

FOSAF

THE FEDERATION OF SOUTHERN AFRICAN FLYFISHERS

PROCEEDINGS OF THE
9TH YELLOWFISH WORKING GROUP
CONFERENCE

ELGRO RIVER LODGE, POTCHEFSTROOM
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Edited by Peter Arderne

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PRESS RELEASE FOR THE CONFERENCE: “WATER, WATER EVERYWHERE NOR ANY
A DROP TO DRINK”.

These were the words of Samuel Taylor Coleridge in his poem, *The Ryme of the Ancient Mariner*. Could this be where South Africa is heading?

In April the report, *The National Spatial Biodiversity Assessment*, was released by the National Biodiversity Institute in Pretoria. A frightening 82% of our rivers are “threatened” of which 42% are “critically threatened”. Many of our 259 estuaries are in a bad way and only 14% are protected. Of our marine biozones 65% are “threatened” with 12% “critically threatened”. This is hardly surprising when seen against the background that many of our provinces do not employ an aquatic scientist at their nature conservation agencies. The resource directed measures component at DWAF, which focuses on river health issues, is also under-staffed.

Good quality water is a basic requirement of all life on this planet yet we have become hardened to regular reports of industrial and other pollution such as raw sewage being pumped into our rivers with no action or reaction by the authorities. We have good environmental laws, but lack the capacity and commitment by the authorities to handle pollution reports made by NGO’s and the public and then to enforce the law. The problem is that the ‘buck’ stops nowhere. Complaints are often referred from one authority to the next until the complainants give up in disgust. Do we not need ‘Water Scorpions’ where government will fund the costs of taking legal action against polluters, irrespective of who they are?

The Yellowfish Working Group held its 9th Annual Conference at Elgro Lodge on the Vaal River on 8 – 10 April. The theme was “Conservation issues surrounding our freshwater fishes”. All the nature conservation departments, organised angling groups and the University of Pretoria made presentations. There was a paper on the extinction of the endangered witvis in the Western Cape’s Berg River system and Dr Gert Willemse of DEAT spoke about the new Biodiversity Act. All presenters echoed disturbing reports on the deteriorating quality of our rivers.

The conference concluded that we have adequate environmental laws but lack the capacity and commitment to support and enforce them. Water quality and quantity should receive the highest priority by government. They should appoint one entity to accept and react upon pollution and other environmental complaints, and should maintain an incident register with appropriate follow-up, which should be available to public scrutiny.

Each provincial nature conservation agency should employ aquatic scientists, and each province should have a well-funded and competent River Health team who will report back publicly (YWG conference could be the vehicle) on progress made and plans for the future. Anglers have a vested interest in water and should be educated to assist the authorities in reporting transgressions of the law.

The Proceedings, which are again being sponsored by Sappi, should be available to delegates by June this year. Copies will be on sale to all interested parties from the FOSAF office (contact 011 4675992 or email fosaf@icon.co.za.) Alternatively zipped copies will be emailed free of charge by the YWG secretary at mwardern@mweb.co.za or you can download from the website www.fosaf.co.za from June onwards.

CHAIRMAN'S ADDRESS

Welcome to the 9th YWG Conference and a particularly warm welcome to newcomers.

The YWG is a unique organisation which is an offshoot of the "Trout 94" Conference. Provincial nature conservators, government agencies, academics, industry, recreational anglers and organized angling from all facets enthusiastically support the group. We have over 230 members with whom we regularly correspond by email. An executive committee comprising a broad cross section of members independently manages the group. The YWG Scientific Advisory Panel headed by Dr Wynand Vlok, which is made up of many of the top aquatic scientists in S.A. also supports us.

The highlight of the year is always our National YWG Conference which creates a platform where presenters and delegates from this broad interest group can interface and discuss the affairs of State. Our theme this year is "Conservation issues surrounding our freshwater fishes" and we are pleased that organized angling groups are well represented. We have an interesting programme lined up which will allow delegates to debate important issues and make recommendations, which will be forwarded, to the executive for ratification and implementation. Proceedings will be produced at the end of the conference and interested parties may access them through the secretariat, including the proceedings of earlier conferences. These proceedings are a proud record of our deliberations and achievements.

Anglers, both competitive and recreational, and their supporting infrastructure and facilities are perhaps the most important and influential user group of our freshwater systems. They have a vested interest in our water systems; have large numbers with considerable influence and significant financial resources. They have the capacity to support and help enforce legislation if they were to be motivated by genuine consultation by legislators and government departments. However anglers and angling groups, together with many other stakeholders are custodians of the environment and with this responsibility comes a duty of care and commitment to act within the spirit and limits of the law.

One of the controversial issues is the application of licence fees. I ask the question "Should angling fees not be channelled back into angling resources?" These funds would be sufficient to fund a National Fresh Water Fisheries Dept that would make all the difference in co-ordinating activities, investing in R&D and managing our resources in a sustainable and wise manner. This will also make a huge difference to the protection of the environment and biodiversity. Is it not time to rethink the issue and look at the big picture?

The most important activity of the YWG is the work carried out on the ground by the provincial conservation departments, the YWG chapters and river conservancies. I always look forward to their reports and plans for the future.

We owe a debt of gratitude to FOSAF for once again funding our basic needs and providing the logistic support for the YWG to operate. Much of FOSAF funding is derived from profits from the sale of the biennial Nedbank Guide to Flyfishing in S.A. The exciting new 5th edition hit the bookshelves in November 2004. Thank you Nedbank. AngloGold Ashanti have been generous in their funding of the pilot genetic study of the Vaal/Orange River yellowfish species which will reach conclusion soon. AngloGold Ashanti's contribution is much appreciated.

SAPPI will again contribute towards the printing and distribution of the Conference Proceedings and they will be funding the long awaited Yellowfish Poster towards the end of the year. Thank you SAPPI.

Without the enthusiasm and energies of our Executive Committee and the unrelenting drive of a few individuals we would not be entering our centenary year and growing stronger by the day. Your contribution is invaluable and appreciated by the executive and members of the YWG.

Dean Impson and Pierre De Villiers assisted by FOSAF attended the 4th International Fisheries Conference in Vancouver, Canada last year and presented a Poster on the work of the YWG. This resulted in Pierre being invited to give a talk to the Nature Conservancy in Washington DC and to present a paper to the American Museum of Natural History in New York at a conference titled “New Currents in Conserving Freshwater Systems” Pierre’s paper is titled “A bottom up approach to the conservation of freshwater biodiversity in the Orange/Vaal River system”. The papers of 30 presenters will be collated and distributed internationally to promote interest in protection of Biodiversity. This is tacit recognition of Pierre’s dedication and contribution to Yellowfish Conservation.

I trust that this conference will be both enjoyable and fruitful.

Regards

Bill Mincher

THE ORIGINS OF THE VREDEFORT DOME

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The Vredefort Structure, known as the Vredefort Dome, is located approximately 100 km southwest of Johannesburg. It is a natural feature consisting of a semicircular series of ridges of Precambrian geological strata, surrounding a central flat area consisting of Archaean granitic basement. It is now generally accepted as the oldest, and a giant amongst the large astroblemes or meteorite impact sites of the world. Some 130 crater structures of possible or probable impact origin have now been identified worldwide. Most of them however are rather small.

Similar structures have been identified in the solar system, such as Orientale on the hidden side of the moon, Lise Meltner on Venus, Caloris on Mercury and Hellas on Mars.

The three largest of the structures on earth are:

- The Sudbury Structure in Canada is believed to have measured 200 km in diameter. Although deeply eroded traces of possible rings were found here, these still have to be mapped and positively identified. The Sudbury Structure is believed to be approximately 1 850 million years old.
- The Chicxulub Structure on the Yucatan Peninsula in Mexico, also measures approximately 200 km across. This structure lies buried under thousands of metres of sediments and is only known from geophysics. The age of this structure is 65 million years. The event of an asteroid striking the earth at that particular time in the earth's history is considered to be the catastrophe, which led to the mass extinction of the dinosaurs.
- The Vredefort Structure possibly had an original crater exceeding 200 km in diameter, as the diameter of the remnants of the thrust nappe rings, as exposed by erosion, is approximately 240 km. The concentric folding of basement rock surrounding the central "dome" indicates a structure with a diameter in excess of 300 km, suggesting this to be the largest known astrobleme on earth. Of the three meteorite impact features, the Vredefort event is the oldest at approximately 2 000 million years.

What we see at present of the Vredefort Structure are the eroded "roots" of this structure at a level of approximately 17 km below the point of original impact. The greater part of the structure had been removed by erosion taking place over 2 000 million years. The impact scar we see today measures approximately 140 km across and is a magnificent display of a variety of shock-induced features which were recorded in the upturned collar strata and the granitic gneiss core of the structure. Two surrounding concentric rings with a diameter of approximately 160 km can also be observed. Nothing of the meteorite remained and the only information is the projection of the size of the original crater, which is estimated at approximately 90 km in diameter and more than 20 km in depth. Following American speculations, one may conceive a subject with a diameter of 4 to 5 and even up to 10 km in diameter striking the earth with a velocity of 30 km per second (108 000 km/hour).

On impact, a transitional crater is formed, which almost immediately is filled up by material falling from the steep sides. This process enlarges the diameter of the crater. The thinner (and consequently lighter) crust of the earth at this point becomes

uplifted over a long period, floating higher on the heavier material of the earth's mantle. The crater is consequently not observed any more, but the surging of the heavier mantle material underneath the original crater. In the process when the crater is formed, immediately after impact, concentric rings are formed around the crater (which can be compared with a pebble dropped into water).

This event took place before the continents as we know them today moved apart. Life on earth at that stage was probably confined to the more primitive forms; being stromatolite-building bacteria, and no great extinction was recorded. Stromatolites survived this catastrophe, as well as other "great extinctions", and can still be found today. This was probably because they were widespread, living under a protective layer of water. Free oxygen only appeared probably during the following 600 million years to which the primitive organisms had to adapt. Multi-cellular life appeared only about 600 to 700 million years ago. It can be speculated that the appearance of eukaryotic life forms after this impact might be analogous to the emergence of mammals after the Chixculub impact some 60 million years ago.

The Vredefort Astrobleme constitutes the only such structure in which sufficient exposure is available for the study of aspects related to the origin of such structures and the consequential effects thereof. The known root remainder of the Vredefort Structure stretches from Kroonstad to north of Carletonville and from Klerksdorp to Heilbron. The flat area around Vredefort and Parys represented the surged bottom of the crater and the surrounding hills north of Parys and to the west of Vredefort forms part of the first concentric ring. The hills around Fochville form part of the second concentric ring. The southern half of the structure lies buried under the younger sedimentary rocks of the Karoo Super Group, which were deposited approximately 1 500 millions years after the event, over the eroded remains of the structure.

ENVIRONMENTAL LEGISLATION AND SPECIES MANAGEMENT
The National Environmental Management: Biodiversity Act, 2004 in context

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Introduction

Species are not only important components of ecosystems and the natural environment, providing important services to the efficient evolution and functioning of complex natural systems, but also to humans providing a resource base for food security and recreation.

As integral components of the natural environment, species are impacted on, directly and indirectly, by a variety of activities and processes, both natural and human-induced. As a result and in the context of sustainable development, legislative intervention is required to ensure sustainability of the natural species base.

1. Integrated environmental management legislation

Regulation of environmental issues is traditionally fragmented amongst several sectors and requires alignment and harmonization in order to avoid incompatibility and achieve efficiency. Environmental legislation in South Africa has taken an integrated approach with the promulgation of the National Environmental Management Act of 1998 (NEMA), setting principles and containing some provisions for the enforcement of specific norms and standards to manage and mitigate impacts. Within the framework of NEMA, specific environmental acts provide more detailed and focused provisions for specific environmental management sectors. Two such specific environmental acts, the National Environmental Management: Protected Areas Act, 2003 (NEMPA) and National Environmental Management: Biodiversity Act, 2004 (NEMBA) have already entered into effect and a third, on coastal zone management, is in preparation. In the context of species management, NEMA and the subsets of NEMPA and NEMBA form an integrated legislative structure to ensure sustainable management of the national species base.

1.1 *National Environmental Management Act, 1998*

Of specific relevance to species management, the NEMA provisions on environmental impact assessment (EIA) and the enabling provisions for designation of environmental management inspectors and the appeals procedure apply.

The EIA provisions of NEMA (not yet in force) will be the EIA provisions that currently apply under the Environmental Conservation Act, 1989, as amended by public consultation and soon to be promulgated as regulations under NEMA s. 24. The application of EIA regulations, aimed at mitigating developmental impacts, becomes more focused on biodiversity impacts in NEMA s. 24 regulations through:

- (a) extending the identified activities also to identified geographical areas, and
- (b) linking NEMA s. 24 EIA regulations to protection of ecosystems in Chapter 4 of NEMBA.

Enforcement of the NEMA provisions, as well as the provisions of the NEMA specific environmental acts, is enabled by designation of EMI as set out in NEMA s.

31, enabling appropriately mandated officials in any structure of government to enforce the provisions of the environmental acts.

NEMA also provides in s. 43 for any affected person to appeal a decision (e.g. a permit decision) made under an environmental act to the Minister or MEC of a province, as may be appropriate.

1.2 *National Environmental Management: Protected Areas Act, 2003 (NEMPA)*

The stated purpose of NEMPA includes *inter alia* “to conserve biodiversity” and “to protect South Africa’s rare or threatened” species. This is provided for not only by establishing several categories of protected areas with provisions requiring approved management plans, but specifically providing for declaration of:

- (a) special nature reserves specifically aimed at protecting highly sensitive species or ecosystems and restricting access to being for scientific purposes only, and
- (b) protected environments which allow private landowners a legal basis for collective action in conservation while affording protection against development of conservation-worthy land.

1.3 *National Environmental Management: Biodiversity Act, 2004 (NEMBA)*

Focusing specifically on biodiversity, the objectives of NEMBA include “protection of ecosystem integrity” and “protection of species to ensure their survival in the wild”, although the act also have many provisions relating to biodiversity aspects and of resource use not directly related to species survival or sustainability.

