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NEW ZEALAND FRESHWATER FISHERIES MISCELLANEOUS REPORT NO. 103

OVERSEAS TRAVEL REPORT PACIFIC SCIENCE CONGRESS 27 MAY TO 2 JUNE 1991, HONOLULU, HAWAII AND AMERICAN SOCIETY OF ICHTHYOLOGISTS AND HERPETOLOGISTS 15 TO 20 JUNE 1991, NEW YORK

by

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Servicing freshwater fisheries and aquaculture

October
1991

NEW ZEALAND FRESHWATER FISHERIES MISCELLANEOUS REPORTS

This report is one of a series initiated in January 1989, and issued by the Freshwater Fisheries Centre, MAF Fisheries. The series was established to ensure that reports prepared for clients, tribunal hearings, internal use, etc., are collected together and available to future users. They are for limited circulation, and some may be confidential.

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MAF Fisheries is the fisheries business group of the New Zealand Ministry of Agriculture and Fisheries. The name MAF Fisheries was formalised on 1 November 1989 and replaces MAFFish, which was established on 1 April 1987. It combines the functions of the former Fisheries Research and Fisheries Management Divisions, and the fisheries functions of the former Economics Division of MAF.

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INTRODUCTION

The primary stimulus for this period of overseas travel was an invitation from the Hawaii Cooperative Fisheries Unit of the United States Fish and Wildlife Service to participate in a symposium on problems with introduced fish species (the US Fish and Wildlife Service paid all expenses). Animal and plant introductions have been a particular problem in Hawaii, including some freshwater fishes, and the fact that Pacific Science Congress was held in Hawaii in 1991 provided a convenient venue at which to discuss problems with introduced fishes.

The freshwater fishes issue was only a part of a major theme of the congress, with extensive sessions allocated to discussion of the question of biological diversity, including many sessions on:

1. Inventories and monitoring of Pacific biological diversity;
2. Role and function of biological diversity in an ecosystem context;
3. Biological diversity in the context of sustainable development.

The general scope of these varied sessions can be determined from the listing of session topics from the Congress programme provided in Appendix 1.

SYMPOSIUM ON THE IMPACTS OF EXOTIC FISHES

My role was to participate in a panel discussion that followed a series of paper presentations (unfortunately, the papers presented bore almost no relationship to those listed in the conference programme, so it is not possible to provide a copy of the actual programme - and as an aside this sort of chaos was characteristic of the whole Congress, which was poorly organised and subject to massive programme changes; furthermore, individual paper presentations were not timed in any sessions making it almost impossible to move from one session to another efficiently, to hear presentations from each).

In the Introductions session, there was a keynote address by Dr Peter Moyle of the Davis campus of the University of California, in which an attempt was made to provide some sort of theoretical basis for the way introduced fishes have impacts on the receiving ecosystems and biotas. Moyle argued that introductions have their greatest impacts in ecosystems of natural low species diversity and their least effect in the more complex ecosystems; I found this argument, based on a very limited empirical data base, to be rather unconvincing, though the principle may apply, nevertheless. Overall, Moyle's main point was that no introduction can be made without some ecosystem impacts.

There was an interesting paper on the impacts of introductions on the so-called anchialine pool systems of the Hawaiian coastline (though it had little direct relevance to the New Zealand situation). These are saline pools, above the limits of the high tide, and in which distinctive assemblages of shrimps and fishes have evolved. Dr R. Brock and colleagues

showed how a large proportion of these unique ecosystems have been polluted by exotic species, leading to extinctions of the natural fauna and a major change in the whole structure of these small ecosystems - from clear water, a flora dominated by blue-green algae and the vegetation cropped by shrimps, to one where the shrimps are extirpated by introduced fishes, the blue-green algae are replaced by a floating mat of green algae, and a mud substrate develops.

Mr S. Hau, of the Division of Aquatic Resources of the State of Hawaii, described the impacts of the establishment of the Asiatic clam *Corbicula* in irrigation systems in Hawaii, and in particular, the way this clam proliferates in the piping systems and completely blocks them up; problems with the clam are accentuated by a demand for them as food amongst the Asiatic communities of some Hawaiian islands. The whole issue of freshwater fish introductions in Hawaii was canvassed by Mr M Yamamoto also of the Division of Aquatic Resources of the State of Hawaii; this focussed extensively on a public relations campaign to encourage people to not get involved in introducing and dispersing freshwater fishes. Hawaii, because of its tropical climate, has problems with fish introductions that do not apply in New Zealand, which relate to the extensive trade in tropical aquarium fishes. In Hawaii, a great many of the fish species involved in this trade can easily become established in wild habitats; New Zealand's much more temperate climate prevents the establishment of such species except in geothermal waters of very limited extent. This paper reached the predictable conclusion that the best way to prevent problems with exotic fishes is to not introduce them, and that, once established, exotic species are difficult to remove unless they are found in only very limited freshwater habitats.

Dr John Paxton, of the Australian Museum, reviewed problems relating to fish introductions in Australia and drew attention to those being caused or likely to develop from the discharge of ballast water from ships visiting Australia. Dr John Carlton, of Williams College, Connecticut, elaborated on the theme of transport of marine organisms by ships' ballast water. A paper by M Tangtronpiros and colleagues from the National Inland Fisheries Institute in Thailand discussed a programme for breeding a large indigenous cyprinid, *Catlocarpa siamensis*, but it was not relevant to the theme of the meeting, nor did it provide any significant insights into fish biology generally.

The panel discussion that followed, canvassed a very wide range of views on, and issues relating to, introductions. Members of the panel included Dr John Bardach, Director of the East-West Centre at the University of Hawaii and a noted ichthyologist and fisheries biologist, John Carlton, Peter Munro of the ICLARM Coastal Aquaculture Centre in the Solomon Islands, John Paxton, Jack Randall of the Bernice P Bishop Museum in Hawaii and a noted tropical reef fish ichthyologist, and Paul Shafland, Director of the Florida Non-native Fish Laboratory in Gainesville, Florida. Some of the panelists made brief presentations to the meeting; my own major point was to emphasise the need to focus not just on the obvious, catastrophic introductions, but also to identify and deal with chronic harmful impacts of exotic species, whose effects, though perhaps less spectacular, may be cumulatively just as harmful in the long term. Paul Shafland, with his background in and responsibility for non-native fishes in Florida brought a somewhat controversial flavour to the discussion that I found useful. There is probably nowhere in the world that there have been more serious problems with exotic fishes than in Florida, and yet Shafland repeatedly

emphasised that with proper management and due care, exotic fishes can make a valued contribution to angling and protein production.

