIC AQUATIC ORGANISMS IN ASIA

I recently obtained a copy of this book which includes 14 papers. This work represents the Proceedings of a Workshop on Introduction of Exotic Aquatic Organisms in Asia edited by S.S. De Silva and published in 1989 by the Asian Fisheries Society as Special Publication 3, 154 pages, Manila, Philippines ISBN 971-1022-53-2, The following excerpts are from 'Address of the Workshop Chairman', Sena S. De Silva:

In keeping with one of the main objectives of the Asian Fisheries Society, to address key issues pertaining to fisheries in the region, the Council at its Second Meeting in 1984 unanimously decided that the Introduction of Aquatic Organisms into the region needed careful consideration. We were aware that this issue was also being addressed by some international organizations amongst others, and the American Fisheries Society. In spite of these considerations the Society felt a need to consider this issue; complex as it is from an Asian context where the socio-economic factors cannot be ignored and or separated from the fisheries issues in general.

Initially, four objectives for the Workshop were identified:

- (i) address the issue of aquatic introductions in the region,
- (ii) evaluate the pros and cons of introductions hitherto made in the region,
- (iii) develop guidelines/a code of ethics for future introductions, and
- (iv) issue a policy statement on future introductions.

It is unlikely that we would be able to fulfill our objectives within the next three days. I consider this workshop as the first step in the direction of achieving our objectives. In order to do so we will have to address our minds to a few key points:

- (i) Do we have sufficient information/knowledge of the situation in each of the countries in the region - if so how do we proceed to collect this information, especially that in the 'grey literature'?
- (ii) Do we need to develop protocols for consideration by Governments in the region, and if so what criteria should we use: should they take into account the socio-economic factors, etc.?
- (iii) Are there recent examples from the region or elsewhere on proposed introductions that impel us to think afresh?

Undoubtedly all of us would agree that we should not adopt, clause to clause, what has been recommended as suitable for North America, Europe and or for that matter mainland Australia. Conditions in Europe and North America are not comparable to that of ours in the region. Here, I do not mean in a climatological sense but in the context of the number of species involved, complexity of the habitats, heterogeneity of the flora and fauna, and the gross beneficial effects of some introductions that have contributed to the animal protein supply. Some of the socio-economic benefits of introductions are not totally quantifiable but they certainly cannot and should not be ignored.

THREE PERSPECTIVES ON PURPOSEFULLY STOCKING INTRODUCED SPECIES

The following is excerpted from comments made by three state fisheries administrators at a mini-symposium titled 'Approaches to Stocking Exotic Species' held at the last annual meeting of the AFS Fisheries Administrators Section, 15 May 1989:

Utah, Bruce R. Schmidt

Utah's position on the issue of introduction of exotic species is colored heavily by the conditions we face. The state is almost equally divided in two drainages, the Green/Colorado River and the Great Basin. These two major drainages have very sparse native fish fauna and a high degree of endemism. Many of the native species are unique in character and highly adapted to specific environments. Of the 25 sport fishes presently managed in the state, only five are native species, three of which are whitefishes that are of relatively low desirability. The remaining native sport fish are the two subspecies of cutthroat trout; these are highly prized but they presently have a very restricted distribution. Utah's sport fishery, therefore, depends almost exclusively on introduced species. Without the introduction of exotics (fish not native to Utah) there literally would be no sport fishery in the state.

Because of the high degree of specialization in the already sparse fish fauna, Utah has a large percentage of its native species on the threatened or endangered list. At the same time, most of our sport

fishery consists of exotic species. As a result, we are faced with a two-way situation that inherently leads to conflict. On the one hand, we must take great lengths to protect and preserve the unique native species which have already been severely impacted by habitat modification and competition or predation from exotics; and on the other hand, we face a high demand for active sport fisheries management, and therefore must continually rely upon exotic species which can adapt to the conditions which presently exist in our waters. Few native fishes are able to adapt to the new modified waters and fulfill the role of a sport fish or forage species. The Utah Division of Wildlife Resources, in managing its native fishes, must take a strong stance and attempt to keep out potentially harmful exotics which could severely impact the natives. At the same time, we need to consider additional exotic species to help solve sport fish management problems. This dual role sometimes leads to a sense of schizophrenia.

Kansas--A State in Transition, Joe Kramer and Bob Hartmann

Our current concerns span protection of threatened and endangered fishes as well as "species in need of conservation," the need for evaluation protocols, genetic conservation, and genetic engineering. NOW, exploding agricultural interests in aquaculture assures a struggle for the control of exotic species between the state's wildlife resource agency and aquaculture's economic and entrepreneurial opportunities.

I feel all fisheries professionals need to make a concerted effort to work together to keep out detrimental species. Proposals to introduce new species should go through a great deal of scrutiny and review before any introductions are made. Review of those proposals, however, needs to be done on an open-minded objective basis for the process to actually function well. Attempts to take the easy way out and simply ban new introductions will very easily lead to sportsmen losing patience with the so-called professionals and deciding to manage the waters on their own. There is already too much of this in evidence, and in almost every case the results are undesirable.

The American Fisheries Society is in an ideal position to address these conflicting approaches to managing exotic species. It is imperative that the Society develop a central position that incorporates both the desire to protect native fishes from exotics, while at the same time encouraging professional management of its sport fisheries, sometimes including exotics. This issue has the potential of being quite divisive, yet it is essential that a realistic stance be adopted by the Society. If it is not, we could easily lose on both sides of the issue.

Illinois, Rodney W. Horner

Passage of the Illinois Aquaculture Development Act, plus pressure from the bait industry in other states, prompted the development of new regulatory strategies. As aquaculture develops, increasing pressure for importation and rearing of exotic species is inevitable. To react to each new species as it pops up, in a "management by crisis" mode seemed a waste of time. The problem appeared to be twofold. One, our laws governing imports of aquatic species needed modernizing. Two, we needed to develop a way to deal with non-indigenous species which would be orderly, and answer the concerns of the various impacted parties.

The result was the development of a proposed change in the law (The Fish Code), and a new administrative rule governing aquaculture which created, among other things, the Aquaculture Advisory Committee (AAC).

The AAC was formed and functioning prior to, and advised on, the administrative rule which officially created itself. While its role is advisory only, the advice comes from all the major players outside of fisheries who would be impacted.