2. *Species-related provisions of the National Environmental Management: Biodiversity Act, 2004*

2.1 *Biodiversity planning*

The section on biodiversity planning takes a spatial hierarchical approach, from national level to specific management plans, the lowermost specific planning instruments aimed at ensuring survival of ecosystems and species. Biodiversity management plans (NEMBA s. 43) thus provide an enabling platform for reiterative planning and management of South Africa’s natural ecosystems and species that may require special attention to ensure survival. NEMBA s. 44 further establishes options for resource assistance through management agreements for principals of biodiversity management plans.

2.2 *Protection of ecosystems*

In the first part of Chapter 4, NEMBA s. 52 creates a framework for identification and listing of ecosystems that may be threatened or in need of protection, and links this through the identification of threatening process (s. 53) with the NEMA s. 24 EIA regulations, thereby requiring an EIA for any listed threatening process intended within a s. 52 listed threatened or protected ecosystem.

2.3 *Protection of species*

Protection of species against the threat of any one or more of the *restricted activities* as defined in NEMBA is achieved through enabling the listing of threatened and protected species in s. 56 and linking this list with authorization requirement for restricted activities in s. 57(1) or prohibition of specified activities in s. 57(2). It has to be noted here that this section of the act focuses specifically on exploitation threats to species.

2.4 *Alien species*

Part 1 of Chapter 5 contains the NEMBA provisions on alien species management, based on the precautionary approach. NEMBA s. 65 requires authorization for any restricted activity involving an alien species, unless that alien species has been exempted from the authorization requirement by listing in terms of NEMBA s. 66. Additionally, NEMBA s. 67 empowers the Minister to prohibit any alien species from receiving authorization for any activity, including a restricted activity.

The NEMBA provisions on alien species are strengthened by requiring in s. 69 duty of care to be exercised by anyone receiving s. 65 authorization, to prevent harm to the environment resulting from alien species and to establish cause for liability in case of resultant environmental harm.

2.5 *Invasive species*

Invasive species management provisions of NEMBA are contained in part two of Chapter 5, enabling the publication of national and/or provincial lists of invasive species (s. 70) and requiring authorization for restricted activities involving listed invasive species (s. 71).

Duty of care with invasive species is also established in NEMBA s. 73 but is linked with ownership of land where the invasive species occur rather than an authorized restricted activity. Application of duty of care is extended to civil society who can request competent authorities to enforce duty of care provisions, and providing recourse in the event of a competent authority not acceding to such request.

2.6 *Permits, offences and penalties*

NEMBA provisions on environmental authorization documentation enable a prescribed standard application procedure (s. 88), standard permit format (s.90), integration of permits required by different legislative instruments and/or issuing authorities (s. 92) and a standard appeals procedure permit decisions in s. 94 (cf. also NEMA s. 43).

Chapter 9 of NEMBA identifies the activities that constitute an offence (restricted to contraventions of authorization requirements and conditions) and established the penalties as being a fine and/or imprisonment. Fines are linked to the provisions of the Adjustment of Fines Act, 1991, or in the case of an offence involving a threatened or protected species, to the commercial value of the specimen(s) involved in the offence.

3. **Conclusion**

In conclusion, the still evolving environmental legislation creates a suite of environmental legislative tools that are tailor-made for specific purposes. Of these, NEMBA as specific biodiversity instrument and in the context of species management provides a range of enabling measures with enforcement support. The integrated implementation of the entire suite of environmental legislation allow for:

- (a) effective conservation with responsible resource use and efficient impact management,
- (b) standardized and nationally valid authorizations, and
- (c) uniformity in enforcement.

ANGLING ORGANIZATIONS AND THE NATIONAL ENVIRONMENTAL MANAGEMENT : BIODIVERSITY ACT

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Introduction

Sect 38 (1) (a) of the National Environmental Management (“NEM”): Biodiversity Act (“NEMBA”) No. 10 of 2004 states that the Minister of Environmental Affairs and Tourism must “prepare and adopt a national biodiversity framework within three years from the date on which this Act takes effect.” Almost a year has already elapsed since this statute was promulgated. The official agencies at both national and provincial level have been engaged in a range of activities related to the preparation of this policy framework. It has been noticeable that with the exception of the Federation of Southern African Flyfishers (FOSAF), few if any other angling organizations have contributed to the limited consultative process that has been undertaken by the official agencies to enable civil society to make their viewpoints known. It would seem also that the official organizations have not yet made many opportunities available to stakeholders to make inputs to the process. Opportunities are now, however, being made available, and it is suggested that it is important to take advantage of the opportunities that are provided.

The relevance of the NEM : Biodiversity Act to freshwater angling

Anglers may well enquire of what relevance this legislation could have for sport and other forms of angling? The short response to this is “a great deal”, since the policy framework will apply to both terrestrial as well as to aquatic ecosystems, and when completed, it will inform both the regulations to this statute as well as to provincial nature conservation legislation and their regulations. In due course, the provincial legislation will have to be amended, in order for it to be harmonised with this and other national legislation of the National Environmental Management suite of statutes, such as the NEM : Protected Areas Act. The regulations controlling freshwater fish species and angling methods has in the past been included in the provincial nature conservation statutes, and one would imagine that this could continue into the future. Also, NEMBA has relevance to the conservation of indigenous species as well as the management of alien species. Since freshwater angling targets both indigenous as well as alien fish species, it might be expected that anglers will have a vital interest in the aquatic component of the policy framework, especially the categories into which the various angling species will be listed, in terms of the act, and the restrictions and controls that will apply (see the presentation by Dr G Willemse).

Some lessons from the past

In the past, it was considered that freshwater anglers could have confidence that the official agencies were sympathetic to their needs, and would ensure that their interests would be taken into account in the formulation of official policy and environmental legislation that affected. However, this no longer seems to be entirely the case, and as is well known, much of present official priorities appear, understandably, to lie elsewhere (e.g. in furthering welfare issues such as health, education and development. In addition, the approach of the official

nature conservation agencies to the management of freshwater fisheries and sport angling generally, appears to have changed from previous positions.

On the other hand, it is something of a comfort that the National Environmental Management Act (NEMA) requires official agencies to consult with the public when new policies and legislation are introduced – a huge improvement over the situation that pertained before the new democratic dispensation which came into being some ten years ago.

Becoming engaged in the public participation process, is however, something of a mixed bag, often requiring considerable effort, and success, viewed from the perspective of participants, is not always assured or achieved. Some examples of experience gained in involvement in the consultative processes in the past are provided below, to illustrate what can be involved.

Freshwater regulations, KwaZulu-Natal Province

In KZN Province, the old Natal Parks Board introduced liaison committees some 30 years ago to promote dialogue with, amongst other groups, angling organizations and to enable stakeholders to provide the board of the nature conservation agency with proposals and recommendations related the angling interests and conservation of the provincial aquatic ecosystems and the fisheries resources. About four years ago, it was announced that new draft regulations were being formulated for the KZN Nature Conservation Management Act. In the discussions that followed in the liaison committees, it emerged that the nature conservation agency intended introducing new policies, which differed from those previously applied and advocated by the angling organizations. Impasse followed, the liaison committee meetings are no longer held. The angling organizations felt the need to form a consortium, the Freshwater Fishing Forum (“the Forum”), to marshal support and resources, in an attempt to persuade the organization to re-engage with them. Draft regulations were subsequently prepared by KZN Wildlife, without (in our view) adequate consultation. However, when these draft regulations were considered by the KZN Parliamentary Environmental and Conservation Portfolio Committee, the Forum made a representation opposing the new regulations, together with other stakeholders. The final upshot was that the draft regulations were not accepted by the provincial parliament, and will have to be revised. We are hoping that stakeholders such as the Forum will have the opportunity of providing their inputs in the next process, in the more favourable climate that appears to have developed since the initiative to encourage dialogue between the stakeholders and official organizations.

Inputs into the passing of the NEM : Biodiversity and Protected Areas Acts

When the NEM : Biodiversity and Protected Areas Bills were published for public participation, a number of environmental NGOs (including FOSAF) decided to collaborate in order to make inputs based on the consensus views of the individual organizations. The Environmental 12 Consortium was formed for this purpose. Eventually, sixteen organizations participated. The Consortium adopted this approach because it felt DEAT had failed to adequately provide for public participation of stakeholders. The consortium was fortunately successful in achieving a number of amendments (a number of which we believe to be of considerable significance) which were eventually included in the NEM : Protected Areas Act. But it was also considered necessary to request permission to address the national Parliamentary Environmental Portfolio Committee in order to ensure that its views were taken into account.

Problems related to participation in public consultative processes

It should be emphasised that involvement in public consultative processes can be very time-consuming, and extremely frustrating for the following reasons.

- Considerable time and effort is usually required.
- Official agencies do not always communicate timeously or appear to give adequate encouragement to NGOs to participate.
- The agencies are often working to truncated time schedules, leaving little time for response.
- It appears that not infrequently, the comment that is submitted may be ignored.
- Costs are likely to be incurred, and no provision is made by government to assist NGOs.

Which organizations are driving the process of formulating the national policy framework on biodiversity conservation?

For those of us who are not in government, it is quite difficult to determine which official agencies are involved. The Department of Environmental Affairs and Tourism (DEAT), has responsibility for the implementation of the provisions of the NEM suite of statutes at national level, and is responsible for implementation of the provisions of the NEMBA. DEAT is presently engaged in the preparation of preparing a National Biodiversity Strategy, which is a part of the SA National Biodiversity Strategy and Action Plan (NBSAP). The Department of Water Affairs and Forestry (DWAF), and the Water Research Council (WRC) are also players at national level.

Unlike DWAF, DEAT does not have its own regional offices, but its functions are implemented by various official organizations of the various provincial governments. For example, in KZN Province, the relative provincial organization with responsibility for implementation of the provisions of NEMBA (through policy determined by DEAT), is the Department of Agriculture and Environmental Affairs (DAEA). Ezemvelo KZN Wildlife (EKZNV), although a parastatal organization, is to all practical respects, a branch of DAEA. In a recent meeting with DAEA and EKZNV officials, representatives of the Forum were informed that EKZNV will be driving the process to obtain public inputs into this process, and were advised to register with it as an interested and affected party.

Of particular interest to anglers is that the SA Institute for Aquatic Biodiversity (SAIAB)¹ is presently organizing an initiative to “develop a long term strategy for freshwater biophysical diversity conservation in the southern African region” together with the SA office of the World Wildlife Fund (WWF). This initiative will feed into NBSAP as part of a joint DWAF-CSIR-WRC initiative to develop a planning tool for the systematic conservation of river biodiversity in SA. A workshop is to be held in mid-May to bring together representatives of provinces and key organizations in an attempt to develop such a strategy. FOSAF is one of the angling organizations that will be contributing to the workshop, in providing some financial support, and by participating in it.

¹ Formerly the J.L.B. Smith Institute of Ichthyology.

Which organizations have responsibility for administration of the national freshwater fisheries?

There is no single organization that has responsibility for the administration of the national freshwater fisheries. The nature conservation organizations or environmental departments of each province claim responsibility for the conservation of indigenous fish species, but apparently not for management of the alien fish species (which was the case in the past).

This raises the question of which organization has responsibility for the management of the alien fish species. It may also be asked whether the indigenous fish species can be adequately conserved without managing the alien fish species? For some time, FOSAF has been asking whether, if the above is taken into account, whether the nature conservation agencies are the best suited to manage the national freshwater fisheries?

Some suggestions for the way forward

It is hoped that from the above, it will be apparent that angling organizations should stand up and be counted, and act in collaboration in order to ensure that their views are taken into account by the relative authority.

Amongst the needs is to determine national responsibility for the conservation management of freshwater systems on an holistic basis, and on this basis, we believe this should be inclusive of both indigenous as well as alien fish species.

It is suggested that there will be significant advantages in submissions being made to authorities in the name of a number of organizations which have common primary interests, speaking on collective common interests, rather than each making their own submissions. It is considered that it is likely that there will be agreement between many angling organizations on such basic issues as the need to conserve freshwater systems and indigenous aquatic biota, to prevent unauthorised stockings of alien species, and so on.

What will be needed is a small team – probably one or two people, with the time, expertise and energy to collate opinion, co-ordinate effort and ensure that the interests of the member organizations are incorporated. While submissions should be made jointly, each member organization should retain the right to submit individual comment.

There may well be the need to make verbal presentations and representations to senior members of the official organizations, and to politicians.

Clearly, there will be costs involved, and these should be shared by member organizations.

The alternatives

The problem is that there are interests out there who have very different objectives to those of anglers, who have the energy and determination to ensure that their views are taken into account.

It is unrealistic to imagine that official organizations will be aware of the many disparate views on key issues that are held by organizations and individuals in civil society, so one can

not take for granted that the interests of angling organizations will necessarily have been taken into account by official organizations. So it really does appear to be a case of 'if you snooze you lose'! In short, there does not appear to be an effective alternative.

Conclusions and recommendations

It is suggested that an integrated holistic approach is needed for the conservation management of freshwater fisheries. Amongst the urgent needs are the following:

- To ensure that angler's interests, needs and viewpoints are taken into account (not ignored) in the formulation of the component of the national policy framework related to freshwater biophysical diversity conservation;
- A means of obtaining an integrated holistic approach to management is of crucial importance; and
- Anglers need to determine how to make this happen.

If anyone needs further information, they are welcome to contact me at wrbainbr@iafrica.com

ARTLURE AND THE CONSERVATION OF OUR FRESHWATER SPECIES

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1. Introduction

1.1 Who are we?

The South African Artificial Lure Angling Association (SAALAA) is an autonomous constituent, administrative section of the South African Sports Federation of Artificial Lure and Fly Angling (hereinafter called "SAFALFA") in accordance with and subject to memoranda and statute, the rules bylaws and policies of SAFALFA which functions as a autonomous organisation with a constitution independent of any other angling facets. SAFALFA is in turn a member of the National Sports Council, which governs all sport organisations.

At present there are only 1500 active Artlure anglers countrywide. The drop in membership can only be directly attributed to high costs involved in organised competitive artlure angling as every angler is expected to own their own boat and a vast selection of rods and reels and matching lures. This makes the sport of angling very expensive for new comers.

