



April 1990

Hiram W. Li, Editor

Volume 10, Number 1

NEWSLETTER CONTENTS

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PRESIDENT'S CORNER

One need not be a genius to realize that fish introductions will be an increasingly important issue in the 90's as their socio-economic and biological benefits are more fully realized in aquaculture, management and even in the preservation of rare or endangered species. Furthermore, as information on fishes from distant places and their potential beneficial uses increases, so too may the occurrence of accidental introductions (i.e., unplanned and generally illegal introductions). The question is not whether more introductions will occur (because they will) but how can we maximize the beneficial, minimize the detrimental and prevent the accidental introduction.

The distinction between planned and accidental introductions is critical, yet it is commonly overlooked or completely ignored. It is not difficult to understand why this is so, and why some find it uncomfortable to entertain a philosophy wherein introductions may be good, bad or something in between. Could it be some early microbiologists had similar doubts about how disease causing agents could be used to develop disease preventing substances such as vaccines?

One goal this year is to develop a consensus statement on fish introductions which identifies areas of mutual agreement and disagreement between what are generally perceived as antagonistic philosophies espoused by academic ecologists and fisheries managers. Walt Courtenay and Don Horak (Past President of the Fisheries Administrators Section) have 'volunteered' to assist me with this task. One way of describing this situation, adapted from a similar discussion on a different topic in a recent New Scientist article is "The problem remains however, that academicians and fisheries managers still do not fully understand one another. They come from different cultures, share different values and expectations, have different aims and strategies of communication. It is only by recognizing these differences that we can begin to hope to eliminate them." Everyone in our Section can participate in this effort by forwarding their opinions to one of us; we really want as much and as varied input as possible, so send us yours today.

We have a lot going on in our Section, but we can still do more with your help. Anyone who has a new idea or would like to work on an existing project please let me know. Together with you, Hiram Li (your first Newsletter Editor of the 90's), Jay Stauffer (President-Elect) and Dawn Jennings (your ever reliable Secretary-Treasurer), let's make the 10th Anniversary of IFS the best year ever!

FROM THE EDITOR

I recently read four articles that seem to be parables related to issues of fisheries and introductions. The first parable is about farming, Wes Jackson and the Land Institute published in Atlantic Magazine entitled "Back to Eden". The parable is this modern farming is largely responsible for much environmental degradation through simplification of the habitat, reduction of biodiversity and genetic diversity through monocultures, the spreading of weeds, the uses of pesticides, and the spreading of waste. Wes Jackson is a farmer and a land manager (also a Ph.D. geneticist) whose views are at odds with most of academic agriculture. He insists that we modify our practices to mimic natural systems using principles learned from how prairie systems operate. More and more the practice of fisheries is adopting the model of modern agriculture (aquaculture and trout hatcheries) moving toward the modern farm and away from the "prairie". Our "Wes Jackson" was Stephen Forbes who in 1877 published "Lake is a Microcosm". How close are we to embracing the modern agricultural model fully?

The second parable is about distribution of seeds through catalogues, especially during the Victorian era, the same period that introduced fishes were being spread throughout the world. Plants were imported from seed companies to enrich the lives of people through new crops (hemp), provide more forage for cattle (Johnson grass), for medicines (opium poppy), and as ornamentals (water hyacinth). All became noxious weeds; for instance, Johnson grass after the first frost produces prussic acid and kills livestock. By and large, some of our most troublesome weeds were dispersed through the mail (Mack 1990). Introduced species escape their natural predators, parasites and competitors that hold them in check.

The third parable concerns the recent oil spill off Morocco. According to the editorial in the New Scientist, the second "Exxon Valdez" incident as predicted by some scientists did not become manifest. The editorial goes on to say that such scaremongering inures the public to real dangers and diverts attention from substantive issues, such as developing new regulations to prevent future accidents. Paul believes that we should be very careful not to "cry wolf", but instead concentrate on issues of prevention.