The AAC was organized to advise the Chief of Fisheries. Within its scope of activities is:

- 1) advising on proposed laws and administrative rules governing aquaculture;
- 2) advising on what species should or should not be included on the Aquatic Life Approved Species List;
- 3) advising on what species not on the Aquatic Life Approved Species List should or should not be allowed in aquaculture in Illinois;
- 4) providing advice to the Chief of Fisheries on aquaculture applications, on a case by case basis, which contain requests for species on the Aquatic Life Approved Species List.

When the Chief of Fisheries receives advice from the AAC, he is in possession of a powerful decision making tool.

NATURAL REPRODUCTION OF BIGHEAD CARP (HYPHOTHALMICHTHYS NOBILIS) IN MISSOURI

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The bighead carp has been present in the Missouri and Mississippi rivers since the early 1980's, as indicated by specimens reported by commercial fishermen. However, the number of reports increased substantially after the ponds of a private fish farmer along the lower Osage River were flooded in the fall of 1986. Approximately 14,000 Kg of bighead carp, each weighing 4 to 14 Kg escaped during this flood, according to an unconfirmed estimate. Many fingerlings were also lost, as suggested by the presence of numerous specimens in the Osage River in February 1987 (Mr. Thomas See, Union Electric Company, personal communication). By July 1987 numerous bighead carp about 1.5 Kg in weight, and some larger specimens were observed in the lower reaches of Maries River, a tributary of the Osage River. In June 1988, bighead carp weighing 1-9 Kg were the predominant large species observed among an estimated 50,000 fishes killed by low dissolved oxygen in a large slough near the Missouri River downstream from the mouth of the Osage River.

I received the first evidence for natural reproduction by bighead carp in August 1989 when Mr. Michael Brooke of Norborne, Missouri reported capturing young while seining for bait in a ditch near the Missouri River in Carroll County. I confirmed this report by seining specimens at this locality, and in two tributaries of the Missouri River in Boone County. The seven specimens that I collected measured 36-77 mm TL. On September 19, 53 bighead carp fry measuring 14-20 mm TL were captured in a single haul of a small seine from another Missouri River tributary in Boone County. No bighead carp had been obtained from this locality when I sampled in August. I believe these fry resulted from spawning in the Missouri River during a rise of more than 1.5 m that resulted from heavy rains in early September. This conclusion was supported by estimates of fry age based on the presence of 10-14 growth rings on the otoliths of four specimens, and the degree of development of paired fins and other morphological characteristics.

Small grass carp (Ctenopharyngodon idella) occurred in collections from two of the four localities where I seined bighead carp. Adult silver carp

(Hypophthalmichthys molitrix) are being reported by commercial fishermen along the Missouri and Mississippi rivers. Private fish farmers are reported to have black carp (Nylopharyngodon piceus), but to my knowledge none have been reported from natural waters.

These exotic fishes, often referred to collectively as Chinese carps, are a potential threat to native species and their environment. If self-sustaining populations are present, they may alter the trophic pathways and competitive relationships of fish communities in natural waters. The planktivorous bighead carp is of particular concern since it has already demonstrated an ability to reproduce, and may compete directly with native planktivores, such as paddlefish (Polyodon spathula) and bigmouth buffalo (Ictiobus cyprinellus).

FLORIDA BASS IN OKLAHOMA

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The Oklahoma Department of Wildlife Conservation began stocking Florida largemouth bass in 1970. Research showed this strain had promise and stocking was implemented statewide by 1976.

Little change in the program was seen until 1984, when electrophoretic analysis showed that hatchery brood stocks were contaminated. The genetic integrity of Florida bass stocked in prior years (and associated research results) were in question. Beginning in 1986, mixed stocks were replaced with pure strain Florida bass obtained from Texas Parks and Wildlife Department and the U.S. Fish and Wildlife Service. Fin clips and PIT tags were used for positive identification of each brood fish.

A survey of 55 of the state's lakes previously stocked with Florida bass was undertaken in 1985 and 1986, and electrophoretic analyses were conducted on more than 2000 samples. Results indicated that 8 lakes had no Florida bass alleles remaining, 20 lakes had less than 20% of the bass with Florida genes, but 13 lakes had Florida genes in more than 50% of their bass.

These data were compared against geographical and lake physical factors, stocking histories, and characteristics of existing fish populations. The persistence of Florida alleles were influenced negatively by lake age (older lakes - fewer Florida genes) and the average number of days with air temperatures below freezing (colder portions of the state - fewer Florida genes). Positive influences were the total number and size of Florida bass fingerlings stocked (frequent stockings of more and larger fingerlings - more bass carrying Florida alleles).

Experimental stockings of electrophoretically verified Florida fingerlings into lakes containing only northern bass were started. The survival and growth of Florida bass, and the persistence of Florida alleles in the populations will be monitored.

Results from the first year's stocking (1987) indicated good survival and growth of Florida bass through the first fall (samples of young-of-year bass from each lake averaged 35% Florida). Sampling the following spring (1988), however, showed that the 1987 year-class consisted of, on average, only 14% Florida bass. Second year stockings (1988) followed similar patterns into the fall, with Florida bass representing an average of 29% of the young-of-the-year bass in each lake (with spring 1989 samples yet to be analyzed). This research will continue for another three to five years.

As a supplemental evaluation within the Florida bass program, "trophy bass" caught by anglers from Oklahoma's public waters are being analyzed. Three of the last five state record bass have proven to be F₁ intergrades, while one was pure Florida, and one was a northern bass. Nearly a dozen other bass greater than 10 lbs. that have been analyzed have been F₁ intergrades.

The introduction of Florida bass in Oklahoma has been a success, with the numbers of trophy bass being caught by anglers increasing annually since the early- to mid-1980's. The Oklahoma state largemouth bass record was an 11 lb. 15 oz. fish caught in 1941. This bass record stood until 1983, when a 12 lb. F₁ intergrade was caught. The record has been broken four times since then, including the most recent 12 lb. 13 oz. bass caught in March 1989.

PRELIMINARY EVIDENCE OF A SEVERE IMPACT FROM THE RECENT INTRODUCTION OF A FRESHWATER NEEDLEFISH, FAMILY BELONIDAE, TO HAWAII

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In April of 1988 a fisherman reported sighting a pair of strange gar-like fish, about 12 inches in length, in the Wahiawa Reservoir, island of Oahu. The reservoir provides the core of recreational fishing activity in Hawaii and has been the site of a national bass fishing tournament of champions in 1977 and 1988. Local fishermen hold routine monthly tournaments for largemouth bass (Micropterus salmoides salmoides), smallmouth bass (M. dolomieu), and tucunare or peacock bass (Cichla ocellaris), which they selected for their organizational emblem. The pongee (Ophicephalus striatus) is another large, top level predator species of special interest in the reservoir because it diverts harvest mortality from the bass. Although not officially classified as a game fish, it is caught by bass fishing techniques, is regarded as a hard fighter and good food fish, and is frequently taken home for dinner in lieu of bass. None of the 21 fish species known to occupy the reservoir at the time even faintly resembled gar, nor did any of the more than 40 fish species found in freshwaters statewide.