1.2 The objects of the Association

The objects of SAALAA as stated in the SAALAA constitution are:

- (a) To promote artificial lure angling as an amateur sport in the Republic and to control the sport at a national level.
- (b) To conserve and promote sportsmanship in artificial lure angling and to oppose any unsporting or illegal angling techniques.
- (c) The activities of the association are limited to angling in freshwater, estuaries, lagoons, tidal estuaries and shore angling.
- (d) To assist in conservation of fish as regulated by the provincial ordinances. To promote their distribution in rivers, dams and freshwater lakes, estuaries, lagoons and tidal estuaries and to make representatives through SAFALFA to relevant authorities in respect of legislation for the conservation of fish.
- (e) To serve as an advisory body to SAFALFA in all matters relating to the rights, statutes and interest of artificial lure anglers.
- (f) To foster, promote and encourage co-operation and unity among angling organisations affiliated within SAFALFA.
- (g) To regulate fresh water artificial lure angling and to endeavour to obtain angling concessions in rivers, dams, fresh water lakes, estuaries and tidal estuaries.
- (h) To assist in the control of water and environmental pollution.

1.3 What is Artificial Lure Angling?

Artificial Lure Angling or Artlure is the art of catching various fish species on artificial lures and can be regarded as the ultimate angling experience as a true artlure angler will seek out

and pursue each and every specie of fish in a specific body of water. This means that he must be able to catch the biggest catfish and the next moment be able to catch a 2.5 cm mosquito fish on a #34 hook and everything in between.

1.4 Who are Artificial Lure Anglers

The broad definition of an artificial lure angler is one who catches or attempts to catch fish with various forms of artificial lures and these lures will range from flies to plastic lures to hard crank baits. As such each and every fly fisherman and bass angler can be regarded as an artlure angler but are affiliated to SAFALFA through their own organisations. A true artlure angler as affiliated to SAALAA is therefore one who catches or attempts to catch each and every species whilst angling on specific body of water.

In light of the above artlure anglers are often perceived as being caught in the middle of contentious issues and where policies and thoughts of an angling body conflict with those of another, artlure anglers are often perceived as sitting on the fence, as it is in their interest that the specific body contain the various fish because of the greater challenge which is presented to them. E.g. if a specific body of water contains among other species bass, carp and yellowfish there will always be potential for a difference of opinion between the B.A.S.S. anglers, the fly fisherman who pursue the yellowfish and the bank or coarse anglers.

On the other hand if a river or dam contains amongst other species trout and yellowfish there is not always going to be consensus between the various groups of fly fishermen. The question therefore always asked is who does the artlure fraternity side with, and who is always right.

Although "sitting on the fence" is not always perceived as taking a stance, in the case of Artlure, we are often forced to do so to maintain our standing in the formal and competitive fishing community.

2. Artlure and Conservation

According to the Artlure constitution and the objectives of the association SAALAA has to among other things:

- 2.1.1 Assist in conservation of fish as regulated by the provincial ordinances.
- 2.1.2 To promote their (the fish) distribution, in rivers, dams and freshwater lakes, estuaries, lagoons and tidal estuaries and
- 2.1.3 To make representations through SAFALFA to relevant authorities in respect of legislation for the conservation of fish

2.1 Assist in Conservation of Fish as Regulated by the Provincial Ordinances

By way of it's definition this implies that Artlure promotes and conserves the interest of the National Artlure Resources, which comprises both indigenous as well as alien, fish species. Artlure strongly supports the need for conservation measures for the protection of the aquatic environments and their dependent biodiversity resources. Artlure subscribes to the

sound management and conservation of all fishing resources and acknowledges the fact that these resources contain both indigenous and alien species.

To date very little research and/or consideration has been given to the fact that the fishing resources on the sub-continent contain both indigenous and alien species and as such very little policy has been established regarding the situation where a specific fishing resource contains both indigenous and alien species. Although Artlure recognises the fact that for many years alien species have been introduced to specific areas, Artlure has not officially been involved or promoted the introduction of the further introduction of alien species to specific river systems and impoundments. In stating this we believe that there is a need to conserve indigenous biodiversity resources.

2.2 To Promote their Distribution in Rivers, Dams, and Freshwater Lakes, Estuaries, Lagoons and Tidal Estuaries

This is written into our constitution and it has long been a policy of Artlure to respect the specific biodiversity of a named river or impoundment. As such all or any official translocation of fish species, whether alien or indigenous, with the aid of Artlure has been done with strict agreement by the provincial authorities, and where necessary the required permits and authorisation has been obtained.

ARTLURE DOES NOT SUBSCRIBE TO A POLICY OF INDISCRIMINATELY AND UNAUTHORISED RELOCATION OF ALIEN OR INDIGENOUS FISH WITHOUT THE CONSENT OF THE LOCAL AUTHORITIES.

The stocking or presence of catfish in the Breede River in the Western Cape was not, contrary to popular belief, the act of any Artlure angler or any angling club. We are led to believe that these catfish were in a farmer's dam, close to the banks of the Breede River and when the wall of the farm dam burst during a flood, the catfish were washed into the Breede River and subsequently bred.

IT IS ALSO NOT THE OFFICIAL POLICY OF ARTLURE TO PRACTICE THE INDISCRIMINATE KILLING OF FISH WHETHER INDIGENOUS OR ALIEN UNLESS DIRECTED TO DO SO BY THE PROVINCIAL AUTHORITIES

Malaa (Mpumalanga Artlure Angling Association) was approached by the management of Loskop to host a bass competition by the then manager of Adventura. Loskop has never been a recognised bass venue and they believe the bass bonanza was the first bass competition staged there.

Nature conservation was involved in the organisation of the competition. There was never any intention to host a catch and kill as Malaa like the rest of SAALAA is very conservation orientated. However, after discussion with Loskop management and nature conservation it was decided that the live bass would not be released back into the dam. Nature conservation had a water tank available and they relocated live fish to certain farm dams from where it would not be possible for them to escape into the river systems. Some bass were also kept for study purposes.

Records taken over a 5-year period show that bass are featuring more in their catch returns and that they are catching fewer dwarf species than in previous years.

Artlure has a strict catch and release policy. Although this is not as refined and developed as the catch and release policy of B.A.S.S bonus points are given for live fish released and as such the indiscriminate killing of fish species is against the official aims and objects of Artlure.

- 2.3 To make representation through SAFALFA to relevant Authorities in respect of legislation for the conservation of fish

SAALAA is well represented on the executive of SAFALFA which represents the interests of organised fly fishermen and B.A.S.S, anglers as well as artlure anglers in South Africa. It plays an integral part in the decision making of SAFALFA which represents approximately 10 000 organised anglers in South Africa. As such SAFALFA has an important role to play as stakeholder and decision maker in the establishment of legislation to regulate sport fishing in South Africa.

3. Artlure and the NEM: Biodiversity Act No. 10 of 2004

- 3.1 Section 64 of the NEM: Biodiversity Act states as follows:

64(1) the purpose of this chapter is:

- (a) To prevent the unauthorised introduction and spread of alien species and invasive species to ecosystems and habitats where they do not occur naturally.

Artlure recognises the need for conservation measures for the protection of aquatic environments and their resources, especially the indigenous fish species. However Artlure recognises that the resources created by these alien species is of considerable value and that there is a need to assess the economic value of the alien species against their effect on the ecosystems and habitats where they do not naturally occur.

- 3.2 To manage and control alien species and invasive species to prevent or minimise harm to the environment and biodiversity in particular.

This must be read together with:-

- 3.3 To eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems and habitats.

Artlure recognises that the introduction of alien species in rivers and impoundments have resulted in a number of environmental problems and have threatened the indigenous species to some extent. However, Artlure also recognises that they have become permanent features in the rivers and impoundments which provide favourable habitat for them, and also recognises that there appears to be no feasible means of eradicating them. Artlure recognises the need for legislation in this regard, and where possible will assist Government and Provincial Authorities in establishing a means to identify, control and eradicate alien species where applicable

- 3.3 To ensure that environmental assessment for purpose of permits in terms of the Genetically Modified Organisms Act are conducted in appropriate cases in accordance Chapter 5 of the National Environmental Management Act.

Because of the nature of artlure angling, artlure anglers are in the best position to assist government in assessing the make-up of the fish species in the specific rivers and impoundments. As such Artlure has embarked in a national project to identify the major rivers and impoundments in the various Provinces, and are in the process establishing a programme whereby the Provinces will report to the National Body of the make-up of the catches in the various rivers and impoundments. This will enable the National Body to establish a database of the occurrences of the fish species in the various rivers and impoundments. This database should be able to assist conservation bodies in establishing whether alien species have any effect on the indigenous species in a specific river system or impoundment.

4. Conclusion

- 4.1 Artlure recognises a need for conservation and management of fish species.
- 4.2 Artlure recognises the fact that this conservation and management comprises the conservation and management of both indigenous and aliens species.
- 4.3 Artlure recognises that both indigenous and alien species contribute greatly to the economy, for food production, sport angling and tourism.
- 4.4 Artlure will abide by the provisions of the NEM: Biodiversity Act No. 10 of 2004.
- 4.5 **Artlure recognises the need for more scientific research into the effects and benefits of the alien species on our environment and are willing to assist Provincial and National Government wherever possible.**

DRAFT PRINCIPLES THAT COULD FORM THE BASIS FOR A POLICY ON THE CONSERVATION OF FRESHWATER FISHERY RELATED RESOURCES AND THE NEED FOR A ZONING SYSTEM FOR FRESHWATER SYSTEMS

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Introduction

The Federation of Southern African Flyfishers (FOSAF) has developed a set of Policies and Objectives for the furtherance of its vision and mission, which may be summarized as promotion of the interests of fly fishing and conservation of the national fly fishing resources comprising both indigenous as well as alien fish species, and the need for conservation measures for the protection of aquatic environments and their dependent biodiversity resources, especially indigenous fish species. In the Preamble to the Policies and Objectives document², is stated the following:

“Based on the desire to advance and improve the quality of life for the people of southern Africa, with specific reference to those who practice or participate in the sport and art of fly fishing, riparian owners, communities and others who may influence the quality of the aquatic environment and aquatic fauna and flora, or who may benefit from it materially or aesthetically; FOSAF commits itself, through its members, to the fundamental values that underpin its vision, mission and objectives, and achievements of its policies and objectives.”

Proposed basic principles

FOSAF has developed a set of proposed principles that are intended to facilitate the development of a policy and strategy for the conservation and sustainable use of the national freshwater fishery resources.

It suggests that the aquatic resource be managed on for key basic principles, as follows.

- Sustainable development (*vide* the World Summit on Sustainable Development);
- Sustainable fisheries resource management;
- Integrated environmental management; and
- Integrated catchment management.

FOSAF’s proposed principles that could form the basis for a policy on the conservation of the national freshwater fishery related resources

FOSAF has formulated the following principles which it proposes be considered by the authorities for the conservation and legal protection of rivers, freshwater bodies and aquatic plants and animals. The principles are not listed in any specific order of priority. The principles are as follows.

² This document may be viewed on the FOSAF website, www.fosaf.co.za

1. An holistic, risk-averse approach should be adopted for the conservation and sustainable use of aquatic systems and biodiversity resources.³
2. Inland fisheries require sound and proper integrated management, development and administration.
3. Protection of indigenous⁴ aquatic biodiversity resources should be provided as a priority, but with recognition given to the role of alien⁵ fish species for recreation and commercial purposes (such as tourism).

This implies that:

- The conservation of indigenous fish species at risk will take precedence over any measures which might be designed to protect an alien fish species.
 - Maintenance of alien fish species is justified provided that any such measures that might be designed to protect and manage alien fish species shall not be undertaken in a manner that has the potential to threaten the status of indigenous fish species.
4. Recognition shall be given to the importance of aquatic resources for recreation, tourism and commercial purposes, and as a source of food.
 5. It is imperative that national and provincial conservation authorities consult with all relevant stakeholders and other interested and affected parties, as prescribed by Sect.2, Principles (4) (f) and (g) of the National Environmental Management Act No 107 of 1998, (as amended).
 6. Recognition shall be given to the rights of communal and private landowners to responsibly manage aquatic resources on or adjacent to their land for their beneficial use, while exercising “duty of care” as required by Sect 69 of the National Environmental Management : Biodiversity Act.
 7. A zoning system for aquatic resources and systems should be developed and implemented to delineate sensitive and non-sensitive zones, for the protection of threatened indigenous species as well as important fisheries provided by other species (as discussed below).

³ The National Environmental Management : Biodiversity Act No. 10 of 2004 defines “**biological diversity**” or “**biodiversity**” as “*the variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and other ecological complexes of which they are a part and also includes diversity within species, between species and of ecosystems.*”

⁴ The Act also defines “**indigenous species**”, which means “*a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity.*”

⁵ The Act defines “**alien species**” as –

(a) *a species that is not an indigenous species; or*

(b) *an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.*”

8. Provision shall be made for legal protective measures that may be necessary for the control of the translocation and restocking of fish and to prevent the unauthorised stocking, non-sustainable and wasteful utilization of aquatic species.
9. Aquaculture is becoming an increasingly important commercial land use with significant potential to cause negative environmental impacts on the aquatic resources. It is therefore necessary to establish the means to identify and control the biodiversity-related impacts which could arise out of aquaculture.
10. Provision shall be made to ensure that all aquatic resources related regulations of provincial statutes should be as uniform and consistent as possible throughout the country, while taking cognisance of the need to provide for specific local circumstances.

The above represents a first attempt at drafting relevant principles to inform policies and strategies for the conservation and sustainable use of the national freshwater fishery resources. These are proposed for wider debate, and employment in the development of policies and strategies for freshwater biodiversity conservation.

The need for a zoning system for freshwater aquatic systems

The Minister of Environmental Affairs and Tourism recently made a statement on the very poor status of South African rivers. He was quoting from the national State of the Environment report, which apparently found that over 80% of South Africa's rivers are in such a bad state that they have been classified as Threatened, and 44% of these have been classified as "Critically Threatened". This unfortunate state is apparently the result of the effects of poor land-uses on the terrestrial ecosystems.

