

SAVING FRESHWATER FISHES AND HABITATS

Newsletter of the IUCN SSC/WI Freshwater Fish Specialist Group

Issue 10 • December 2015



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- Tracking Freshwater Fishes
- Crowd based conservation
- Saving the European eel
- IUCN-SSC Leaders Meeting
- And Much More!!!



Wetlands
INTERNATIONAL

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Medalist (see p. 8), collecting
torrentfish, *Cheimarrichthys*
fosteri at Kaiaua, New Zealand.

FFSG UPDATE

Message from the FFSG Global Chair

Dr. Richard Sneider



As we approach the end of 2015 I would like to thank all the members of the IUCN-SSC/Wetlands International Freshwater Fish Specialist Group (FFSG) for their support for the FFSG through another year. It has been a good year – and the successes and outputs of the FFSG will, of course, be summarized in the 2015 annual report.

This year has not been without some challenges, but we are meeting them resolutely. We are still looking for financial support for our Programme Officer, and will continue to work on that as a priority. I am sure you will have noticed our website (www.iucnffsg.org) was not accessible for a couple of months. This was due to the website being compromised by a cyber-attack, which meant that Chester Zoo, which has been hosting the web site for us, could no longer keep it open. I especially want to take this opportunity to express my sincere thanks to Chester Zoo for their generous help to us since late 2013 when Gordon McGregor Reid retired as the former Global Chair of FFSG. Chester Zoo was under no obligation to continue to support the website, but very kindly agreed to, for almost two years while we looked for another host. We, as a group, are deeply indebted to them for their help and patience, and especially to Martin King, their Head of IT.

Project Piaba (<http://projectpiaba.org/>) and New England Aquarium (<http://www.neaq.org/>) have agreed to take over the role of hosting the website, and we are exceptionally grateful to them, and especially Deb Joyce and FFSG Steering Committee member Scott Dowd for arranging this. I am delighted to say that the website is now back up. Following the cyber-attack, a lot of work had to be done, locating archive files and checking files for viruses, by Ian Harrison, Deb Joyce, and with help kindly provided by Alex Mauroner. The staff at the South African Institute for Aquatic Biodiversity (<http://www.saiab.ac.za/>) also very kindly offered to help as we rebuilt the website, and provided advice in retrieving archived files; we are especially grateful to FFSG Regional Chair Olaf Weyl and to SAIAB Senior Librarian Sally Schramm. The FFSG FaceBook site (<https://www.facebook.com/FreshwaterFishSpecialistGroup/>) proved to be an essential resource for sharing news and information while the website was down, and I encourage you all to continue to monitor and use the FaceBook site.

As you can imagine, all of this has slowed us down in the FFSG Secretariat and, as a consequence, we skipped the autumn issue of *Saving Freshwater Fishes and Habitat* this year. We apologize for this, but we expect to be back on track with the regular quarterly production in 2016. Once again, many thanks to the South African Institute for Aquatic Biodiversity for assisting with the preparation of the newsletter, especially Ann Wu, intern with Olaf Weyl at SAIAB.

One reason why we missed the last newsletter was because we were busy following up with outputs from the IUCN SSC Leaders' Meeting, held at Abu Dhabi from September 12 to 18. This is always an important meeting, held every four years as we approach the end of each quadrennium for IUCN. It is an opportunity for the various Specialist Groups, Subcommittees, and Red List Authorities to meet, review work over the previous four years, and plan forwards for the next four. If you have not already looked at the 2014 Annual Report of

IUCN's SSC and Global Species Programme, to get an idea of the diversity of expertise and enormous amount of work that we all do, as members of SSC, then I encourage you to do so. The report is available at: <https://portals.iucn.org/library/node/45591>.

I also recommend that you read the final version of the Declaration from the SSC Leaders' Meeting in Abu Dhabi, which can be found at: http://cmsdata.iucn.org/downloads/3rd_ssc_leaders_meeting_in_abu_dhabi_declaration.pdf.



Participants at the 2015 IUCN Leaders' Meeting, Abu Dhabi, assembled on the staircase of the Ritz Carlton Hotel.

The Leaders' Meeting was also an opportunity for SSC members to express our gratitude to Simon Stuart, for leading us as the SSC Chair through two, highly successful and productive, four-year terms, which will end in September 2016 when he must stand down (SSC Chairs can only hold office for two consecutive terms). The meeting this year was a very busy one, covering a lot of ground. Simon Stuart said "it was one of the most useful and inspiring meetings I have attended during my 30 years with SSC. We remain hugely grateful to our friends in Environment Agency - Abu Dhabi, without whom the meeting could never have taken place." The discussions at the meeting included extensive and detailed discussion on freshwater topics. Some of us from the FFSG were present at the meeting, and we identified several priorities for freshwater projects and goals for the next quadrennium (2016-2020). These are discussed in more detail on pages 45-55.

Importantly, at the SSC Leaders' Meeting it was decided that the Anguillid Eel Specialist Subgroup should stand as its own Specialist Group, rather than a Subgroup of FFSG. I discuss this further on page 6, and here I

give my hearty congratulations to Matt Gollock, chair of the subgroup, for doing such an excellent job in leading it to this new point. Though we are now separate Specialist Groups, I know we have a long and profitable relationship, of continued close collaboration, ahead of us. I should also like to take this opportunity to congratulate our FFSG Technical Officer, Ian Harrison, on receiving the SSC Chair's Citation of Excellence at the meeting in Abu Dhabi (see also page 9). Similarly, I congratulate Rachel Roberts, the SSC Network Coordinator for also receiving a Citation of Excellence. The work of the FFSG Secretariat would be impossible without the expertise, patience, and unfailing good spirits of Rachel to guide us.

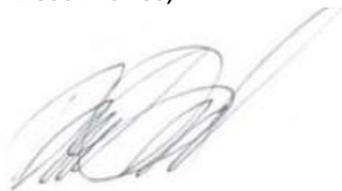
This autumn I have also had the opportunity to present the work of FFSG to colleagues at a meeting of The Explorers' Club in New York, and at a Board meeting of the National Geographic Society in Yucatan, Mexico. We have some strong potential for future collaboration. I have also been fortunate enough to continue to collaborate with several people on IUCN's media presentations on extinction. The 2014 Living Planet Report published by WWF

(see http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/living_planet_index2/)

confirmed that there are much higher levels of decline in freshwater species relative to terrestrial and marine ones; hence the crisis of extinction is especially urgent for freshwater biodiversity.

Indeed, this issue of the FFSG newsletter covers an interesting mix of points that focus on the challenges of conserving freshwater habitats, and the species that live in them, through *in situ* and *ex situ* approaches that also make the most of citizen science. We have a wealth of highly motivated and competent citizen scientists available among the global public who can help us achieve our goals, as discussed by Jörg Freyhof in his article on aquarium breeding of a the threatened killifish *Aphanius apodus* (page 23); we should make the most of this capacity. The articles in this issue cover projects in Europe, North America, Africa, Asia, and include reports back from two important meetings that occurred this year in which members of SSC were involved (the IUCN Leaders' Meeting and the Fish Passage conference). I am sure you will enjoy reading them.

Best wishes,



Richard Sneider
FFSG Global Chair

Anguillid Eel Specialist Group – update

Richard Sneider

FFSG Global Chair

I am happy to report that the former Anguillid Eel Specialist Subgroup has now been formally assigned as its own Specialist Group – the Anguillid Eel Specialist Group (AESG)

<http://www.zsl.org/conservation/species/fish-and-invertebrates/eel-conservation/iucn-anguillid-eel-specialist-group>

Under the leadership of Dr. Matt Gollock, the Anguillid Eel subgroup has always been a very active and productive part of FFSG. The group has functioned self-reliantly and effectively – essentially comparable to the Sturgeon Specialist Group and the Salmon Specialist Group – for as long as I have been Chair of FFSG; therefore it seemed quite logical that the Group should have its own independence. This is particularly important because the Anguillid Eel group deals with some very specific issues on policy, fishing regulation, etc. where it will be useful for the group to have the autonomy to make eel-specific decisions and statements that do not have to be issued as an FFSG statement. The SSC Steering Committee has supported this decision to make the group its own Specialist Group, also noting that TRAFFIC (www.traffic.org) – the wildlife trade monitoring network – is actively working on eel trade issues and there would be great added value from formation of a dedicated Specialist Group.



Matt Gollock hold a chocolate covered bread eel at the 2014anguillid eel assessment workshop in Japan.

But I also look forward to a continued and very close relationship between FFSG and AESG. We are close sister groups who can support each other, with the AESG focused on their specific work but collaborating with FFSG to identify how their work fits into the larger picture of overall freshwater fish projects. This is comparable to the relationship we already have with the Salmon Specialist Group. I look forward to the continued, energetic contributions from Matt and his team to our work and our outputs, and we will continue to feature this work in our newsletter and via our website.

FFSG Welcomes A New Regional Chair

Ian Harrison

FFSG Technical Officer

Continuing our effort to support activity at the regional level, the FFSG has undergone some further revision of its regional leadership. As previously noted in our March 2015 newsletter, the south-east Asia region is split into an Indo-Burma hotspot area, but which includes Peninsula Malaysia, and is covered by co-chairs Dr. Chavalit Vidthayanon and Dr. Amirrudin Ahmad; and the Sundaland/Philippines region that includes the large islands of Borneo, Java, and Sumatra as well as their surrounding islands, and the Philippines, which will be covered by our new regional chair Dr. Tan Heok Hui.

We welcome Tan Heok Hui as a new FFSG regional Chair; he is based at Lee Kong Chian Natural History Museum, which is part of the Faculty of Science of the National University of Singapore. He has already contributed to the work of FFSG in Sampled Red List assessments, and the development of the guidelines for photographing fishes, that are provided on the Global Freshwater Fish BioBlitz website (<http://www.inaturalist.org/projects/global-freshwater-fish-bioblitz>). He also has plans to develop assessments of freshwater fishes for the Sunda region.



Dr. Tan Heok Hui

FFSG Steering Committee Member David Cooper wins Assisi Award

Richard Sneider

FFSG Global Chair

On October 4, 2015 FFSG Steering Committee member, David Cooper, was awarded the Assisi Medal by the New Zealand Companion Animal Council (NZCAC). The NZCAC is an umbrella organisation for animal welfare groups in New Zealand. The medal, named in honour of St Francis of Assisi, the Patron Saint of Animals, is in recognition of outstanding service to animals. It is awarded to individuals who have contributed to the welfare of animals, whether in New Zealand or on the International scene (<http://www.nzcac.org.nz/nzcac/assisi-awards/about-the-awards>).

David was awarded the medal for work in the area of ornamental fish and in freshwater fish conservation and in particular conservation of New Zealand native freshwater fishes. David has spent a lifetime working in fish related roles. He is currently Special Projects Manager and Aquatics Tutor with the Mahurangi Technical Institute in New Zealand. He has been working closely with Scott Dowd in the development of the Home Aquarium Fish Subgroup of FFSG.



This is the first time this award has ever been made to a fish specialist, and the first ever to mention the word “conservation”. This is particularly pleasing to David given his oft repeated mantra that “conservation is simply animal welfare on a grand scale”.



David Cooper (right) and Dr. Arnja Dale (NZCAC Chair) during Assisi Medal award ceremony

Ian Harrison receives SSC Chair's Citation of Excellence

Richard Sneider

FFSG Global Chair

I am delighted to report that on September 18, 2015 our FFSG Technical Officer, Ian Harrison, was awarded the IUCN SSC Chairs Citation of Excellence at the SSC Leaders' Meeting in Abu Dhabi. Ian was given this award "in recognition of his dedicated and strategic contributions to SSC's work on freshwater biodiversity, and especially to the Freshwater Fish Specialist Group and the Freshwater Conservation Sub-Committee."

This is well deserved. Also, as Ian mentioned to some colleagues when he received this award, this is as much a reflection of enormously strong and collaborative team we have in FFSG, as it is a reflection of the work that Ian does himself.



Ian Harrison celebrating his award in Abu Dhabi with Topis Contreras MacBeath (Chair of the Freshwater Conservation Subcommittee; on left) and Will Darwall (Head of the IUCN Freshwater Biodiversity Unit; on right).

Workshop on ‘*The next generation of biodiversity research: theory, traits and methods*’: presentation of the Blueprint for Freshwater Life

Will Darwall¹ and Ian Harrison²

¹ Manager, IUCN Freshwater Biodiversity Unit

² FFSG Technical Officer

Colleagues from the FFSG and IUCN-SSC’s Freshwater Conservation Subcommittee have, for some time, been planning a new project, the *Blueprint for Freshwater Life*.

The objective of this project is to:

- Raise global awareness of the issues of freshwater biodiversity and its conservation
- Consolidate the existing body of work on freshwater biodiversity
- Create a global voice for freshwater biodiversity conservation
- Secure major funding to fill information gaps, conduct new research, and create a sustainable future for freshwater biodiversity.

Our intention is to adapt the model of the Census of Marine Life.