The new fish was occasionally sighted during surveys in May and by June it had become common with the bulk of the population in the 100-200 mm size range. Based on photographs, it was tentatively identified as Strongylura kreffti, a freshwater needlefish, by an authority on the group. The species is native to New Guinea, and one aquarium fish dealer confirmed that New Guinea was the source of specimens he had for sale under the term "needlenose gar". Fishermen in the Wahiawa Reservoir were already referring to it as a "stickfish", a common name for its marine counterpart.

Early field observations suggested that the presence of the stickfish could be of concern for the Wahiawa fishery. It was found to be a voracious, exclusively piscivorous species in accordance with its toothy appearance. Technicians quickly learned not to hold the fish by its tail, because it would whip its head around and latch onto the errant hand. Attacks on pongee fry were noted in June of 1988.

General Life History Findings

The unique feeding behavior pattern of the stickfish consists of a stealthy approach, then a short lunge to grab the prey from the side. In the case of larger prey, the stickfish will wiggle its jaws to turn the victim to a head-first position before swallowing. It clearly prefers torpedo-shaped prey but is capable of swallowing laterally compressed species such as tilapia that are seemingly too large for ingestion. Its straight gut with only a slight

bulge defining the stomach region infers a rapid digestive rate and frequent feeding activity.

The stickfish occupies upper water levels near shoreline cover. Two anatomical characteristics, large eyes and relatively small gills, are matched to this habitat. The large eyes probably indicate that sight is the primary sense used in the capture of prey. The small gills suggest that the fish require substantial dissolved oxygen (DO) concentrations. Both light and DO are characteristically highest near the surface, and this is especially true in the Wahiawa Reservoir. Unfortunately, this is also the habitat occupied by fry or fingerling bass, tucunare, and pongee.

Distinct sexual dimorphism is obvious through the development of a small but bright red crest behind the top of the head of males greater than 110 mm TL. Females greater than 150 mm TL are reproductively active and exhibit 4 distinct egg set sizes when mature. Eggs ready for deposition are 3 mm in diameter and are adhesive. The gross data show a sex ratio of 2.1 females to 1.0 males. It appears that spawning may occur throughout the year. Even though individual fecundity is low (about 40 to 300 in the 200-300 mm TL size range), these factors infer a high annual breeding potential.

Recent Events

The stickfish exploded in abundance over the past year and has now become one of the most abundant species in the reservoir. The bulk of the adult population in June of 1989 was in the 250-350 mm TL size range, and individuals greater than 450 mm TL were sighted. Beach seining, which was an ineffective collection method in 1988, took more stickfish than all of the other top level predator species combined.

Seining in the prime nursery areas for largemouth bass, where large numbers of largemouth bass fingerlings should have been collected, took only stickfish. Other sampling has indicated that the 1989 year class production of juvenile largemouth bass (the peak of the spawning period is January through March) is less than 5% of expectations. The severe decline is probably attributable to predation by the stickfish. Analysis of the identifiable gut contents from 175 stickfish collected in June of 1989 found the following distribution by species:

<u>Prey Species</u>	<u>Occurrence (%)</u>
Tilapia	50
Threadfin Shad	19
Mosquito Fish	12
Pongee	12
Bass	6
Bluegill	1

No guts contained more than one prey species. Selectivity is evident in the 18% of pongee and bass, which combined represented less than 0.001% of the available prey in the appropriate size range.

Evaluation

It is too early to make definitive conclusions about the effect of the stickfish on the Wahiawa recreational fishery, but the preliminary evidence is not encouraging. Significant predation on bass, pongee, or tucunare has never before been recognized, despite intensive study of the question. As yet there is no evidence of predation on stickfish. Whether the system can adjust to this new perturbation remains to be seen.

The absence of tucunare in the stickfish guts may suggest a lesser degree of vulnerability, although the sampling was done relatively early in the

spawning season for that species. The paired adult tucunare guard their young quite vigorously for some two months after hatching, when the juveniles reach roughly 100 mm TL. None of the prey in the sampled stomachs exceeded 55 mm TL. Unfortunately, prey size selectivity is directly proportional to predator size and the size frequency distribution of the stickfish population may still be increasing.

Pongee also guard their young, albeit not as aggressively as the tucunare. They also herd their young nearer the shoreline, where exposure to the stickfish is maximized. Repeated attacks by stickfish on young pongee without the elicitation of any response on the part of the nearby parental adult have been observed.

Although concern is presently focused on the future of the bass fishery, the stickfish may eventually represent a direct hazard to freshwater fishermen. Its marine counterpart has been responsible for one death and many injuries to fishermen at night in Hawaii, when it may jump wildly when startled by light. Its narrow body and sharp snout has the same effect as a hurled lance if it unintentionally collides with a human body. Tailwalking and jumping have already been observed during night surveys on the Wahiawa Reservoir, but as yet the stickfish are too small to present a threat.

Tucunare anglers have begun to complain because the stickfish are killing the live fish they are using for bait before the tucunare can be caught (tucunare invariably ignore dead bait). Due to its feeding behavior and hard jaws, the stickfish is rarely hooked in the process; in fact, trials with fishing techniques have found that a stickfish can be yanked, without hooking, into a boat once it has clamped onto a live fish bait because it is reluctant to release its hold during this immobilization phase. Even if anglers learn how to catch the stickfish, they are unlikely to be very interested because the fish has little body mass (a 300 mm TL specimen only weighs about 100 g). The flesh of the freshwater stickfish is white and of good quality, but there may be a local stigma against eating it because certain of their marine counterparts have greenish flesh and bones.

The stickfish is the latest in a slew of accidental introductions to Hawaiian freshwaters attributable to the aquarium fish trade. Although politely described as escapees, most are deliberately released by aquarium enthusiasts who are averse to flushing them down the commode. The resultant environmental costs, including those that must be borne by sport fishermen, justify greater attention to the regulation of importations by the industry.

