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### Assessment of freshwater fish diversity and ecology: Azerbaijan-Russian joint expedition 2008, Nina Bogutskaya, Regional Co-ordinator - North Asia

FFSG member Nina Bogutskaya was recently awarded funding support from NEZS Chester Zoo's Conservation and Research grant for her project to assess freshwater fish diversity and ecology from Eastern Ciscaucasia (Dagestan, Russia) and Eastern Transcaucasia (Azerbaijan).



The eastern Ciscaucasia region incorporates rivers of the Western Caspian coast and small rivers in Azerbaijan to the north of the Main Caucasus Ridge. Main rivers in this area include the Kuma, Terek, Sulak, and Samur. Although primary freshwater fish diversity is relatively low in this region (17 species) there is a high percentage (47%) of endemics. The eastern Transcaucasia region encompasses the whole Kura-Aras catchment and rivers of the Caspian Sea in south-eastern Azerbaijan, and lower reaches of rivers (Kyzyluzen eastward to the Taran River). Primary freshwater fish diversity is greater in this region (34 species).

The objective of the project was to collect new data on the taxonomy, distribution ecology, abundance and conservation status of freshwater fishes in these two major ecoregions. Nina and her team visited a total of 48 sites, concentrating mainly on the Samur River drainage in Dagestan, rivers of the Akstafa district in western Azerbaijan and rivers of the karstic region in north-western Azerbaijan and Lenkoran district.

In eastern Ciscaucasia, Dagestan, the team focused particularly on endemic fishes, including *Barbus ciscaucasicus*, *Chondrostoma oxyrhynchum*, *Gobio holurus*, *Romanogobio macropterus* and *Sabanejewia caucasica* to name but a few. Species were found to be relatively abundant in areas of appropriate habitat, and a number of specimens of all species were collected for morphological examinations. Molecular analyses were also carried out in order to clarify taxonomic status for some species. Generally, the status of rivers in this ecoregion were considered relatively good except for in their lower reaches, which are heavily dammed, canalised and transformed into irrigational canals. Although not a focus of this study, it was noted that fishes would not be able to migrate up river from the Caspian Sea to spawn.

The Kura river drainage in eastern Transcaucasia, Azerbaijan, is a huge area (188000km<sup>2</sup>) and could not be explored entirely in the scope of this project. The middle and lower reaches of the Kura River flow through extensive arid lowlands, and few tributaries reach it. Almost no native fishes were found in the locations visited in this area, however only two non-native species *Carassius gibelio* and *Pseudorasbora parva* were abundant. Local fishermen reported an obvious decline in river fisheries, for example they now only register a few individuals of the Caspian migratory barbs at the formerly renowned Bank Fishery. The state of the Kura River system and the rivers of the Lenkoran' District were considered much poorer compared to

the rivers and streams in eastern Ciscaucasia. In a number of localities, the research team found no fish at all.

The abundance of fishes in piedmont and montane sections of the rivers was considered much higher than in the lowlands. The research team found numerous endemic species including *Acanthalburnus microlepis*, *Alburnus filippii*, *Barbus mursa*, *Capoeta capoeta* and *Chondrostoma cyri*.

In Azerbaijan, the researchers focused on the only two locally endemic species - *Pseudophoxinus sojuchbulagi* and *Pseudophoxinus atropatenus*, which are only known from their original descriptions.



The team spent ten days travelling around the Akstafa District searching for *P. sojuchbulagi*. This species was known to

occur in a spring called Sojuch Bulag (“cold springs”). Five such “bulags” were located, including those on the territory of the Karayazy Nature Reserve but no *P. sojuchbulagi* were found. The original description of this species was based on materials collected in 1948-1949. This area has since been developed and now contains a network of irrigation canals, which have notably changed the entire hydrography of the region. Additionally, cattle husbandry is now very intensive, and the springs appear considerably modified. Further extensive searching is necessary to confirm whether



or not this species is extinct.

The research team was luckier with the second focal species, *Pseudophoxinus atropatenus*,

finding specimens in two springs. External examination confirmed its assignment to the genus *Pseudophoxinus* rather than *Rutilus*. This fish was very numerous and the team captured 60 specimens using hook-and-line in approximately one hour.



Collected specimens are being sent to the Zoological Institute, St. Petersburg and the Institute of Zoology in Baku. Tissue samples were also sent to a number of molecular geneticists for collaborative research.