Jonathan Jeschke and Hans Peter Grossart , who oversee the cross cutting research domain "Aquatic Biodiversity" at the Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB) in Berlin, Germany organized a workshop “The next generation of biodiversity research: theory, traits and methods” on October 7-9, 2015. Will Darwall (IUCN Freshwater Biodiversity Unit) was invited to present the project at that meeting. The concept for the project was well received by the staff of IGB, who have offered to collaborate on the project, starting with their very generous support for holding a workshop in early 2016 to formalize the materials we need on the project in order to take it to prospective donors. Several of the IGB staff have also offered to develop a draft manuscript, in collaboration with our IUCN colleagues who are already involved in the project, describing the objectives of the project.



*Will Darwall (seated in front of flipchart) at the IGB workshop
(photo by Laura Tydecks, IGB)*

NEWS FROM AROUND THE WORLD

Launch of FishMAP - A new citizen science initiative in Africa.

Olaf Weyl

South African Institute for Aquatic Biodiversity

Data on the distributions of fishes are important for their conservation because such data can be used to identify areas of conservation concern or identify threats, such as invasions by alien fishes. In Southern Africa, data on fish distributions are either not available or, if available, they are often temporally or spatially disjunct. The primary causes for this are the small number of people formally employed to undertake such surveys, high costs of undertaking surveys, and limited funding opportunities. In this regard, involving everyday citizens in the collection of distributions data presents exciting possibilities.

FishMAP is the newest project of the Animal Demography Unit (ADU) at the University of Cape Town which has been capturing distribution data for birds, mammals, reptiles, frogs, Odonata (dragonflies and damselflies), lacewings, Lepidoptera (butterflies and moths), scorpions, spiders, mushrooms, orchids and trees. FishMAP is a collaborative project and current partners include the ADU, South African Institute for Aquatic Biodiversity, and the National Museums of Kenya.

FishMAP is one of the “Virtual Museum” projects run by ADU and works on the very simple method of capturing the fish on camera. The exact location of the photograph is also recorded whether by GPS in the camera, from a tablet or GPS device or by using Google maps at the time of uploading the record to the museum. FishMAP will work like all of ADU’s Projects and capture all of the historic information into the system alongside the current records submitted to the virtual museum. A key element of ADU’s toolset is to bring the fourth dimension of time to science and distribution mapping. Capturing the historic data and adding the current records provides an ongoing view over the time period from the earliest studies through to the latest view of what is where.



FishMAP record 90: D. Kennedy

Record 90. Nembwe Serranochromis robustus from Botswana

Most importantly for all sides of the debate is that the ADU maintains an independent and unbiased view of the data which its Observers provide and turns the data into knowledge through the mapping and statistical tools at its disposal for all its projects. Furthermore, ADU subscribes to the “Creative Commons” rule that all knowledge is freely available to the world for educational, environmental, conservation and policy decisions.

To be successful, FishMAP will require expert advice regarding fish identifications and the coordinating team is looking for regional volunteers. To learn more about this exciting new initiative, and to get involved, visit www.adu.org.za; visit the FishMAP Facebook page at <https://www.facebook.com/groups/FishMAP.Africa/> or contact Jeremy Shelton jemjem@gmail.com – FishMAP Project coordinator.

Postscript from Ian Harrison (FFSG Technical Officer): This is an excellent project and FFSG will explore how to link FishMAP with the FFSG’s Global Freshwater Fish BioBlitz project that is run through iNaturalist.
<http://www.inaturalist.org/projects/global-freshwater-fish-bioblitz>

***Mastacembelus armatus*: An excellent freshwater fish is under threat.**

Prof. Jyotirmoy Shankar Deb

Faculty of Zoology, Barasat College, Kolkata, India



Image : www.fishbase.org

Mastacembelus armatus (Lacepède 1800), a member of Order Synbranchiformes and Family Mastacembelidae, is a ray-finned, snake-like freshwater eel fish, found in the riverine habitats of India, Bangladesh, Pakistan, Nepal, Indonesia, Thailand, Sri Lanka, Vietnam, Sumatra and other parts of South-East Asia. It is also found in the canals, lakes, ponds, ditches and other such water bodies with fresh and brackish water habitats. It is also known as zig-zag eel, leopard spiny eel, spiny eel, white-spotted spiny eel. Locally, it is known as bami, baam, etc. This is an aquarium fish too. It is also in high demand in the local markets due to its very delicious taste.

More than 50 years ago, it was very common in the rivers and streams of the specified areas. They were plentiful in the local markets. Although ranked globally as 'Least Concern' according to the last IUCN Red List assessment made in 2009, gradually their numbers are declining in some regions, such as West Bengal. Their presence is almost zero in some markets. Specially, after the blue revolution in some countries, they have tended to disappear from some local markets due to the increasing importance of carp fishes that can be aquaculture. The induced breeding of *M. armatus* has not yet been successful, and their culture has not been possible until now. They are rare in some areas due to destruction of their natural habitat, disturbances during natural breeding, as well as overexploitation of fish species in the rivers and streams. Their natural food sources are also disrupted due to repeated anthropogenic activities in their habitats. Still, they are found in some areas, not regularly but occasionally. This species is considered to be threatened in West Bengal and Bangladesh according to the fishermen and local people. The Bangladesh Government has declared it as an Endangered species and is trying to breed it artificially.

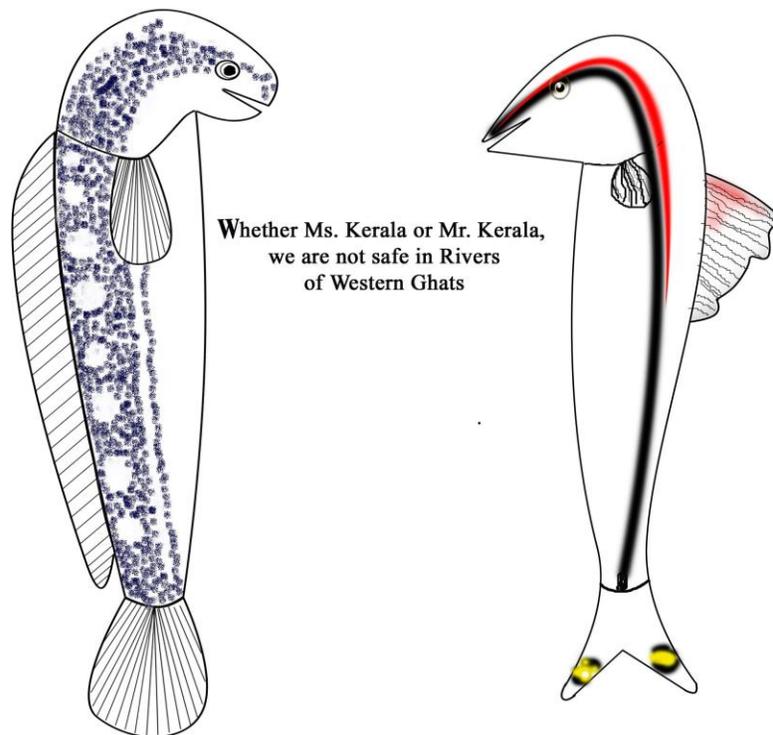
Acknowledgements :

CIFRI(Govt. of India.), Barrackpore, Kolkata – 700120; Department of Fisheries, Govt. of West Bengal; Howrah Fish Merchants' Association, Howrah – 711101; Barasat Fish merchants' Association, Barasat, Kolkata - 700124

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Many thanks also to FFSG member Sajan Sajeevan for submitting a small cartoon (below) to remind us of the threats to fishes of the Western Ghats, including *Channa diplogramme* (listed as Vulnerable in the IUCN Red List) and *Sahyadria denisonii* (listed as Endangered).



“Destroying the forests that are the source of these rivers in the Western Ghats could turn peninsular India into a desert!!!!”

Mr Kerala- *Channa diplograma* (Day 1865) Miss Kerala- *Sahyadria denisonii* (Day 1865)

Tracking freshwater fishes to improve restoration science.

Jill L. Brooks and Andrew M. Rous

Fish Ecology and Conservation Physiology Lab, Carleton University, Ottawa, ON, Canada.

Wetlands provide important functions such as generating critical habitat for valued wildlife, buffering coastlines, transforming excess nutrients, and the stilling of turbid waters by aquatic and emergent vegetation. Indeed, they are vital to the health of an aquatic ecosystem. In the Laurentian Great Lakes, it is estimated that over 70% of wetlands are no longer accessible as fish habitat. As such, local conservation organizations have been engaged in a variety of habitat restoration activities. Monitoring the success of these projects usually involves assessing the biodiversity or the ecosystem services of the “restored” habitat. Surveying the fish biodiversity of a habitat traditionally involves using non-selective fishing methods, such as electro fishing and trap netting. These methods are useful for comparing trends in annual/seasonal catch, species richness, and abundance at standardized locations. There are limits to these methods, however. They are seasonally and weather restricted, labor intensive, and only capture the biodiversity at a particular location at a single point in time.

The functionality of a habitat is also an important consideration during the assessment process. Do fishes use the area for foraging, spawning, nursery, and/or refuge sites? Observing the year-round behaviour of fishes to see how they are using restored habitats is essential. Traditionally, biotelemetry has benefitted restoration projects by providing information regarding habitat preferences of various species of fishes but, until recently, has rarely been used in post-restoration validation monitoring. In freshwater systems, acoustic telemetry is one of the most common forms of biotelemetry. It can provide information as to whether the fishes are actually using the restored habitat more frequently than before and which habitats, depths, and temperatures are preferred by the tagged species. The combination of biotelemetry and traditional biodiversity surveying methods could prove an ideal approach to assessing the success of restoration projects.

Over the past five years, two ongoing projects in the western end of Lake Ontario have used acoustic telemetry to evaluate the effectiveness of habitat restoration and improve our understanding of habitat science and management. Here we briefly summarize those two projects using a case study approach. The research described here involves a multi-partner team of academics, government scientists, and habitat managers.



Figure 1: A map illustrating the locations of the acoustic receivers in Toronto Harbour

Case Study: Toronto Harbour, Lake Ontario, Canada.

Historically, the Toronto waterfront was a large interconnected wetland complex, dominated by marsh, spanning over 6km². Over the last two centuries, nearly all has been lost to port expansion and urban development. The International Joint Commission listed the Toronto Harbour as an Area Of Concern (AOC) in 1979. As part of the Remedial Action Plan (RAP) to restore fish and wildlife habitat, restoration and creation projects have been occurring for decades. Current research aims to determine how fishes respond to these restored habitats to assess the effectiveness of these ongoing actions and to inform the design of future projects slated for additional areas in the Toronto Harbour. To monitor the movement and behaviour of fishes in these habitats, an acoustic telemetry array composed of 85 receivers was deployed in 2011 and over 320 fishes have been tagged and released with acoustic transmitters (See Figures 1-3). We are tracking the habitat use patterns of northern pike (*Esox lucius*), largemouth bass (*Micropterus salmoides*), common carp (*Cyprinus carpio*), yellow perch (*Perca flavescens*), bowfin (*Amia calva*), white sucker (*Catostomus commersonii*), and walleye (*Sander vitreus*).

Preliminary results of this research have revealed several hotspots of habitat use within the Toronto Harbour. Generally, fishes spend a high proportion of their time in the network of channels in the Toronto Islands, as well as, the cells and embayments of Tommy Thompson Park (TTP). Whether in quays directly adjacent to the

downtown core of Toronto or in the cells and embayments of Tommy Thompson Park, tagged fishes are more likely to occupy areas where habitat has been restored. Some individuals make regular movements between these habitat areas (i.e., between TTP and the Toronto Islands). Furthermore, we have developed an improved understanding of the overwintering habits of these fishes which has directly informed the design of future restoration plans to include more deep-water habitat in addition to near-shore areas with high structural complexity.



Figure 2: Toronto Region Conservation Authority provides assistance with electrofishing to obtain fish for the study. Here, Toronto Harbour Project Leader Andrew Rous is surgically implanting an acoustic transmitter into the body cavity of a northern Pike (*Esox lucius*). Photo by: Jeff Dickie (dickiejeff31@gmail.com)

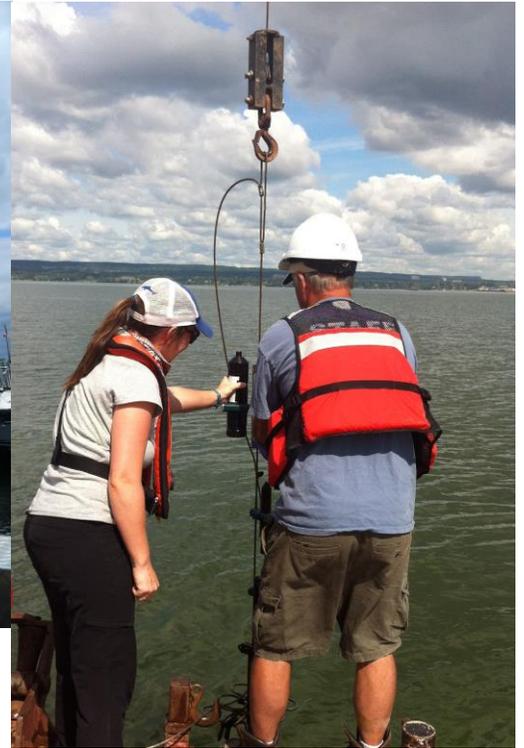


Figure 3: Hamilton Harbour project leader, Jill Brooks, attaching an acoustic receiver to a mooring cable. Photo by William Twardek

Case Study: Hamilton Harbour, Lake Ontario, Canada.