SOME IMPACTS OF FISH INTRODUCTIONS IN TROPICAL FRESHWATERS

C.H. Fernando and J. Holcik

The freshwater ecosystem has been greatly altered both by modification and extension. A major change during the past 50 years, has been the creation of a vast area of reservoirs throughout the world. Fish introduction into tropical regions was confined largely to upland areas and involved north temperate zone fish till quite recently. Now, both fish culture and capture fisheries based on introduced fish, are widespread activities in tropical regions and these enterprises are growing rapidly. Tropical riverine fish faunas are rich and varied except for the Australasia region, thus fish introductions into rivers and streams have been restricted to some desirable, familiar sport fishes. On the other hand, the newly created reservoirs and the relatively few tropical lakes, many of which have depauperate fish faunas, have received many fish introductions. Although the wisdom of such introductions has been, and is being debated, the demand for protein has made such debates largely academic. On the basis of our theory that lacustrine fish are an important factor in giving high fish yields, the introduction of

carefully screened species where high fish yields are desirable, seems scientifically defensible.

In the past, fish species chosen for introductions for sport and food have often been determined by familiarity to those involved in the introduction. Thus, trout and carps, which are non-tropical have been used for enhancing both capture and culture fisheries but mainly in the upland tropics. The more recent use of tropical species for the enterprises of fish culture and capture fisheries is succeeding more and more in the tropical lowlands.

Although many fish species have been introduced into the tropics, relatively few have had an impact, either positive or negative. The most controversial impacts of introduced fishes in tropical freshwaters concerns piscivores which have eliminated indigenous fishes and even caused collapse of existing fisheries. Tilapias which have been responsible for spectacular increases in fish yields in some regions are also controversial. To societies where sport fishing is primary, tilapias can seem to be of no value, and may even be deemed noxious. To others, who see indigenous fishes as likely to be overshadowed and/or displaced, tilapias constitute an ever present threat.

It is evident that the clock cannot be turned back on self-propagating fishes already introduced into tropical freshwaters. Eradication, which is sometimes advocated, may not be the best course of action in the long run. Deficient fish faunas, either the result of geographic isolation or of human activity in creating new types of habitats in a particular area, may necessitate the introduction of fishes. Also, other human impacts like overfishing, pollution, and water level changes are exterminating indigenous fish just as surely as unsuitable fish introductions. The most reasonable course of action is to use our knowledge of the impact of fish introductions and sound basic ecological principles to shape fish species composition on a case to case basis. Fish introductions are experiments which we can analyze with considerable benefit to fishery science. Comparative studies of fish introductions done objectively will provide us with sound management tools and also contribute to our understanding of ecology and evolution.

Introductions into the ancient lakes with endemic fish communities must be strictly prohibited and introduction of exotic fishes to recent lakes and reservoirs must be carefully planned taking into account the biological properties of particular species, their possible impact on the indigenous fishes and the pertinent ecosystem as well. Stenocious and forage fishes should have preference before euryecious and predatory species.

--Summary of paper by C.H. Fernando and J. Holcik
read at September 1989 SCOPE-UNESCO Workshop on
Ecology of Biological Invasions in the Tropics.

EIFAC REPORT ON THE EFFECTIVENESS OF STOCKING FISH

The objectives of the Workshop were to establish a basis for continuing work by the European Inland Fisheries Advisory Commission's (EIFAC) Working Party on Stocking. More specifically the Workshop was requested to:

- (i) review current stocking policies and practices of EIFAC member countries;
- (ii) identify information and methods needed for the evaluation of the effectiveness of stocking and for the establishment of guidelines;
- (iii) suggest a program to be undertaken by EIFAC through the agency of its Working Party on Stocking.

Stocking is widely used as a management tool in Europe for a variety of objectives of which the main ones are to support commercial or subsistence food fisheries and to enhance sport fisheries. A large number of species are involved in stocking programmes including coregonids, salmonids, cyprinids, pike, pike-perch, eel and crayfish.

In certain cases, for example the coregonid fisheries of Polish lakes, these had been analysed to show the positive effects on the catch achieved by adding fish to populations which do not reproduce naturally. In other cases, such as transfers of cyprinids, evidence for success or failure is at best circumstantial.

Considerable differences emerged in the approach to evaluation of the success of stocking. Although guidelines have been formulated and applied to some fisheries, usually those for coregonids or salmonids, these have not proved wholly reliable over time. In fact neither approach to the evaluation of stocking success has been able to generate an adequate understanding of the impact of stocking, nor has it permitted the reliable quantification of stocking necessary for efficient management of aquatic ecosystems.

It was concluded that this was mainly because simple input/output models were insufficient to describe the effects of adding fish to natural or manipulated populations. Ecological processes within the water bodies and socio-economic pressures acting on the fishing community also introduce factors which have to be taken into account in evaluation of stocking programmes.

The Workshop also felt that the objectives of stocking were not always clearly thought out in advance or were based on assumptions that had not been validated. Under these circumstances it was not surprising that difficulties had been experienced in feedback between stocking effectiveness and future stocking programmes.

The differences in approach and objectives have led to great variability in the quality of the information available and the Workshop recognized that further progress in this topic will depend on the acquisition of reliable data sets. Such studies should not be limited to input/output analysis, but would require a deeper understanding of the influence of such ecological parameters as the degree of natural reproduction occurring in the fish community of the target water body; fry survived; the influence of physical, chemical and biological components of the water body on its carrying capacity; the effects of fishing intensity, as well as the characteristics of the stocked species, such as the length of its life cycle, its trophic status and any interactions with other species present. Such data collection should be supplemented by experiments in individual water bodies where control of stocking input and fisheries output can be exercised.

--Excerpts from EIFAC/IV/88 Inf. 11. February 1988.

INTRODUCTION OF ZEBRA MUSSELS INTO THE GREAT LAKES: TRUTH AND CONSEQUENCES

Over the past two years, the predacious zooplankter "B.C." (Bythotrephes cederstroemi), the perch-like ruffe (Gymnocephalus cernuus) and the zebra mussel (Dreissena polymorpha) have all been sighted in the Great Lakes' ecosystem. These recent immigrants join the long list of exotic species that have entered the Great Lakes probably as a result of discharges of freshwater ballast from ocean-crossing ships; a practice allowed because of the lack of Federal regulations.