The discussion was at times quite vigorous, with a strong sentiment that fish introductions were basically harmful and to be avoided if at all possible. One aspect of the discussions related to repeated proposals that Hawaii should introduce anguillid eel stocks for aquaculture there, a proposal that the Inland Resources Division of Hawaii had successfully rebuffed over a long period. John Bardach entered this discussion with a report that there was a landlocked population of anguillid eels in the Cook Islands - his point being that though it is generally thought the anguillid eels have to go to sea to breed, this was not always true. I found this surprising, since no such landlocked populations have ever been reported for anguillids anywhere else, and I was aware of Don Jellyman's recent/current work on eels at Mitiaro, in the Cook Islands. It appears that Bardach had read Jellyman's paper (perhaps as a referee, perhaps because the paper had been submitted to Pacific Science which is published in Hawaii); Bardach had misinterpreted statements in the paper that the lagoon at Mitiaro has no surface outlet, and had jumped to the erroneous conclusion that the eel population there was therefore landlocked. Overall, I felt that though the symposium had been quite lively and stimulating, it was re-working ground that had been covered before in a number of venues that I had attended, including the Australian Society for Fish Biology's symposium on "Introduced and translocated fishes and their ecological effects", at Magnetic Island, Queensland, in August 1989, and to some extent also the Fisheries Society of the British Isles symposium on "The biology and conservation of rare fish" held at Lancaster in July, 1990. However, the meeting did have the important value of raising the issues within a distinguished congress held in Hawaii, at a time when the Hawaiian authorities are endeavouring to establish control over their situation, and it probably therefore had considerable local value that would not have been evident. It also gave staff of the Division of Inland Resources the opportunity to discuss issues and problems with a range of people from other countries.

I was asked to have a meeting with Henry Sakuda, Director of the Aquatic Resources Division, and Bill Devick one of his staff. It turned out that this was primarily to discuss a statement in my book "Diadromy in fishes" in which I include a review of statements originating in the United States that the Hawaiian goby *Lentipes concolor* is "rare and endangered". This is the status assigned to the fish in the Fishes Red Data Book of the International Union for the Conservation of Nature, a book assembled by an American ichthyologist. Evidently, the rare and endangered status of the fish has been exaggerated (in the view of Hawaiian authorities, and in the light of more extensive data), and the Hawaiian's consider it far from endangered. In part, however, their strategy in seeking to get its endangered status reduced relates to difficulties created by Federal legislation that govern the management of fish populations and the waters they occupy, in any fish species that are endangered. In effect, it appears that the legislation, designed to offer protection for such fish species or populations, provides considerable difficulties for any agencies that wish to manage such populations and habitats for the protection of their endangered species.

The indigenous freshwater fish fauna of Hawaii is very small, comprising only five amphidromous (sea-migratory) species of gobiid fishes (family Gobiidae). These have some cultural interest to the native Hawaiian people, who call them "hinana" reflecting the close historical/cultural links with the Polynesian peoples of Hawaii and New Zealand (Maori call

juvenile galaxiids and retropinnids "inanga"). Thus, for cultural and conservation reasons there is considerable interest in these few fish species, and a modest investment of effort in research on them. They are of considerable interest to me because of my interest in the phenomenon of diadromy. I spent some time talking about these fishes and the life histories with Bill Devick and Bob Nishimoto, and in particular about problems they experience with quantitative sampling of them. They find electric fishing of limited value, in much the same way as we have for quantitative work, owing to the difficulties in catching representative samples, the problem of narcotising the fish in concealment habitat, and so on. In Hawaii, they have adopted the practice of "crawl diving" in which an observer using snorkel and mask, crawls upstream counting fish and identifying locations occupied. This would have value for species that spend some time out of concealment cover and in relatively slowly flowing waters; it would be of much less value for species that spend their time within concealment cover, and in swiftly flowing waters.

Hawaii also has a fauna of amphidromous atyid shrimps (related to our freshwater shrimp *Paratya curvirostris*); interest in these apart from their amphidromy, relates to their incredible ability to climb high and steep falls - they just walk up the rock faces of the falls (something that some of the gobies are able to do, though to a lesser degree than the shrimps).

GLOBAL CLIMATE CHANGE AND FISHERIES

Because I was already attending Pacific Science Congress to participate in the above symposium, I was also asked, by Dr T.G. Northcote of the University of British Columbia, to contribute to a symposium on the effects of global climate change on fisheries. I was somewhat hesitant to become involved since Gordon Glova has been the Freshwater Fisheries Centre scientist involved in this issue for New Zealand reviews and reports; however, there was not funding to support attendance, and I prepared a general and wide-ranging review of the question by synthesising what has been published in New Zealand on this topic. This series of papers (8 of them) proved to be rather uneven in character, varying from my very general account, and a similarly broad-ranging discussion of the need for broad, globally-based studies on the world's larger lakes by D.G. Reid of the US National Oceanic and Atmospheric Administration, to detailed accounts of the impacts of rising temperatures on such situations as commecial culture of channel catfish in the southern United States, by R.W. McCauley of the University of North Texas, or on sockeye salmon runs in the Fraser River in Canada, by M.A. Henderson and J.G. Stockner, of the Department of Fisheries and Oceans, Vancouver, Canada.

PLENARY ADDRESSES

I attended two notable plenary addresses. One was related to the then forthcoming solar eclipse the path of which passed directly over the largest astronomical observatory in the world on the island of Hawaii. Dr Donald Hall, Director of the Institute for Astronomy at

the University of Hawaii, held a very large audience spellbound for over an hour as he discussed various aspects of solar eclipses, and about the steps that the astronomical community was making to take full advantage of the opportunity presented by the coincidence of the path of the eclipse and the site of the Hawaii observatory. Amongst other things, Dr Hall related his experience of chasing another eclipse across the Middle East in the Concorde airline, which enabled longer observation of what happens during an eclipse - and in passing, about how the French pilot had so extended this chase that the aircraft eventually landed with only a few minutes' fuel remaining! This address was exceptional as an example of bringing a specialised scientific topic to a very broadly based, if erudite audience.