The Hamilton Harbour is a large (21km²), protected harbour at the western end of Lake Ontario. It has experienced degradation over the last 120 years as a result of industrialization and land use change. Sewage, fertilizers, and industrial pollutants flowing into the relatively small system combined with extensive physical habitat alteration has resulted in Hamilton Harbour being deemed as an Area of Concern (AOC) by the International Joint Commission.

The past 25 years since the AOC designation has seen a collaboration between government, NGOs, and members of the public in restoring the harbour to the pre-1920s conditions. These efforts have included stricter sewage treatment policies, the protection and creation of critical fish habitat, the planting of native marsh plants, the installation of the Laurentian Great Lake's first two-way fish barrier, and the reintroduction of native fish species, including walleye (*Sander vitreus*). The final stages of the Harbour's Remedial

Action Plan (RAP) are to monitor the progress of these restoration efforts to facilitate refinements necessary to meet delisting criteria. Scientists from the Department of Fisheries and Oceans and the Ontario Ministry of Natural Resources and Forestry have been conducting electrofishing and trap netting surveys since the AOC designation to monitor the nearshore fish community throughout the rehabilitation process. Preliminary studies have shown that physical and chemical remedial efforts have had a positive influence on the fish community. However, with more recent threats to the ecosystem (e.g, new invasive species and recent declines in water quality) the fish community is still impaired and dominated by non-native and pollutant-tolerant species.

To complement the nearshore sampling efforts, researchers are using passive acoustic telemetry to track the movements of the reintroduced population of walleye (Figures 4 & 5), with the plan to continue tagging fish in multiple trophic levels. Will they use the rehabilitated areas more than the degraded areas? One key question pertains to the future spawning habits of this almost sexually mature population. The lack of knowledge of previous Hamilton Harbour walleye’s spawning habits, combined with the fact that these fish are introduced from a life in aquaculture, has scientists intrigued as to potential spawning locations. Will they try to swim west through the fish gate into the large marsh area (Coote’s Paradise, see Figure 2) and find the tributaries or, will they swim east and leave the harbour to find suitable spawning habitat? Will they return to the harbour post-spawning? These questions will hopefully be answered over the next few years and will assist further rehabilitation decisions as to the habitat types that are in need of further restoration or protection.



Figure 4: The ventral incision sutured and ready for release. Photo by Jill Brooks



Figure 5: A walleye (*Sander vitreus*) about to be released back into the harbour. Note the external identifying tag with contact details. Recreational anglers are asked to inform scientists if they catch and release or harvest a tagged fish. Photo by Jill Brooks

Conservation Status and Recovery of California Coho Salmon.

Stephen Swales

Senior Environmental Scientist, Fisheries Branch, California Department of Fish and Wildlife, Sacramento, California.

<http://www.dfg.ca.gov/fish/Resources/Coho/CohoRecovery.asp>

Coho salmon (*Oncorhynchus kisutch*) are widely distributed across the North Pacific, with their geographic range extending from northern Japan, to the Kamchatka peninsula in eastern Russia, across the Bering Sea to Alaska, Canada and the Pacific Northwest. Northern California represents the southernmost extent of their natural geographic range, with populations occurring in coastal watersheds as far south as Monterey Bay, just south of San Francisco.



Fig. 1 Adult coho salmon

However, coho salmon in many of California's coastal watersheds are severely depleted, with population declines occurring throughout their range. Coho salmon in the Central California Coast Evolutionarily Significant Unit (CCC ESU) are listed as endangered under both the federal and state Endangered Species Acts, while coho in the Southern Oregon/Northern California Coast ESU (SONCC ESU) are listed as threatened (see Fig.2 for location of ESUs). CCC coho salmon was recently identified as a 'National Species in the Spotlight' by the U.S. National Oceanic and Atmospheric Administration (NOAA). This program seeks to highlight species which are most at risk of extinction and to target efforts vital for stabilizing their populations and preventing their extinction.

See: http://www.nmfs.noaa.gov/stories/2015/05/05_14_15species_in_the_spotlight.html



Fig. 2. Locations of California Coho Salmon Evolutionarily Significant Units (CCC ESU – brown, SONCC ESU green)

A recent study found that, overall, 83% of California’s freshwater fishes are extinct or at risk of extinction, with a 16% increase since 1995 and a 21% increase since 1989 (Moyle *et al.*, 2011). Many salmonid species, including coho salmon, steelhead and trout, are thought to be at particular risk of extinction (Katz *et al.*, 2012). Coho salmon are particularly vulnerable to the effects of climate change, as water temperatures increase and suitable aquatic habitat decreases (Moyle *et al.*, 2013).

The main causes of the recent population decline in coho salmon in California are thought to be related to the loss and degradation of suitable habitat for juvenile rearing and adult spawning in coastal watersheds. The large influx of Euro-American settlers into the region over the last 150 years has led to the wide-scale alterations of coastal watersheds in northern California, mainly through the effects of gold mining, intensive logging, water diversion and impoundment for water supply, hydro-power production and land development for agriculture. In recent years, population declines have been exacerbated by poor ocean conditions, which have led to low adult survival in the marine environment and low returns of adults to their natal spawning grounds. In addition, ongoing severe drought conditions have further hampered population recovery through the adverse effects of low streamflows on adult spawning success and juvenile survival.

Coho salmon have existed in California’s rivers, streams and coastal waters for millennia; archeological evidence suggests that coho salmon were abundant pre-historically in northern and central California, and have long been a valuable food and cultural resource for many coastal communities. Coho still provide an important subsistence fishery for Native Americans, both in northern California and throughout the Pacific Northwest. Following Euro-American settlement of California in the mid-19th century, coho salmon were harvested commercially in ocean and river fisheries, and later also provided a valuable sport fish for recreational fisheries.

Chinook salmon have long been the dominant species of salmon in commercial landings in California, but in some years in the mid-20th century coho salmon approached 50% of the salmon landings. The annual catch of coho salmon in California ocean and troll fisheries in the late 1960s and 1970s ranged from 100,000 to more than 650,000 fish. However, as a result of over-fishing in the oceans and rivers, combined with habitat degradation in coastal watersheds, stocks of coho salmon in the State soon began to decline, and today coho salmon have been lost from many of their historic streams and populations in many coastal watersheds are declining precipitously.

In response to these declines, the California Department Fish and Game¹ published in 2004 the *Recovery Strategy for California Coho Salmon* (CDFG 2004). The *Recovery Strategy* provides a list of recovery goals, delisting criteria, and a detailed list of range-wide and watershed-specific restoration recommendations, based on expert opinion, to achieve recovery of coho salmon populations in California's coastal watersheds.

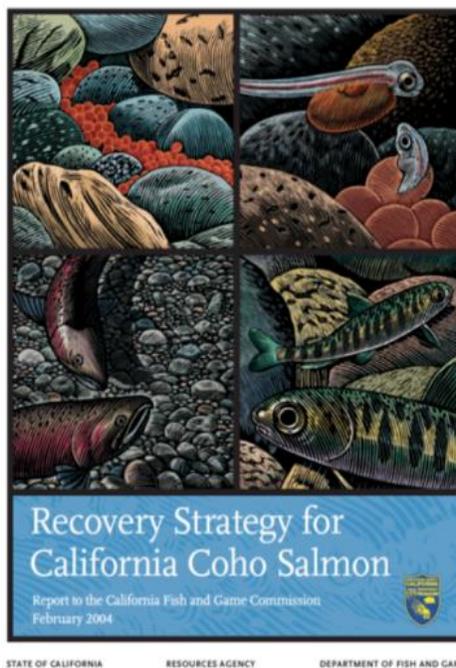


Fig. 3. CDFG Recovery Strategy for California Coho Salmon, 2004

The many recommendations in the *Recovery Strategy* include planning and regulating water supply development and water rights to ensure adequate stream flows and timing; elimination of barriers to fish passage where possible; and restoration and land management practices that improve habitat conditions. The *Recovery Strategy* also provides specific recommendations for individual watersheds and rivers, prioritizes watersheds according to restoration and management potential, and prioritizes tasks needed to achieve the goals of the strategy. Recovery of the species will also continue to rely on protecting the fish and fishery through the enforcement of laws and regulations concerning activities such as land management, forestry practices, water management, as well as sport and commercial harvest.

¹ In 2013 the California Department of Fish and Game (CDFG) was renamed California Department of Fish and Wildlife (CDFW)

The primary objective of the *Recovery Strategy* is to identify tasks that when implemented will return coho salmon to a level of sustained viability, while protecting the genetic integrity of both ESUs. The ultimate goal of the *Recovery Strategy* is to delist the species so that protection under CESA will not be necessary. A second objective of the *Recovery Strategy* is to achieve harvestable populations of coho salmon for Tribal, recreational, and commercial fisheries for the cultural and economic well-being of California. The *Recovery Strategy* states that improving coho salmon populations and habitat is the means to achieve these two objectives. Since the *Recovery Strategy* was produced in 2004, the California Department of Fish and Wildlife has progressed in funding and implementing numerous range-wide and watershed recommendations listed in the *Strategy*, focusing particularly on the restoration of suitable instream and estuarine habitat for juvenile rearing and adult spawning.

In addition to the State *Recovery Strategy*, federal recovery plans for both the SONCC and CCC coho salmon ESUs, which extend and build upon the *Recovery Strategy*, have also been prepared by the National Marine Fisheries Service (NMFS 2012, 2014). Since CCC coho salmon were initially listed as endangered under the Federal Endangered Species Act (ESA) in 1996, the population has continued to decline and the species is now very close to extinction. The federal recovery plan for CCC coho salmon is therefore considered to be largely a plan to prevent further extirpation and to provide a road map that focuses and prioritizes threat abatement and restoration actions necessary to recover, and eventually delist, the species.

It is anticipated that, when fully implemented, the combined State and Federal Recovery Plans will result in the recovery of California coho salmon, although, given the depleted state of many populations and the degraded condition of coho habitat in many of California's coastal watersheds, recovery may be measured over a time-scale of decades.

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Twenty-five years of unorganized, crowd based *ex-situ* conservation in *Aphanius apodus*.

Jörg Freyhof

Group on Earth Observations - Biodiversity Observation Network (GEO BON); German Centre for Integrative Biodiversity Research (iDiv), Leipzig, Germany.

Ex-situ conservation of freshwater fishes seems to be an easy task. Most species are simple to breed and large numbers can be produced with limited effort. Also, *ex-situ* conservation seems to be much easier and cheaper than habitat restoration or any other battle against the reasons for decline and extinction of species. While *ex-situ* conservation seems to be easy, funding supplies are usually small, genetic bottlenecks unavoidable and, in the long term, the captive population is exposed to the effects of domestication and artificial selection.

But...are the obvious problems inherent to *ex-situ* conservation reasons enough not to engage in this field and just let, knowingly, species pass to extinction? Naturally not! In fact, the most difficult issue in *ex-situ* conservation is the sheer number of species which would benefit from a captive rescue population that is well organized and monitored by professional personnel in well-funded institutions. But this ideal situation is only met for very, very few enigmatic species, such as the sturgeon *Acipenser sturio*, the pupfish *Cyprinodon diabolis* and few others.

The tellia *Aphanius apodus* is a small-sized, colourful killifish endemic to northern Algeria, where it is known from a very small area only (Area of occupancy [AOO] less than 50 km²). Following the EDGE approach (www.edgeofexistence.org), this species represents one of the most unique phylogenetic lineages within freshwaters of the Mediterranean basin and threatened with extinction (Geiger *et al.*, 2014). It was never commercially exported from Algeria, but Wolfgang Villwock, a German scientist, collected live fishes for hybridization experiments from three different populations in 1969. He has already mentioned that the habitats of the species are in bad condition. He has also mentioned that he has conducted many searches to see if there might be more than these three populations left. Villwock seems not to have given offspring to other scientists or hobbyists, so the stocks got lost. In the 1980's, there were speculations that the species might be extinct, but nobody traveled to Algeria to search for it. Only in 1990, van der Zee & Vonk reported once again about the species in Algeria. They visited all three places described by Villwock (1969), but found the species only at one place. Also, no other population was found despite intensive research. As the species co-occurred in very low numbers with millions of alien *Gambusia* in a small habitat doomed to extinction by the construction of a road, they collected 50 individuals and exported these to The Netherlands. However, in 2008, the species was found again in the same area by I. Doadrio (pers. comm).