While each of these recently introduced species will disturb the ecological relationships among native biota, the zebra mussel will probably be the first exotic species to impart a severe cost on the users of the lakes. Using its

byssal apparatus to secrete horny threads, the zebra mussel can climb and firmly attach itself to any solid surface (e.g. rocks, piers, breakwalls, pipes, boats, fishing nets, mussel shells). As a consequence, they have already restricted the inflow of water to electrical generating and water treatment facilities by reducing the diameter of intake pipes. They are expected to reduce the catch of fish by fouling impounding gear, affect sailing activities by colonizing the hulls of boats, restrict swimming activities by forming large "mussel mats" in littoral areas, interfere with beach activities because of large numbers of shells washing up along shorelines, and reduce the aesthetics of water-front areas by encrusting anything in contact with the water.

Based on the size of the shells collected (maximum length of 30 mm), the zebra mussel has probably been in the Great Lakes for 2-2.5 years. The occurrence of zebra mussel shells along beaches and their reported occurrence in water treatment plants indicates that they currently are found in the central and western basins of Lake Erie, the Detroit River and Lake St. Clair. Their rapid dispersal has been facilitated by their high reproductive capacity, free-swimming larval (veliger) stage, and the ability of yearlings to disperse by drifting. By 1990, the zebra mussel will probably expand its range into the eastern basin of Lake Erie and the Niagara River. However, it is not confined to Great Lakes' habitats, and will probably begin to appear in inland reservoirs, lakes and rivers in the near future, transported by waterfowl and wildlife.

--Ronald W. Griffiths. Monthly News Letter #45, February 1989. Water Resources Assessment Unit, Southwestern Region, Ministry of the Environment.

THE ZEBRA MUSSEL, *DREISSENA POLYMORPHA*: A SYNTHESIS OF EUROPEAN EXPERIENCES AND A PREVIEW FOR NORTH AMERICA

Dreissena polymorpha, the zebra mussel, is now present in Lake St. Clair and Lake Erie and will probably reach Lake Ontario by the end of this year. The life history of zebra mussels is very well known, but varies considerably from one lake to the next. Large zebra mussel populations have an enormous capacity to filter water and biodeposit organic nutrients and should result in an improvement in water quality and clarity as mussel densities increase. Large populations of game species of waterfowl, and perhaps fish, may also develop as they exploit their growing bivalve food resource.

The greatest impact of the zebra mussel, however, will be negative. The mussels are very strongly byssate and they will attach to insides and occlude the openings of industrial and domestic pipelines, clog underground irrigation systems of farms, greenhouses and any other facility that draws water directly from the Great Lakes, encrust navigation buoys to the point of submerging them, and encrust hulls of boats and other types of sailing craft that remain in the water over the summer and fall. They will also encrust and clog fishing nets (e.g. trap and pound nets) and become a nuisance to commercial fishermen. The mussels may also become a significant vector of parasites that are lethal to game species of waterfowl and fish. ... there is no universally accepted method for zebra mussel control.

--Excerpts from a 76 page July 1989 report available from Kathy Morch, Telephone (416) 323-4913.

GRASS CARP ET AL. IN CANADA

The following information was sent by John Bruner, Department of Zoology, University of Alberta, Edmonton, Alberta T6G 2E9. The grass carp papers were part of the 5th Annual Applied Aquatic Studies Workshop held 21-22 February

1989, and Dave Philipp's talk was part of a tour sponsored by the Zoological Education Trust of Canada.

Aquatic Weed Control In Alberta Irrigation Canals Using The Triploid White Amur. E. Duncan Lloyd, Special Projects Coordinator; Alberta Agriculture Irrigation Branch; Agriculture Center, Jail Road; Lethbridge, Alberta; T1J 4C7 Canada.

Almost since irrigation began in the Province of Alberta in the early 1900s, aquatic weed growth has impeded water flow causing serious water delivery shortages during critical crop growing periods. As an alternative to the costly chemical and mechanical control of submersed aquatic macrophytes in canal systems, the sterile white amur (*Ctenopharyngodon idella*) is a very good candidate species. The five-year research study, which began in 1988, will evaluate this fish species for its potential as a biological control and possible environmental impacts.

Objectives of this study are: can the triploid white amur function and survive in the canal systems, potential cost and benefits, sites suitable for this type of weed control, possible fate scenarios for escaped fish, list of potential diseases and parasites associated with the fish, requirements for private fish culture in the province, and other benefits to agriculture across Canada

Triploid Grass Carp Maintenance And Chromosome Evaluation. K. Smiley, M. Morwood-Clark, M. Lefebvre, J. Somers, L.E. Lillie, J. Moore. Alberta Agriculture Irrigation Branch; Agriculture Center, Jail Road; Lethbridge, Alberta; T1J 4C7 Canada.

Grass carp (*Ctenopharyngodon idella*) are used in many parts of the world for control of aquatic weeds. Grass carp were first imported into Canada by The Alberta Environmental Center during 1988, in support of the experimental evaluation study "Elimination of Aquatic Weeds in Irrigation Canals Using Triploid Grass Carp," undertaken by Alberta Agriculture, Irrigation Secretariat. The fish are maintained under quarantine conditions in the laboratory. Dietary and thermal conditions have been manipulated to induce adequate growth. The evaluation of bacterial and parasitic agents has produced negative findings to date. Sexually sterile triploid grass carp have 72 chromosomes, while the diploid grass carp, capable of reproduction have 48 chromosomes. Two methods are being used to determine the diploid/triploid condition of the fish prior to release from the laboratory. One method involves the measuring of the nucleus volume of red blood cells, while the other procedure involves conducting actual chromosome counts.

Fish Introductions: When Do Good Intentions Go Bad? Dr. David P. Philipp, Fisheries Geneticist, Illinois Natural History Survey, Champaign, Illinois, U.S.A.

Our society's most precious commodity is the wealth of natural resources that exist on our fragile planet. Given that premise, we need to make the conservation and wise use of these resources our top priority in all decision-making efforts. It has been known for some time that a great deal of genetic diversity exists both among individuals within a population and among different populations. Protection of this genetic diversity is an essential component of sound conservation programs. Unfortunately, state/provincial and federal management agencies have been slow to incorporate the principles of genetic conservation into their management programs. This policy must be changed.

Intentional and unintentional releases of fish, whether from governmental hatchery programs or private aquaculture operations, impact native fish populations. These impacts range from ecological to genetic in scope, and thereby encompass a wide range of potential problems. Theory predicts that through the process of natural selection, local populations become adapted to their local environments. As a result, management activities that involve the culture, transport, and mixture of different genetic stocks of fish through introduction programs may have long-term negative impacts quite different from their designed goals. Unfortunately, little information exists comparing the performance traits among genetically defined stocks, or the effects that stock transfer programs can have on the fitness traits of a recipient, resident population.