The last parable is one concerning the impact of the crown-of-thorns starfish on the tropical reefs of Australia. Periodic outbreaks of this native starfish are thought to be catastrophic for coral reefs. This is certainly true for localized reefs in the Great Barrier Reef system off of Australia. However, it is not known whether or not this is a normal irruption that over the larger scale of the reef system and therefore of little concern to the general public or a plague like the "black death" of the Middle Ages. The scientist that first reported this concern was Dr. Robert Endean of Queensland University. He holds that the outbreaks are abnormal; whereas, other scientists argue that all is quite normal. What should we make of this controversy? First is that in the face of uncertainty, most of us may have reacted like Dr. Endean. If, in the end he is wrong; what will be lost? Some personal reputation perhaps; but in the long run, he stimulated a lot of research from other scientists. If Dr. Endean is wrong, we will have at least gained the knowledge why we were wrong. The scientific community will not have lost. If Dr. Endean decided not to raise the alarm and he was wrong in not doing so, the resources of the reef would have been placed in jeopardy (a fascinating article on the social interactions among scientists as well as coral reefs in the New Yorker Magazine). The prudent path is to preserve future options.

A sign of a healthy news letter is the airing of controversial issues in a constructive and an instructive format. Certainly, this has been the signature of this newsletter under the stewardship of the previous two predecessors. I hope to continue in this vein and I hope my successors will follow suit. The lively commentary made this one of the best newsletters to which I subscribe. Points of disagreement may suggest a gap in knowledge as differentiated from a gap in understanding values. I fully agree with Paul that the future will be very challenging. Illegal transfers of fishes are increasing. If we have trouble stemming the flow of illegal narcotics, what

hope will we have in stemming something really important, like.....ah, unlawful possession of an illegal fish? If global climate change occurs as rapidly as predicted by climatologists, interbasin water transfers will increase in magnitude and transfers of biota will occur. Will we have to make decisions whether or not to facilitate ecological succession northward because habitat fragmentation is now so severe? There is a greater need to study the ecology of species introductions more than ever.

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Eisenberg, E. 1989. Back to Eden. The Atlantic, 264(5):57-89.
Forbes, S.A. 1877. Lake is a microcosm. III. Natur. Hist. Surv. (15):537-550.
Ford, D. 1988. A reporter at large (The Great Barrier Reef). The New Yorker, July 25:34-63.
Mack, R. N. 1990. Catalog of woes. Natural History, March:44-52.
New Scientist. 1990. No slick response. new Scientist 125(1699):25.

THE WILLIE SUTTON PRINCIPLE

Willie Sutton was a famous criminal who escaped from many prisons and bragged that there wasn't a prison that could hold him. Many accidental introduction of alien species occur from pond breakouts that hold aquacultural prisoners. In 9(1):12 of the IFS Newsletter, Steve Waite of the Illinois Aquaculture Industries Association argued that the escape of bighead carp would be unlikely as they will be held in closed systems with little change of escape as the facilities would be 3 miles to the nearest drainage ditch. In that same issue, Peter Moyle replies that if raising this species became popular, escape was inevitable either through illegal transfer or through unexpected flooding. In a subsequent issue, 9(4):9-10, William Pflieger presented evidence that several chinese carps are now in the Missouri River system, the last escape resulting from the flood of fish ponds in the lower Osage river. It is obvious that Peter is right. German carp, catfish, muskellunge, northern squawfish, and largemouth bass escaped into Oregon's rivers flooded ponds, not as managed introductions. Grass carp escaped into the Salt River several years ago from experimental ponds in Arizona. Introduction of the Nile perch to Lake Victoria, surely one of the great ecological and evolutionary disasters, made their way into the lake in some unknown fashion. What is known is that Nile perch were raised in ponds around the shore of Lake Victoria during the 1950's. An estimated 45-50% of the Atlantic salmon in some areas in Scandinavia are escapees from netpens. Escapes of netpenned salmon in Puget Sound are common. Coincidentally, the introduction of Viral Hemorrhagic Septicemia (VHS) has mysteriously appeared in Puget Sound, killing an estimated four million hatchery salmon. Thus far there is no evidence that the virus has infected wild fishes, but studies are underway to determine which species are at risk. Aside from strict prohibitions, can illegal or accidental introductions be controlled or will alien species continue to escape like Willie Sutton?