Nina and her fellow researchers are compiling preliminary annotated lists of freshwater fishes of Dagestan and Azerbaijan. They are also preparing a paper on the re-description of *Pseudophoxinus atropatenus* for publication and Nina will present this expedition and its results in more detail at the next FFSG meeting.

### Central Africa freshwater fish biodiversity workshop, IUCN Freshwater Biodiversity Unit

With funding from the Ecosystem Grants Programme of the IUCN National Committee for the Netherlands, FFSG experts assisted fish scientists from across the Central Africa region in a workshop held recently in Yaoundé to assess the conservation status of freshwater fish from the Congo and Lower Guinea regions.

The workshop was part of a 5-year project funded by the European Commission and coordinated by the Freshwater Biodiversity Unit of the

IUCN Species Programme. Its aim was to provide briefings on key issues in conservation across West and Central Africa, train-up those unfamiliar with the assessment process and to peer-review species conservation assessments for every species of freshwater fish, mollusc, odonate, and selected aquatic plants and crabs from the Central Africa region (Lower Guinea basins and the Congo drainage). This included evaluating their IUCN Red List status and mapping their distribution for submission to the IUCN Red List.



Workshop participants included 15 freshwater fish experts from the Democratic Republic of Congo, Central African Republic, Cameroon, Zambia, USA, Belgium and the UK; including Gordon McGregor Reid, Chair of the FFSG and FFSG members Will Darwall, Kevin Smith, Melanie Stiasny, Jos Snoeks and Paul Skelton (pictured in group photo, above).

There were approximately 1,300 fish species to assess – the highest species richness for any of the African regions. Not all assessments were finalised during the workshop, however excellent threat information was collated for all of the threatened species and their distributions were modified. All outstanding species assessments will be completed via e-mail correspondence.

Workshop participants identified many threats to freshwater fishes within the Central African region

including existing dams, the construction of new dams, mining, urbanisation, varying intensities of agriculture, slash and burn agriculture (mainly in densely populated areas, overfishing, hydrocarbon and industrial pollution and war (eastern Congo basin).



### **Cryopreservation and cryo-banking of somatic cells, gametes and embryos of fish, Professor David Rawson, FFSG Special Advisor - Fish Banking**

In June 2008 Gordon McGregor Reid and Professor David Rawson joined other experts at the *International Workshop on BioBanks – Perspectives and Possibilities for Wildlife Conservation*, in Trier, Germany. Gordon gave a presentation on the Frozen Ark Project (<http://www.frozenark.org/>) of which he is a Trustee and David gave the following presentation on cryopreservation of fish:

In 2006 the IUCN identified 232 species of ray-finned fish as being Critically Endangered, a rise of 65% in the period 1996 – 2006. Whilst these figures are already alarming they are also thought to be an under-estimation of the size of the problem. The urgency of the situation is well demonstrated by the collapse of Lake Victoria Cichlids.

Over 400 species evolved from only 5 species of ancestor over a period of 14,000 years, but following the introduction of the Nile perch (*Lates niloticus*) in the 1950s the number of cichlid species fell to below 200, and the fish biomass fell from 80% cichlid to 1% during the 1980s.

The collapse of fish numbers and species has started to focus attention on the benefits that cryo-banking and cryo-conservation could bring. Zoos and aquaria around the world hold valuable collections of fish that are endangered or even extinct in the wild, and The Frozen Ark is starting to cryo-bank material from these sources. In the vast majority of cases, access to such material will be opportunistic, depending upon material from fish that have been

euthanised or are recent /fresh mortalities, and specimens that can be taken when veterinary interventions are required. In addition to material held in such collections, collaborations with conservationist, fisheries and survey vessels are also being developed with a view to sample collection in the field. Currently the focus is on the establishment of somatic cell line cultures from fin tissues, and in the case of euthanized fish, gill and muscle explants.

There are two possible approaches to viable cell banking: (i) retention of viable cells in cryopreserved tissue samples in the hope that on recovery from liquid nitrogen storage the explant can give rise to cell lines in culture; and (ii) the establishment of cell lines in culture from sample tissue prior to cryopreservation, the most attractive option. Fish cell lines can be established and maintained, both in 'continuous' culture and as cryopreserved specimens, however, different species bring new challenges and bacterial contamination, in particular mycobacterial infections by *M. fortuitum*, *M. marinum*, have to be overcome.