In The Netherlands, 10 fish were given to the Dutch Killifish Association and 40 were kept by the Artis-Zoo in Amsterdam and all multiplied fast. van der Zee & Vonk (1990) aimed to establish a captive population at the

Artis-Zoo for *ex-situ* conservation. They called this “Projekt *Aphanius apodus*”, noting that they intended to negotiate with officials in Algeria for re-introduction and designation of a protected area. They also had contact with Peter Maitland from the *Fish Conservation Center* in Scotland, and with colleagues from the *Centre D’Aquacultura Experimental* in Valencia (Spain), who breed killifish for stocking.

Today, 25 years later, we have to presume that all of these plans failed and there was never any publication reporting about the success or failure of keeping the species long-term in the Artis-Zoo. Plans for activities in Algeria apparently failed, or were not followed. Also, the species is not in the stocks of the *Centre D’Aquacultura Experimental*.



***Aphanius apodus*. Photo: Jörg Freyhof**

If the species would have been dull or difficult to maintain, the efforts by van der Zee & Vonk (1990) would have yielded no success and the species, if really extinct in the wild, would have just passed away. But, fortunately, this has not been the case. Members of the Dutch Killifish Association and also the Artis-Zoo bred this species and gave offspring to virtually everybody who wanted to have them. There was never any commercial issue related to this species, fishes were usually given for free. It was often mentioned that the species is threatened or maybe even extinct in nature, which might have motivated some of the keepers. The German Killifish Association keeps track of the numbers of keepers and tries to motivate them to breed this species (and others) if the numbers of keepers decline. Similar coordination efforts are believed to be in place in other countries. However, there is no official stud-book and no official coordinating body as is the case for many endangered zoo-animals. It is difficult to be sure how many people keep the species, but there are probably no more than 20-30 persons worldwide, mostly in Europe. Still, the fishes are vital, reproduce well and there are no malformed fishes or any other signs of inbreeding depression; but this has not been studied by scientific means.

Aphanius apodus is listed as Data Deficient in the IUCN Red List (Crivelli, 2006) but is nevertheless a species of major conservation concern. Importantly, by the crowd-based activities noted above, *Aphanius apodus* has been maintained in *ex-situ* for 25 years now. Fishes from this captive population have been used in various scientific studies and they are available for re-introduction, if this would be seriously considered. The strength of the crowd-based approach is in the number of people keeping the species, what makes the *ex-situ* stocks relatively resistant against disease outbreaks or other accidents in their husbandry, which might delete

individual stocks. Most keepers have less than 10 adults of the species increasing the theoretic risk of inbreeding depressions. However, most keepers have the species only for a limited time, although it is unknown if breeders exchange fishes from time to time to refresh their stocks. While we would assume that the survival of a species should not be the issue of loosely organized hobby associations, this is the reality and obviously works for *Aphanius apodus*. Nevertheless, it must also be considered, that the model of crowd-based *ex-situ* breeding works only for a very limited set of small species attractive to specialized keepers as killifishes, goodeids, livebearers, anabantoids and a few others.

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Saving the European eel, *Anguilla anguilla*, from extinction - the role of conservation aquaculture, Llangorse Lake stocking evaluation project.

Dr. John Taylor

Fisheries and Aquaculture Technical Specialist, Natural Resources Wales

Stocks of elvers are known to be at an all-time low across Europe and have plummeted to 1-5% of levels recorded 20 years ago. Most scientists and conservationists accept that the species is now outside safe biological limits and urgent action is needed to halt this decline. Consequently, the following classifications have been applied to the conservation status of the eel:

- UK BAP Annex 1 priority species
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Annex II
- International Union for the Conservation of Nature (IUCN) Red list – Critically Endangered.

The European Commission has initiated an Eel Recovery Plan (Council Regulation No.1100/2007) to try to return the European eel stock to more sustainable levels; Article 7 describes the measures concerning stocking (DEFRA, 2009). There is a requirement for each member state to provide a set of Eel Management Plans detailing how they plan to address the decline in this species, and stocking forms an integral part of many EMP's. The 2007 Regulation also requires that at least 35% of the commercial catch of eels of less than 12cm is made available for restocking rising to 60% by 2013. However, scientific evidence evaluating the efficacy of stocking remains scarce. Most studies have focused on the contribution of stocking to commercial fisheries.

The ICES/EIFAC Working Group on Eels (WGEEL) has been exploring this issue for some years. Despite the large scale application of eel stocking throughout Europe there is clearly insufficient quantitative data from targeted studies of the performance of stocked eel in open wild environments. More data of this kind would help considerably in determining optimum environments to stock, and most suitable life stage and number. In addition to this, there is a need to attempt to trace migrating silver eels originating from stocking to determine if they have the capability to reach their spawning grounds and contribute to future generations.

Llangorse Lake stocking project

Llangorse Lake is the second largest natural lake in Wales and there are records of eel trapping here going back to 1584. The Welsh Government regulatory Authority, Natural Resources Wales (NRW; formerly Environment Agency Wales) actually own a silver eel trap exiting the lake on the River Llynfi which was once fished commercially. The trap was last fished in 1999 when the average catch was estimated to be around

700lbs (pers. comm). Prior to this, historical records show catches of up to 2,500lb in 1989 (Figure 1), of which over 1600lbs were taken in two nights.

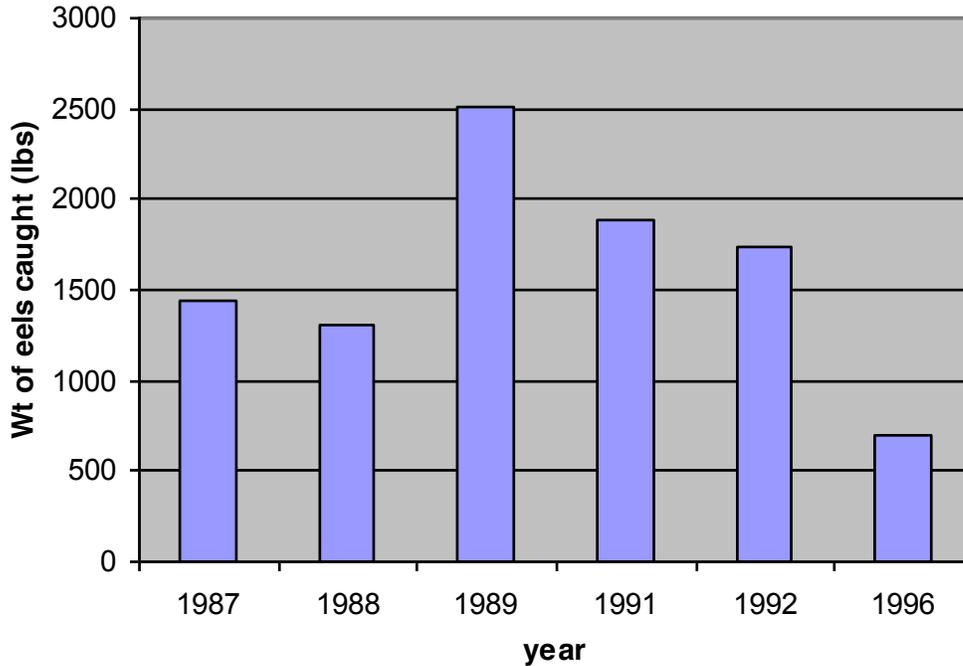


Figure 1. River Llynfi (Llangorse Lake) silver eel trap catch (1987-1996)

The trap has not been fished for 10 years and the potential data that could be recovered are considered significant bearing in mind the historical context.

Llangorse Lake is a relatively shallow, eutrophic lake, and is four miles from the NRW owned Cynrig hatchery, making it an ideal setting to test the cost effectiveness of stocking juvenile eels as a means of increasing silver eel escapement.

The lake is able to support juvenile eel stocking at the densities shown in Table I below.

LIFE STAGE	No/KG	No Elvers/juveniles required	Stocking Density (per ha)	Lake Area (ha)
Elvers	3000	23,000 - 30,600	150 - 200	153
3 month fed juveniles	333	8500 (assuming 90% survival)	50	153
6 month fed juveniles	100	3800 (assuming 70% survival)	17	153

Table I. Juvenile eel stocking densities for Llangorse Lake.

The survival and recapture rates of the different life stages can be compared by monitoring escapement at the Llynfi silver eel trap. All eels will either be marked with a dye that stains the otoliths (strontium chloride), a coded wire microtag, or a pit tag. Glass eels/young elvers were stocked directly from UK Glass eels, older juveniles were on grown at Cynrig Hatchery in a special re-circulation system. The first stocking took place in 2011 in collaboration with UK Glass Eels and the Severn and Wye Smokery.



Figure 2 (left) Some of the strontium chloride marked elvers ready for stocking; and Figure 3(right) a view of the Lake



Figure 4 (left). Coded wire tagging 6 month juveniles; and Figure 5 (right) releasing them at the lake margins

Since 2012 the silver eel trap has been fished selectively, following the pattern of previous commercial catches (mid-October to mid-November). So far, a total of 42 eels have been trapped from historical recruitment, measuring an average of over 80cm in length and weighing over 1kg. These eels are almost certainly old females (15-25 years of age) and an indication that recruitment has been poor for many years.

2015 is an exciting year as it is possible that the first young silver eel males, resulting from the stocking project, may be migrating this autumn, fingers crossed!!



Figure 6. One of the old females trapped on her way out to the Sargasso Sea

Report from the Fish Passage Conference 2015.

World Fish Migration Foundation

FFSG is a partner on the World Fish Migration Day project (see pages 37-39), which is coordinated by the World Fish Migration Foundation. The Foundation was also responsible for coordinating the Fish Passage Conference that was held in the Netherlands in June 2015 and included FFSG Steering Committee members Zeb Hogan and Claudio Biagùn as keynote speakers.

The following pages provide a copy of a report made by the Foundation on the Fish Passage conference. We are grateful to the Foundation for allowing us to reproduce the report here.



GRONINGEN, THE NETHERLANDS



Feedback from the 2015

By the World Fish Migration Foundation

The Fish Passage 2015 (FP2015) conference held in Groningen, The Netherlands, was an important international meeting on the subjects of fish passage and river connectivity for migratory fish. Specialists, policy makers, ecologists and engineers all came together to exchange experiences, ideas and to network. Previously the event has been held in the United States, but under the coordination of Herman Wanningen from the World Fish Migration Foundation, the Fish Passage conference was brought to Europe for the first time in June 2015. Mr Wanningen wanted to bridge the gap in knowledge and experience between different parts of the world and to bring the work on fish passage in Europe into the spotlight.

Official Opening

On June 21st the conference was officially opened in a ceremony at the Oosterpoort venue in Groningen. An audience of around 550 international delegates was welcomed to the

Netherlands by Henk Ovink, Special Envoy on International Water Affairs for the Kingdom of the Netherlands, on behalf of Minister Schultz van Haegen-Maas. The ambassador caught and released a symbolic mini airship with the Happy Fish emblem on, which symbolised the effort that needs to be taken to ensure free flowing rivers and uninhibited fish migration, in turn contributing to "happy migrating fish"(see above photo). During this ceremony 10 specialists who have contributed to major achievements in the field of fish migration in the Netherlands were also honoured.

Key Note Speakers

The official program included presentations from six special guests - Beate Adam, Claudio Baigún, Zeb Hogan, Martin Mallen-Cooper, Dmitrii Pavlov and Laura Wildman. Each delivered thought provoking presentations, highlighting the various issues, experiences and approaches used from different regions of the world.



Fish passage in an era of broken rivers: new approaches a reason for hope?

Zeb Hogan, Plenary Talk © Herman Wanningen



Dam Removal

Laura Wildman, Plenary Talk © Sergio Makrakis

Dr Claudio Baigùn and Dr Zeb Hogan for example highlighted the challenges that are faced in developing areas such as South East Asia and South America and the need for novel fish passage solutions that maximize environmental benefit and minimize cost.

Laura Wildman, a fisheries engineer with the New England Regional Office from Princeton Hydro was a source of inspiration resulting from her work on dam removal in the US. It was hoped by many that projects in Europe will lead to the future removal of smaller, older and redundant dams. During the official conference opening Herman Wanningen appealed to the Dutch minister to consider removal of redundant dams in West Europe. A list of redundant dams will now be generated for the Netherlands watch this space.

Program

Whilst the keynote speakers focused on general issues, the presenters during the sessions delved into the details of the various fish passage related projects from around the world. These were presented during various sessions. Here are a few examples of the sessions:

- Sessions ranged from standardization of fish way evaluations, fish lifts and fish locks, fish behaviour and swimming capabilities, dam removal, policy and management of fish ways, to examples of fish passages in Asia
- There were presentations on the designs of fish passages and the introduction of fish friendly pumps, to presentations about the policy regarding fish migration.
- There were also presentations of telemetry studies carried out in different parts of the world, studies on downstream passage and the obstacles which fish encounter, examination of the performance of pool type fish passages as well as information needs for the management of fish passages
- Workshop on the functionality of fish ways for sturgeon in large European rivers
- Session discussing fish passage in the Rhine River, hosted by the International Rhine Commission.
- Workshop on networking and communication of Fish Migration issues

The majority of the 230 presentations were applied and focused on an audience from a wide range of knowledge backgrounds. General feedback from attendees indicated interest in additional presentations on basic passage engineering research and bio-mechanics. For a closer look at the abstracts and presentations please visit the conference [website](#).