References

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New Scientist. 1989. Four million fish die in epidemic. 122(1663):31.

INTRODUCED FISH DISEASES

A nematode, Anquillicola crassus, found in the Far East, Australia, and New Zealand has invaded Europe through the introduction of eels. It infests the air bladder. It was first discovered in Italy in 1982, it has then spread to France, Belgium, the Netherlands, and to Denmark by 1987. Its effects on the eels are presently unknown. It does not appear to affect the ability of eels to acclimatize to sea water or to hydrostatic pressure to 60 atmospheres. An excellent review concerning the problems of fish introductions and fish diseases is in press (Ganzhorn et al. In Press). Problems are global because several introduced fishes carrying these diseases are nearly global in

distribution (common carp, rainbow trout, brown trout). Examples of parasites include Bothriocephalus opsarichthydis, bacterial pathogens Renibacterium salmoniarum and Yersinia ruckeri, and viruses such as infectious hematopoietic necrosis and infectious pancreatic necrosis.

References

Petter, A.J., Y.A. Fontaine, N. Le Belle. 1989. Etude du developpement larvaire de Anquillicola crassus (Dracunculoidea, Nematoda) chez un cyclopidae de la region Parisienne. Ann. Parasitol. Hum. Comp. 64(5):347-355.

Fontaine, Y.A., N. Le Belle, E. Lopez, B. Querat, B. Vidal, L. Barthelemy, P. Sebert, J. Alinat, and A.J. Petter. 1990. Infestation de populations Francaises d'anguilles (Anquilla anguilla L.) par des nematodes (Anquillicola crassus): essais therapeutiques evaluation de risque potentiels lies a l'ecophysiologie de l'hote. Ann. Parasitol. Hum. Comp. 65: In press.

Ganzhorn, J., J.S. Rohovec, and J.L. Fryer. In Press. Dissemination of microbial pathogens through introductions and transfers of finfish. In: D.E. Brune and J.R. Thomasso (eds.). Aquaculture and water quality. World Aquaculture Soc., Baton Rouge LA.

PAPUA NEW GUINEA PROVIDES MODEL FOR EVALUATING INTRODUCTIONS

Peter Moyle writes: The Sepik River in New Guinea is a geologically young and isolated river system, so has a depauperate fish fauna and low yields to fisheries. Because the region it drains is short of protein, the government of Papua New Guinea (PNG) got help from the UN-FAO to evaluate introductions of fishes to enhance the fisheries. UN-FAO established a research team, under the direction of Dr. David Coates, to study the river and its biota for seven years (1981-88) before making any recommendations. The research team accomplished extraordinary things under considerable hardship (resulting in the accidental death of one researcher and we can look forward to a long series of publications on the biology and ecology of Sepik River fishes and invertebrates.

I do not want to get into the results or recommendations of this research here, but I do want to describe the final method of evaluating proposed introductions, as a model to use elsewhere. Dr. Coates got together an international panel of experts whom he bombarded with reports and publications on the river and its fishes, as well as information on fishes proposed for introduction. Panel members were also sent a series of short questionnaires, one for each species proposed, asking opinions of the effects and benefits of the introductions. I found the exercise a very interesting and informative one, requiring me to decide whether or not I would support a proposed introduction and to provide reasons for my opinion. The recommendations will be summarized by Coates and then sent to the government of PNG who will make the final decision.

I think the IFS (USI) should offer to make its membership list available to any state or agency proposing and introduction for creation of an independent panel of experts. The agency would or could then send out whatever information it has to the experts, along with the questionnaire and get a fairly rapid response to a proposal. If PNG can do it, why not us?