The poor condition of the physical state of rivers has a profound effect on the status of aquatic biodiversity, but this status has also been compromised by the introduction of alien invasive species (see the presentation by Dean Impson).

One of the planning measures that it is believed should be considered in order to address some of the negative impacts on aquatic biodiversity would be to develop a zoning system for the national freshwater aquatic ecosystems. Amongst the aims of such system could be the following.

1. To provide a means of balancing conflicting demands on the aquatic systems;
2. To guide, control and manage the most appropriate land-uses to be imposed on these systems;
3. To promote provision of multiple-uses such as:
 - Conservation of specific section of rivers;
 - Conservation of indigenous biodiversity resources;
 - Sustainable use of fisheries by a range of stakeholders; and
 - Provision for zones for a range of purposes, including conservation of threatened or rare biota, for fisheries based on a mixture of indigenous and alien fish species, for fisheries based largely on alien fish species.

SPORT ANGLING: QUO VADIS?

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1. WHERE WE ARE TODAY

The Confederation of Sport Anglers has a formal membership of 29 000 individuals which includes freshwater angling (all facets) 16 000 individuals

Equity in sport has led to previously disadvantaged individual members achieving national colours and representing South Africa at world championships. To achieve this, provinces have moved from 17% to 50% representation in their development teams.

Two new angling facets are being developed with great success: Pole Angling and Carp Species Angling. These facets are internationally very strong and the South African team came 3rd at the very first Carp World Championships they participated in 2004. This took place in Italy.

In the past, many of our facets (Freshwater) were fishing according to “Home-brewed” rules and regulations that had its origin in the old “Fisheries Act of 1949” and we are now in the process of aligning ourselves to the international rules of Federation International Peche Sportiv (FIPS). This body controls all sport angling and operates for example, at the same level as FIFA

2. WHAT HAS THIS TO DO WITH CONSERVATION?

There are some fundamental principles that all sport anglers need to be aware of. As direct user stakeholders of natural fish stock resources, we have every right to a share of those resources as confirmed in the United Nations Code of Conduct for Responsible Fisheries.

We have a right to expect those resources to be managed sustainably by government(s) for the benefit of all stakeholders. Fish stock resources are after all one of Humanities Natural Heritage.

The assertion of ‘rights’ however, brings with it, ‘responsibilities’. Not only must we conduct our own exploitation activities responsibly BUT we must do our best to ensure that all exploitation activities are carried out sustainably for the benefit of future generations.

The longer, recreational sport anglers have been fishing, the more they will have witnessed a decline in the quality of their sport, both in terms of numbers and size of individual fish, so the overarching goal for the Sport Angling Group is to:

- Help bring an end to over-fishing and,
- Contribute to the political will for the restoration of depleted fish stocks.

If these goals can be realised, sport anglers can once again enjoy more and bigger fish.

One debate, is whether the word ‘conservation’ is the most appropriate to describe the work of DEAT. After all, we do not seek to retain things as they are at present! Nor can we eradicate alien species such as Carp that have been in our waters for more than a century! We actually want fish stocks to be given the opportunity to rebuild themselves. Sounds quite simple doesn’t it? Indeed, the actual management measures that are necessary to achieve these goals are logical, rational and well understood. What however is of concern is the fragmentation of the projects that DEAT is undertaking. It is my personal opinion that they

are creating their own complexity and could result in major implementation problems. The secret to any good system is simplicity!

A number of socio-economic impact studies show beyond doubt that the use of some fish stocks for recreational exploitation is the optimal use of such resources. It actually supports far more jobs with the least detrimental impact to resources. The economic benefits are particularly felt within the tourism industry.

These arguments however need to be professionally voiced to policy makers. Thus, what we need is the professional expertise of people within Sport and Recreational Angling that can fulfil this task. To get outside expertise can only be a costly exercise!

3. SPORT ANGLING STANDPOINTS

- Sport Angling supports and subscribes to the establishment and enforcement of conservation measures.
- Legislation is the correct means but must be augmented by education.
- Sport Angling supports and encourages the objectives of DEAT.
- What is of concern are the paradigms that DEAT have placed on them.
- Concerns arose due to lack of consultation with all interested parties.

4. WHAT HAS THIS TO DO WITH SPORT ANGLING?

- Sport Angling falls under the Department of Sport and Recreation and is governed by the South African Sport Council (to become the Sports Forum).
- When DEAT set up their parameters, this department was excluded.
- Sport Angling has international rules that may be locally affected by proposals/legislation that is made if DEAT is unaware of their existence.
- This could jeopardise international events that may take place in South Africa.
- Concerns became the order of the day and found its way onto the Internet (Fishing Owl). 200 000 hits per month!

5. WHAT IS SPORT ANGLING GOING TO DO ABOUT IT?

- Sport Angling has appointed a National Conservation Officer.
- Sport Angling approached DEAT and registered as a stakeholder and subsequently became involved in the debates that are currently taking place.
- This has resulted in a better insight as to what is taking place and why there are so many heated debates taking place.

6. WHAT ABOUT OTHER BODIES?

- The number of interested bodies is numerous with each having its own vested concerns so that you have a cacophony of voices that only creates more complexity.
- The concerns raised are so many that no legislation can ever address them all.
- Legislation is in reality a governmental policy document that addresses the big picture and cannot cater for each specific item
- What is needed is a management programme that places responsibility, authority and accountability in the hands of institutions and organizations that have a direct impact on the environment.
- By developing the human expertise and resources, to participate in the management of our fish stock resources.
- By raising the profile of recreational freshwater angling.

6. CONCLUSION

IT IS TIME TO BRING ALL INTERESTED PARTIES ON BOARD AND ENSURE THAT A BROAD-BASED STRATEGY IS DEVELOPED, ACCEPTED AND IMPLEMENTED THAT IS TO THE BENEFIT OF THE ENVIRONMENT AND PEOPLE. CONSERVATION MUST BE INCLUSIVE NOT EXCLUSIVE!

A PLACE FOR BASS IN SOUTH AFRICA

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Mr Chairman, FOSAF Members, ladies & gentlemen...

Thank you for this opportunity to present the policy of the South Africa Bass Angling Sport Society concerning one of our premier freshwater game fishes, and arguably the most popular inland sport angling target in southern Africa, namely the Black Bass.

The SA Bass Society is a private, non-governmental organisation that we try to run on business lines. Its members all share a passion for bass angling, and reside all over the country, including Namibia, Zimbabwe, Swaziland and even the US and Britain.

The Society's only affiliation is membership of the International Federation of Black Bass Anglers headquartered in the USA, and via my position on the international committee enjoys the good offices of IGFA.

The Society's mission is to be a major role player in recreational bass fishing in South Africa. The Society's objective is to provide opportunities and services that enhance the bass angling experience of its members, and to assist bass fishing, as a purely leisure activity, to play a significant role in conservation and commerce.

We at the Society recognise and fully appreciate the advantages and disadvantages of having this premier game fish in our waters; we also understand the viewpoints of those who would like to see our country populated only by indigenous flora and fauna. Our sincere opinion is that a balance has to be found and maintained between these positions.

Instead of adopting a confrontational stance – which we believe is totally unproductive - we rather opt for a positive, pragmatic one, and therefore put forward a plan of action that we believe will go a long way to resolving many of the problems, both actual and perceived, and one which would definitely result in this country being able to offer its citizens and visitors leisure fishing of truly international quality and standard.

STEP ONE:

Let us firstly accept that bass, along with carp and trout, are here to stay and that very little, even nothing, can be done to eradicate them; they have adapted extremely well and should be regarded as a naturalised citizen in our country. They are well loved by the anglers who fish for them and in addition have considerable economic value. No amount of fretting, teeth gnashing or legislation will change this fact.

STEP TWO:

Then accept and understand that these three fish represent by far the largest percentage of effort and consumer spending on inland angling in the country. Take away bass, carp and trout, and you will see the collapse of at least 98% of an industry which I was recently told is now estimated to be worth over One Billion Rand annually.

Our indigenous species that do enjoy some level of angling popularity – the catfish, yellowfish, kurper and mudfish – all have some limiting factor that militates against them becoming as popular as the naturalised ones: the catfish is more hated than loved, the largemouth yellowfish is endangered and in addition demands a far more active technique

than carp; kurper is available only in certain regions of the country, and the mudfish, while being prolific, is way down on the popularity poll.

STEP THREE:

Also accept and understand that no government policy can, or ever will, be successful without the support of the angling community. In contrast, should the government take a pro-active stance in improving leisure angling in the country, following for example, what is done in the USA, there will be a huge groundswell of support.

Our proposal therefore is:

- That, as I wrote in my Conservation column in our November 2004 issue, the country's inland waters be zoned according to the current status of the species in them, with *de facto* fish populations being upgraded to a *de jure* status;
- that the DEAT, on both national and provincial level, and even at municipal level, makes its expertise and manpower available so that both public and private waters are scientifically managed in order to make them truly world class leisure fishing venues (this includes both directorates, namely environment affairs AND tourism).
- that breeders and fishing resorts, not only be allowed, but positively assisted, to stock and breed desirable game fish species such as bass according to practical guidelines designed to establish high quality leisure fishing and to protect natural waterways from any possible damage.

We are, after all, anglers, not fishery scientists – we know how to catch fish, not necessarily how to grow them! But it is we who pay the angling licences, buy the tackle and pay the entrance fees. The Bass Society is of the serious and sincere opinion that the department would be well advised to enter into pragmatic discussions with all the role players in the angling industry. As I have written before, there is space for everyone, and that definitely does include bass.

I must add that the Society does not condone any indiscriminate stocking of bass. Indeed it actively discourages it, even though the presence of bass is of enormous social and economic benefit. I must also add that “exotic” or “alien” is not always undesirable - indeed, our country would be all the poorer without those imported species of plants and animals, and also people, that have enriched this country over the years.

I think it is true to say that FOSAF, along with all those who regard bass fishing as their prime recreational activity, regard the bass as being part and parcel of the fauna of South Africa. It has been here a long time, but only relatively recently has it come to the fore as a well-established species in many of our dams.

It is also preyed upon by indigenous species and can really struggle to maintain its population growth.

During spring and early summer unethical fishing louts take out bags and bags of bass from the spawning beds; carp come along and slurp up the eggs, and when the fry do emerge they are a prime food source for species such as canary kurper and catfish which decimate the newcomers; what's left after the spawn must then fight hard to compete with other fishes for the available food. Contrary to what many mistakenly believe, bass do not have it that easy here in South Africa!

That it is a predator and so preys on other fish, which of course includes some indigenous species, is not refuted. But in doing so it has to compete with several indigenous ones,

notably the catfish, canary kurper and the yellowfish, amongst many others. We strongly believe that the bass is not alone on top of the food chain, but shares this position with a host of other species.

Some research into the predatory habits of the smallmouth bass in the Western Cape has shown that it is detrimental to a particular microhabitat. Perhaps this lies at the heart of the criticism that is so boorishly and loudly bandied about, namely that it is the bass, and the bass alone, that is destroying populations of yellowfish, kurper, and even carp and trout! But it remains nothing much more than conjecture (and often, I think, used to hide an inept angler's lack of fishing success!).

The unfortunate result is that when any species shows any sort of decline, perceived or actual – the bass is blamed. An irate angler once told me that bass were killing off all the carp in Bloemhof Dam, when in fact a parasite infestation brought about by drought conditions was the real cause. In any event we do not know of any bass in Bloemhof – BUT - perhaps this prime angling venue is now under threat from grass carp – who put them there and why I don't know – and perhaps the grass carp should be the subject of intense investigation by the DEAT?

It has become almost fashionable to concentrate criticism only on bass whenever the status of indigenous species such as Largemouth Yellowfish and Blue Kurper is discussed. But this we believe is taking the easy option by attacking a soft and highly visible target. Would that these self same critics first of all attack those that are responsible for the decline in the quality of our waterways and the destruction of natural habitats. Industrial, agricultural and social pollution, and the destruction of the natural flow of rivers by weir and dam building, have all had highly negative effects on fish populations. But granted, it is not so easy, and also not financially advantageous, to tackle governments and big business when it comes to pollution and destruction of habitat. After all, unlike angling publications, they don't publish the results of their actions!

The fact of the matter is that we desperately need far more practical research, and furthermore for the findings of that research to be made freely available to the angling public. As Dean Impson wrote in our December '04 issue, "the jury is still out when it comes to largemouth"; which merely means that not enough is known.

And in conclusion, to all those who so readily point a finger at others, remember that while only one finger points forward, there are three fingers pointing back at yourself!

I thank you.

Eugene Kruger is Editor of SA BASS Magazine, Vice-president of the SA Bass Society and RSA Representative of the International Game Fish Association.

FOREIGN SPECIES ARE A PROBLEM

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Introduction

Since the promulgation of the Biodiversity Act last year a storm has erupted with regards to the impact of foreign fish species and the protection of indigenous species. In the Tight Lines magazine for example, bass fishermen like André Pretorius wrote inflammatory articles with headings like “*Swarthaars in die vuurlinie*” (Black Bass in the Firing Line) and “*A New Threat to Bass Fishing*”.

I will come to what was exactly said in those articles a bit later.

The goal of this paper is to give a bit of perspective and balance to the dispute with regards to the impact of foreign fish species on indigenous species. The goal is not to step on any toes or to hurt egos. As a matter of fact – there is no place for egos when it comes to the protection of the environment (although you may tell everybody what a wonderful fisherman you are). So the bass guys or carp anglers should not feel affronted if I criticise the impact of their target species. Personally, I feel that bass is not a bad fish to catch (and they are good to eat) and I have caught many a carp that gave me a wonderful fight. It is also a fact that if it were not for the bassing industry we would not have the wonderful fishing tackle on the market that we have today.

Why should indigenous species be protected?

In general, foreign species are a threat to indigenous species. Foreign species adapt quickly to a new habitat (look at carp, for example) and they compete with indigenous species for the same food sources and habitat. Of course each water resource should be looked at on its own merits. Indigenous species do not have natural defence mechanisms against predatory fish (i.e. trout and bass). Indigenous species are more readily affected negatively by man-made factors (such as the impact of the absence of fish ladders on eels and yellowfish).

