

EXECUTIVE SUMMARY

The Executive Committee of South Africa's national Yellowfish Working Group (YWG) recommended in 2006 that a status report be compiled for the nine "yellowfishes" that are the focus of the Group's activities. These species include six true yellowfishes (*Labeobarbus* spp.) and three large *Barbus* species (*B. andrewi*, *B. rapax* and *B. serra*) that closely resemble yellowfishes. The Committee further recommended that two reports be produced: a popular report for the layman (e.g. anglers, riparian land-owners) and a technical report, aimed at scientists and conservation staff, that would provide comprehensive and updated information on the status of the nine species. Funding was needed to produce such reports, and the Water Research Commission approved an application, managed by the Federation of Southern African Flyfishers (FOSAF), in 2006. The popular report was released at the annual conference of the YWG in April 2007.

Why is it necessary to produce a national status report on yellowfishes? There are several compelling reasons. First, the yellowfishes are, arguably, the most popular indigenous freshwater fishes caught by anglers across the country, and hence support valuable and growing recreational and subsistence fisheries. Second, yellowfishes are valuable indicators of aquatic ecosystem health, as they require rivers and dams that have diverse habitat, good water quality and few or no alien fishes and plants. They thrive in rivers that have a near natural flow regime. Being charismatic to anglers and good ecological indicators, they are possibly our best flagship species for aquatic ecosystems. Third, three of the nine species are threatened, including two that are endangered (Berg-Breede whitefish *Barbus andrewi* Barnard, 1937 and Clanwilliam sawfin *Barbus serra* Peters, 1864). Finally, several yellowfish species have been translocated by inter-basin water transfer schemes (IBWTS) and through stockings into new waters where they are now invasive and likely to become an ecological problem.

The technical report comprises 11 chapters, with an introduction followed by nine species accounts and a final chapter on invasive alien yellowfishes in South Africa. Ichthyologists and conservation officials who have a sound knowledge of the biology, ecology and management of yellowfishes in southern Africa have written the various chapters. The report concludes with an appendix containing the most comprehensive list of yellowfish reference material available.

The introductory chapter on yellowfishes highlights that they are widely distributed and endemic to Africa and constitute a lineage of about 80 large cyprinid fish species with several well-defined traits and characteristics. The taxonomy of southern African yellowfishes is rather confusing and has, over the years, changed considerably with 30 species being described in the early 1900s. Today, only six South African species are considered valid.

The most outstanding feature of the African yellowfish lineage is the very high number (about 150 – a hexaploid or six-fold condition) of cell chromosomes. Most other African cyprinids have around 50 chromosomes (the normal or diploid state) in each cell. Southern Africa has two groups of yellowfish, described as large-scale and small-scale forms. Of the six true yellowfish species described in this report, five are small-scaled and one large-scaled. At present the relationship between these groups is uncertain, because forms also exist elsewhere in Africa.

The physical features of yellowfishes include their relatively large size, fusiform bodies, parallel striations on scales, and short-based fins that include a dorsal fin with a simple (i.e. not serrated) usually bony and spiny anterior ray. Yellowfishes show little sexual dimorphism with both sexes in many species tending to turn deep brazen gold or yellow when breeding, and they develop small pimple-like nuptial tubercles on the head and sometimes all over the body.

There are three other large barbine cyprinids in southern Africa that are covered in this report, but these are not true yellowfish. None of these other species have 150 chromosomes, and they also differ in several essential morphological features. *Barbus andrewi* and *B. serra* are tetraploid cyprinids with about 100 chromosomes, a feature which is shared with the Western Cape's redfin minnows and all European *Barbus*. They have a serrated dorsal fin spine and the head shape with its pointed snout differs from that of the yellowfishes. These two species seem to be more closely related to some of the smaller redfin minnows than to yellowfish. The papermouth *Barbus rapax* Steindachner, 1894 also has a serrated dorsal fin spine but is a "diploid" species with 50 chromosomes and is related to other African barbs. The chapters on the nine species are divided into sections on distribution and conservation status, status of habitats, biology and ecology, threats, conservation management and yellowfish utilisation.

An assessment of the conservation status shows that three of the nine species are threatened. The conservation status of South African fishes was revised in 2006 using the most recent IUCN criteria. The three threatened species include two Endangered species, namely *B. andrewi* and *B. serra*, and one Vulnerable species, the Clanwilliam yellowfish *Labeobarbus capensis* (A. Smith, 1841). *Barbus andrewi* is the first "yellowfish" to have become locally extinct in an entire river system; notably in the Berg River System in the mid 1990s due to a combination of threats. The Orange-Vaal largemouth yellowfish *Labeobarbus kimberleyensis* (Gilchrist & Thompson, 1913) has been listed as Near Threatened, because of flow modifications and impaired water quality in parts of its distribution range.

The natural distribution of the nine species varies markedly, with some species restricted to a single river system, whereas others are widely distributed across several river systems and provinces. The current distribution of the three threatened species has

become even more restricted, due to major declines in distribution range as a consequence of local extirpation by invasive alien predatory fishes. The most naturally restricted species are those of the Western Cape, namely *B. serra* and *L. capensis*, which are endemic to the Olifants-Doring River System and *B. andrewi* which is only found in the Berg and Breede River systems. At present, healthy recruiting populations of each species occupy less than 20 percent of their original distribution range. *Barbus andrewi*, is even more restricted, due to the severe impacts of invasive alien fishes, with healthy recruiting populations only present in a few dams in the Breede catchment. The species became extinct in the Berg River in the 1990s. Two other yellowfishes (*Labeobarbus aeneus* [Burchell, 1822] and *L. kimberleyensis*) are also naturally restricted to a single river system, the Orange-Vaal, but are widespread across a huge area because this extremely large catchment covers more than half of South Africa. The former species has also been translocated extensively across South Africa, due to IBWTS and stocking programmes several decades ago. The remaining yellowfish species and *B. rapax* are found in many river systems and, like *L. aeneus* and *L. kimberleyensis*, are widespread and still relatively abundant.