The other address was by Dr Peter Raven, Director of the Missouri Botanical Gardens, and discussed the subject "Biological extinctions: a global crisis". Rather than a scientific discourse, this was a passionate and eloquent plea for the governments of the world to pay better attention to the looming mass extinction of animal and plant species. A notable aspect of this address was the vigorous criticism by Dr Raven of his own country and its government for demanding that the nations of the third world should adopt conservation strategies in the management of their natural resources, when the United States is the largest consumer of such resources the world has ever seen.

OTHER SYMPOSIA

As is typically true of large, broadly based and general congresses, like Pacific Science Congress, there were masses of other interesting papers and symposia. These were so many, and the Congress itself so poorly organised, that it was a major struggle to locate interesting papers, determine when they would be presented, and find space in rooms to listen. People attended the Congress from throughout the world, with emphasis on Pacific rim nations, and including a good array of New Zealanders in a broad array of fields.

AMERICAN SOCIETY OF ICHTHYOLOGISTS AND HERPETOLOGISTS

The annual and 75th anniversary meeting of the American Society of Ichthyologists and Herpetologists was held in New York 15-20 June, 1991, and having travelled as far as Hawaii, the opportunity was taken to travel on to New York and to attend this meeting, where I had been asked to contribute to a symposium on "The conservation of biodiversity in ichthyology and herpetology". This was a very large series of some 85 papers, covering a huge diversity of topics. The meeting was opened by an impassioned and often humorous plea by Phil Pister of the Desert Fishes Council in California. Pister's message was, essentially, that we as scientists are neglecting our responsibilities if we do not give attention to ensuring that we pass on to future generations as much of the existing biological diversity as we are able. My contribution related to identifying and clarifying the particular problems involved in the conservation of diadromous fishes - especially those relating to the diversity

of habitats occupied by diadromous fishes, the obligatory nature of doing so, and the need to provide for passage of fishes between these habitats.

The ASIH makes a series of awards for papers presented by students at the meeting, and I was asked to present the Myvanwy Dick Award for the most innovative paper presented by a student. Myvanwy Dick was Keeper of the fish collections at the Museum of Comparative Zoology, Harvard University, when I studied there during the late 1960s, and I had visited Mrs Dick at her home in Sarasota, Florida, during a period of leave between the Pacific Science Congress and the ASIH meetings, and so was able to bring fresh news of her to the people attending the meetings, many of whom knew her.

With probably more than 600 ichthyologists and herpetologists attending, the ASIH meetings provide a very fertile opportunity to meet and discuss matters with a wide array of leading scientists in these fields, an opportunity perhaps only equalled by such meetings as those of the American Fisheries Society and the European Ichthyological Congresses. Though one can often not identify specific and explicit benefits from these opportunities, the constant meeting with and talking to diverse scientists from all fields is an invaluable stimulus to improving one's own research work.

Perhaps an over-riding impression from the ASIH meetings, however, was that New York city is not a pleasant place to live, at least compared with modest suburban cities like Christchurch. Interestingly, many of the Americans attending felt this even more keenly than I did. Even so, clearly, millions of people live in New York, and are able to go about their lives; perhaps people grow accustomed to the place!

ITINERARY

25 May	Christchurch - Auckland - Honolulu
26 May to 2 June	Pacific Science Congress, Honolulu
3-13 June	Annual leave in Hawaii, Florida and Louisiana
14 June	New Orleans - New York
15-20 June	American Society of Ichthyologists and Herpetologists, New York
21-23 June	New York - Auckland - Christchurch

APPENDIX

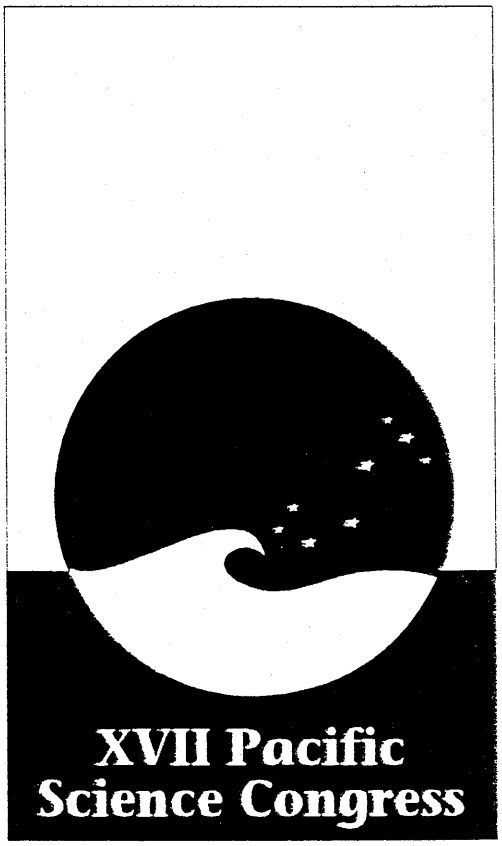
1 Relevant section of programme of Pacific Science Congress

2 Program of ASIH meeting.

APPENDIX 1

GENERAL PROGRAM

OF THE



TOWARDS THE PACIFIC CENTURY: THE CHALLENGE OF CHANGE

27 MAY TO 2 JUNE, 1991
SHERATON WAIKIKI HOTEL
HONOLULU, HAWAII, U.S.A.

Further aspects of global environmental change: freshwater ecosystems and others
T.G. Northcote, University of British Columbia, Canada

Session 1. Wed 8:00 am - 9:30 am Rm J

D. Meisner, Environmental and Social Systems Analysts Ltd., Canada
Effects of Global Climate Change on Distributions of Freshwater Fishes

T. Northcote, University of British Columbia, Canada
Predicting the Effect of Global Environmental Change on Freshwater Ecosystems and its Impact on Sport Fish, their Habitat and Fisheries in British Columbia

R. McCauley, Wilfrid Laurier University, Canada & T. Beitinger, University of North Texas, USA
Predicting the Effects of Climate Warming on the Commercial Culture of the Channel Catfish Ictalurus punctatus