Presentations in the Happy Fish room. Happy fish could be seen throughout the conference venue

Side Program

The side program included various activities, including the talent room, topical courses, banquet and tours where participants could visit various fishways and restoration projects in the region (see photos from the course and tours on next page).

The courses were held during the weekend prior to the conference and were well attended, with 83 delegates. The most popular courses were the downstream passage course (Olle Calles, Sweden; Alex Haro, USA; and Steve Amaral, USA), the fishway evaluations course (Theodore Castro-Santos, USA and Paul Kemp, UK) and the technical

and nature-like fishways course (Alex Haro, USA and Marq Redeker, Germany).

The talent room was an opportunity for students to meet specialists in fish migration. During the meetings, the specialists inspired students with stories showing how they developed their successful careers and students used this opportunity to network and identify future opportunities.

Belinda Burtonshaw, a student at Van Hall University of Applied Science had this to say: "For me the talent room was a good opportunity to present myself and my project work. It was interesting to receive feedback from "real" scientists. Furthermore the Talent room was a

good platform to meet other students as well as hear stories from experienced researchers."

TALENT ROOM



Meeting specialists

Niels Brevé (Sportvisserij Nederland) giving advice to a student © Liisa Hämäläinen

COURSES



Downstream Passage course

Presented by Olle Calles, Alex Haro & Steve Amaral



Guillermo Giannico & his class

Integrating fish passage requirements in Watershed Restoration Plans: How to prioritize actions and monitor their effectiveness

TOURS



Tidal Barriers Tour

Hosted by Kees Munting and Jeroen Huisman © Kees Munting



Source to Sea Tour

Hosted by Peter Paul Scholema & Uko Vegter © Keetiaer Olsson



Olle Calles and Herman Wanningen during the Banquet © Josh Royte

Banquet & Award winners

The conference banquet was held on Tuesday evening in the Great Hall of the Oosterpoort, and proved to be very popular with attendees. The award for best project and the lifetime award were selected from nominated projects, by the EWRI-AFS Joint Committee on Fisheries Engineering and Science. These awards were proudly presented to the winners during the banquet.

The winner of the Best Distinguished Project in Fisheries Engineering & Ecohydrology was awarded to Javier Sanz-Ronda and associates for the project "Salto De San Fernando: Problems and Solutions".

The Life Time award was presented to the French duo Michel Larinier and Francois Travade for their seminal work on ecohydraulics and fish ways.

DamNation

On the last evening of the conference, the conference officially ended with the screening of the American documentary film DamNation at Images in Groningen. With impressive footage the documentary shows how the mentality in the USA slowly shifted from the pride in big dams as wonders of the art of engineering towards the awareness that the health of the country also depends on the life and health of the rivers.

THE SUCCESS OF THE CONFERENCE

Overall, we can all look back on the conference as being a great success!

The true value of the conference was in the networking opportunities on an international level, and the discussions that took place between the sessions. Some of the most valuable contacts and knowledge were gained during the highly popular social events, where the specifics of projects, past successes, trials, tribulations and lessons learnt were enthusiastically debated.

A huge amount of people were interested in attending this conference for just these reasons.

What did the participants have to say about FP2015?

At the close of registration, 550 participants from more than 40 countries had registered, with the majority of participants attending from Western Europe and the United States.

Putting Africa on the map

One participant came from Africa, Dr. Gordon O'Brien, a researcher at the University of KwaZulu Natal, made it clear why such meetings are necessary. According to Dr. O'Brien, throughout Africa, many developments that are creating impassible barriers in rivers and deltas are underway with very little consideration of the effect of these developments. Africa needs to learn from past mistakes and incorporate the latest best practices and management approaches. Dr. O'Brien came to Groningen to meet kindred spirits and to discuss river connectivity management ideas. During the conference he was officially named the official coordinator for Africa for the World Fish Migration Day 2016 and was enthusiastic that he could now officially speak on behalf of an international organization, and more effectively represent the interests of migratory fish in Africa.

Searching for innovative techniques

Erik Sparrevik, environmental expert at the Swedish engineering company Vattenfall, represents a key business area. Vattenfall, a supporter of the Fish Passage 2015 conference, develops many fish passages at hydropower dams. Dr. Sparrevik said, "We are trying to do this as efficiently as possible. Currently every drop of water that flows through a fish ladder does not go through our turbines, which means less revenue. So we are looking for innovative techniques to lose as little water as possible and still provide optimum service to migrating fish." He indicated that during the conference he found some useful information and wants to develop

further contacts including governmental representatives, researchers and NGO's: "they were all to be found here, which made the meeting diverse and extremely valuable."

Lessons learnt

For Peter Gough of Natural Resources Wales in the UK, the contacts he made during the Fish Passage were important. According to Gough you could learn a lot during daily sessions including not only details of the construction of fish ladders for eel or salmon but also for other less conspicuous species. But in the informal meetings and conversations, you could also discuss detail and experiences – good and bad! He noted that presentations and publications describe successes, but open and honest debate in the socials was a great and important opportunity to hear the experiences of others.

Gough also highlighted that a lack of

monitoring is a common mistake: "For the construction of fish passages you can often get a budget, however it is usually much more difficult to secure resources for monitoring. That means that there is sometimes a lot of money spent on services, but no way to understand how well they are working or whether they should work more efficiently."

Sharing knowledge from different continents

Another key participant was Sergio Makrakis from the Universidade do Oeste do Paraná - UNIOESTE, in Brazil. Dr. Makrakis highlighted the value of South American experience to innovation and technique, with knowledge gained about measures to improve conditions for migratory fish. He came to the Netherlands to hear updates on the latest technologies on various topics, including those related to monitoring migratory fish, in search of opportunities to publish scientific work and to share valuable information from Brazil that others can benefit from. There is much experience in Brazil with the construction of large water works within the Paraná River network, one of the



largest river basins in South America. Makrakis said: "We know a lot about the management of large water systems, for instance about the effects from the construction of dams. These consequences are sometimes seen hundreds of kilometers away. In the Paraná you will find a wonderful species diversity. We also know a lot about these subjects. In the scientific field we have developed analytical techniques, assessment of spawning areas and genetic flow for the conservation of migratory fish, which we may well provide insight into the results. Regular meetings among researchers, interest groups and the government, as the Europeans well know, can be an example for us." Furthermore, Makrakis is busy with the development of a new laboratory where research will be done on the fish behaviour and swimming capacity and where he is looking for latest technological innovations.

Taking the message home

Larry Greenberg, professor of the Karlstad University in Sweden, was impressed with Zeb Hogan's contribution to our knowledge about the migration of large fish.



Key note speaker, Henk Ovink enjoying the Wadden Sea swimway poster

Prof. Greenberg was also impressed with others at the conference including the long-term research that has been done at the Russian Academy of Sciences, by Prof Dimitrii Pavlov and his colleagues, who have a high-level of scientific contribution to the understanding of the migration behavior of fish and worked on studies such as the use of fishlifts for sturgeon in the Wolga applicable to the construction of fishlifts in the IronGate Port in the Donau in Romania. Prof. Greenberg would like to use the knowledge gained during the conference in consultation with owners of hydro-electric plants regarding the construction or the efficiency of fish passages and the understanding of the migratory behavior of fish.

He has studied the use of fishways for upstream-migrating fish and guidance structures for downstream-migrating fish in for example, the River Emån in southern Sweden.

Interviews with participants courtesy of Eric Le Gras

LET'S DO THIS AGAIN

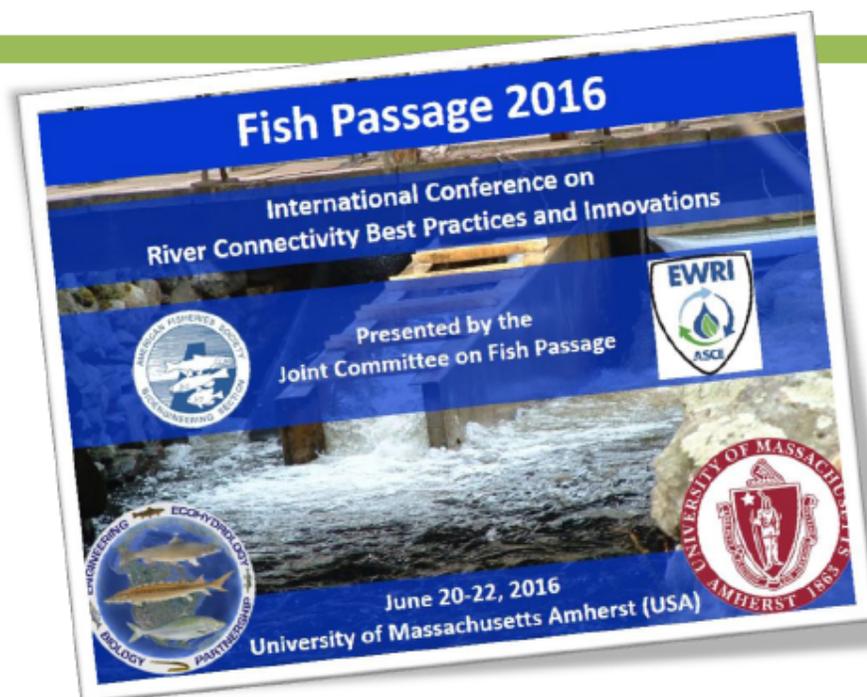
Participants in the conference openly discussed and taught each other about fish migration, ecology and how the learning could bring environmental and economic benefit in their countries. The atmosphere of mutual enthusiasm and ambition at the conference was great, and all attendees were able to make valuable contacts and gain great inspiration from the work of others.

The conference was a great success and as a result of this the organisers will definitely ensure that the Fish Passage conference series will return to Europe soon, and in due course travel around the world.

Hope to see you next year!

Come join us in 2016 for Fish Passage Conference in the USA

www.fishpassageconference.com



WWW.FISHPASSAGECONFERENCE.COM



FISH PASSAGE 2015

International conference on river connectivity best practices and innovations



June 22-25, 2015 | Groningen (The Netherlands)

Made possible by:



World Fish Migration Day 2016.

World Fish Migration Foundation

FFSG is a partner on the World Fish Migration Day project, and the next World Fish Migration Day is set for May 21, 2016. Please encourage your colleagues to register events for the Day, at:

<http://www.worldfishmigrationday.com/>

And follow World Fish Migration Day via their FaceBook page.

<https://www.facebook.com/WorldFishMigrationDay/>

The following pages provide a summary of the objectives for World Fish Migration Day.

May 21st, 2016



**World Fish
Migration Day**
Connecting fish,
rivers and people

**FOR PEOPLE WORKING FOR RIVERS
AND MIGRATORY FISH AROUND THE WORLD**

The World Fish Migration Platform invites you to join the second World Fish Migration Day on May 21st, 2016. Following the overwhelming success of the first World Fish Migration Day in 2014, this international event calls attention to the need to safeguard free flowing rivers and to restore the connections in rivers for migratory fish.

WHY DO WE CARE?

Migratory fish (like salmon, trout, shad, lamprey, giant catfish, sturgeon and eel) are threatened worldwide by barriers such as dams, weirs, culverts in road crossings, and sluices built for water management, hydropower and land drainage. This makes it difficult, often impossible for fish to reach their spawning grounds which can, in some cases cause local extinction. Millions of people around the world rely on these fishes as their primary source of protein and for their livelihoods. Water managers and conservationists are striving to protect and improve fish migration routes between and within rivers, deltas and the oceans. These 'fish highways' are vital for their survival.

World Fish Migration Day strives to improve the public's understanding of the importance of free flowing rivers and migration routes for fish. Raising awareness, sharing ideas, securing commitments and building communities around river basins are essential aspects of fish passage and river restoration. On this day, we will connect celebrations and events that start in New Zealand, and follow the sun around the planet until it sets on Hawaii.

World Fish Migration Day in 2014 had 273 events, in 53 countries, with contributions from 1000 different organizations.

Events included:

- Presentations
- Family fun days
- Fishway opening and tours
- River tours
- Workshops
- Dam removals

For photographs and more details about the 2014 World Fish Migration Day go to worldfishmigrationblog.wordpress.com

We want World Fish Migration day in 2016 to be even bigger and better! We aim to connect events at some 500 locations worldwide. We are looking for organizations that want to join this inspiring initiative. There is already an exciting array of events planned, varying from a public education event in New Zealand and playing a human board game called "The migratory fish" at the Belo Horizonte Aquarium in Brazil and kids' activities planned in many countries around the world.

WOULD YOU LIKE TO ORGANIZE AN EVENT?