Much of our research has tried to document the negative impacts that can accompany stock transfers. Based upon the high level of genetic variability observed among populations of largemouth bass, Micropterus salmoides, different stocks would be expected to exhibit substantial variation in performance characteristics. To compare performance traits and relative fitness among different genetically-tagged stocks, experimental populations, were established in a number of different geographic locations. Survival, growth and reproductive success of each stock were compared in each environment. To assess the potential impact that introduction of foreign stocks might have on native populations, the degree of hybridization and the performance of the resulting offspring were also determined. Each experiment confirmed that local stocks do become genetically tailored for their environment, a result that has significant implications for many of our current management policies.

SECTION BUSINESS

**MINUTES OF THE 10TH ANNUAL IFS BUSINESS MEETING
5 SEPTEMBER 1989, ANCHORAGE, ALASKA**

President-Elect Paul Shafland called the Tenth Annual Business Meeting of the Introduced Fish Section (IFS) to order at 1315 h, 5 September 1989. A quorum of members was present; special recognition was given to Nick Parker and Jay Stauffer, former IFS Presidents, and to Art Whitney, Reeve Bailey, Joe Dillard, and Lee Redmond, who are current or Past-Presidents of AFS Divisions or the Parent Society. Approximately 30 people attended the business meeting which is the largest attendance ever!

Minutes of the 9th Annual IFS Business Meeting as printed in our Newsletter 8(3):2-4 were approved. The Treasurer's Report was also approved and showed a balance of \$232.29. Treasurer Dawn Jennings, reported that current expenditure for printing and mailing the Section Newsletter costs more than the \$3.00 membership dues. The membership report indicated a total of 217 members; however, 4 new members were recruited at the meeting!

A summary of the Ballast Water Statement was presented by Carlos Fetterolf of the Great Lakes Fishery Commission, Ann Arbor. It included a discussion of the current status of the exotic ruffe (Gymnocephalus cernua), zebra mussel (Dreissena polymorpha), and spiny water flea (Bythotrephes cederstroemi). Gary Edwards, U.S. Fish and Wildlife Service, summarized Congressman Davis' bill regarding the problem of ballast water introductions.

President-Elect Shafland mentioned that the newly formed Aquarium Fishes Committee, chaired by Dr. Herbert Axelrod, should be very beneficial to the Section. The primary objectives of the Committee are to identify problems within the industry and to promote research on aquarium fishes. This Committee will ultimately be made up of 15-20 aquarium fish industry leaders. Members to date include Mike Hennessy, Bill Lewis and Marshall Meyers.

Donald Horak, President of the Fisheries Administrators Section, lead a lengthy discussion among the members concerning realistic approaches to purposeful introductions. The general premise of the discussion focused on developing reasonable protocols for risk analysis of introductions and forming a policy statement regarding introductions that would be mutually agreeable between IFS, Fisheries Administrators and other AFS subunits, which might ultimately be endorsed by governmental agencies. No progress was made by the U.S. Fish and Wildlife Service on a national policy for introduced aquatic organisms during the past year.

President-Elect Shafland briefly reported on the current status of zander in North Dakota, and also mentioned that the Symposium on Introduced Fishes at last year's meeting went very well. Zander have been hatched and stocked into the primary zander study area where they will be evaluated during the next several years.

Nick Parker presented the election results as follows: Paul Shafland was elected President and Dawn Jennings was re-elected Secretary-Treasurer; however, there was a tie for President-Elect between Jay Stauffer and Hiram Li. Nick agreed to re-tally the ballots. If the votes remain tied, we will have a run-off election. Regardless who wins, both candidates are expected to be very active with IFS this year!

Several changes in the IFS Bylaws were discussed. President Shafland mentioned creating a new position for Newsletter Editor instead of keeping this responsibility part of the President-Elect's position. The Newsletter Editor would be appointed by the EXCOM and he/she would be a non-voting member of the IFS EXCOM. He also proposed the option of 2-year terms for all EXCOM members to promote more continuity within the Section. The EXCOM was directed to consider these potential changes and present them in an upcoming newsletter to be voted on by the entire membership. The EXCOM was also directed to reexamine the current newsletter format to find the most economical format for printing.

Dave Philipp requested a contribution from the IFS treasury of \$1.00 per member to help sponsor sessions for the World Fisheries Congress. Because we did not have enough money in the treasury, it was decided that contributions from members would be solicited through the newsletter, and whatever money is received will be used for that fund.

The IFS treasury received a donation of \$510.00 from Dr. Herbert Axelrod. Members voted to use this money for purposes other than printing and mailing the Newsletter; i.e., symposia, awards, etc.

President Shafland mentioned that the AFS Program Chair for the 1990 meeting, Steve Rideout, has invited IFS to participate by organizing symposia for the meeting. Members were encouraged to let the EXCOM know if they are interested in doing this.

Members were also encouraged to volunteer for IFS committees. Several suggestions for committees were mentioned, including: Membership, Nominating, Awards, Special 10th Year Anniversary, International, Select Literature, Symposium, Newsletter, and Species-Specific Committees. The AFS EXCOM is promoting the use of awards within each Section for special recognition of members.

President Shafland suggested that IFS consider updating Section VII in the 1973 North American Fisheries Policy. Perhaps a committee would be useful for this?

Finally, discussion took place on how to reverse the negative cash flow in our treasury. Options discussed and generally agreed upon included reformatting the newsletter to decrease printing costs and/or to increase Section membership dues. The IFS EXCOM was directed to correct the negative cash flow with either or both of these recommendations. The meeting was adjourned at 1505 h.

--Dawn Jennings, Secretary-Treasurer

ELECTION RESULTS NOW OFFICIAL

President-Elect candidates Hiram Li and Jay Stauffer received exactly the same number of votes. After considerable thought this tie was resolved when Hiram accepted the position of Newsletter Editor. This will allow Jay to concentrate on other Section activities. With both Jay and Hiram actively involved this year, our Section should grow and be more active than ever before. Maybe we should have ties more often!

--Nick Parker, Chairman Nominating
and Ballot Committee

NEW "INTRODUCED FISH MANAGEMENT AND CULTURE" JOURNAL?