ALIENS FROM THE ABYSS

(cars aren't the only imports from the Far East)

Routine monitoring of the Sacramento-San Joaquin Delta Estuary documented a population explosion of a new Asian copepod of the genus Pseudodiaptomus. The Chinese copepods have been resident for the last decade; whereas, the Japanese species may have been around for 20 years. Three Chinese copepods have been introduced within the decade, a Japanese copepod may have spent a score here. The results may be very profound restructuring of the food web. The native copepod Eurytemora is a more easily captured food item for the important introduced sport fish, striped bass, than the introduced Sinocalanus. Eurytemora is in long-term decline and is vulnerable to predation by Potamocorbula, itself an accidental marine introduction. pseudodiaptomus is not apparently vulnerable to the exotic clam. Striped bass are in decline in California. The California Department of Fish and Game will work through the national Association of Fish and Wildlife Agencies to obtain legislation to prevent dumping of ballast water.

-Bay-Delta Annual Report to the California Fish and Game Commission-

FLOUNDER IN LAKE ERIE?

Among other incidences of ballast water introductions are the introduction of Japanese sea bass Lateolabrax japonicus near Sydney, Australia (Paxton and Hoese 1985), and the European flounder Platichthys flesus to Lakes Erie and Superior (Carlton 1985).

References

Carlton, J.T. 1985. Transoceanic and interoceanic dispersal of coastal marine organisms: the biology of ballast water. Mar. Biol. Ann. Rev. 23:313-371.

Paxton, J.R. and D.F. Hoese. 1985. The Japanese sea bass, lateolabrax japonicus (Pices, Percichthyidae), an apparent marine introduction into Eastern Australia. Jap. J. Ichthy. 31:369-372.

CONGRESSIONAL ACTION ON BALLAST WATER INTRODUCTIONS

(Help may be on its way)

HR 2459 was signed on December 12, 1989. Of particular interest to us is Section 207 of this bill, which are as follows:

" (a) IN GENERAL-Not later than 6 months after the date of enactment of this Act, the Secretary of Transportation shall submit to the Congress a report on the options available to control the infestations of the waters of the United States, including the Great Lakes by exotic species from the ballast water of vessels operating on the waters of the United States. In preparing this report, the Secretary shall consult with the Secretary of the Interior, the Secretary of Commerce, the Great Lakes Fishery Commission and other appropriate parties.

(b) EXOTIC SPECIES DEFINED-In this section 'exotic species' means nonnative fish, mollusks, crustaceans, zooplankton, and other aquatic organisms, other than sea lampreys.

In compiling information for this report the Secretary shall consult with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and Environmental Protection Agency, the Great Lakes Fishery Commission, state fish and wildlife agencies, the American Fisheries Society, and any other individuals or groups that the Secretary deems appropriate. This report should contain a complete discussion of the monetary costs, efficacy, and environmental risks associated with each method of controlling ballast water introductions. Control methods discussed in the report should include 1) ballast water exchange at sea; 2) treatment of ballast water with chlorine or some other toxicant; 3) installation of filters on ballast water pumps; and 4) coating vessel ballast water tanks with antifouling paint. The Secretary should also be aware that different control methods may be required for different parts of the country. For example, ballast water exchange at sea may be effective in controlling the introduction of marine exotic species in the freshwaters of many U.S. ports. Finally given the international nature of

this problem, the secretary is urged to bring this matter before the International Maritime Organization."

-Congressional Record-House 21 Nov. 89-

A POSITIVE INTRODUCTION!

Coming your way soon in Transactions!.....Introduction of the cisco, *Coregonus artedii* has benefited the recruitment and production of the lake trout in Lake Opeongo, Ontario. F.E.J. Fry suggested that food chain efficiency could increase through the stocking of the cisco. One of the lessons we might glean from this is that the cisco-lake trout complex is one that is native to the region and apparently highly co-adapted. Use of species native to zoogeographic provinces may be very useful in management. The side effects were few: a decline in yellow perch and paradoxically a greater sensitivity of the lake trout to overharvest.

Reference

- Matusak, J.E., B.J. Slater, and J.M. Casselman. 1990. Changes in lake trout growth and abundance after the introduction of the cisco into Lake Opeongo, Ontario. Trans. Amer. Fish. Soc. In Press.