M.A. Henderson, J.S. Stockner, Department of Fisheries and Oceans, Canada & D.A. Levy, Levy Research Services Ltd., Canada
Probable Consequences of Global Climate Change on the Production of Fraser River Sockeye Salmon (Oncorhynchus nerka)

Session 2. Wed 9:45 am - 12:30 pm Rm J

M.C. Feller, University of British Columbia, Canada
Potential Impacts of Global Climate Change on the Chemistry of Forested Streams in Western North America

D.F. Reid, National Oceanic and Atmospherice Administration, USA
Large Lakes of the World: A Proposed Global Science Inititative

R.M. McDowall, Ministry of Agriculture and Fisheries, New Zealand
Global Climate Change: What Might Happen in an Oceanic Archipelago Like New Zealand, Lying North-South in Southern Latitudes

B.J. Shuter, Ontario Ministry of Natural Resources, Canada
Tools for Assessing the Impact of Climate Change on Freshwater Fish Populations

Emission of biogenic gases from freshwaters and their impacts on global environmental change
M. Sakamoto, National Musuem of Ethnology, Japan

Session 3. Fri 1:30 pm - 3:15 pm Rm K

Future of Management of Alien Organisms

Chair: *J. D. Parrish, University of Hawaii, USA. A Panel with Audience Participation*

Panel Discussion:

J.E. Bardach, East West-Center, USA

J.T. Carlton, Williams College Maritime Studeis Program, USA

R.M. McDowall, Ministry of Agriculture and Fisheries, New Zealand

P.B. Munro, ICLARM Coastal Aquaculture Centre, Solomon Islands

J.R. Paxton, Australian Museum, Australia

J.E. Randall, Bishop Museum, USA

P.L. Shafland, Florida Non-Native Fish Laboratory, USA

Session 4. Fri 3:30 pm - 5:15 pm Rm K

Experiences with Introductions and Management

Chair: *K. Leber, Oceanic Insitute, USA*

R. Brock, J. Bailey-Brock & A. Kam, University of Hawaii, USA
The Impact of Exotic Fishes in Hawaiian Anchialine Systems

M. Yamamoto, G. Higashi, R. Honebrink & W. Devick, Hawaii Division of Aquatic Resources, USA
Management Strategies to Control the Spread of Exotic Fishes in Hawaii

P.K.L. Ng, L.M. Chou & T.J. Lam, National University of Singapore, Singapore.
Introduced Aquatic Species in Singapore—A Status Report

A.G. Jhingran, Central Inland Capture Fisheries Research Institute, India
Introduction of Exotic Fish Species: Indian Experience

J.R. Paxton, Australian Museum, Australia
Introduced Fishes in Australia

J.T. Carlton, Williams College Maritime Studies Program, USA
The Introduction of Marine Invertebrates in the Pacific Basin: Perspectives on Centuries of Human-Mediated Biological Invasions (How Many Species? How Will We Ever Know? Why Does It Matter?)

Posters

J. Bailey-Brock, R. Brock, T. Weatherby & A. Kam, University of Hawaii, USA
Grazing Shrimp Halocaridina rubra as the Keystone Species in the Anchialine Pool Community

M. Tangtrongpiros, S. Nukwan & K. Lawonyawut, National Inland Fisheries Institute, Thailand
Breeding and Larvae Rearing of Giant Carp Catlocarpio siamensis

P. Jarimopas, National Inland Fisheries Institute, Thailand
Realized Response of Thai Red Tilapia to 7 Generations of Size-Specific Selection for Growth

S. Nukwan, K. Lawonyawut & M. Tangtrongpiros, National Inland Fisheries Institute, Thailand
Cross Breeding and Reproductive Ability of the Hybrids Between Thai Catfish Clarias macrocephalus and African Sharptooth Catfish Clarias gariepinus

APPENDIX 2

Combined Meetings

75th Anniversary 71st Annual Meeting

American Society of Ichthyologists and Herpetologists

7th Annual Meeting

American Elasmobranch Society

Program and Abstracts

American Museum of Natural History
New York, NY

15–20 June 1991

ABBREVIATED PROGRAM--SUNDAY AFTERNOON 16 JUNE

TIME	SESSION 1: AES Symposium. Fisheries Assessments. Chair: Morrissey and Hueter. Room: Blum Theater.	SESSION 2: ASIH Biodiversity Symposium. Strategies and Programs for the Conservation of Biodiversity. Chair: Dodd. Room: Kaufmann Theater.	SESSION 3: Systematics of Fishes I. Chair: G. Nelson. Room: Linder Theater.	SESSION 4: Ecology and Behavior of Fishes. Chair: Kallman. Room: People Center.
13:00	Branstetter--Welcome	Pister--Ethical considerations in conservation biology	Morizot--Gene mapping	*Pyle--Exploring the twilight zone
13:15	Casey--Keynote	cont'd	Chen, Xinyu--Olfactory organ diversity	Randall--Fish fauna of Lord Howe Island
13:30	cont'd	Norse--Conserving life in the neglected 73%	McCune--Holostei monophyly	*Kavanagh--Ecology and evolution of *Melichthys niger*
13:45	Branstetter--Analysis of shark catches	cont'd	Grande, L.--Amiiforms	Helfman--Effects of sociality on threat-sensitivity in damselfish
14:00	Manire--Natural mortality in lemon sharks	Williams--World diversity of fishes and their conservation	Begle--Euteleostean clades	Draud--Territory defense in damselfish juveniles
14:15	Hueter--Sport fishing in Florida	cont'd	*Grande, T.--Gonorhynchiform relationships	*Herold--Ecodynamics of pair bonding in *Eurypegasus draconis*
14:30	**BREAK**	**BREAK**	**BREAK**	**BREAK**
14:45	Russell--Longline fisheries in Gulf of Mexico	Gregory--Conservation applications of snake research	Todd--Phylogeny of Coregoninae	Clark--Monogamy vs polygyny in *Malacanthus*
15:00	Macias--Shark conservation in Mexico	Klemens--IUCN Turtle Plan	Lockwood--*Coregonus* relationships	*Privitera--Reproductive biology of *Asterropteryx semipunctatus*
15:15	Cailliet--Commercial fisheries on US west coast	Pritchard--Conserving sea turtles	Buth--Allozyme relationships of *Mylopharodon* and *Ptychocheilus*	Laroche--Reproduction and recruitment in the Nassau grouper
15:30	Holts--California shark fisheries	Thorbjarnarson—IUCN Crocodilian plan	Chen, Xiaoping--Amblycipitid catfish phylogenetics	*Abate--Herbivores affect foraging in the bluehead wrasse
15:45	Martin--Status of Californa skate fisheries	Duellman--Sampling biodiversity	*de Pinna--*Leptoglanis, Zaireichthys* and amphiliids	Forestier--Group size and feeding rate in a coral reef fish
16:00	Cailliet--Demography of leopard sharks	McDiarmid--Sampling biodiversity	Dingerkus--Taxonomic comments on *Lota*	*Mazeroll--Learning, memory, and spatial knowledge in reef fish
16:15	cont'd	Strysky--Screening endangered marine fishes		*Curran--Does the cunner hibernate?
16:30	Dudley--Protective netting	Kaufman--Lake Victoria Research and Conservation Plan		
16:45	Open discussion	Ogutu-Ohwayo--Fish species diversity in African Great Lakes		