Participating organizations are encouraged to organize their own event (e.g. activity sessions, workshops or talks) and communicate this to the public, under the umbrella of the World Fish Migration Day. Educational material will be available to share with visitors. The consortium of the recently started World Fish Migration Platform (www.fishmigrationplatform.com) will take care of the central coordination, international publicity, maintain the main website and host several webinars on fish migration topics leading up to WFMD2016. The events of participating organizations will be highlighted on the website, social media and in the press.

MORE INFORMATION

Web www.worldfishmigrationday.com
Facebook www.facebook.com/WorldFishMigrationDay
Twitter [@fishmigration](https://twitter.com/fishmigration)

TO ORGANIZE AN EVENT, PLEASE CONTACT US

Coordination Pao Fernández Garrido
Email pao@fishmigration.org
Or use the event registration tool on the WFMD-website



WORLD FISH MIGRATION PLATFORM



Challenges for settling on right balance for conservation and development

Prof. Spase Shumka

Agricultural University of Tirana

Tirana, Albania

Recently during field work in the Albanian Alps a group of students met a group of designers of some small hydropower plants (HPPs). During our talks we explained that reducing the amount of water in the river would bring serious threats to the native trout, giving numerous examples from other rivers in Albania where the ecological flow seems to be almost nothing; and the reduction in humidity will prevent the chestnut mast (even without HPPs it faces serious impact from climatic changes). However, it was challenging to get these messages across, because many of the people we spoke with were focused more on economic motives, and Europe's development over the last few decades addressing poverty, unemployment, etc. What troubled me more, and prompted me to write this article, was the often used phrase "...why this water must go in vain."

Similar developments to those recorded in Albania, for HPPs, are also occurring in other Balkan countries where, due to historical and political reasons, there are luckily still some free flowing water courses, without dams. The remarkable richness of plant and animal species in the Balkan Peninsula represents a unique ecological and biogeographical phenomenon in Europe. The variety of regions, the complex geological history, and interactions between populations, species, and ecosystems have all resulted in enormous diversity within the abundance of plants, animals, and ecosystems in this area (Savic, 2008). Within the wider region there is a large number of endemic and relict species, which are highly significant in themselves, and their different ecological characteristics, distribution, and origin contributes to the region's uniqueness.

Balkan freshwaters are home to a large number of endemic species and rare fauna of fish and shellfish, representing the main source of natural and biological diversity. About 40% (151 species) of molluscs and 28% (52 species) of freshwater fish are considered threatened at the European level, making it one of the 'hotspots' that are most important in Europe and the Mediterranean region (Freyhof, 2012). Furthermore about 75% of the fish species and 70% of molluscs threatened in the Balkan region are vulnerable to habitat alteration, particularly the alteration caused by dams (Figs 1 & 2) that convert lotic to lentic habitats with the aim of creating sustainable water bodies (Cuttelod *et al.*, 2011). Similarly, these and other flora and fauna are very vulnerable to the invasion of alien species that is often associated with the development of dams and reservoirs. The history of the development of hydropower in Albania is filled with vivid examples of violation (habitats, ecosystems), many of them irreversible.

Albania is well known for its high diversity of ecosystems and habitats. The total land area is divided into three main ecological zones (the coastal plain zone, the hilly transition sub-mountainous zone, and the mountainous zone) and 13 sub-zones, which contribute to the country's rich biodiversity. Forests cover 36% of the country's

territory, agricultural land about 26%, and pastures about 15%. Approximately 60% of the pastures are alpine and sub-alpine pastures and meadows. Forests and pastures have a high diversity of types of Mediterranean shrubs, oak woodland, beech forest, mountain pine, etc., and animal communities (MoE, 2015). Along the coastline of the country there are many ecosystems of significance in the Mediterranean region such as lagoons, wetlands, sand dunes, river deltas, hydrophilic and hygrophilous forests. The lakes and rivers are also important for the biological and landscape diversity of the country. The beauty of the landscape makes Albania a potential attraction for nature-based recreation activities.

Despite the work that has been done, different aspects of the biology of freshwater fishes in standing and running waters, such as their diversity, distribution, and conservation status, are still very poorly known. The recent publications on loaches (Cobitidae and Nemacheilidae) (Šanda *et al.*, 2008), salmonids (Snoj *et al.*, 2009) and barbels (genus *Barbus*; Cyprinidae) (Marková *et al.*, 2010), have revealed interesting results that need further research. The available sources of information are mostly those of Poljakov *et al.* (1958) who included 36 freshwater species, and Rakaj (1995), 77 species. The described new species within transboundary water systems in neighbouring countries (Montenegro and Greece) makes the area highly interesting. Currently there is under publication the new checklist of Albanian freshwater fishes and the list includes 59 species, both catadromous and anadromous (*in publication*). The effects of more than 60 constructed HPPs (the plan according to various sources is close to 400), is clearly threatening both aquatic and terrestrial species of flora and fauna.

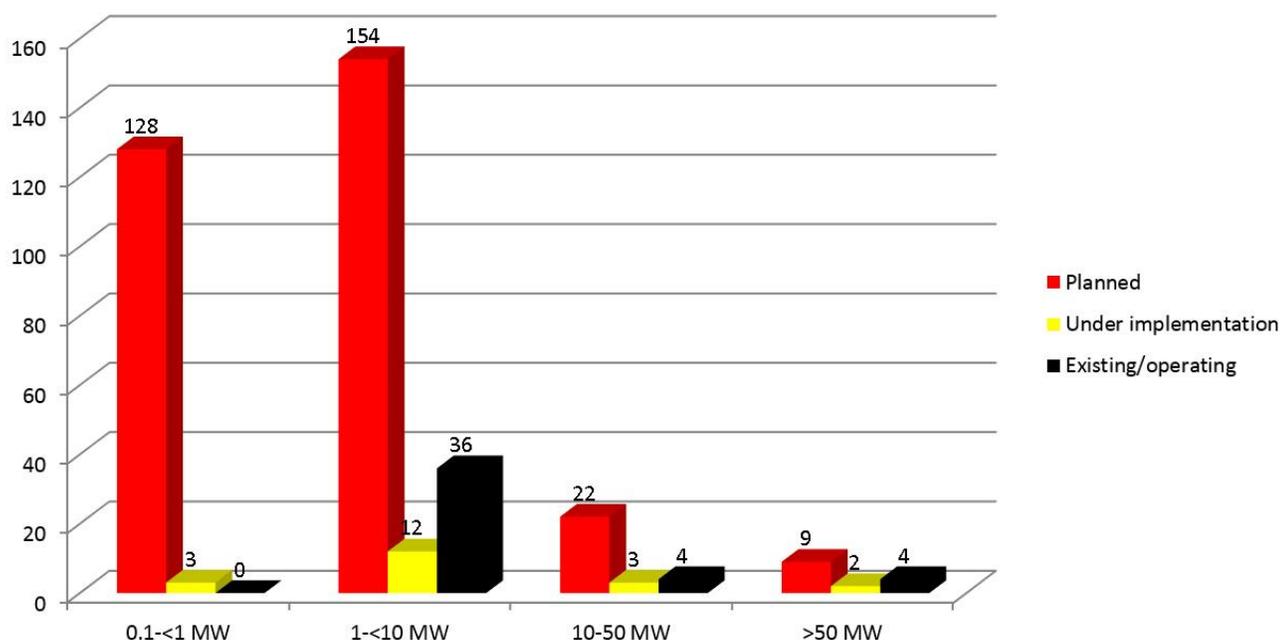


Figure 1. Update of the Balkan Dams, September 2015 (FLUVIUS, 2015)

During the development and transition of Albania, there has been political uncertainty and economic difficulties, where foreign investments are limited and the internal resources have not appeared to generate the required development and employment. Under these circumstances it appears that water and energy are the key to a temporary performance. This scenario has been, and continues to be dominant during the last

two decades. It seemed that the phrase "... let's to turn the country into a *piccola superpotenza energetica*..." significantly attracted foreign companies, investors and banks (including the World Bank, Deutsche Bank, IBRD).

Among the largest current threats to the natural heritage of the Balkan region is a wave of planned hydropower stations. Hydropower dams have a significant impact on the river ecosystem and the longitudinal continuum for living organisms and sediments. They can also negatively impact wild terrestrial animals including large carnivores living in mountain fringes within the Dinaric Arc. This leads to a loss of ecological integrity, river degradation, and consequently a decrease in biodiversity (Schwartz, 2012).

Despite its important role as a renewable resource replacing power generation that is dependent on fossil fuels, hydropower comes with its own significant social and environmental costs that, in many extents, seems to be largely unrecoverable. The challenge facing Albania is to settle on the right balance and ethics of hydropower development so that natural resources and their uses by other sectors are maintained along with biodiversity and social and cultural assets. Potential losses in development, and the social and environmental values of biodiversity need to be weighed against the economic and social benefits of hydropower.

Hydropower plants in Albanian rivers

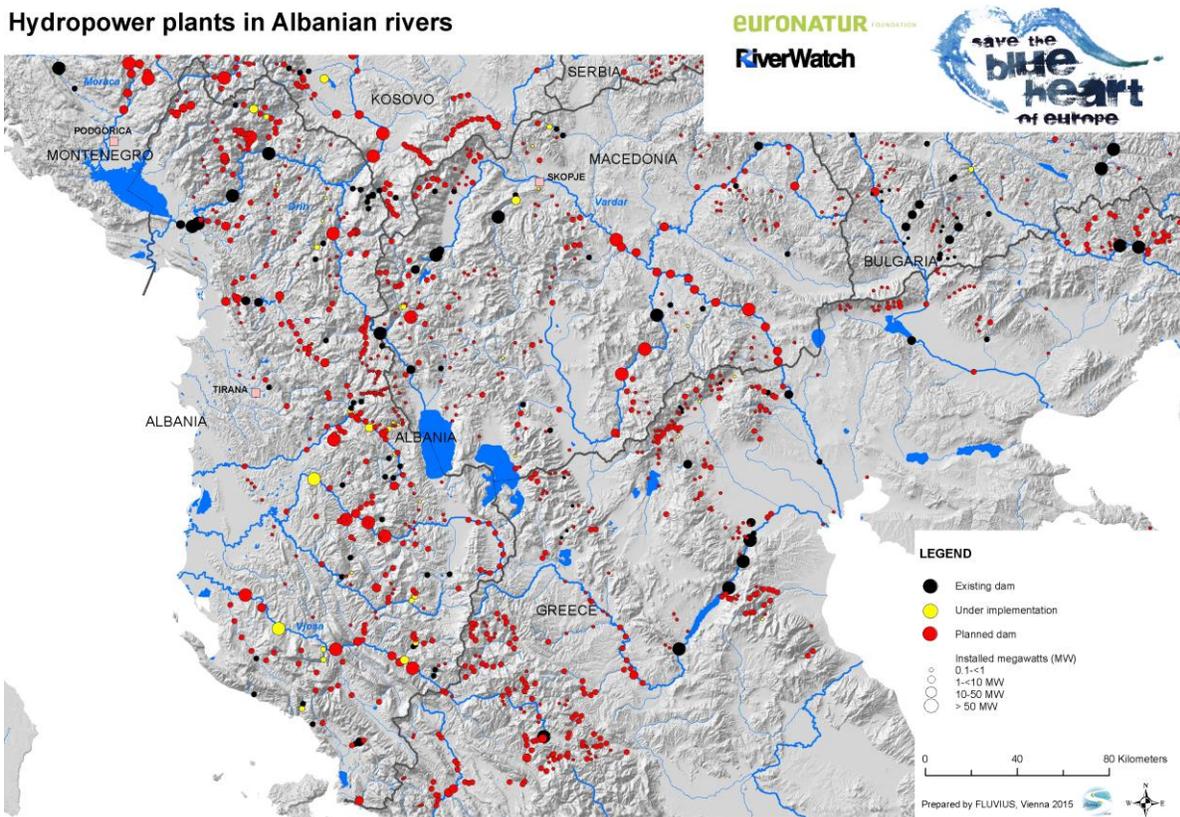


Figure 2. Update of existing, under construction and planned hydropower in Balkan region, September 2015 (FLUVIUS, 2015)

By 2027, Europe's water framework directive will require all the countries' bodies of water to be of good ecological status. Ironically, for Balkan countries and Albania to fulfill their aspirations of EU accession, they may need to roll back the effects of a hydropower boom that the EU's investment banks have promoted. During the last decade, the role played by the hydropower investments in national and regional development

has been increasingly questioned. In the context of many uncertainties about the availability and quality of water resources at a regional scale, using water (viewed as a common good) to produce energy must be justified not only on the basis of national or local economic benefits in general, but also on the basis of the quantity and quality of expected benefits received by different stakeholders (including local communities). In the Albanian and Balkan contexts, the ethical considerations reveal a deep discrepancy in benefits from the national level vs. local ones, while the conservation of natural resources has been significantly neglected. Analyzing the last development within environmental issues related to hydropower clearly involves the environmental decision-making process. In many examples of HPPs, the process is closely linked to legal and regulatory frameworks, and to environmental assessment and licensing processes that, in the case of Albania, need further, serious improvements. Environmental assessment has not been considered as a management tool and a guide for decision-making. Therefore, environmental assessments should be presented as real, meaningful instruments to be used by decision makers, to carry out their duties in accordance with relevant legal and regulatory frameworks.