FOOD CHAIN IMPACTS (Oops!)

Food chain impacts, especially to terrestrial and avian vertebrates are often overlooked when introductions are being planned. Jack Hope in his column *Outdoors* (New York Times 28 Jan 90), reported on this very problem. White bass-striped bass hybrids were introduced into the Swinging Bridge Reservoir in New York in 1983 on the assumption that it would convert large standing crops of alewives into great sport fishing. The environmental assessment presumed that little damage to the surrounding ecosystem could possibly result as the fish was sterile. They overlooked the fact that this was the most important winter roosting area for the bald eagle, precisely for the abundant forage provided by alewives (which as Mr. Hope put it, "were stunned, sometimes chopped into near-gefilte fish by the nearby power plant", obviously eagle fast food). The hybrid bass did its job well lowering the alewife density by a level of ten. The eagles declined from 30-35 to about a dozen birds by 1985. Stocking continued through 1989, during which year, heavy rains forced the raising of the flood gates. 2,000-7,000 large hybrids escaped into the trout waters of the Mongaup River and ate themselves out of house and home (after which they headed downstream). Estimates of 4-8 years will be needed for the recovery of the native fishes. The last eagle census in 1989 failed to record a single bird in the refuge area. "We're not saying there will be no more stocking," said Region 3's Elliott. "But we want to be perfectly responsive to the situation. This winter, we'll survey the alewives carefully. We'll monitor the turbines, the eagles, even the escaped bass, if we can, before we decide." (Editor's note: at least the eagle survey will be easy.)

IFS DATA BASE

The best suggestion for the IFS data base was to use the same software (PC compatible) and format used by the U.S. Fish and Wildlife Service at Gainesville, Florida for documenting all the exotic species. The idea is that Dawn Jennings will provide copies of the software to volunteers in IFS, who will then enter data using it concerning introductions in their state or region. Gainesville will then be the repository for our combined efforts and act as the data base center for our section, and act as our electronic bulletin board. **THE IDEA IS SO SIMPLE THAT IT SHOULD WORK. THE KEY IS TO HAVE FAITHFUL VOLUNTEERS, AT LEAST A LOT MORE THAN RESPONDED TO MY FIRST CALL (BY THE WAY THANKS TO THE BOTH OF YOU--THE REST OF THE GANG, LOOK OUT FOR LAND SHARKS).**

-Chairman Li, Central Committee Politburo for the introduced fishes data base-

If you have been reading this newsletter, you have become aware that there are more than one explanation for the decline of the haplochromine complex in Lake Victoria (see IFS newsletters 7(2):3-4, 7(3):8-11, 8(1):13, 9(1):16-21, 9(2):14-16). One explanation is that the introduced Nile perch exposed the naive haplochromine complex to a form of predation to which they were maladapted. The second is that overfishing the haplochromines was as much responsible for their demise as any other factor. A recent FAO review (Reynolds and Greboval 1988) was recently abstracted in the newsletter and I thought that I would provide the readership with further selections as a spur to encourage careful reading of the original document by the readership. I denote editorial annotations by enclosing them in parentheses.

(In general, we need ecological evaluation, little research has been done except for general survey work and some analyses of catch statistics.) Page 66:" The technical ecological and biological issues involved with this line of argument do not lie within the scope of the present review, and were not addressed in detail. But there are various aspects to the argument and they need to be recognized and judged on their respective merits. First of all, it must be acknowledged that very serious questions are at stake. There can be no doubt that the establishment of such a highly successful predator as *Lates* in Victoria waters carries profound implications for the pre-existing or traditional trophic structures of the lacustrine environment."

(Although overfishing is a cause and although the authors did not perform any ecological analysis, they conclude that *Lates* is the major factor in the demise of haplochromines.)

Page 67:" In any event, it is clear that the abundance of haplochromines has been greatly reduced nowadays, probably owing mostly to Nile perch predation but to some extent (in Tanzania) perhaps to the impact of industrial trawling as well."