9:00-11:00 Opening Speakers, Naturemax Theater
17:30-19:30 Graduate Student Reception, Amphibian and Reptile Hall
13:00-15:00 ASIH Workshop: Use of Amphbians, Reptiles, and Fish in Research, Planetarium Classroom 1
11:30 Group Photograph, 77th St. steps
19:30-22:00 Wine/cheese Social, Akeley Hall and Roosevelt Rotunda

ABBREVIATED PROGRAM--MONDAY MORNING 17 JUNE

TIME	SESSION 5: AES Symposium. Concepts and Future Directions. Chair: Howe. Room: Blum Theater.	SESSION 7: Systematics of Fishes II. Chair: de Pinna. Room: Kaufmann Theater.	SESSION 8: ASIH Biodiversity Symposium. Factors Associated with Declining Diversity I. Chair: Pister. Room: Linder Theater.	SESSION 9: Population Biology of Fishes. Chair: C. L. Smith. Room: People Center.
9:00	Hoff--Sandbar sharks	Buckup--Phylogeny of Characiformes	Courtenay--Introduced fishes and biodiversity	Nolan--MtDNA analysis of American shad
9:15	Applegate--Mexico shark conservation	Harold--*Polyipnus* species group phylogeny	Platania--Range fragmentation in the Rio Grande drainage	Sadovy--Age and growth of the red hind
9:30	Martin--Genetics of shark populations	Dyer--Atheriniformes phylogeny	*Leite--Effects of damming the lower Tocantins River, Brazil	*Johnson--Biology of hagfishes
9:45	Martin--Role of public education	*Orti--Molecular phylogeny of sticklebacks	Thomerson--Venezuelan annual killifishes	Cordes--Age and growth of the kelp bass
10:00	Gruber--SSC Shark Specialist Group	*Moore--Phylogeny of Trachichthyiformes	Stoeckel--Developing rare fish propogation techniques	Wooninck--Subpopulation structure of the California halibut
10:15	Castro--Informal discussion of east coast US plan	Mooi--Vicariance biogeography of *Plesiops*	Bell--Iterative evolution in sticklebacks	*Franklin--Age and growth of white seabass
10:30	**BREAK** (followed by **SESSION 6: AES General Session I.** Chair: Carrier.	**BREAK**	**BREAK**	**BREAK**
10:45	Welcome	McMillan--Genetic relationships among Indo-Pacific butterflyfishes	Balon--Dynamics of biodiversity	Allen--White seabass recruitment in southern California
11:00	Van Dykhuizen--Growth rate of sevengill sharks	*Waugh--Kyphosid phylogeny	*Shrestha--Conservation of Himalayan fishes	Harris--Prolonged planktonic period in the Dover sole
11:15	*Zeiner--Growth rates of two skates	Hastings--Interrelationships of chaenopsid genera (Blennioidei)	Günther--Effects of detergents on amphibian eggs	Quinn--Sexual dimorphism and reproduction in sockeye salmon
11:30	*Didier--Anatomy of *Rhinochimaera pacifica*	*Radding--Phylogeny of Ammodytidae	Wyman--Synergistic causes of amphibian declines	McLaughlin--Comparison of two collecting methods in Florida seagrass
11:45	Martin--Physiological molecular clock for mtDNA	Parenti--Phylogeny and biogeography of sicydiine gobies	*Pechmann--Mitigation of an amphibian breeding site	Rodriguez, J.--Pelagic spawns of the bluehead wrasse
12:00	**LUNCH**	**LUNCH**	**LUNCH**	**LUNCH**