What are the dangers to indigenous fish species

The bassing fraternity is of the opinion that bass are being made public enemy number one and that the impact of bass is not that bad. It is acknowledged that bass is not the only problem. The dangers to indigenous aquatic biota are countless: Gill netting, pollution, certain birds species like cormorants, animals like otters, fishermen wading in breeding areas, anglers keeping more fish than they should, the building of dams and weirs, the absence of fish ladders, over abstraction of water resources, silting of dams, irresponsible use of land, foreign plants and even indigenous fish species like the Canary Kurper, to name but a few. In addition to the above, two more very important factors should be added: The introduction of indigenous South African fish species into water resources where they have not existed naturally and foreign species.

It is important to note that is not only one of these factors that cause the problem, but the cumulative effect of it. Hartbeespoortdam is a good example. Gill netting, anglers keeping more fish than they should, pollution, silting, the absence of fish ladders and the introduction

of bass and carp resulted in the situation which we have today: yellowfish, kurper and eels are basically extinct.

I would now want to look at a few factors individually.

The introduction of indigenous South African fish species into water resources where they have not existed naturally

I grew up in what is now called the Limpopo province, where I had access to a wonderful private dam with huge red-breasted bream and blue kurper. It was not uncommon to catch 60 blues of 2 kg and above in a mornings fishing, and I caught several red-breasted bream that were larger than the SA record. The dam also contained huge black bass of up to 3,5 kg. It was a wonderful dam – everything in balance. But I was not satisfied: the dam did not contain catfish. So we introduced a few. For a few years the dam was now a real paradise. Four species of fish, all of them good-sized specimens were caught regularly.

However, then we had the fiercest drought in living memory and the dam became almost completely empty. The bass and catfish annihilated both bream species. Only bass and catfish remained. The fact that we added another fierce predator upset the balance completely.

Largemouth Black Bass

In his mentioned articles in Tight Lines André Pretorius described largemouth bass as a “*stilwatervis wat redelik rustig in damme voortbestaan en nie juis geneig is om die inbeemse waterlewe op te voeter nie*”, thus a fish which keeps in still water and does not affect indigenous aquatic biota. He goes even further and states that a largemouth bass is a “*n relatief stadige, relatief lui, dikkerige doesiele damvis wat stilwater verkies en sy prooi eerder in struktuur en plantegroei voorlê en vang as om dit aggressief te jag*”, thus a relatively slow, lazy, docile fish which hunts by way of ambush rather than hunting aggressively.

With respect, this cannot be further from the truth. Firstly, largemouth bass are gluttonous predators. Bass have been described by bass writers (including André himself) to “*herd schools of baitfish towards the shore area where they are defenceless and easily taken*”. In South Africa the problem is that we have catfish as well and they frequent the same habitat and hunt the same way that bass does. I have been told that catfish and bass were seen in Hartbeespoortdam hunting together, herding baitfish into shallow bays and annihilating them. The dam’s ecosystem was in relative balance when catfish were the only predators.

Secondly, largemouth bass is not an exclusive still water fish and small largemouth bass are not structure bound. I have caught many small bass right below the Barrage (at Erina Spa) **in the rapids** while fly-fishing for yellows. The bass wait at banks of the river and islands and on the edges of the rapids to grab food particles that float by. Thus they compete for habitat and food with yellows, moggels and muddies. Small bass have appetites like teenage boys. They eat the whole day and will actively hunt in open water for their prey. Small bass are very quick and ferocious and will attack fish nearly as large as itself.

As they get bigger they move to the deeper and quieter sections of the river where there is enough structure to hide and ambush prey. And we all know that the Vaal has ample appropriate structure. Now the bass competes for food and structure with catfish, larger

smallmouth yellows and largemouth yellows. It is not uncommon to hear of nice sized bass being caught in the Lindequesdriif-area. This is in an area where there is a constant flow of water. Fish are adaptable – bass will hunt in the inlets and outlets of pools, if that is where the food source is.

Another and even bigger problem is Florida bass. They grow quicker and larger and they are more adaptable than “normal” largemouth bass. Hartbeespoortdam can serve as an example again. Largemouth bass were introduced into Harties a long time ago, but it just did not seem to adapt. A few years ago Florida’s were introduced and now Harties is one of the best bass dams in the country, despite all the pollution!

Smallmouth bass

To illustrate the problems that smallmouth bass create, one only has to look at the study Dean Impson and his team undertook in the Rondegat River. The study was discussed in detail at last year’s conference, so I am not going into too much detail in this regard. In short it was found that all the indigenous species namely, the Clanwilliam yellowfish (except for a few larger specimens), Clanwilliam redbfin, Clanwilliam rock catfish, Fiery redbfin and the Cape galaxias were annihilated by the bass in the river. This is not too difficult to believe. In a recent article in *tight Lines*, André Pretorius wrote that he caught 44 smallmouths in 2,5 hour’s time! Dean Impson indicated to me that only 5% of the Bergriver-redfin could now be found in its original habitat, because of the impact of smallmouth bass.

Carp

Carp’s feeding habits are a problem. Sometimes they blow jets of water into the bottom of the water resource so as to loosen food particles. Sometimes they even “burrow” into the sediment to get to the food. Studies by Dr Louis de Wet from Waterlab indicated that this type of behaviour loosens nutrients which are in the sediment and this in turn stimulates the growth of algae. It also increases the turbidity of the water and this can affect other species’ ability to look for food. Again Hartbeespoortdam is a good example. Carp is also accused of eating fish eggs.

It is generally accepted that carp is a fish that keeps in still deep water. This is not 100% true. Fish can adapt to its circumstances. I have caught quite a few carp in the rapids in the Vaal.

Trout

Trout is also a problem, but due to the fact that their impact is limited to cold water they do not get the same negative publicity as bass and carp. However, what is good for the goose is good for the gander and no species should get preferential treatment. Trout should be treated in the same manner as bass and carp.

Legislation

As said previously, the bass fraternity is of the opinion that only bass have been chosen to bear the brunt of legislation. Again this is not true. The Biodiversity Act is just one piece of legislation dealing with some of the issues pertaining to the protection of our environment. The purpose of the Act is to protect South African biodiversity and to protect certain

endangered species and ecosystems. We have a considerable amount of legislation dealing with most of the dangers that I have mentioned earlier.

I am not going to deal with all the legislation, but just want to note the following:

Provincial legislation pertaining to the protection of the environment states that you may not introduce a species of fish to a water resource where such a species does not occur naturally. Failure to comply is an offence. As already shown earlier this legislation exists for a reason. The ill-considered introduction of foreign species into a water resource can irreparably harm a water resource.

Furthermore, the National Water Act states that polluting a water resource is an offence and punishable with a jail term of up to 10 years. “*Pollution*” is defined so as to include making a water resource harmful or potentially harmful for any **water organism** or the **resource quality**. “*Resource quality*” is defined so as to include the quality of all the aspects of a water resource, including the **biological properties** of the water and the **properties, condition and occurrence** of aquatic biota. Therefore the introduction of foreign species – if it negatively affects the properties, condition and occurrence of aquatic biota, can be defined as pollution (so-called biological pollution).

Therefore: Do not introduce foreign species into water resources where it does not occur naturally – it is selfish and illegal!

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DISCUSSION “DRAFT REGULATIONS FOR THE USE OF WATER FOR RECREATIONAL PURPOSES GENERALLY AND IN RESPECT OF A GOVERNMENT WATERWORKS AND SURROUNDING STATE-OWNED LAND”

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Introduction

The Department of Water Affairs and Forestry (“DWAF”) is in the process of drafting regulations pertaining to the recreational use of water. The regulations are currently only in draft format and have not yet been published for public comment. Lorraine Fick from DWAF has however indicated that they would welcome any comments at this stage. The regulations will directly impact on fishermen and it is therefore important for all fishermen to take cognisance of the regulations and submit their comments **prior** to the promulgation thereof. On the face of it the Regulations seem quite onerous, but Ms Fick indicated to me that the DWAF intends to only regulate specific problem areas and that the regulations will not apply generally to all recreational uses of water resources. Time will tell how the regulations will be implemented.

Purpose of the Regulations

The purpose of the regulations is to ensure that recreational water use is undertaken in ways which take into account:

- The purpose of the National Water Act 36 of 1998 (“NWA”)
- The need to apply precautionary approaches to recreational water use of the nation’s water resources;
- The need to utilise recreational water use of the nation’s water resources to achieve economic growth, human resource development, capacity building, employment creation and sound ecological balance consistent with the development objectives of national government;
- The need to protect the nation’s water resources and the bio-diversity of aquatic and associated ecosystems and to minimise pollution of those water resources;
- The need to achieve, to the extent practicable, broad and accountable participation in the decision making processes provided for in these regulations;
- The need to re-structure the commercial recreational water-use industry in order to address historical imbalances and to achieve equity within the industry;
- The need to ensure compatibility of recreational water uses with other water uses, including other recreational water uses; and
- The need to ensure the safety of all recreational water users.

Definitions

The regulations deal mainly with "**commercial recreational water use**" which includes recreational water use for financial gain, including organised sporting activities and events and "**high impact recreational water use**" which is defined to mean recreational water use which may, does or is likely to detrimentally impact a water resource or other water uses of

that water resource. “**Recreational water use**” means the use of water for recreational purposes and includes all activities that require the use of water, including the surface of water for the exclusive purpose of sport, tourism or leisure, personal or commercial purposes, or activities which contribute to the general health, well-being and skills development of individuals and society.

Use of a water resource for recreational purposes

A person may only use a water resource for recreational purposes:

- if he has lawful access to that water resource
- subject to the prescribed precautionary practices;
- if the water use does not detrimentally impact any other water use;
- if the water use is not harmful or potentially harmful to human health and safety or the water resource;
- if the water use is compliant with an approved recreational water use operational plan; and
- subject to the requirements of any approved water resource management plan.

Precautionary practices

The wording of regulation 6 is problematic in that it puts an onus on a recreational water user to ensure that, *inter alia*:-

- the owner or skipper of a vessel at all times:
 - operates or handles the vessel safely;
 - is not under the influence of intoxicating liquor or any substance having a narcotic effect;
 - the vessel, when not in use, is securely anchored or moored so as not to endanger other vessels or persons on the water or along the banks of the relevant water resource;
 - the number of persons aboard a vessel does not exceed the carrying capacity of that vessel; and (v) has the standard of knowledge and experience for navigating or otherwise operating or handling the vessel;
- all vessels are constructed of suitable materials of good quality with regard to sound design practice and methods of construction;
- safety equipment adequate for the safety of the maximum number of persons, in particular flotation aids and lifejackets, is provided and maintained to industry standards;
- relevant safety rules and lawful notices, warnings, water traffic signs and signals are obeyed.

The problem with this regulation is that it places the onus on the water user, instead of the **owner or skipper** of a vessel to adhere to safety measures regarding boats, canoes etc. This is problematic as the water user may not have the knowledge of safety practices, constructing methods etc.

Recreational water users should also ensure that a water resource and the associated ecosystem are not detrimentally affected, that the recreational water use is not harmful or potentially harmful to human health and safety and that other water users and any other persons are not detrimentally impacted upon.

Recreational water use operational plans

The Minister may require a high impact or commercial recreational water user to apply for the approval of a operational plan for a high impact or commercial recreational water use within 180 (one hundred and eighty) days of the date on which he or she is notified by the Minister to do so. In such an operational plan must include an assessment and evaluation of the impact of the recreational water use on the water resource, environment and socio-economic conditions of any person who might be directly affected by such a water use.

With regards to fisherfolk, this may include the organizing of fishing competitions and festivals. How the Minister will know that you are intending to organize an event and how one will be contacted by the ministry, is any one's guess.

The operational plan must also describe the manner and extent to which he or she has consulted with interested and affected parties on the contents of the operational plan and describe the manner and time period in which he or she intends to achieve stakeholder equity in the commercial recreational water use concerned. Interested and affected parties have not been defined in the regulations and will differ according to the facts of each case. Fishermen may for example be interested and affected parties in certain circumstances.

The operational plan must also describe how harm to human health and to the environment will be avoided and how to deal with negative impacts on the environment.

Water resource management plans

The Minister may require that a water resource management plan be compiled and approved for a water resource or for government waterworks to be utilised for recreational purposes. A government waterworks is defined so as to include any borehole, structure, earthwork or equipment installed or used in connection with water use, eg dams, weirs etc. The Minister must, before approving a water resource management plan, obtain and consider public comments.

Record keeping and disclosure of information

Any person using water for recreational water use purposes may be requested to keep records of aspects relating to the water use and make the information available to the responsible authority. It is doubtful that this will be implemented generally. It is foreseen that it will only be made applicable in circumstances where the water resource or the environment may be negatively impacted on.

Furthermore, any information on the occurrence of incidents that causes, or may cause or is likely to cause, detrimental impacts on the water resource quality must be provided to the responsible authority.

Access to and use of government waterworks for recreational purposes

The Minister may allow or refuse any person access to any part of a government waterworks and may prohibit the holding or giving of any public entertainment, the collection of any money from the public or any other activity which the Minister, for good reason, considers necessary and desirable to ensure compliance with the Act and these regulations.

The Minister may also determine general or specific rules for the safety of the public at a government waterworks and the surrounding state-owned land, and must cause the rules to be posted up in places approved by the Minister for such purpose. These rules may include:

- access to the government waterworks and surrounding state-owned land;
- the use of the government waterworks and surrounding state-owned land and the conduct of persons in such areas;
- water and land speed limits applicable to the government waterworks and surrounding state-owned land;
- reservation of certain areas for use for specified purposes;
- hygiene;
- times during which the government waterworks and surrounding state-owned land will be open to the public;
- reasonable charges payable for access to or for the use of the amenities or other facilities provided in the government waterworks and the surrounding state-owned land; and
- water-based recreation activities.

The use of government waterworks for recreational use is currently being administered by the various provincial governments. The concern is that additional fees may be charged and that anglers will now have to pay even more to enjoy their sport. It seems that this is not such a huge problem, however. The various provincial governments are administering the recreational use of government waterworks in terms of contracts between themselves and DWAF. These contracts will need to be reviewed in due course. In the review process, DWAF will expect the provincial governments to submit a water resource management plan in which charges etc will have to be addressed. DWAF will then determine what a reasonable charge will be. Thus anglers will not pay double the fees for a fishing trip.