Acknowledgements: I am extremely grateful to colleagues of the Euronature Germany, and “Save the Blue Heart of Europe” projects for providing the update information of hydropower that is presented as figures in this article.

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Save the Blue Heart of Europe – Campaign Brochure

Ian Harrison

FFSG Technical Officer

For more information about the campaign to protect the rivers of the Balkans, as discussed in the article above on *Challenges for settling on right balance for conservation and development* by Prof. Spase Shumka, go to:

<http://balkanrivers.net/en/news/campaign-brochure-now-available>

Where you may download the campaign brochure ***Save the Blue heart of Europe - Balkan Rivers under attack from Hydropower Lobby.***



Reports from the IUCN SSC Leaders' Meeting, Abu Dhabi. September 12-18.

SSC Freshwater Conservation Sub-Committee Meeting; September 12 & 13



Ian Harrison

FFSG Technical Officer

The abbreviated report below focuses on information on greatest relevance to FFSG; a full report of the Subcommittee meeting will be available on the Freshwater Conservation Subcommittee webpage and IUCN Portal.

Freshwater Conservation Sub-Committee (FCSC) members present: Topis Contreras MacBeath (FCSC Chair); Richard Sneider (Freshwater Fish Specialist Group (FFSG), Chair); Richard Lansdown (IUCN SSC Freshwater Plant Specialist Group, Chair); Ian Harrison (Technical Officer, FFSG); Will Darwall (IUCN Freshwater Biodiversity Unit); Harmony Patricio (Griffith University / Freshwater Working Group, Society for Conservation Biology); John Simaika (Invertebrate Conservation Sub-Committee); Neil Cox (IUCN Biodiversity Assessment Unit); Michele Thieme (WWF-US/FFSG; by Skype, part-time); Rachel Roberts (IUCN SSC)

Guests for specific agenda items:

Simon Stuart (Chair, SSC); Dr Jon Paul Rodríguez (SSC Deputy Chair); Mike Hoffmann (Senior Scientist, SSC); Natasha Ali (IUCN Global Species Program); Dan Challender (IUCN Global Species Programme); Kira Mileham (Director of Specialist Group Partnerships, SSC); Russ Mittermeier (Conservation International); Anders Rhodin (IUCN SSC Tortoise and Freshwater Turtle Specialist Group); Phil McGowan (IUCN Policy Sub-Committee); Noel McGough (IUCN Policy Sub-Committee); Justin Cooke (IUCN Policy Sub-Committee); Sonia Peña Moreno (IUCN Policy Sub-Committee); Catherine Machalaba (IUCN Wildlife Health Specialist Group); Piero Genovesi (IUCN SSC Invasive Species Specialist Group); Mark Stanley Price (IUCN SSC Species Conservation Planning Sub-Committee); Annabelle Cuttelod (IUCN Global Species Program); Taej Mundkur (Wetlands International); Jane Smart (IUCN Global Species Program).

1. Brief updates from the Sub-Committee members

FFSG Update

Richard Sneider and Ian Harrison gave an update on activities of the Freshwater Fish Specialist Group since our meeting in Cuernavaca, Mexico, in December 2014. FFSG programmatic efforts and priorities have included:

- Seeking funds from grants and private sponsors to support FFSG activities and the Secretariat (especially ongoing support for the Programme Officer position that was held part-time by Alex Mauroner)

- Search for a new host organization to replace Chester Zoo; develop collaborative relationships with zoos and aquariums (e.g., New England Aquarium, via Scott Dowd and his role as Chair of the Home Aquarium Fish Subgroup)
- Develop/collaborate on new project concepts, including:
 - World Fish Migration Day 2016;
 - analysis of migratory fishes and placement of dams;
 - effects of freshwater invasive alien species (with SSC Invasive Species Specialist Group) –
 - develop a *Blueprint for Freshwater Life* (see page 10)
- Promote the newly formed Home Aquarium Fish Subgroup, which has been developing very successfully
- Fill vacant regional chair positions (including Sunda region, with plans for fish assessments for that region, coordinated via the Wildlife Reserves Singapore and the National University of Singapore).

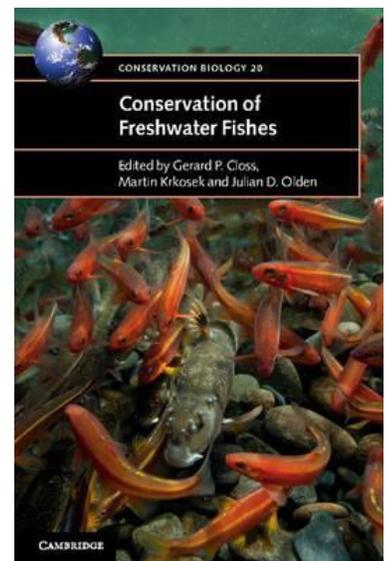
IUCN Freshwater Biodiversity Unit/Biodiversity Assessment Unit updates

Will Darwall noted that the Freshwater Biodiversity Unit (FBU) is revising its assessments of fishes in Madagascar and completing the other freshwater assessments for the region. It is also identifying Key Biodiversity Areas (KBAs) in Madagascar and other Indian Ocean Islands. It is using the Red Listing process to identify KBAs, and then identifying site champions who can implement conservation strategies on the ground.

FBU is working on Lake Victoria catchment: compiling Red List reassessments; fine-tuning KBAs; studying livelihoods values, and examining climate vulnerability traits.

Will Darwall contributed to the forthcoming book *Conservation of Freshwater Fishes* edited by Closs *et al.* This is aimed as a university textbook, with a broad 'aquatic ecologist' audience.

Neil Cox noted that the Biodiversity Assessment Unit (BAU) is working on Red List assessments and KBAs for Canada; and is working with NatureServe for red list assessments for the USA. BAU is also covering freshwater assessments for South America, working on the tropical Andes via a MacArthur grant; they have reviewed 1300 species and developed KBA workshops. ICMBio (Brazil) has been working with BAU for assessment workshops for fishes, for the Atlantic Forest and other areas,



2. World Conservation Congress

Ian Harrison reported that 15 water themed events (workshops/knowledge cafes) were in development for submission at the World Conservation Congress, through collaboration of Freshwater Conservation Sub-Committee, Freshwater Fish Specialist Group, WCPA Freshwater Task Force, and the Belmont Forum Deltas group.

Ian Harrison noted that it will be important to identify freshwater motions to be submitted. The call for motions should open in mid-November 2015, with the deadline being February 12 2016.

Suggestions thus far are:

- Situation analysis for the Mekong Navigation Project
- Dams and migratory fishes – or more broadly EIAs sufficient to address impacts to freshwater biodiversity
- Increasing monitoring of anguillid species both in freshwater and marine environments
- Increasing monitoring of exploited diadromous fish
- Climate change adaptation and the role of water management in this for economic, livelihood, biodiversity and ecosystems challenges
- Freshwater ecosystems/invasive species – policy and management recommendations.

3. Discussion with the IUCN Policy Sub-Committee (PSC)

The group noted that we should be looking at how we can carry strong freshwater biodiversity messages to the Convention on Biological Diversity, the Ramsar Convention, IPBES, UN Watercourse Convention, Convention on Migratory Species.

The Freshwater Conservation Subcommittee needs to link closely with the IUCN Water Programme on a formal position on dams, and the development of a set of ecosystem based guidelines.

There is also a need to develop freshwater focused metrics for Sustainable Development Goals. The IUCN Water Programme has been involved in SDG 6 (focused on water); it is important to strengthen the freshwater ecosystem/biodiversity components of this.

More progress should be made on regulation on invasive species. Freshwater is a priority for health and biodiversity, so a priority should be to build the information that can help establish the policy for the regulation of invasive species.

It is important to document 'conservation evidence' – using science to advance policy – to show the importance of biodiversity, with examples of the beneficial effects of maintaining/restoring healthy ecosystems.

Complete a review of Ramsar sites, and identifying which sites have threatened species; which sites should be listed on the Montreux record; where are there areas that are not Ramsar sites but should be recommended to governments for consideration?

4. Developing collaboration with zoos and aquariums

Topis Contreras MacBeath recommended that the Subcommittee formed a working group that created a list of species that would be of interest to aquariums. Species would be included in this list based on the practical conservation needs and their high chances of reintroduction.

The Subcommittee (and other Specialist Groups should look into the opportunities created by informing zoos of IUCN's work and especially the Red List: zoos can use this information to help with their outreach and to address specific conservation challenges. Richard Sneider also noted that FFSG needs to strengthen its engagement with the aquarium trade; coordinated via the Home Aquarium Fish Subgroup.



FFSG Global Chair, Richard Sneider (lower right of photo), discusses opportunities for collaboration with zoos and aquariums with Freshwater Conservation Subcommittee Chair, Topis Contreras MacBeath (below camera, holding selfie stick), and SSC Director of Specialist Group Partnerships, Kira Mileham (lower left of photo). Photo by Topis Contreras MacBeath.

5. Meeting with Species Conservation Planning Sub-Committee

Topis Contreras MacBeath recommended that the Freshwater Conservation Subcommittee aimed to develop species action plans for about 20 species.

6. Priorities for the Freshwater Conservation Subcommittee (FCSC) 2016-2020

Policy

- 1) Highest priority - Identify the most important global and regional scale deliverables where FCSC can contribute to policy, based on the list below.
 - Convention Migratory Species
 - Ramsar; eg. develop Ramsar site freshwater species inventories
 - Freshwater aspects of SDGs (particularly Goal 6, in liaison with IUCN Water)
 - CBD Inland Waters
 - UN Watercourses Convention
 - CITES
 - IPBES
- 2) Write a science/policy article on freshwater (see Communications/media, below).

Communications/Media

- 1) Highest priority: identify 5-10 key organisations/businesses/SG's for raising freshwater profile and start working on them
- 2) Highest priority: identify three key opportunities for collaboration with aquariums. Provide recommendations for species to show in exhibits
- 3) Immediate goal: develop events for World Conservation Congress [several sessions have been proposed; we need to prepare freshwater motions]
- 4) Identify a high profile ambassador for the Subcommittee
- 5) Develop a programme for publishing scientific papers in high profile journals, such as in Policy/Opinion sections of journals (e.g., a paper about the importance of freshwater data); write a science/policy piece of freshwater (with the Policy Sub-Committee).

Operations

- 1) Immediate goal: recruit a Programme Officer to serve the whole FCSC, not just Specialist Groups. We need to find funding for the position.

Projects

- 1) Highest priority: Develop a program of Conservation evidence (documenting conservation success; what is the relationship between conservation success and protected areas; and links between biodiversity and ecosystem services/human health)
- 2) Highest priority: Develop at least five Species Conservation action plans (immediate goal: identify those species as priorities)
- 3) Highest priority: Develop a review of dams and freshwater biodiversity. Create report on the evidence of the effects of large dams on biodiversity; look at the WWF report from *ca.* 10 years ago and compare the prediction of impacts with the results. Discuss opportunities for restoration of dammed rivers.
- 4) Immediate goal: communicate with IUCN Water Programme to share plans for developing a 'Dams Strategy'
- 5) Highest priority: *Census of Freshwater Life* - this is being pursued by Will Darwall/Ian Harrison with support from Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Germany (IGB)]
- 6) Highest priority: Develop projects on invasive species in freshwater, in collaboration with the Invasive Species SG.



Some members of the Freshwater Conservation Subcommittee with IUCN Global Species Programme Director Jane Smart (third from right) and some of her staff. Photo by Catherine Machalaba (SSC Policy Subcommittee)

- 7) Immediate goal: test the KBA standards for freshwater species
- 8) Complete Red List assessments according to SSC Targets.

IUCN SSC Leaders' Meeting, Abu Dhabi. Workshop on the Convention on Migratory Species. September 17.

Ian Harrison
FFSG Technical Officer



Session Moderators: Jean-Christophe Vié, Lyle Glowka, Marco Barbieri

Scientific council of CMS meets in first quarter of 2016.

Recommendation to develop a Strategic Plan for Migratory Species. Perhaps develop a SWOT analysis for CMS processes, to assess how effective they are.

Marco Barbieri (Scientific Advisor to CMS) discussed a Task Force on guidelines for dams.

Ian Harrison discussed FFSG interests in mapping fish migration pathways and comparing this to the presence of existing or proposed/expected dams; and in doing an update on Hogan's (2011) paper on migratory fishes.

Rachel Roberts (IUCN-SSC) recommended using the IUCN Union Portal for developing a process for communication of Specialist Group members G members who are interested in CMS using the Union Portal.

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IUCN SSC Leaders' Meeting, Abu Dhabi.