10:00--16:00 Poster Session I, Gallery 77

ABBREVIATED PROGRAM--MONDAY AFTERNOON 17 JUNE

TIME	SESSION 10: AES General Sessions II. Chair: Martin. Room: Blum Theater.	SESSION 12: ASIH Symposium. Labroid Evolution I. Chair: Stiassny. Room: Kaufmann Theater.	SESSION 13: ASIH Biodiversity Symposium. Factors Associated with Declining Diversity II. Chair: McDiarmid. Room: Linder Theater.	SESSION 14: Biology of Fishes. Chair: Bortone. Room: People Center.
13:00	*Lowe--Feeding behavior in the Pacific electric ray	Stiassny--Introductory remarks	Hutchinson--Public media and conservation of the Goliath Frog	Winemiller--Multivariate analysis of life history strategies
13:15	*Wetherbee--Buoyancy of deep-sea sharks	Witte--Destruction of a cichlid species flock	Herrington--Reptile fatalities in Georgia	Keefe--Metamorphosis in the summer flounder
13:30	*Morrissey--Activity and habitat selection of lemon sharks	Meyer--MtDNA of East African cichlid radiations	Fellers--Conservation biology of *Xantusia riversiana*	*Marks--Ontogenetic shift in the diet of the bluefish
13:45	DeMarignac--Homing and site attachment in lemon sharks	Nishida--Molecular evidence for old cichlid lineages in Lake Tanganyika	Smith, R.B.--Radiotelemetry of *Drymarchon corais couperi*	*Juanes--Size-structured piscivory in the bluefish
14:00	Carey--Movement of pelagic sharks	*Moran--Origin of Lake Malawi cichlids	Sajdak--Mongoose impact on reptiles in the Lesser Antilles	Chittenden--Spanish mackerel in Chesapeake Bay
14:15	Nelson--Acoustic tracking of a megamouth shark	Sturmbauer--Lake Tanganyika mouthbrooder phylogeny	Buhlmann--Conservation of *Dierochelys reticularia* in Virginia	Hales--Historical age structure changes in Atlantic croaker
14:30	**BREAK** (30 minutes for Blum)	**BREAK**	**BREAK**	**BREAK**
14:45	**SESSION 11: Anatomy and Physiology of Fishes, Amphibians, and Reptiles. Chair: Reilly**	Reinthal--Lake Malawi cichlid speciation	Seigel--Conservation of *Trachemys scripta*	McKown--Diets of striped bass around Long Island
15:00	Dorton--Effects of aluminum and pH on striped bass	McElroy--Genetic control of morphology in Malawi cichlids	Berry--Desert Tortoise as an indicator of environmental degradation	Young, J.--Pectoral fin asymmetry in striped bass
15:15	Haney--Osmotic regulation in the Eustis pupfish	Wimberger--Phenotypic plasticity and trophic polymorphisms in fishes	Musick--Status of sea turtles in Virginia	Wirgin--DNA polymorphisms in striped bass
15:30	*Gibbs--Olfactory organs of mesopelagic fishes	Kaufman--Taxonomic scale and form variation		Waldman--Stock identification techniques for striped bass
15:45	Van der Meer--Morphology of photoreceptor patterns in percomorphs			Chittenden--Variation in catches of searobins
16:00	Sever--Sperm nourishment in *Eurycea cirrigera*			McBride--Seasonal distributions of searobins
16:15	Young--Effects of postural change on the snake heart			Barrett--Reactive distance and pursuit speeds in rainbow trout

15:00–16:30 AES Business Meeting, Planetarium Classroom 1
17:00 Buses leave for AES Banquet, Front of Planetarium (81st St.)
18:00–22:00 AES Banquet, New York Aquarium

ABBREVIATED PROGRAM--TUESDAY MORNING 18 JUNE

TIME	SESSION 15: AES General Session III. Chair: Luer. Room: Blum Theater.	SESSION 16: ASIH Biodiversity Symposium. The Units of Conservation: Species. Chair: Fitzsimons. Room: Kaufmann Theater.	SESSION 17: Symposium. Labroid Evolution II. Chair: Reinthal. Room: Linder Theater.	SESSION 18: Ecology of Fishes I. Chair: Collette. Room: People Center.
9:00	Applegate--Paleontological view of modern lamniforms	Dinkins--Life history of the smoky madtom (*Noturus baileyi*)	Stiassny--Phylogenetics of Madagascan cichlids	Turingan--Diversity and abundance in a Puerto Rican coral reef
9:15	O'Sullivan--Prickly shark (*Echinorhinus cookei*)	Shute--Captive rearing and reintroduction of the smoky madtom and yellowfin madtom	Casciotta--Phylogenetic relationships of Neotropical cichlids	*Young--Movements of two moray eels
9:30	Conlogue--NMR imaging of elasmobranch chondrocranium	Roman-Rodriguez--Conservation of *Totoaba macdonaldi* in the Gulf of California	Yamaoka--Intestinal coiling in cichlids of Lake Tanganyika	*Beets--Postrecruitment processes in Caribbean reef fishes
9:45	Chen, C.--Reproductive system of blacktip sawtail catshark	Garrett--Conservation of *Micropterus treculi*	Jensen--Relationships and morphology of the Embiotocidae	*Brogan--Near-reef distributional patterns of fish larvae in the Sea of Cortez
10:00	Castro--Biology of finetooth shark	Ross--Reproductive behavior and habitat of the bayou darter	Sanderson--Functional ecology in labrids	Paperno--*Lagodon rhomboides* and *Archosargus probatocephalus* in oligotrophic waters
10:15	Capape--Reproductive biology of the butterfly ray	Edwards--*Gambusia georgei*, the San Marcos gambusia	Westneat--Three locomotor modes in labrid fishes	*Hanna--Tidepool selection in the bald sculpin
10:30	**BREAK**	**BREAK**	**BREAK**	**BREAK**
10:45	Schmid--Reproductive biology of bamboo sharks	Hendrickson--Razorback sucker and Colorado squawfish reintroductions in Arizona	Galis--Morphological constraints in *Haplochromis piceatus*	Parrish--Predator interactions with flat-iron herring schools
11:00	*King--Population trends in a central California estuary	White, R.--Life history and status of the Warner sucker	Leis--Ontogeny of marine labroids	*Levin--Variation in recruitment of a Gulf of Maine labrid
11:15	Heine--Mechanics of flapping ray locomotion	Abarca--Sonoran topminnow and desert pupfish status	Lobel--Sounds produced by labroid fishes	Clark, A.--Food habitats of juvenile cunner
11:30		Burr--A new threatened shiner from Alabama and Kentucky	Kornfield--Selection on bowers in a Malawi cichlid	Armstrong--Use of a salt marsh creeks
11:45		*Foster--Movement of Gulf sturgeon in the Suwannee River, Florida	Rossiter--Mating tactics in a Tanganyikan cichlid	*Rountree--Salt marsh creek community structure
12:00	**LUNCH**	**LUNCH**	**LUNCH**	**LUNCH**