Precautionary practices

In the case of a government waterworks for which an approved water resource management plan does not exist:

- no recreational facilities or structures may be established on surrounding state land without the written approval of the Department or any other relevant authority;
- no recreational water use involving the use of vessels for overnight accommodation purposes may take place without the written approval of the Department;
- no recreational activities may take place at the minimum distance of 100 metres from the dam wall and outlet works or spillway without the written approval of the Department; and
- no recreational water use may take place, where cruising speed is involved within 70 metres from the water's edge and in the river inlet areas to the dam.

The last point is of concern. After consultation with Ms Fick, it became apparent that the intention of DWAF was to prohibit boats to go quicker than **idling** speed within 70 metres from the water's edge. However, the regulations currently do not indicate whether it is applicable to boats or motor vehicles or both. Furthermore the regulations currently read that one may not fish or undertake any other recreational water use if boats (and/or cars?) drive quicker than cruising speed within 70 metres from the water's edge, thus effectively saying that boaters may act as they wish and fisherfolk should stay away.

Conclusion

It seems that the regulations were drafted hastily, and clearly without having fisherfolk in mind. We are lucky enough that the regulations are still in their preparatory stage and that comments can still be given to DWAF in order to amend the regulations to render them sensible. I urge fisherfolk to read the regulations and forward their comments to Lorraine Fick at DWAF (deb@dwaf.gov.za), either personally, through their representative bodies or by contacting me.

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A NEW APPROACH – CAPENATURE APPOINTS A FRESHWATER ANGLING LIAISON OFFICER

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This paper outlines the three main reasons for the appointment and also the objectives of the Liaison Officer and what CapeNature would like to achieve through this approach.

Why this approach? :

- In 2004 the new (updated) National Environmental Management: Biodiversity Act came into force with a great emphasis on biodiversity conservation and the need to control the adverse affect of invasive alien species on our indigenous fauna and flora.
- The status of the fish fauna in our inland waters of the W.Cape is of great concern, with 14 of our 18 indigenous freshwater fish species threatened, of which 9 are endangered.
- Freshwater angling is very popular among South Africans, with an increase in anglers annually over all facets of angling, which includes coarse, fly-fishing and artlure.
- It is CapeNature's intention to allocate the considerable income that could be generated from licence sales to a dedicated account for freshwater angling matters in the W.Cape.
- CapeNature has identified an urgent need to educate, inform and get anglers to participate in conserving our inland waters.

The main objectives of the Freshwater Angling Liaison Officer are:

1. To strengthen the relationship between CapeNature and freshwater anglers by improving communication channels between them via:
 - Re-establishing the Freshwater Angling Forum in the W.Cape
 - Creating a contact database of all angling clubs and tackle retailers for communication purposes
 - Responding to and raising angler concerns to conservation authorities and *vice versa* to achieve mutual benefit
2. Educate and inform anglers about conservation issues via quarterly newsletters and presentations at angling competitions and club meetings.
3. Increase annual licence fees (from R35 to R45) and therefore ensure through the increase that the angling liaison post is self-sustaining from 2006.
4. To get anglers to assist with CapeNature's Alien Fish Control Programme by:
 - Encouraging catch and release of indigenous fish species
 - Not returning any caught alien fish to rivers
 - Report any illegal activities to conservation authorities (e.g. stocking of rivers with alien fish)
 - Involvement in alien fish eradication projects

What does CapeNature want to achieve through the Liaison Officer and the implementation of these objectives? :

1. Halt declining indigenous fish numbers
2. Improve relationship with anglers
3. Rehabilitate priority rivers with the assistance of anglers
4. Prevent the spread of invasive alien species in inland waters

5. Enhance fishing opportunities by improving habitats and management of fish stocks for future use
6. Revenue received from increased licence fees will hopefully sustain the Liaison Officer post from 2006 and beyond

In the U.K. and U.S.A these type of initiatives have proved to be very successful and aided in restoration projects, restocking of fish and aquatic research, which all enhanced the overall fishing experience in the countries respectively and for this reason they have a saying, “**User Pays – User Benefits**”.

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THE UTILIZATION OF THE XIKUNDU FISHWAY BY *LABEOBARBUS
MAREQUENSIS*

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Abstract

The fishway constructed at Xikundu in the Luvuvhu River was designed to cater for the needs of fish species that occur in that region of the river. As part of an ongoing national project aimed at setting design criteria for South African fishways, the University of Venda was contracted to determine the effectiveness of the design of the fishway.

In order to determine the effectiveness of the fishway, it was to be monitored for a year and this low-intensity monitoring was carried out once a month for a 24-hour period at four hourly intervals. Over and above measuring the fluctuation and changes in the physical characteristics within the fishway, other environmental and water quality parameters were measured as well.

It was then felt that valuable data concerning locally migrating fish species could be obtained at the same time. Therefore, samples of each 1 cm length class of the fish species collected, which *inter alia* included *Labeobarbus marequensis*, were collected and taken to the laboratory where the gonad development and the condition factor of each specimen was determined.

The results of this presentation illustrate the periodicity of the migratory movements of *L. marequensis* and the possible linkages that exist between this movement and the biological and environmental cues.

1. Introduction and background

A fishway can be broadly described as any natural or artificial device that enables fish to overcome structures in rivers that obstruct their natural migrations. Clay (1995) describes a fishway as “essentially a water passage around or through an obstruction, designed to dissipate the energy in the water in such a manner as to enable fish to ascend without undue stress”.

There are large numbers of in-stream barriers (such as weirs, dams, and causeways) in South African rivers that obstruct the natural migrations of aquatic biota. Although over 35 fishways have been built on instream barriers in South Africa, many of these are based on designs developed in the northern hemisphere and only a few appear to be reasonably effective in passing indigenous species (Bok, 2003). It is only in recent times that serious research has gone into developing fishways for South African conditions that can meet the requirements of indigenous species and to suit our environmental conditions.

Existing legislation in South Africa is encompassed in the Environment Conservation Act,

1989 (No. 73 of 1989), National Environmental Management Act (Act no. 107 of 1998), The National Environmental Management: Biodiversity Act (2004) and the National Water Act, 1998 (Act No. 36 of 1998) and Limpopo Environmental management Act (Act 7 of 2003). These laws stipulate the requirement that appropriate mitigation (e.g. construction of a fishway) is necessary to ensure that the natural migrations of indigenous aquatic species are not obstructed by man-made structures.

Two WRC sponsored projects dealing with fishways are presently under way. One of these is a WRC project contracted to Pulles, Howard and de Lange to do a comprehensive study to develop criteria for the design of fishways for South African rivers and estuaries. The Department of Biological Sciences of University of Venda for Science and Technology (Univen) has been subcontracted in this project to *inter alia* monitor the fishway at the Xikundu Weir in the Luvuvhu River. Partnerships with the University of Limpopo and the Limpopo Department of Economic Development, Environment and Tourism have been formed to assist in the investigation.

The Luvuvhu River arises in the Soutpansberg Mountain and flows through a diverse landscape before it joins the Limpopo in the Kruger National Park. The Xikundu area where the weir is situated is app 35 km from the Punda Maria gate of the KNP (S 22° 49.453' and E 30° 47.912') in the lower reaches of the river at 446m a.s.l.

Gaigher in DWAF (1999) listed 25 species that he regards to be still present in the section of the river where the fishway is built. He does not list *Chiloglanis engiops*, *Glossogobius guirius* or *Hydrocynus vittatus* but includes *Barbus toppini*, *Labeo congoro*, *L. rosae* *L. ruddi* and *Schilbe intermedius* that are not listed in table 1. If all were included it would bring the total possible number of species that could be expected to 28.

The Limpopo Environmental Affairs “fish distribution data base” updated January 2005, provides a detailed distribution pattern for all fish species in the province. This historical data set, (including data from Gaigher) provided the background for a detailed study of the fish assemblages of the Luvuvhu River, which was conducted as part of the State of Rivers Report (2001) for the Letaba and Luvuvhu River Systems.

Table 1: Fish species collected in the Luvuvhu River, as reported in the 2001 State of River Report, based on monitoring sites downstream and upstream of Xikundu. Those fish marked with an * were collected immediately up and downstream of the fishway during the 2004 fishway survey. ** were only collected during this survey.

Scientific name	Abbreviation/ code	Botsoleni	Mhinga	Lambani
<i>Amphilius uranoscopus</i>	AURA		✓	✓
<i>Anguila mossambica</i>	AMOS	✓		
<i>Barbus paludinosus</i>	BPAU	✓		
* <i>Barbus trimaculatus</i>	BTRI	✓	✓	✓
<i>Barbus unitaeniatus</i>	BUNI	✓		
* <i>Barbus viviparus</i>	BVIV	✓	✓	
<i>Chiloglanis swierstrai</i>	CSWI	✓	✓	
* <i>Chiloglanis paratus</i>	CPAR	✓	✓	
* <i>Chiloglanis pretoriae</i>	CPRE	✓	✓	✓
<i>Clarias gariepinus</i>	CGAR	✓	✓	✓
<i>Glossogobius guirius</i>	GGUI	✓		
** <i>Hydrocinus vittatus</i>	HVIT			
* <i>Labeobarbus marequensis</i>	LMAR	✓	✓	✓
* <i>Labeo cylindricus</i>	LCYL	✓	✓	✓
* <i>Labeo molybdinus</i>	LMOL	✓	✓	✓
* <i>Micralestes acutidens</i>	MACU	✓	✓	
* <i>Mesobola brevianalis</i>	MBRE	✓	✓	
<i>Marcusenius macrolepidotus</i>	MMAC			✓
* <i>Oreochromis mossambicus</i>	OMOS	✓		✓
<i>Petrocephalus wesselsi</i>	PCAT	✓		✓
* <i>Pseudocrenilabrus philander</i>	PPHI	✓	✓	
<i>Tilapia rendalii</i>	TREN			✓
<i>Tilapia sparrmannii</i>	TSPA	✓		
Total number	23			

2. Materials and methods

2.1 Sampling frequency.

For the period from May 2004 to November 2004 the fishway was monitored once a month for a period of 24 hours at 4 hourly intervals. At each four-hour interval the following weather conditions were determined on site and recorded: Air temperature, cloud cover, wind direction and rain.

2.2 Data collection.

For fish monitoring, three parts of the fishway were monitored namely, the upper, middle and lower section. Because of its longer length the upper section was subdivided into two sub-sections. Each monitoring point consisted of three pools and was monitored as a unit.

The upstream inflow of each monitoring point was blocked with a barrier consisting of a steel framed net to prevent any fish from escaping upstream. In the downstream notch of the unit a steel-framed collection net, with a long bag to facilitate fish collection and prevent fish from escaping, was placed. The fish were electro-shocked (220-Volt 0,8 kVa AC) and the

current washed stunned fish into the collection net. A long-handled shocker was constructed to reach all the points in the fishway. Long wooden handled scoop-nets were kept on hand to collect fish that float.

2.3 Identification measurement of the fish

The fish collected in each section were placed in separate plastic buckets and taken to the sampling table where they were identified using the key published by Skelton (2001). The length of each fish was measured in millimeters on a measuring board and the mass of each fish was determined on a balance to the first decimal point. A specimen of each specie was collected and will in due course be forwarded to South African Institute of Aquatic Biodiversity (SAIAB) as voucher samples. Samples of each size class were then preserved in formalin and transported to the laboratory. The rest of the fish were returned to the river alive.

2.4 The physico-chemical parameters.

During each site visit the pH, water temperature, conductivity and dissolved oxygen was determined on site using a Hannah pHep3 pH meter, a Checktemp thermocouple, a Hannah HI 8733 conductivity meter and a WTW Oxi-320 oxygen meter respectively. Care was taken to calibrate the oxygen and conductivity meters before each reading according to the measured water temperature. A water sample was collected and taken to the laboratory for analysis.

In the laboratory the turbidity of the water was determined from the water sample collected at each site with an Analite Novasino nephelometer using double distilled water as a standard. To determine the Total Suspended Solids (TSS) a 250ml sub-sample of the water sample was filtered through an oven dried filter paper of a predetermined mass. The filter paper was then dried overnight at 60°C and the increase in mass determined on a Sartorius Handy microbalance. The increase in mass was then expressed as mg l^{-1} . The total dissolved salts (TDS) was determined by drying 200 ml of the filtered water sample overnight in a glass beaker with predetermined mass. The increase in mass was then determined and expressed as mg l^{-1} .

2.5 Fishway dimensions and hydraulics

In order to establish the hydraulic characteristics of the fishway the following was done during each site visit:

2.5.1 The following aspects were physically measured once using a meter rule: a) the water depths in each pool b) the height of the water flowing through the notch and c) the drop in water height between pools.

2.5.2 The water velocity was determined in the notch at three levels namely a) just below the water surface, b) approximately in the middle of the nappe and c) with the velocity meter touching the base of the notch. A Science Workshop velocity meter was used and velocity was measured in meters per second.

2.5.3 The discharge (Q) through the notch was then calculated using the formula below and expressed in cumecs (cubic meters per second):

Q = (Water height in notch in meters) X (width of notch in meters) X (average velocity in notch).

2.6 Laboratory investigations of the fish.

In the laboratory the fish were again measured, the body mass determined and dissected to expose the viscera and reproductive organs using the method described by Willers (1991).

2.7 The condition of the fish.

The Condition Factor (CF) of each specimen was calculated with the use of the formula prescribed by De Villiers (1991) :

$$CF = \frac{\text{Fish mass}}{L^b} \times 100$$

Where b = exponential derivative that refers to the length mass relationship. In most cyprinids the length to relationship is usually expressed as follows $L^b = L^3$ (Hamman, 1981, Fouche, 1995). This would imply that in the case of this family L^3 could be applied.