Introduced fishes will undoubtedly play a significant role in the future of the world's fisheries resources; as a result, an increasing amount of the world's fisheries literature will be devoted to this topic. A New York publisher has asked me to be the Founding Editor of a new international, peer-reviewed professional journal dealing with introduced fishes; however, I am uncertain whether or not I will be able to take on this additional responsibility.

I believe there is a real need for this journal, and that the Introduced Fish Section should play a major role in its development. A successful journal will elevate introduced fishes to a higher level of professional recognition and involvement than currently exists. I have discussed this idea with Bob Kendall, AFS Managing Editor, who felt this was an opportunity well worth pursuing and that it would not conflict with AFS publishing policies.

So what do you think? Should IFS proceed in a leadership role in the development of this journal? If so, are you willing to personally get involved by submitting high quality manuscripts, acting as a reviewer, being on the editorial board, etc. Please let me know your thoughts on this as soon as is possible.

--Paul L. Shafland

COMMITTEES -- COMMITTEES -- COMMITTEES (THERE'S A PLACE FOR YOU IN IFS)

I am really pleased to have had many highly qualified and very busy individuals 'volunteer' to chair committees that I think will be of interest to many members. Most committees need more volunteers, so please contact me if you would like to participate in this way.

I have attempted to find people who are already working within a specialty area to chair committees. This not only insures a high level of expertise but it hopefully generates less additional work.

Active Committees with the Chairperson listed first are:

Aquarium Fishes--Herb Axelrod, George Blasiola, Mike Hennessy, Bill Lewis, Marshall Meyers
Ballast Water Concerns--Peter Moyle
Genetics--Jim Seeb, Stan Allen
Grass Carp--John Cassani, David Clapp
Impacts of Purposefully Introduced Fishes--Al Zale
Position Statement on Purposeful Introductions--Paul Shafland, Walt Courtenay, Don Horak, Bruce Schmidt, Jack Wingate
Literature Base--Hiram Li
Introduced Fishes in Aquaculture--Nick Parker
Membership Directory--Dawn Jennings
10th Year Anniversary--Walt Courtenay
Tilapia--Ron Gulau, Rick Stout
Zander--Terry Steinwand

COMPUTERIZED DATABASE FOR EXOTIC FISHES IN THE UNITED STATES

Available records on each introduction, from contacts with State and Federal agencies, fisheries biologists, museum curators, laboratory and museum collections, literature reviews and unpublished reports are currently being compiled and arranged into a computerized database format. Presently, there are about 180 records for specific introductions in the database, and we are anticipating entering at least 1000 records in 1990.

The data base was created using PC-FILE:DB software, which is fully compatible with dBASE files. Each record for a particular exotic fish collection will include information on taxonomy, introduced locality, methods of collection and disposal, and the status of the introduction.

The data base will serve as a centralized source of information for exotic fishes in the United States. It will provide a complete listing of collections and personal observations of exotics on a national basis. It ultimately will serve as an information exchange base for monitoring distribution and potential range expansion of established populations. The data base is presently available to all State and Federal agencies to enhance awareness of exotic species introductions and facilitate management decisions concerning exotics. Records currently are primarily from the state of Florida. We are encouraging other State agencies to contact us will be made available on request.

--Dawn Jennings or Jim Williams, USFWS
7920 N.W. 71st Street, Gainesville,
FL 32606, (904) 378-8181

COMPUTERIZED LITERATURE BASE FOR INTRODUCED FISHES

What is the distribution of the creepy land shark, Carcharodon nightmare-onelmsstreetis (Moyle)? Has it been an effective biological control on arrogant bureaucrats? Is it true that it has few ecological side effects other than eating a few skate boarders (a virtue, actually)? Who has had experience working with this critter? Don't you wish you could access this type of information? This may be possible in the near future if we started this type of service up ourselves. This is a chance for you to help design the format.

What type of information should we encode? Listed below are a few suggestions:

- Refereed literature (aquacultural, papers, physiological papers

- autecology, community ecology, fish diseases, management papers, etc.)
- Gray literature
- Biologists familiar with given species
- Active programs using introduced and exotic species in North America (other locations world wide?)
- Species distributions by watershed, date of introduction, etc.

What kind of data base system should we use?

- D Base?
- R Base?
- Other, e.g. hypercard

What key words should we use?

- scientific and common names
- proposed use (e.g. sport fishing, aquaculture, biological control, etc.)
- type of introduction (e.g. accidental, bait bucket, purposeful, research, escape, etc.)

Once we have chosen the software and the format, each person can donate time and data by using the accepted format (presuming that they have access to the same software). Experts in particular areas or on particular species are especially invited to participate. Information exchanges could take place via modems and by establishing an electronic bulletin board. Does anyone have experience here? I have not and would like to solicit advice (preferably a willing volunteer).

We may be able to use a similar format to that established by the U.S. Fish and Wildlife Service (their data base is too restrictive, limited to exotics, sensu Chris Kohler) and exchange information with them. Should our Section develop a service charge to non-members once the data base is established to subsidize our costs? Should we develop a library for gray literature that could be accessed by our membership?

This is a long term project. It can be, should be a valuable service to all aquatic biologists. Perhaps we can use it to help recruit more members. We have a head start because of our Newsletter, in my opinion, one of the best newsletters going. I have saved most of my old issues. We have moved to the electronic age and should take advantage of it. I have volunteered to kick this off, BUT I WILL NEED YOUR HELP, IF NOTHING ELSE YOUR IDEAS. PLEASE RESPOND, NONRESPONDENTS MAY BE TARGETED BY INTRODUCTIONS OF LAND SHARKS IN THE VICINITY OF THEIR OFFICES. THIS IS AN OFFICIAL THREAT.

--Hiram Li, Oregon Cooperative Fisheries
Research Unit, Oregon State University,
Corvallis, Oregon 97331 (503)737-4531

DONATIONS SOUGHT FOR WORLD FISHERIES CONGRESS

At our annual AFS meeting in Anchorage, the Steering Committee for the World Fisheries Congress asked each Section to make a contribution to the Congress as a demonstration of Society-wide support. Unfortunately, our \$3.00 membership dues is not currently covering the costs of printing and mailing our Newsletter. Thus, we voted to seek donations from our membership. These contributions should be sent to our Treasurer, Dawn Jennings and checks should be made out to the AFS Introduced Fish Section.

Please designate how you want your donation spent. It will be a real embarrassment if ours is the only Section not to make a contribution to the Congress.