10:00-16:00 Poster Session II, Gallery 77

ABBREVIATED PROGRAM--TUESDAY AFTERNOON 18 JUNE

TIME	AES OPEN SLIDE SHOW AND DISCUSSION PERIOD: Room: Blum Theater.	SESSION 19: ASIH Biodiversity Symposium. Ecosystems and Faunas as Units of Conservation. Chair: Williams. Room: Kaufmann Theater.	SESSION 20. ASIH Symposium. Labroid Evolution III. Chair: Stiassny. Room: Linder Theater.	SESSION 21: Ecology of Fishes II. Chair: J. Nelson. Room: People Center.
13:00	AES OPEN SLIDE SHOW	Meffe--Community perspectives in fish conservation	Yanagisawa--Behavior diversity in Tanganyikan mouthbrooders	Szedlmayer--Telemetry of summer flounder
13:15		Fitzsimons--Hawaiian freshwater fishes	Goldschmidt--Lake Victoria haplochromine egg mimics	*Smith, K.--Influence of vegetation on salt-marsh fish distribution
13:30	cont'd	Buxton--Littoral reef ichthyofauna off eastern South Africa	*Gashagaza--Breeding habit diversity in lamprologine cichlids	Breitburg--Naked goby settlement behavior and patterns
13:45		Contreras--Freshwater fish diversity in northern Mexico	Sato--Mating system evolution of Tanganyikan shell-brooding cichlids	Monteiro-Neto--Chesapeake Bight surf-zone community structure
14:00	cont'd	Almada-Villela--Mexican marine fishes	Hori--Laterality of a Lake Tanganyika scale-eating cichlid	Potts--Factors influencing fish aggregations in Onslow Bay, North Carolina
14:15		Chao--Diversity of the ornamental fishes of the Rio Negro, Brazil	Kohda--Foraging specializations of a piscivorus Tanganyikan cichlid	Sosebee--Life history of the Atlantic silverside
14:30	cont'd	**BREAK**	**BREAK**	**BREAK**
14:45		Weitzman--Status of the fishes of the Brazilian eastern forest		Johnson--Role of habitat on abundance in a Florida estuary
15:00	cont'd	Taphorn--Venezuela fish fauna conservation		Rydene--Habitat utilization in seagrass beds in Tampa Bay, Florida
15:15		Honegger--Maintaining Switzerland's herpetological biodiversity		Vose--Flow restoration to a mangrove-rimmed habitat
15:30	cont'd	Moll--New World turtle biodiversity		Luczkovich--Prey size and selection by juvenile snook
15:45		Klemens--Amphibian and reptile status in Connecticut		*Bennett--Resource partitioning of two fish ectoparasites
16:00	AES OPEN SLIDE SHOW ENDS	Peden--Lower aquatic vertebrates in the Columbia Basin of Canada		
16:15		Berry--Using flagship species to protect ecosystems		

16:15 Alternate time for group photograph if Sunday rained out, 77th St. steps

18:00-22:00 NYZS Picnic at Central Park Zoo

TIME	SESSION 22: Functional Morphology. Chair: Westneat. Room: Blum Theater.	SESSION 23: Systematics of Fishes III. Chair: Ferraris. Room: Kaufmann Theater.	SESSION 24: ASIH Biodiversity Symposium. Patterns of Endemism and Diversity. Chair: Almada-Villela. Room: Linder Theater.	SESSION 25: Faunistics and Ecology of Fishes. Chair: Brown. Room: People Center.
9:00		Chapleau--Phylogeny of Pleuronectiformes	Kiester--Biogeographical perspective on turtle conservation	Matthews--Fish faunal regions in the U.S.
9:15	Long--Why vertebrae?	*Klassen--Phylogeny of Ostraciinae	Green--Frogs on mountain tops	Warren--Hierarchical classification of Kentucky and Tennessee drainages
9:30	*Wu--Suction feeding in elasmobranchs	Collette--Shallow water fishes of the West Wind Drift Islands	Flores-Villela--Mexican herpetofauna	Seegert--Comparison of electrofishing and seining
9:45	Brainerd--Recoil aspiration in *Polypterus*	Lea--Fishes of Isla San Benito, Mexico	Bauer--Reptiles of New Caledonia	Cavender--Monitoring Ohio River fishes
10:00	Sanderson--Buccal flow in filter-feeding fishes	Das--Revision of *Bembrops*	Price--Texas as a center of biodiversity	Cerri--Biological vs physical control of fish populations
10:15	Richard--Ontogeny of trophic morphology in sunfishes	Poss--Review of *Neocentropogon*	Angermeier--Fish diversity in Virginia	Raesly--Status of the Maryland darter
10:30	**BREAK**	**BREAK**	**BREAK**	**BREAK**
10:45	Reilly--Feeding mechnisms in salamanders	Baldwin--Relationships of *Jeboehlkia gladifer* (Serranidae)	Du-Bouchet--Freshwater fishes of Cuba	Grossman--Effects of drought on fish assemblage in North Carolina
11:00	Wainwright--Feeding kinematics in *Chamaeleo*	Hartel--Revision of *Foetorepus* (Callionymidae)	Varela-Romero--Freshwater fishes of Sonora, Mexico	Clark, S.--Parasitism in eastern mosquitofish
11:15		Gill--Systematics of xenisthmid fishes (Gobioidei)	Reinthal--Freshwater fishes of Madagascar	*O'Bara--Ecology and behavior of the blackside dace
11:30		Poss--ASIH fish collection survey	Bart--Regional influences on stream fish diversity	Stiles--Ontogenetic changes in activity and retina of greenside darter
11:45			Thomson--Endemic fishes of the Gulf of California	Groves--Spawning habitat of fantail darter
12:00	**LUNCH**	**LUNCH**	**LUNCH**	**LUNCH**