(They discuss the decline of several species of commercial fishes of high value.)

Page 67:"The extent to which *Lates* predations has contributed to the decline of these other species groups is difficult to assess. Some fish like *Protopterus* and *Clarias* may be relatively immune to predation by Nile perch because of their habitat ranges. On the other hand, they may be subject to indirect pressure from *Lates* due to competition for common prey stocks."

(They conclude that based on short-term economic trade-offs, that the introduction may have had a positive effect. Of course, sustainability of that resource is dependent upon a forage base and that is uncertain.) Page 67:" Yet it is by no means clear that this should be regarded to be the 'disaster' for local fisherfolk that some critics have alleged. Indeed, if lakeshore dwellers' own stated reactions and the documentary evidence assembled by the mission offer any guides, there are no reasons at all to speak of a 'disaster' FROM A FOOD RESOURCE COMMERCIAL VALUE POINT OF VIEW." (bold emphasis-mine)

(Most of the benefits will accrue to big business and export trade. Will these benefits reach the common man? Will it alleviate local hunger or will this economic boon resemble the anchovetta fisheries off Peru?)

Page 70:"Although the distribution of earnings from Nile perch may favour larger fishing and trading enterprises, it is nevertheless the case that the new fish supports a robust artisanal industry and is highly valued by most lakeshore folk as a money maker."

Page 71:"Far from destroying opportunities for fishermen, then, the proliferation of *Lates* have created them. The substantial growth which has occurred in fleet size and the population of fishermen since the 1970's is indicative in this regard."

Page 72:"The displacement of poorer small-scale fishermen, artisanal processors, and petty traders by wealthier entrepreneurs and industrial firms is another question. It bears on the distribution of benefits rather than on their sheer availability.....There are some signs in some areas that richer owners of gear and equipment secure substantial advantages for themselves while those fishermen with less means are left in a marginal position."

(The Nile perch fisheries has increased deforestation)

Page 71: "It does seem to be the case that fuelwood shortages are severe in many areas bordering on the lake, particularly in Kenya and Tanzania, and that these shortages have been exacerbated by the growth of the Nile perch fisheries."

(It is interesting to me that the same types of arguments about esthetics and economics permeates the ancient forest vs. timber industry debate. Conservationists worry about ecosystem sustainability; whereas, industry is concerned with short-term economic gain.)

REGIONAL UPDATES North America

Cascadia

Correspondent: Hiram Li

Beginning with the phrase, "Webster's dictionary defines unnatural as 'contrary to, or at variance with, nature'", the newsletter of the Columbia River Intertribal Fish Commission, comprising the Confederated Tribes of Warm Springs, the Confederated Tribes of Umatilla, The Yakima Nation, and the Confederated Tribes of Nez Perce; question the continuing introduction of aquatic piscivores to the Columbia Basin. The walleye were planted in Montana and Idaho with the promise that they would not spread into waters supporting anadromous runs of salmonids. The growth rates of the walleye are as high as that reported anywhere and it appears that the next world's record will come from the Columbia Basin, big fish from the Columbia are just a couple of pounds shy. The feeding ecology of the walleye is not well understood but published studies by Alec Maule and Howard Horton of Oregon State University suggest that salmonids constitute a significant portion of its diet. Presently, walleyes are still expanding their range and growing in numbers. They are not a large source of smolt mortality now because of relatively low numbers, but the future impact is unknown. The tribes are extremely disappointed that the Washington Department of Wildlife's introduction of the sterile tiger musky into Mayfield Reservoir on the Cowlitz River occurred over their strenuous objections. They fear that sportsmen will pressure for more widespread releases elsewhere and that baitbucket transfers will result. They argue that this is contrary to the stated goals of the Northwest Power Planning Commission to double the run size of anadromous salmonids by the year 2,000.

Bait bucket transfers are serious. Illegal introductions of walleye have been recorded from the upper Willamette River Basin, of black and white crappies into Tenmile Lake, an important coho salmon rearing area on Oregon's coast, and smallmouth bass into the Umpqua River.