2.8 Gonadal development.

The intestines were removed to expose the gonads. The gonads were then carefully removed and weighed to the nearest 0.0001 g. The reproductive seasonality was then determined by calculating the monthly Gonadosomatic Index (GSI) values (De Villiers, 1991) using the formula:

$$GSI = \frac{\text{Gonad mass (g)}}{\text{Total fish mass (g)}} \times 100$$

3. Results

3.1 General characteristics of the fishway

The Xikundu fishway is a pool-type fishway that is divided into three parts namely, the upper section, middle section and lower section that are at right angles to one another. These sections have 10, 4 and 9 pools in the upper, middle and lower sections respectively. The pools are all 2,4m wide, approximately 2,2 m long and are 1,2 m deep. Where two sections join there are two larger “joining pools” (2,6 X 2,35 m) of the same depth. The pools are separated with notched baffles and these notches are at alternate ends of consecutive baffles, which allows for dissipation of the energy and creation of resting areas for the fish where the water velocity is greatly reduced and the energy dissipated. A 100mm pipe at floor level in the baffle wall forms an orifice through which fish can escape when water ceases to flow through the fishway. The downstream entrance to the fishway is constructed with large boulders to guide the fish into the fishway.

3.2 The fish observed in the fishway

In South African rivers only the eels, *Anguilla sp.*, are diadromous and catadromous and migrate over long distances (Skelton, 2001). Gaigher (1999) is of the opinion that it is the only migratory specie. The rest of the fish species that migrate are potamodromous and it is thought that they migrate or move for reproductive reasons where they participate in spawning events (Skelton, 2001). These species are often be regarded as “local migrators” because the only move relatively short distances. Ten of the 23 species listed in table 1 can be regarded as fish that move or migrate. The species *C. paratus*, *C. pretoriae*, *H. vittatus*, *Labeobarbus marequensis*, *Labeo cylindricus*, *L. molybdinus*, *Micralestes acutidens*, *Marcusenius*

macrolepidotus and *Petrocephalus wesselsi* are local migrators that migrate for reproductive reasons during late spring or summer.

Table 2: Fish collected in the Xikundu fishway during the period May to November 2004.

Species	Number collected						
	May	June	July	Aug	Sept	Oct	Nov
<i>Amphilius uranoscopus</i>	0	0	0	1	0	0	0
<i>Anguila mossambica</i>	0	0	0	0	1	0	0
<i>Barbus trimaculatus</i>	0	1	0	0	0	17	3
<i>Barbus unitaeniatus</i>	0	0	0	1	0	0	0
<i>Barbus viviparus</i>	5	0	0	1	1	3	1
<i>Chiloglanis swierstrai</i>	0	8	1	0	0	0	18
<i>Chiloglanis paratus</i>	12	7	13	2	2	1	4
<i>Chiloglanis pretoriae</i>	147	180	42	80	24	11	20
<i>Glossogobius guirius</i>	0	0	0	2	0	0	0
<i>Labeobarbus marequensis</i>	23	26	22	28	154	161	41
<i>Labeo cylindricus</i>	28	23	7	5	1	5	48
<i>Labeo molybdinus</i>	21	18	3	3	5	70	23
<i>Micralestes acutidens</i>	2	3	0	0	22	56	55
<i>Mesobola brevianalis</i>	26	0	0	26	0	73	13
<i>Oreochromis mossambicus</i>	6	3	42	0	1	16	6
<i>Pseudocrenilabrus philander</i>	1	0	0	1	0	4	0
<i>Marcusenius macrolepidotus</i>	0	0	0	0	0	0	14
<i>Petrocephalus wesselsi</i>	0	0	0	0	0	0	1
<i>Tilapia rendalii</i>	0	0	0	0	0	1	0
Total no of species = 19	10	8	7	11	8	12	11

Only one specimen of *A. mossambica* was collected and this occurred in the September 2004 survey. The fact that no real increase in water level and velocity, such as that caused by a flood, occurred would explain the absence of this specie.

According to the results shown in table 2 a total of 19 fish species were collected in the fishway. Eight of the total expected number of migratory species, which equates to 72,7 % of the migratory species, was collected in the fishway.

3.3 The Lowveld largescale yellowfish (*Labeobarbus marequensis*) in the fishway.

Figure 1 shows how the total number of *L. marequensis* changed during the monitoring period. In the first four months from May to August the numbers remained more or less constant in the twenties with the highest number of 28 collected in August. September showed a dramatic increase to 154 individuals and in October it rose to 161. In November the number dropped to 41. The results in table 3 show that not only did the numbers increase, but also the size composition of the catch. More large or older fish were collected in the September and October.

Figure 2 illustrates how the condition factor (CF) in the size classes 81 - 140 started improving in the months prior to September. This clearly indicates a physiological preparation period preceding migration during which energy reserves are stored. Tables 4,5 and 6 illustrate the situation in the larger size classes.

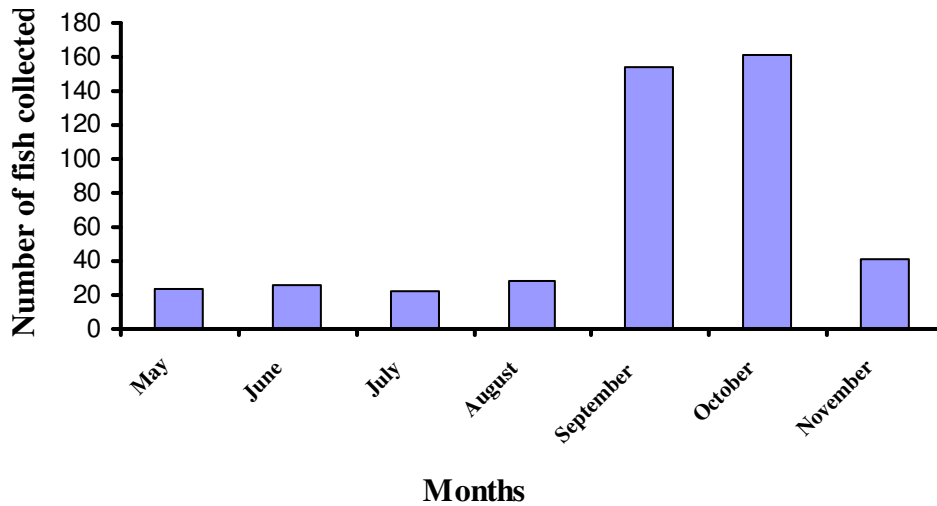


Figure 1: The total number of *L. marequensis* collected in the Xikundu fishway during the period from May to November 2004.

Table 3: The number of *L. marequensis* per length size class collected in the Xikundu fishway during the period from May to November 2004.

Length size classes	May	June	July	August	September	October	November
51 - 60	4	0	1	2	43	8	15
61 - 70	4	4	1	0	4	6	6
71 - 80	2	6	4	1	5	7	2
81 - 90	2	7	5	3	3	1	3
91 - 100	2	3	9	5	13	4	0
101 - 110	2	4	2	3	13	9	0
111 - 120	2	0	0	1	17	29	2
121 - 130	3	0	0	4	16	22	3
131 - 140	1	0	0	1	5	25	3
141 - 150	0	0	0	0	12	15	2
151 - 160	0	0	0	0	4	18	3
161 - 170	0	0	0	0	2	8	1
171 - 180	0	0	0	0	1	2	0
181 - 190	0	0	0	0	1	1	1

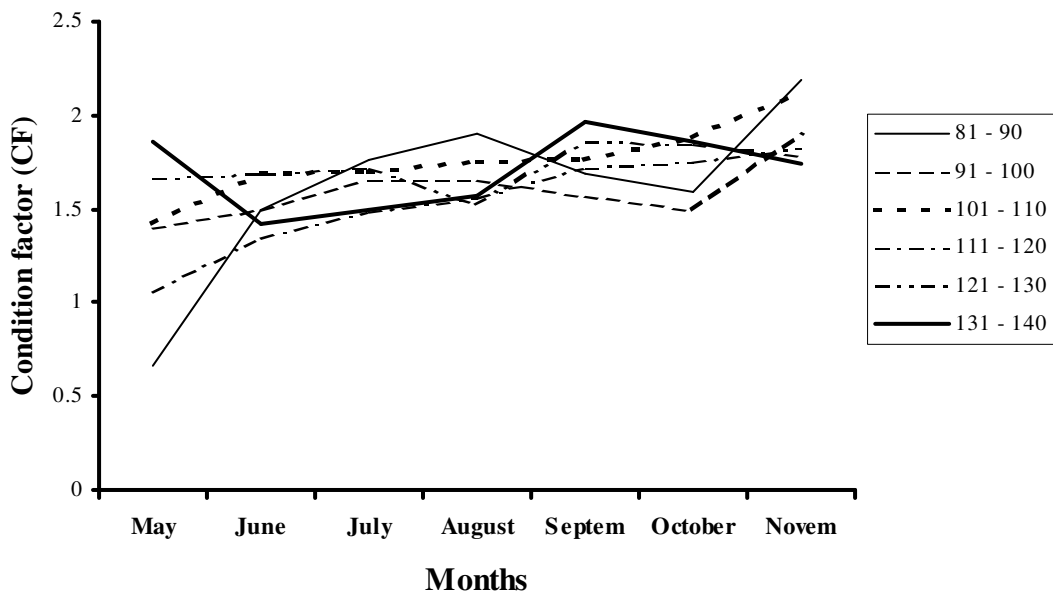


Figure 2: The Condition factor (CF) calculated for the 81 – 140mm length size classes of *L. marequensis* collected in the Xikundu fishway in the period May to November 2004.

Table 4: Body dimensions, condition and sexual maturity of the different length classes of *L. marequensis* collected in the Xikundu fishway during September 2004. (FL: fork length, CF: condition factor, GSI: gonadosomatic index, MC: maturity coefficient).

Body dimensions				Condition and gonadal development		
Size class	N	Ave. Mass (g)	Ave. FL (cm)	Ave. CF	Ave. Gonad Mass (g)	Ave. GSI
61 -70						
71- 80	1	8.53	7.6	1.943	0.0739	0.87
81 - 90	4	11.68	8.85	1.685	0.0579	0.51
91 - 100	6	14.65	9.78	1.566	0.2585	1.76
101 - 110	6	20.8	10.57	1.761	0.3013	1.45
111 - 120	17	27.07	11.63	1.721	0.2161	0.81
121 - 130	8	38.77	12.78	1.857	0.2788	0.72
131 - 140	6	51.21	13.77	1.961	0.6286	1.23
141 - 150	3	57.94	14.37	1.798	0.6662	1.15
151 - 160	3	73.28	15.4	2.006	0.9937	1.36
161 - 170	2	82.91	16.7	1.781	1.0449	1.26
171 - 180	1	102.6	17.2	2.016	0.9118	0.89
181-190	1	135.94	18.2	2.254	2.0958	1.54

Table 5 : Body dimensions, condition and sexual maturity of the different length classes of *L. marequensis* collected in the Xikundu fishway during October 2004. (FL : fork length, CF : condition factor, GSI : gonadosomatic index, MC : maturity coefficient)

Body dimensions				Condition and gonadal development		
Size class	N	Ave. mass (g)	Ave.FL (cm)	Ave. CF	Ave. gonad mass (g)	Ave. GSI
61 -70						
71- 80						
81 - 90	1	11.61	9	1.593	0.0501	0.43
91 - 100						
101 - 110	7	23.65	10.8	1.877	0.1476	0.62
111 - 120	1 2	28.47	11.75	1.755	0.1717	0.61
121 - 130	1 6	37.67	12.68	1.847	0.2392	0.63
131 - 140	1 3	47.19	13.65	1.855	0.3314	0.71
141 - 150	1 1	57.87	14.71	1.818	0.4215	0.73
151 - 160	1 1	70.74	15.62	1.856	0.7206	1.02
161 - 170	5	84.75	16.34	1.943	0.8129	0.96
171 - 180						
181-190						

Table 6 : Body dimensions, condition and sexual maturity of the different length classes of *L. marequensis* collected in the Xikundu fishway during November 2004. (FL : fork length, CF : condition factor, GSI : gonadosomatic index, MC : maturity coefficient)

Body dimensions				Condition and gonadal development		
Size class	N	Ave. mass (g)	Ave. FL (cm)	Ave. CF	Ave.gonad mass (g)	Ave. GSI
61 -70	1	6.71	6.5	2.367	0.0023	0.03
71- 80	1	12.21	8.1	2.297	0.0202	0.16
81 - 90	1	13.46	8.5	2.191	0.0421	0.31
91 - 100						
101 - 110	1	22.56	10.2	2.126	0.0112	0.05
111 - 120	2	28.59	11.6	1.831	0.0484	0.17
121 - 130	2	33.14	12.3	1.782	0.1344	0.41
131 - 140	3	46.71	13.9	1.739	0.1558	0.33
141 - 150	1	60.67	14.5	1.991	0.0992	0.16
151 - 160	2	78.02	15.9	1.941	0.5664	0.73
161 - 170						
171 - 180						
181-190						

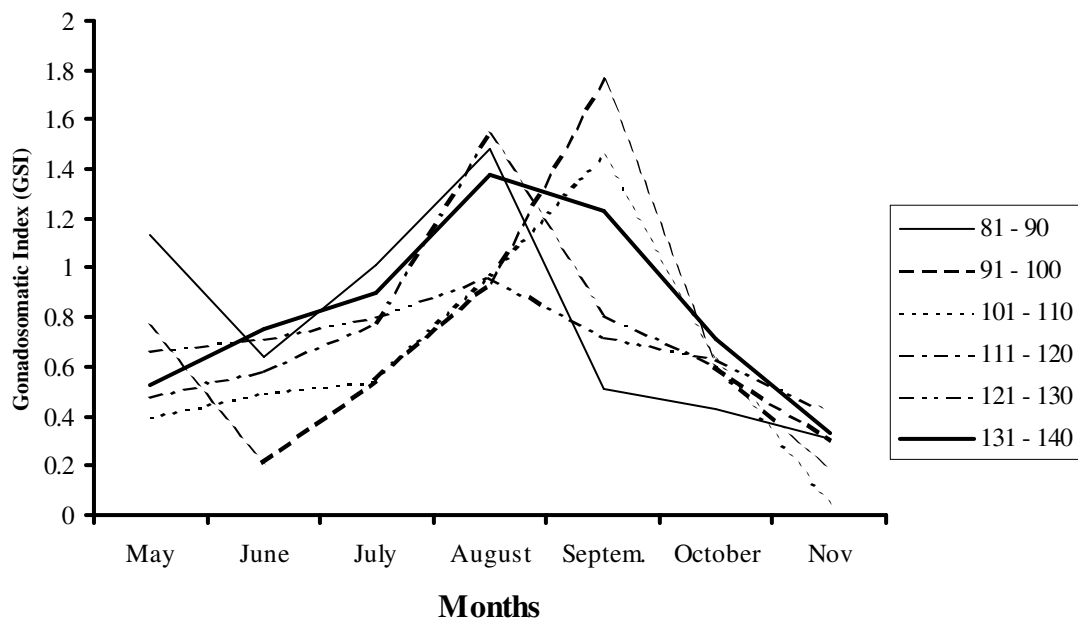


Figure 3: The Gonadosomatic Index (GSI) calculated for the 81 – 140mm length size classes of *L. marequensis* collected in the Xikundu fishway in the period May to November 2004.