10:00-16:00 Poster Session III, Gallery 77

TIME	SESSION 26: Systematics of Amphibians and Reptiles. Chair: Ford. Room: Blum Theater.	SESSION 27:. Ecology of Fishes III. Chair: Parenti. Room: Kaufmann Theater.	SESSION 28. ASIH Biodiversity Symposium. Foundations of Conservation: Population and Community Biology. Chair: Platania. Room: Linder Theater.	SESSION 29. Genetics, Anatomy and Morphology of Fishes, Amphibians, and Reptiles. Chair: G. Dingerkus. Room: People Center.
13:00		Bortone--Life history of the blackmouth shiner		*Reiss--Palatal metamorphosis in primitive caecilians
13:15	*Kaiser--Morphometrics of Antillian *Eleutherodactylus*	Hoover--Foods of coastal and sailfin shiners	Williams--Decline of anadromous salmonids on the west coast of the U.S.	Mable--Developmental abnormalities in triploid hybrid treefrogs
13:30	Schindlinger--Genetic variation in *Bufo americanus*	Trexler--Temporal changes in a freshwater larval fish assemblage	McDowall--Problems in the conservation of diadromous fishes	Hayes--Sexual size dimorphism in the African Bullfrog
13:45	*Zeyl--DNA sequence from *Leiopelma hochstetteri*	Killgore--Habitat use by the ironcolor shiner	Carter--Belize barrier reef ecosystem	Dohm--Quantitative genetics in scale counts in *Thamnophis sirtalis*
14:00	*Titus--Phylogenetic analysis of desmognathine salamanders	Douglas, N.--Changes in abundance in the Tensas River, Louisiana	Nakamura--Pacific hagfishes of central California	*LaDuke--Positional homology of vertebrae in garter snakes
14:15	Lowcock--Use of genome size in phylogenetics of urodeles	Taylor--Darter/sculpin interactions		
14:30	**BREAK**	**BREAK**	**BREAK**	**BREAK**
14:45	Perez-Beato--A new anole from Cuba	Pyron--Fish assemblage structure in McCurtain County, Oklahoma	Kiester--Sex ratio dynamics of *Terrapene carolina triunguis*	Bornbusch--Fine structure and ontogeny of engraulid gill rakers
15:00	Griffith--Convergent evolution of elongation in *Eumeces* species	Bouma--Environmental control of growth and ontogeny in the Pecos pupfish	Dodd--Temporary pond herpetofauna	Blum--Swim bladder-lateral line connection in butterflyfish
15:15	*Harvey--Scale surfaces in xenosaurid lizards	Marsh--Embryo size variation in *Gambusia geiseri*	Mushinsky--Rarity of amphibians and reptiles in Florida scrub	Rajaguru--Anomalies in flatfish
15:30	*Pinou--Microdermatoglyphics vs biochemistry in *Opheodrys*	Stouder--Behavioral and dietary shifts in a benthic stream fish	Frazer--Life table of *Kinosternon subrubrum*	
15:45	Dowling, H.--Partition of the snake family Colubridae	Lonzarich--Seasonal changes in community structure in Washington	Pague--Distribution, habitat, and population size of *Plethodon*	
16:00		Nelson, J.--Reproductive cycle and fecundity of *Gambusia affinis*		
16:15		Berra--Reproductive isolation of *Notropis cornutus* and *N. chrysocephalus*		

16:30-18:00 ASIH Business meeting, Kaufmann Theater
19:30-21:00 Public Forum and Press Conference, Kaufmann Theater
19:30-21:00 Neotropical Ichthyological Association, Linder Theater

TIME	SESSION 30. Systematics of Fishes IV. Chair: C. Rodriguez. Room: Kaufmann Theater.	SESSION 31. ASIH Biodiversity Symposium. Conservation Genetics. Chair: Buth. Room: Linder Theater.	SESSION 32. Sex, Behavior, and Reproduction in Fishes. Chair: Moller. Room: People Center.
9:00	Lydeard--MtDNA phylogenetics of *Gambusia*	Cole, C.J.--Cryptic teiid lizards in South America	*Basolo--Fisherian sex-ratio evolution
9:15	Kallman--Muzquiz platyfish pigment pattern genetics	Meyer--MtDNA variation in Lake Victoria cichlid fishes	Cole, K.--Does spawning success = reproductive success in a damselfish?
9:30	Thompson, K.--Karyotype of *Lepomis punctatus*	Smith, M.H.--Genetic diversity of fish communities	Itzkowitz--Damselfish male variation
9:45	Thompson, B.--Darters of the subgenus *Percina*	Vrijenhoek--Genotypic diversity and fitness in desert fish populations	*Sang--Reproductive biology of the gulper shark
10:00	*Shaw--Phylogenetics of *Nothonotus* and *Etheostoma*	Vrijenhoek--Gila topminnow recovery program	*Asoh--Gonadal differentiation in the fairy basslet
10:15	Wood--Systematics of the *Etheostoma jordani* complex	Quattro--Conservation genetics of endangered fish populations	Shapiro--A new interpretation of protandric hermaphroditism
10:30	**BREAK**	**BREAK**	**BREAK**
10:45	Layman--Description of a new darter from Tennessee	dilorio--*Poeciliopsis* heat shock proteins	Dawley--Low clonal diversity among unisexual killifishes
11:00	Ceas--Evolution within the *Etheostoma squamiceps* complex	White, C.--*Poeciliopsis* heat shock proteins	Schultz--Do early-born dwarf perch mate more?
11:15	Dowling, T.--MtDNA analysis of populations of *Notropis rubellus*	Leberg--Demographic bottlenecks	Schroeder--Reproductive failure of behaviorally dominant males
11:30	LeGrande--Chromosomal and allozymic variation in the elegant madtom	Haglund--Threespine stickleback genetics	*Coleman--Fanning: Parental investment behavior
11:45		Berg--Conservation genetics and refugia design	Yan--Method for measuring acoustic sensitivity
12:00	**LUNCH**	**LUNCH**	**LUNCH**

TIME	SESSION 33: Herpetological Ecology and Behavior. Chair: Donnelly. Room: Kaufmann Theater.	SESSION 34. Systematics and Genetics of Fishes. Chair: J. Lundberg. Room: Linder Theater.
13:00		Petry--Central Amazon ichthyoplankton
13:15	Kupferburg--Resource importance to larval anurans	Flecker--Neotropical stream trophic guilds
13:30	Collins--Disease as a factor limiting cannibalism in *Ambystoma tigrinum*	Stewart--Dwarf pimelodid catfishes
13:45	*McAlpine--Temporal changes in genetic variation in *Hyla cinerea*	Gobalet--Colorado River fishes of Lake Cahuilla
14:00	*Secor--Activity energetics of *Crotalus cerastes*	Douglas, M.--Morphometrics of three species of Colorado River *Gila*
14:15	*Nelson--Aquatic foraging success in *Thamnophis sirtalis*	Weeks--Fitness in *Poeciliopsis*
14:30	**BREAK**	**BREAK**
14:45	Barry--Multiple paternity in water snakes, *Nerodia sipedon*	*Rodriguez, C.--Phylogenetics of *Limia*
15:00	*Reese--Competition for perches by *Sceloporus occidentalis*	Rodriguez, L.--Phylogenetic position of the Cuban fish, *Girardinus creolus*
15:15	*St. Clair--Growth in the painted turtle, *Chrysemys picta*	Smith, M.--Faunal composition and biogeography in the West Indies
15:30		

18:00-22:00 ASIH Banquet, Hall of Ocean Life