Generic protocols for initial handling and storage of somatic cells and tissue samples have been identified, to allow short-term 'holding' at temperatures in the range 4 to -20°C, prior to



cryopreservation in liquid nitrogen. These procedures will enable both DNA and protein sample banking, and more significantly provide material in a state that

may allow cell cultures to be raised from explants and the subsequent cryopreservation of these viable cell lines.

Whilst the somatic cells and sperm of fish can be successfully cryopreserved, research is also underway to develop protocols for ovarian tissue, mature oocytes and embryos, none of which have yet been successfully cryopreserved. The ability to cryo-bank both male and female gametes and early embryos would be a major break-through in fish cryobiology and have significant implications for the cryo-conservation of endangered fish species.

Primary collections of fish material from UK sources will be stored at -80°C or -196°C in dedicated facilities at three locations - the Natural History Museum, London; Institute of Zoology, Zoological Society of London; and the cryo-facility at LIRANS, University of Bedfordshire. Frozen Ark cryo-banks are planned for key locations around the globe, enabling regional species to be held, using standard cryo-protocols and banking procedures.

### In the news – British angler catches rare giant freshwater stingray

'A British angler has caught a rare giant freshwater stingray - possibly the largest freshwater fish species in the world - during a visit to Thailand's remote rivers. Ian Welch and four colleagues spent 45 minutes battling the 6ft wide and 14ft long fish, which was too big to weigh but was estimated to be about 23 stones.

"When we got it to the surface I could not comprehend that something that size existed," said Mr Welch, 45, a doctor in freshwater biology, from Aldershot, Hants. "It was as big as a snooker table." It "bent over double" and the boat moved around in circles as he reeled it in.

After bringing it to the surface the party towed it to



the shore to measure it before releasing it back into the Maeklong River. The Giant Freshwater Stingray is listed as a vulnerable species on the International Union for Conservation of Nature's

Red List. However, a number of recent catches have been reported in rarely explored parts of the river systems in Thailand, prompting anglers to believe the population is thriving’.



**A note of caution from the IUCN Shark Specialist Group:**

The giant freshwater stingray *Himantura chaophraya* is globally assessed as Vulnerable, with the main threats to the species being habitat alteration and destruction and directed and bycatch fisheries.

Australian sub-populations are thought to be in a favorable status. However, there are concerns for this species outside of Australia and a sub-population assessment exists for Thailand where this species is assessed as Critically Endangered. In areas outside of Australia, large rivers are often very heavily fished, particularly in the dry season when the rivers are easier to navigate and fish, and stingrays are most vulnerable.

While these giant stingrays are possibly able to move between rivers during the wet season, when there are very large areas of brackish water around estuaries, we don't know whether they can enter

seawater or how much opportunity there is now (when estuaries are often degraded) for exchange and/or recolonisation between rivers. These possibly isolated subpopulations may be extremely vulnerable to extirpation.

Last year 20 giant stingrays were reported to have suffered mortality due to eutrophication in the Bangpakong River, east of Bangkok. As for many other elasmobranchs, the life history strategies of these huge species (including the production of very few offspring) make them intrinsically susceptible and slow to recover from population depletion. Incidents such as these could therefore have a major impact, particularly if they affect all or most of the sub-population.

Furthermore, increased media interest in the occurrence and capture of the giant stingray perhaps give the impression that it is becoming more abundant. However people often have a tendency to confuse large unit size with actual abundance of animals.

This species is due to be re-assessed for the IUCN Red List next year, but in order for the conservation status of this species to improve, the development and implementation of collaborative species and habitat management is urgently required.

### Expo 2008 – the World's biggest water festival



The Bureau of International Expositions is holding Expo Zaragoza 2008 – the World's biggest water festival.

(the transparent, 76m tall Water Tower), the expo will also boast the 'largest freshwater aquarium in Europe'.

The aquarium will feature 300 species of fish and other animals from different rivers around the world in more than 60 tanks or terrariums.

This event is taking place in Saragossa, Spain until 14<sup>th</sup> September, with the main theme being 'Water and Sustainable Development'.

Featuring buildings designed by Zaha Hadid (the Bridge Pavilion, which is expected to be turned into a museum after the event) and Enrique de Teresa

More than 100 countries are expected to participate in the expo, which is estimated to generate 135m euros (£106m) in admission fees alone. More information is available on the Expo 2008 website at: [http://www.expozaragoza2008.es/Home/seccion=3&idioma=en\\_GB.do](http://www.expozaragoza2008.es/Home/seccion=3&idioma=en_GB.do)