Two committee chairpersons are organizing symposia for the next annual AFS meeting in Pittsburgh. Organizers, tentative titles and objectives of the symposia are: Nick Parker, "Communications: Aquaculture Pressures from Abroad" will assess the growing demand for exotic fishes in the U.S. aquaculture industry; and John Cassani, "Grass Carp: Evolution of a Resource Management Tool" will review and update grass carp applications and administrative oversight. For more information about these symposia contact John or Nick.

LETTERS TO THE EDITOR

Irene De Moor writes:

Regarding your criticism of our Atlas [see IFS 9(2):15-17], I do not really think that this was too severe and you did make some valid points. I think however that it should be realized that this publication was essentially a review document. We did not carry out any original "field research" and the Atlas represents a compilation of existing knowledge, which was often rather scanty. Very little quantitative research has been done on the impact of alien species on indigenous communities in southern Africa. The fact that there is insufficient data necessitates a certain reliance on such modifiers as "perhaps, maybe" and "potential".

I would like to explain some of the background to the report on brown trout. Firstly I don't fully agree with you that the two statements which you compare are inconsistent. The quotation from p 87 was taken from the summary remarks on the species and were, of necessity, not as fully referenced as the detailed account of the impact given on p 91. I think that summaries and abstracts do often eliminate some of the complexities and nuances and perhaps this summary did oversimplify the issue. However it is expected that the interested user of the Atlas will read the full text of the report on the impact of the species which gives a more comprehensive review of the literature. In the detailed account is was quite clearly explained that other factors (such as the deterioration of the habitat) could also have contributed to the decline of the indigenous species. As you pointed out, there is a lack of quantitative data. The report therefore, summarises the opinion of different ichthyologists without attempting to provide definite conclusions. If more definite statements had been made, without the use of modifying remarks, then perhaps we would be accused of being too speculative.

There has been quite a lot of controversy regarding the presence of Oreodaimon quathlambe in the Umkomasana River. Despite Crass's (1960) suggestion that this species co-existed with brown trout for 20 years, this worker has in another publication suggested that the type locality for the specimen collected in 1938 is wrong and that O. quathlambe has never existed in the river. This accusation is made despite the fact that the original specimen is housed in a museum and was collected by a reliable ichthyologist. As you can imagine there is considerable controversy over Crass' statements and most leading ichthyologists in the country do not agree with his views. However I think that perhaps the account given in the Atlas did not cover this issue in enough detail, which resulted in too much emphasis being given to Crass' speculation that the two species co-existed in the river for 20 years.

Please do not worry about us being offended by your criticism. I think that the criticism was constructive and is obviously essential in reviewing the works of other scientists. If you wish you can publish this letter in your next newsletter.

--Irene de Moor, JLB Smith Institute of Ichthyology,
Grahamstown, South Africa, 16 August 1989

Your recent exchange with Peter Moyle (July 1989) brought to mind Aldo Leopold's observation in A Sand County Almanac: "Conservationists are known for their dissensions.... In each field one group (A) regards the land as soil, and its function as commodity production; another group (B) regards the land as a biota, and its function as something broader."

I am a fishery biologist with the California Department of Fish and Game who has spent the majority of his career contending with alien species ranging from beavers to brown trout. Although the short term effects of exotic species such as brown trout have been favorable under certain circumstances, I have developed a very suspicious attitude, bordering on disdain, toward nonnative species, including Man and his motives. Possibly this reflects the fact that with advancing age I am becoming more appreciative of the beauty of a natural ecosystem.

As California's human populations explode into the next century, resulting in ever less water in natural habitats, the more futile it appears to me in the long run to try to meet angler demand by bringing in new "toys" in an effort to meet the demands of an insatiable public, irrespective of short-term economic benefits. I also find it disturbing that fishery biologists are often willing to overlook the permanence of such introductions and the inescapable ecological impacts involved, if not on other fishes, then most assuredly somewhere else within the ecosystem.

One of the major projects of my career has been a 25-year effort to remove brown trout from the Kern River headwaters where the golden trout evolved, and I can well appreciate the points made by DeMoor and Bruton in their Atlas. Extensive data are not necessary to prove a point when (in this instance) we removed the brown trout and reestablished goldens and Sacramento suckers (yes, we do plant suckers in California when necessary to recreate the native fish fauna), with a resultant explosion of native fish populations. At the height of the problem, browns outnumbered goldens at a ratio of 100 to 1, and the goldens were approaching extirpation.

Aldo Leopold also observed (in A Sand County Almanac): "A land ethic, of course, cannot prevent the alteration, management, and use of these resources, but it does affirm their right to continued existence, and, at least in spots, their continued existence in a natural state." Perhaps the reason for the extreme concern shown by Peter Moyle and me is that in a water-short state with a rapidly expanding human population of 30 million (and the same problem exists throughout the Southwest), "continued existence in a natural state" is becoming ever harder to achieve. So please understand why we flinch every time someone suggest some new panacea in the shape of a chainsaw with fins. We are trying to hold the line until such time that society begins to appreciate the values that are axiomatic to B-type fishery scientists. We surely appreciate the philosophical and economic benefits of angling, but wherever possible let's do it with native fishes. A concluding Leopold statement: "One of the penalties of an ecological education is that one lives alone in a world of wounds." Introductions are forever!

As I approach retirement, it appears to me that the ideal gift would be a button I could push to magically eradicate any species that was not here in the year 1500 (this would include Europeans, of course), and then allow us to start in again from scratch. The button could then be activated every 100 years to allow future generations to gradually refine the process of introductions in the hope that, sooner or later, we would finally come to the realization that it is sheer folly to gild a lily.

--Phil Pister, California Department of
Fish and Game, Bishop, CA, 29 Aug 1989

Carl Sullivan writes:

I've read the brief "introduced fish editorial debate" in Volume 9, Number 3, and find myself much more in agreement with your views than with those of Section Past-President Peter Moyle. I commend both of you for your concise and lucid presentation of your thoughts in the matter.

I believe that I understand the potential hazards of introducing new species into an ecosystem. Despite these possible problems, I believe that introduced species, sterile hybrids, and biologically engineered species represent one of our very best fisheries management tools and opportunities. We must remain scientifically objective on the issue, and please let us not discard such a potentially valuable management option because of a few accidents and mistakes in the past.

I value my Introduced Fish Section membership and will join in the effort to bring other AFS members into our group.

--Carl R. Sullivan, Executive Director, American
Fisheries Society, 20 November 1989

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