Workshop on Invasive alien species in freshwater ecosystems: a review of collaborative project opportunities for the Invasive Species Specialist Group and freshwater focused SSC Groups. September 17.

Shyama Pagad¹, Piero Genovesi², Will Darwall³ & Ian Harrison⁴

¹ Programme Officer, IUCN-SSC Invasive Species Specialist Group

² Chair, IUCN-SSC Invasive Species Specialist Group

³ Manager, IUCN Freshwater biodiversity Unit

⁴ FFSG Technical Officer



Session Moderators: Piero Genovesi, Topis MacBeath, Will Darwall

Outline of meeting rationale and objectives

Invasive alien species are an increasingly significant threat to the health of freshwater ecosystems globally. For example, a recent assessment carried out in Europe showed that one out of three species of freshwater fishes at risk of extinction is threatened by invasive species (Genovesi *et al.*, 2015). The principal causes for the introduction of invasive alien freshwater species are: accidental or deliberate release of aquaculture and aquarium species; deliberate introduction of species for commercial or recreational fisheries; accidental introduction of 'stowaway' species attached to boats or in their ballast water, and other objects moving between waterways; and dispersal via connection of previously isolated river systems, as a result of new canal and water infrastructure projects. The colonization success of introduced species is then supported by modification of habitat, including pollution and sedimentation, and change in flow and thermal regimes of river systems. The results of these introductions include loss of native species, decline of water quality and ecosystem functions, loss of natural and cultural benefits, including loss of incomes and livelihoods of communities relying on these natural benefits. There are also impacts on human health and food security, and costs for remediation. With increasing reliance on freshwater systems for fisheries, hydropower, navigation, irrigation and water supply, all of the aforementioned causes and effects of alien species invasion can be expected to worsen.

There is, therefore, an urgent need to take action, through an evidence based review of the processes of freshwater alien species invasions and assessment of the extent of ecosystem change and the loss of

ecosystem goods and services that these cause, including the identification of programs for mitigation, and prevention and management of these alien species invasions. It is important to identify regions, ecosystem, and species that are priorities for further research and action; and to identify the partners, stakeholders and biosecurity intervention that should be brought together to implement projects for the management of invasive alien species.

Members of SSC's Invasive Species Specialist Group, Freshwater Conservation Subcommittee, and Freshwater Fish Specialist Group are developing a concept document outlining potential areas for developing research and conservation action. The SSC Leader's meeting provided an ideal opportunity to bring together representatives from these groups, and from other relevant SSC Groups and Committees with a freshwater interest, to: review the concept note; identify priorities and sources for fundraising and action; develop more detailed plans for implementing these projects; and identify specific people to take responsibility for working on developing project proposals.

Prior to the workshop at the IUCN leaders meeting, several activities were suggested for implementation, as below.

1. Activities engaging with the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and the Ramsar Convention on Wetlands

- 1.1 Conduct a global assessment on the impacts of invasive species on freshwater ecosystems, with a particular focus on the chains of internationally important wetlands that lie along the three main flyways – the Africa-Eurasia Flyway², East Asia- Australasia Flyway³ and the Americas Flyway⁴ that migratory species use.
- 1.2 Conduct regional assessments (Africa, the Americas, Asia, Oceania, Europe) on the existing and potential impacts of invasive species on Ramsar designated sites and other wetland sites and species of high biodiversity value.
- 1.3 Conduct a global assessment of impacts of invasive species resulting from Dams and inter-basin water transfers in three of the worlds' major rivers – Mekong, Amazon, Congo.
- 1.4 Develop and prioritize protocols for the assessment and management of existing and potential invasive alien species of serious concern to wetland managers.
- 1.5 Richard Lansdown (Chair, Freshwater Plant Specialist Group) recommended that this included mechanisms for quantifying impact.
- 1.6 Develop a standardized process for producing Red List maps of the ranges of introduced species (or a subset of the most important species), regularly updated to demonstrate the extent and speed of species spread.

2 The Africa-Eurasia Flyway, which connects the breeding grounds of Europe and northern Asia with the wintering grounds in Africa, and includes vital stop-over sites in the Middle East and Mediterranean

3 The East Asia-Australasia Flyway, which connects north-east Asian breeding grounds with wintering grounds in south-east Asia and Australia, and includes the vital stop-over sites in China and the Korean Peninsula.

4 The Americas Flyway, which connects North American breeding grounds with wintering grounds in the Caribbean and Central and South America

1.7 Develop protocols to insure that invasive alien species assessments are carried out and that biosecurity and invasive alien species management plans are made an integral part of all wetland site designation and management.

2. Activities engaging with the Food and Agriculture Organisation of the United Nations

2.1 Proposal to update the 2006 IUCN publication Alien species in Aquaculture (Hewitt *et al.*, 2006) - Considerations for responsible use including checklists/ guidelines for Governments to consider while taking decisions to allow importation of alien aquatic species that could be potentially invasive.

2.2 Develop Global Guidelines for the management and eradication of aquatic alien species including a compendium of best practice of management of aquatic invasive plant species and invasive freshwater fish species, including use of hazardous chemicals or poisons.

3. Activities to support conservation and management action, through evidence based case studies

3.1 A dedicated effort to present the Conservation Evidence programme⁵, evidence based case studies (for e.g. the widespread introduction of Nile tilapia *Oreochromis niloticus*) that demonstrate the combined ecological and economic cost of the introduction of commercially important species.

Summary of workshop discussions

There is a need to quantify the global and regional impacts of invasive alien species.

An important part of this process will be to approach the trade sectors who are the drivers of invasive alien species and to develop discussions with them, and highlight the need for better regulation of activities that may result in introduction of invasive species.

Projects should focus on:

- how to change policy
- promoting good practice; eg. producing best practice guidelines for local retailers and international trade
- seeking native alternatives to commercially promoting invasive alien species; for example, develop programs to engage with traditional and sustainable fisheries, rather than developing introduced fisheries
- promoting success stories; building up the evidence base (case studies, success stories, etc.) to strengthen communications and to feed into policy; use these success stories to develop guidelines for protocols to apply elsewhere.
- the second order effects of freshwater invasive species (for example, when pesticides are used to eradicate invasive species; what are the consequent pollution effects; compare the positive or negative ecosystem changes that result from invasive alien species and their subsequent management)

⁵ Conservation Evidence: ConservationEvidence.com: providing evidence to support decisions about nature conservation

<http://www.conservationevidence.com/>

It will be important to work with governments, international development organizations, multi-national banks etc., e.g., identifying alternatives for local communities and aquaculture, ensuring appropriate checks are in place).

It is recommended that we develop projects with regional focuses:

- Small islands are ideal project sites since the impacts of invasive species are often extreme, but because they are spatially small and isolated, they are easier to manage and represent good case study sites for testing methods.
- Identify a country where there is a GEF allocation that could help support the work, such as African island state)
- Florida was recommended as a study site. It is a critical region for the impacts of invasive species on freshwater ecosystems. State level jurisdiction exists for invasive species control. It will be important to identify the right level of stakeholders who will benefit from the work.
- Possible develop an Action Task Force for eradication of invasive species in management areas (e.g., islands, as discussed above).

Mitigation and eradication projects will be very important (for example, projects that focus on targeted control; or look at how native species can adapt to the presence of invasive species). But it will also be important to study prevention of invasive species introduction, compared to subsequent management and mitigation.

Other suggestions for projects included:

- Develop flyway level assessments of invasive alien species, for relevance to migratory species
- Study the impact of invasive species of ecosystem function (potential for collaboration with the IUCN Commission on Ecosystem Management)

It will also be important to prepare a Motion for a Resolution, Recommendation, Expression of Opinion etc. to be presented at the World Conservation Congress; perhaps a motion to develop a standardized process for quantifying the effects of invasive species.

References

- Genovesi P., Carnevali L., and Scalera R. (2015). The impact of invasive alien species on native threatened species in Europe. ISPRA M ISSG, Rome. Technical report for the European Commission. Pp. 18.
- Hewitt, C. L., Campbell, M. L., and Gollasch, S. (2006) Alien Species in Aquaculture. Considerations for responsible use. IUCN, Gland, Switzerland and Cambridge, UK. Viii +32 pp. <https://portals.iucn.org/library/efiles/documents/2006-036.pdf>

IUCN SSC Leaders' Meeting, Abu Dhabi.

Workshop on Guidelines on Recreational Fishing as a Conservation Tool. September 18.

Ian Harrison

FFSG Technical Officer

Session Moderator: Pete Rand

The session provided an opportunity to discuss the Guidelines document being drafted by IUCN-SSC, which has also been circulated to various members of FFSG for review. Guidelines focus on recommendations for **threatened** fishes (by IUCN or other national listing processes).

The users of the Guidelines should be defined. It was suggested that the Guidelines should be written as a Situation Analysis document, which could then be applied to help decision making for different scenarios of recreational fishing.

It was recommended that freshwater and marine issues are each complex and must be treated independently. In freshwater cases it is important for the fishermen to implement the recommendations on their own volition; so the guidelines should be developed and implemented in collaboration with them. For example, the document could be developed as a Situation Analysis (as discussed above) and distilled into a set of simple but effective messages.

Catch and release guidelines will be a quick, initial, potential opportunity as a 'right answer' to sustainability. However, the Situation Analysis should not be a way of simply approving catch & release; instead, it should be a mechanism for examining how and when to apply catch & release.

It is important to carefully account for the biology of individual species being considered and provide guidelines specific to the species' biology, rather than assigning a general prescriptive set of guidelines. Hence, any management plan must be backed by biological studies.

In the Red List categories of threats, 'recreational activities' is listed under 6.1; but Red Listers might not be aware of that and be more likely to list recreational fishing under hunting. For some species (e.g., sharks), the listing of the threat tends to be included in the text and not scored against a category. So it is important to do a careful check of all possible threat categories and text when looking for species in the Red List that are noted as threatened by recreational fishing.

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World Conservation Congress 2016

Save the date for the next World Conservation Congress – 1-10 September, 2016

The next IUCN World Conservation Congress will take place in Hawai'i, USA, from 1 to 10 September 2016.

Events at the Forum are varied and include Workshops, training and capacity-building sessions at the Conservation Campus, Posters and Knowledge Café sessions. It is a great platform to meet and discuss with like-minded people. So if you would like to engage and inspire others, this is your opportunity to do so!

Visit the Congress Website for the latest updates and information about the Congress
<http://www.iucnworldconservationcongress.org/>.



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Photo by Tom Myers, Courtesy of the Sacramento Convention and Visitors Bureau

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RUNNING ON EMPTY

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Running on Empty: Increasing Demands on Freshwater Resources in the Face of a Changing Climate

In many regions of the developed and developing world, large human populations live in arid environments that out of necessity depend on scarce or imported water. This is certainly true in California and the Western US where a complex infrastructure of dams, canals, and groundwater extraction provide freshwater for some of the world's most productive farms and some of the world's most opulent living conditions. Compounding this insatiable demand for freshwater is the effects that variable environmental conditions of a warming climate, changing precipitation, and increasing frequency and severity of droughts have on over-taxed water supplies.

While water resource managers contemplate these issues, the farms and cities keep consuming, despite dwindling supplies. The 2016 meeting of the Society for Freshwater Science will be held in Sacramento California at a time when the State is experiencing the worst drought in its modern history. Although droughts are not uncommon in the Western US and other semi-arid regions of the world, expanding human populations have accelerated the loss of freshwater resources and the impacts to aquatic organisms. The theme of the 2016 meeting of the Society for Freshwater Science will focus on declining freshwater availability and explore issues of freshwater depletion, the consequences for freshwater ecosystems, and potential solutions.

To register for the Society for Freshwater Science Meeting go to:

<http://sfsannualmeeting.org/>



VI Iberian Congress of Ichthyology

'Ichthyology: dedication to marine fish, freshwater fish and aquaculture'

The Iberian Society of Ichthyology congresses are celebrated every two years, to address scientific and management challenges relates to different aspects of Ichthyology.

The forthcoming edition of the Iberian congress aims at creating a meeting point between conservationists, researchers and managers working with marine fishes, freshwater fishes and aquaculture.

When: 21-24 June, 2016

Where: Auditorium and Congress Centre Victor Villegas, Murcia, Spain

For more information, please visit <http://www.um.es/sibic6/en/presentation/>



SIBIC2016

VI CONGRESO IBÉRICO
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Ichthyology: dedication to marine fish, freshwater fish and aquaculture

NEXT ISSUE OF 'SAVING FRESHWATER FISHES AND HABITATS'

Do you want to share news from your freshwater fish conservation project with a global audience? Are you doing fascinating research or organising an exciting event? Well, the FFSG Newsletter could be the perfect way to tell your story!

The deadline for submitting material for the next issue is 15th February 2016.

If you have any questions or if you want to submit material, please email info@iucnffsg.org



The Freshwater Fish Specialist Group is generously supported by IUCN's Species Survival Commission, Wetlands International, the New England Aquarium, and the Zoological Society of London.

Doring River, Western Cape,
South Africa © Bruce Paxton

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