The biology and ecology of the nine species reveals that they are primarily river dwellers, with a preference for large rivers with diverse habitat, natural fast flows and good water quality. However, all species are relatively adaptable and appear to thrive in impoundments, provided that spawning habitat is available in the dam or inflowing rivers. The chapter on northern smallscale yellowfish *Labeobarbus polylepis* Boulenger, 1907 shows that some species have fairly specific life history and spawning requirements. This has important implications for the design and operation of dams in rivers with indigenous yellowfish populations. Another common feature of the nine 'yellowfishes' is that they are slow growing and long-lived. The slow growth rate, especially of Western Cape species, makes juveniles particularly vulnerable to predation by faster growing alien fishes such as smallmouth bass *Micropterus dolomieu* (Lacepède, 1802). Trophy yellowfishes are probably between 10 and 20 years old and, in order to reach that size, anglers need to release captured fishes, even large specimens.

It is clear that there still are substantial gaps in our knowledge of the nine 'yellowfishes' – for some species such as *B. andrewi* there is a general lack of scientific knowledge whereas with others we do not know enough of specific matters such as spawning requirements, age and growth, diet, and detailed habitat requirements.

Threats to yellowfishes are numerous and varied. The most threatened species are all in the Western and Northern Cape – namely *B. andrewi* in the Berg and Breede River systems and *B. serra* and *L. capensis* in the Olifants-Doring River System. These fishes have experienced huge declines in their distribution ranges and population densities since the 1930s – invasive alien fishes have been the major cause of this decline but water

abstraction from rivers, in-stream dams, and to a lesser extent, invasive alien plants and water pollution have all contributed significantly.

The other six species, although more widespread and abundant, are also under growing pressure from man-made impacts. For the northern and eastern species, the key threats are deteriorating water quality (often due to poorly managed or inadequate water-treatment works), illegal harvesting by subsistence fishers (primarily by netting) and IBWTS which have translocated yellowfishes into new areas causing new ecological problems, including the potential for hybridisation with locally occurring yellowfishes. *Barbus rapax* and *L. kimberleyensis*, in particular, are severely affected. In addition, several sub-populations of the remaining species are in decline. Until we have a clear understanding of the intraspecific genetic differences of each species, we cannot afford to lose yellowfish populations in any river, as they may be genetically unique. Many conservationists have expressed particular concern that as yellowfishes become increasingly popular with anglers and riparian landowners, they will be illegally introduced into new waters and cause ecological damage. The chapter on alien yellowfishes highlights the various yellowfish translocations that have taken place, mostly through IBWTS and officially sanctioned stockings several decades ago. Introduced yellow-fishes have usually thrived in their new waters and, being large omnivores, may have disturbed the local ecology significantly. Little research has taken place to quantify this phenomenon or the possible hybridisation with native populations.

The growing interest in yellowfishes, led by the concerted efforts of the YWG, has had major positive spin-offs for river conservation through the establishment of dedicated yellowfish conservancies. The Orange-Vaal River Yellowfish Conservation and Management Association, established in 1996, have 749 members and manage the river from Vaal Dam to Bloemhof Dam, a river distance of nearly 700 km. A similar conservancy has been set up on the Elands River in Mpumalanga below Waterval-Boven. In the Western Cape, the Greater Cederberg Biodiversity Corridor, has been recently established as part of the Cape Action for People and the Environment (CAPE) to improve conservation of the wider Cederberg area, including the critically important Olifants-Doring River System. Angling groups have enthusiastically embraced efforts to improve management of yellowfishes and associated habitat. These include FOSAF, Fly Castaways, Cape Piscatorial Society and the bait and artificial-lure angling sectors. Angling groups are pressurising government to harmonise legislation affecting yellowfishes so that there are no differences across provincial boundaries. Latest proposals include a no-keep catch approach to *B. andrewi*, *B. serra*, *L. capensis* and *L. kimberleyensis* and a daily catch limit of two fish per day of 30 to 50 cm for the more common species. Anglers also want a national freshwater fishing licence, the income from which will be used to improve management of inland fisheries across the country.

Key concerns relating to yellowfish management are the inadequate resources allocated to freshwater fish conservation and river health management across the country – some provincial conservation authorities do not even have a dedicated freshwater aquatic scientist. Most conservation authorities employ less than three persons, surely too few for the requirements of sound river and fishery management. The Department of Water Affairs and Forestry also has major capacity constraints at present; these may be overcome once Catchment Management Agencies are fully operational. The lack of adequate funding for freshwater fish monitoring and research work is also a major concern. This issue could be overcome through a dedicated national freshwater angling fund.

Angling for yellowfish will continue to grow in popularity and, with adequate resources and skills devoted to their management, these fishes can sustain very valuable recreational and subsistence fisheries across South Africa. Sound management depends on good information that is based on facts and the input of experts. It is hoped that current and future stakeholders in yellowfish management will read and be guided by the contents of this report.