It is suspected that predation from exotic introductions is responsible for the decline in several threatened and endangered fishes. Recent alarming declines of the Warner sucker coincided with the appearance of illegally introduced white and black crappies in Warner Lake. Predation by a suite of introduced fishes may have been instrumental in the decline of the Lost River sucker and the Klamath smallscale suckers (Al McGie, Ore. Dept. Fish Wildl., pers. comm.) Dr. Douglas Markle and Todd Pearsons of Oregon State University are filing to have two forms of the Oregon chub listed as threatened and endangered. Predation by introduced centrarchids is suspected because, the chubs are only found where centrarchids are absent. Dr. Paul Reimers has found an interesting correlation between the continued decline of the coho salmon in Tenmile Lake, Oregon. By following long term trends, he noticed that after the introduction of largemouth bass in 1971, runs of coho salmon remained depressed rather than typically fluctuating upward in accordance with other coho stocks along the coast. Coho salmon fry of Tenmile Lake inhabit the littoral areas shortly after leaving rearing streams and several stomachs of largemouth bass contained salmon fry.

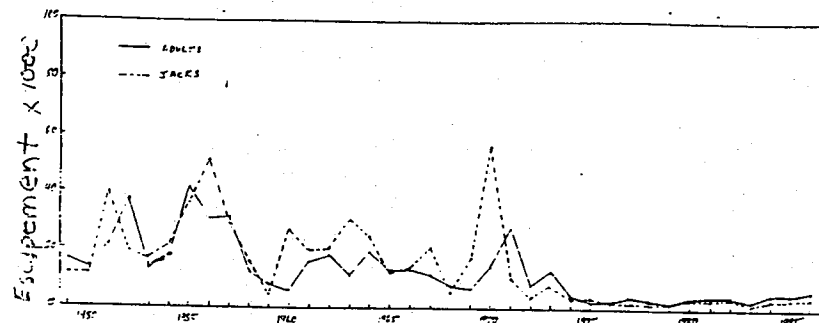


Figure 2. Calculated annual escapement of Jack and adult coho salmon in Tenmile Lakes based on a relationship between spawning surveys and Peterson population estimates.

It is difficult to obtain experimental proof in circumstances as described above, because of the ethical constraints of using sensitive or threatened species in experimental trials and it is difficult to gather meaningful data from dietary studies of predators because rare species are hard to find by the biologist or the predator once the impact becomes manifest. Criticisms of nonrigorous scientific standards become moot.

THE THRILLA FROM MANILA

The Oregon Department of Fish and Game is experimenting with the Manila littleneck clam (*Tapes japonica*). Nearly 100,000 adults and more than 3.5 million juveniles have been released in Netarts Bay. By covering the introductions with 3.32 mm mesh plastic netting, survival in some plots ranged as high as 80% in two years. This species is well established in the state of Washington where it was introduced in the 1930's inadvertently with the import of oyster seed from Japan. It was introduced because the adults use an area high on the tidal flats not well exploited by the native littleneck; it is not as susceptible to diseases at the larval stages as the native species; the native littleneck clams are heavily harvested, and Washington fishermen have made money harvesting this species. (Editorial note: whereas the adults may not compete for space, what occurs at the earlier life stages?)

Reference:

- Gaumer, T. and P. Farthing. 1990. Welcome stranger. Ore. Wild. Jan-Feb:10-11.
- Maule, A.G. and H.Horton. 1984. Feeding ecology of walleye, *Stizostedion vitreum vitreum* in the mid-Columbia River, with emphasis on the interactions between walleye and juvenile anadromous fishes. Fish. Bull. 82:411-418.
- Maule, A.G. and H. Horton. 1985. Probable causes of the rapid growth and high fecundity of walleye, *Stizostedion vitreum* in the mid-Columbia River. Fish Bull. 83:701-706.

Great White North (North Dakota or thereabouts) Correspondent: Bruce Barton

Rainbow smelt have been found in Lake Winnipeg, part of the Hudson Bay drainage, the result, most likely, of bait bucket introduction. According to Bruce, the ruffe is doing very, very well in Lake Superior, especially in the Duluth area.

The third attempt to introduce the European zander to Spiritwood Lake seems successful on the basis of a confirmed catch. Gene VanEckhout, district biologist was quoted as saying, "This is great. It now appears we may have something to study and monitor". The first batch of 100,000 zander were destroyed because they were carriers to a virus virulent to northern pike, the second batch of 300,000 were lost to heat, drought and marauding salamanders. -Associated Press, Grand Forks Herald, March 90-

Hawaii

The o'opu alamo'o a freshwater goby endemic to Hawaii is threatened with extinction. It has already been extirpated from Oahu, the impacts of stream channelization, stream diversion, and introduction of non-native species have been cited as causes for its demise. The goby is a candidate for listing as an endangered species.

-Hawaii Star Bulletin, 29 Nov. 89-

Texas

Texans in possession of grass carp or hybrid grass carp are in trouble. The Texas Parks and Wildlife department now prohibits both fishes. The hybrid is subject to genetic abnormalities (why is that so surprising?) that can result in "high mortality of young and inefficient vegetation control. A group of hybrid fish sold to the department was for experimentation also proved to be contaminated with pure grass carp"...(an interesting oxymoron, contaminated with purity)

-Talkin' Texan, 14 March 90-

California

The red shiner, Notropis lutrensis, is now well established in the San Joaquin drainage. 2,141 red shiners were collected from 18 of 27 sites. It was found to be significantly associated with the following species, the common carp, threadfin shad, mosquitofish, inland silverside, striped bass, fathead minnow and the Sacramento blackfish. With the exception of the Sacramento blackfish, this is an entirely introduced fauna. No significant negative correlations were detected between the red shiner and other native species, suggesting that, at least now, interactions between the native fish fauna and the red shiner are benign. The possibilities that this is the result of bait bucket is high as it is a legal bait in many parts of California.

Reference

Jennings, M.R. and M.K. Saiki. 1990. Establishment of red shiner, Notropis lutrensis, in the San Joaquin Valley, California. Calif. Fish and Game 76(1):46-57.

ACKNOWLEDGEMENTS

Thank you to Paul Shafland, Dawn Jennings, Peter Moyle, John Dentler, Bruce Barton, and Carl Bond for contributing items to this newsletter.

WANTED: NEWS ITEMS, REPORTS, LETTERS, OPINIONS--CONTACT HIRAM LI

WANT TO SEND A COPY OF THE NEWSLETTER TO A PROSPECTIVE MEMBER? DROP A LINE OR PHONE HIRAM LI OR DAWN JENNINGS.

1990-1991 IFS Officers

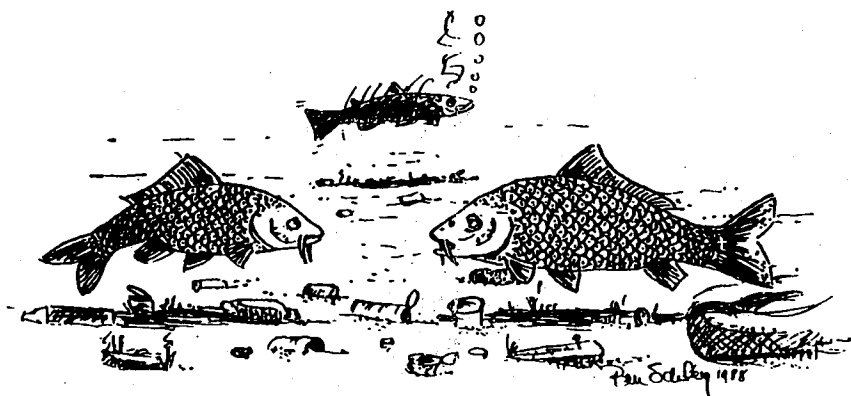
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"OH, IT'S JUST ANOTHER NATIVE AMERICAN WHO CAN'T COPE WITH PROGRESS."