3.3 The atmospheric and physico-chemical parameters.

The atmospheric conditions that prevailed during the monitoring period are shown in Table 7. No seasonality or definite trends, other than in temperature, were observed. The temperature trend is typical for the area and the season.

Table 7: Atmospheric parameters at the Xikundu fishway from May to November 2004.

Parameter	Month						
	May	June	July	Aug	Sept	Oct	Nov
Max. air temperature (°C)	27	21	24	27	25	27	29
Min. air temperature (°C)	11	9	5	15	18	16	19
Range of cloud cover	0/8-1/8	0/8-7/8	0/8	2/8-8/8	7/8	7/8 – 8/8	1/8 – 7/8
Rain	No	No	No	No	No	No	No
Prevalent wind direction	SW/N W	NW/ NE	N/ E	NW/ W	S/ W	NW / S	S/ NE

Table 8 shows that while TDS and TSS generally increased during the monitoring period, the turbidity decreased. These aspects are the direct result of the lack of flow and specifically velocity observed. The flow pattern is illustrated in figure 5. The Luvuvhu River is a turbid river and the readings obtained are in line with what is expected. Table 9 shows that the water contained sufficient oxygen for fish life and both the pH and the conductivity were within normal ranges. It is also important to note that no dramatic changes in any of the above occurred between consecutive months. The water temperature on the other hand increased by nearly five degrees between August and September and another three degrees

between September and October after which it remained more or less constant for the remainder of the period (table 9 and figure 4).

Table 8: Results of laboratory determinations performed on the water samples collected monthly at Xikundu fishway in the period from May to November 2004. (TDS refers to the Total Dissolved Solids and TSS refers to the Total Suspended Solids).

Parameters	Units	May	June	July	August	Sept.	Oct.	Nov
TDS	<i>mg/l</i>	0,25	0,30	0,50	0,50	0,45	0,60	0,65
TSS	<i>mg/l</i>	0,026	0,025	0,034	0,048	0,06	0,06	0,02
Turbidity	<i>NTU</i>	10	20	20	20	12	10	8

Table 9: The physico-chemical aspects of the water determined during the field visits at Xikundu fishway in the period from May to November 2004.

Parameters	Units	May	June	July	August	Sept	Oct	Nov
Range of dissolved oxygen in still water.	<i>mg/l</i>	8,3 - 8,4	8,2 - 9,8	8,5 - 9,0	7,2 - 8,6	7,9 - 8,5	6,7 - 7,02	7,6 - 8,5
	<i>%</i>	95,0 - 98,9	96,0 - 99,0	91,0 - 96,0	84,0 - 100,0	94,0 - 98,0	78,0 - 88,0	90,0 - 98,0
Range of dissolved oxygen in turbulent water	<i>mg/l</i>	8,4 - 8,6	9,4 - 9,5	8,9 - 9,2	7,3 - 8,8	8,4 - 8,8	6,8 - 7,7	8,3 - 8,8
	<i>%</i>	97,5 - 101,0	100,0 - -101,0	93,0 - 98,0	85,0 - 100,0	97,0 - 100,0	85,0 - 95,0	97,0 - 100,0
Min. temperature	<i>°C</i>	20,1	15,9	15,3	19,6	20,0	23,2	20,2
Max. temperature	<i>°C</i>	20,9	17,2	15,7	20,8	23,5	23,8	23,5
pH		7,6	8,7	7,8	7,9	7,9	8,0	7,9
Conductivity	<i>µS/cm</i>	97.6	112	109	112	110	138	110

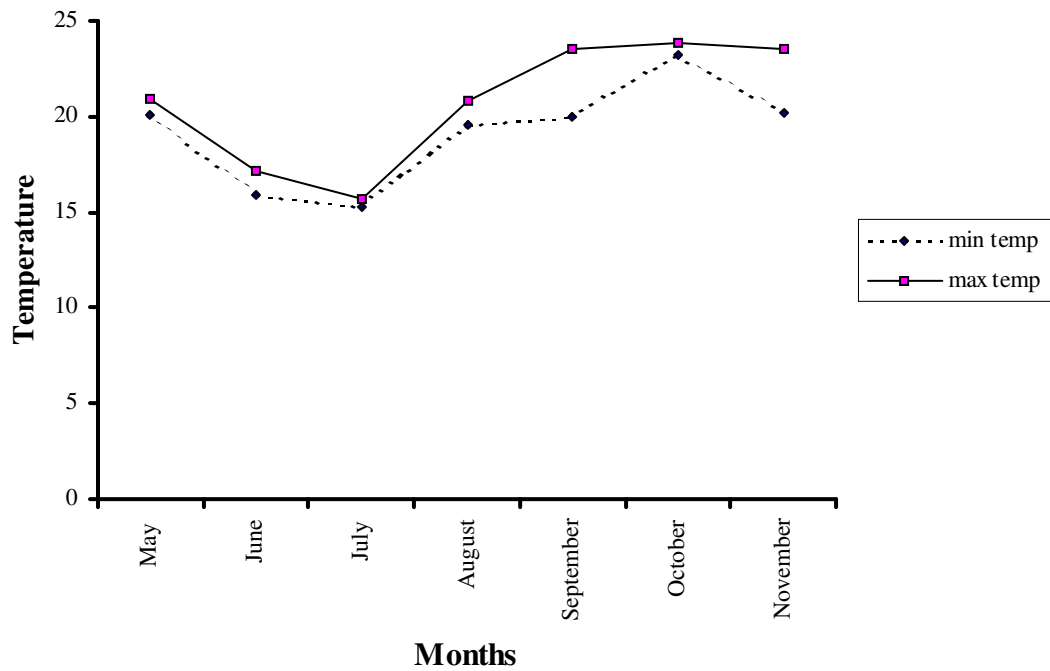


Figure 4: The maximum and minimum water temperatures, measured in the Xikundu fishway for the period May – November 2004.

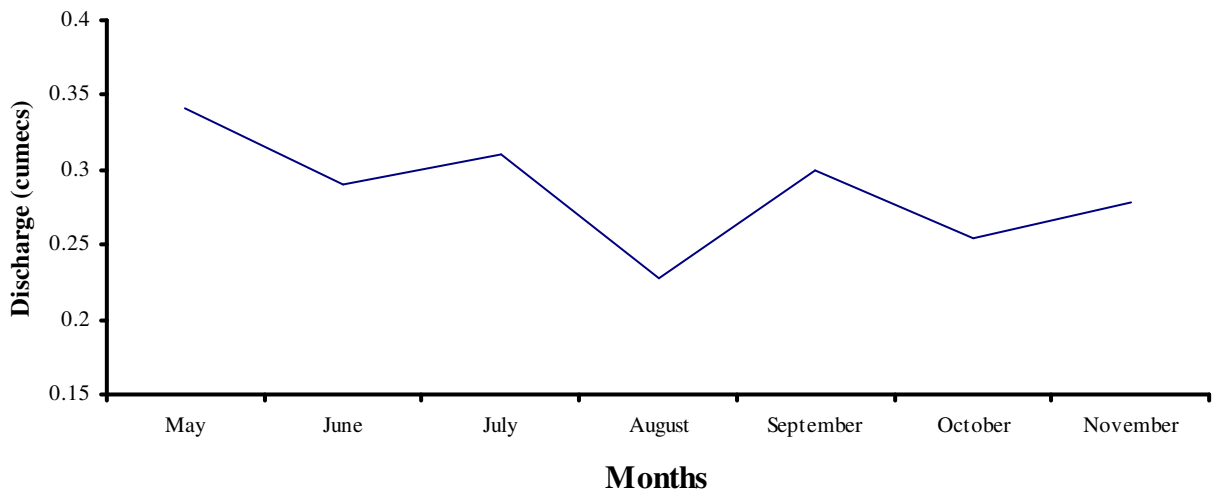


Figure 5: The calculated discharge in the Xikundu fishway for the period May – November 2004.

Figure 5 shows a general downward trend in the discharge through the fishway. It should however be noted that an increase did occur between August and September. This increase,

which could be regarded as a freshet, was not maintained and flow diminished between September and October. A small increase did however again occur from October to November.

4. Discussion

The numbers of *L. marequensis* collected in the fishway indicates that they are utilising the fishway. Because a whole suite of different sizes of *L. marequensis* were collected throughout the fishway it can be concluded that the design of the fishway renders it effective for the specie. Since *L. marequensis* specimens were collected in all the sections of the fishway throughout the monitoring period it can be accepted that they are not merely occupying the fast deep habitat provided by the fishway, but are moving through as part of what is possibly their migratory behaviour.

The physiological changes such as the improvement of their condition and gonadal development, displays a pattern that could be construed as seasonal and which coincides with changes in environmental parameters. Figures 6, where the temperature changes over the period are superimposed over the GSI of three of the size classes, and figure 7 shows that the gonadal development is in synchronization with the rise in temperature. This figure and figure 3 show an abrupt decline in the GSI between October and November. From the above it would appear as if temperature could be the environmental cue that initiates migration or movement in the specie. Hecht (1982) suggested that pH could be the cue but this could not be demonstrated in this study as no changes or pattern for that matter, in the pH other than the higher reading in June were observed. The increase in the CF (figure 6) preceded the rise in temperature and although it is typical of post-winter physiological changes in fish it could also indicate a preparation for migratory movement.

The findings of this report in no way tries to indicate that the improvement in GSI in the size classes of the fish collected reflects that fish are sexually mature and are spawning. Although Hecht (1982) and Skelton (2001) agree on the size at sexual maturity of the females of this specie with 270 mm and 290 mm fork length (FL) respectively, they do not agree on the size at which males attain maturity. Hecht (1982) reported that in the Nwanedi/Lupepe dam in the Nzhelele River males reached maturity at 170mm FL while Skelton indicates that this occurs at 70mm.

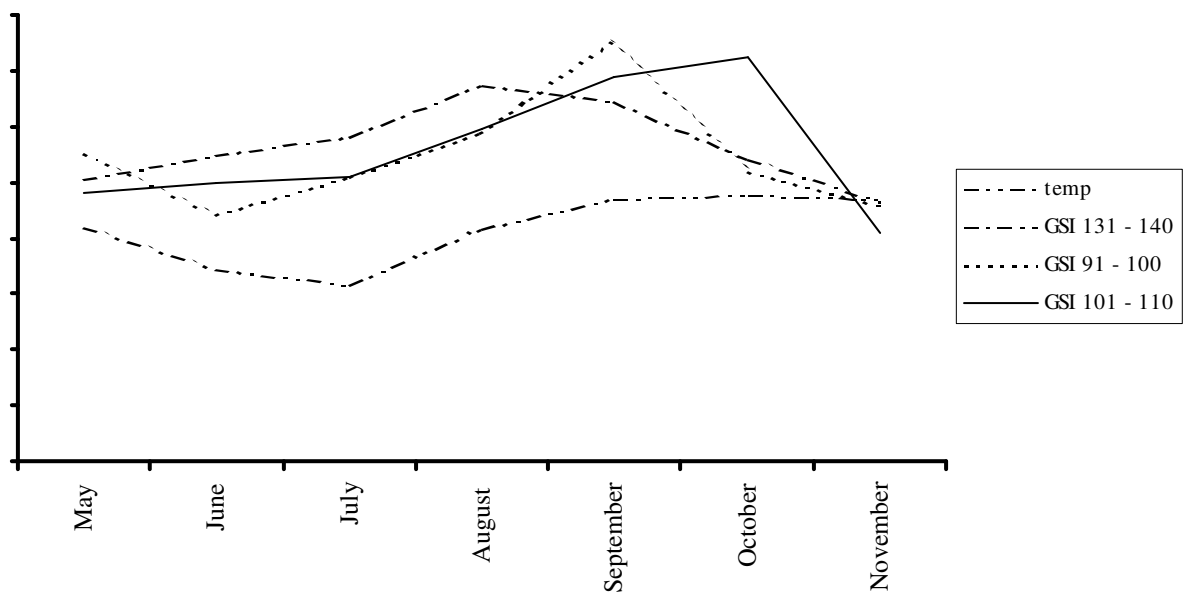


Figure 6: A comparison of the temperature trends with the trends in GSI changes in three length classes of *L. marequensis* collected in the Xikundu fishway during the period May to November 2004.

In general the observed size of the fish with gonadal changes is reported, and specifically the females collected, are smaller than the sizes reported by other researchers and this needs further investigation. The data obtained in this study also shows that prior to the September monitoring period no macroscopic observation of eggs was reported. In September, eggs were visible in 10 of the 47 specimens examined larger than 100mm. This increased to 33 in the sample of the 76 specimens examined in October. Based on the above it could be postulated that the increase in numbers could be related to reproductive behaviour. It should also be borne in mind that the reported GSI does not separate the males from the females and that the GSI of the males is diluted.

Further data analyses will also clarify matters in this respect. Gonad samples have been preserved and are currently being analysed to determine further aspects of the reproductive biology, such as for example fecundity etc. of each specimen.

The second phase of the project that will involve intensive monitoring during the months in which migration has been observed, will commence in August 2005 and it is envisaged that more comprehensive data will be obtained.

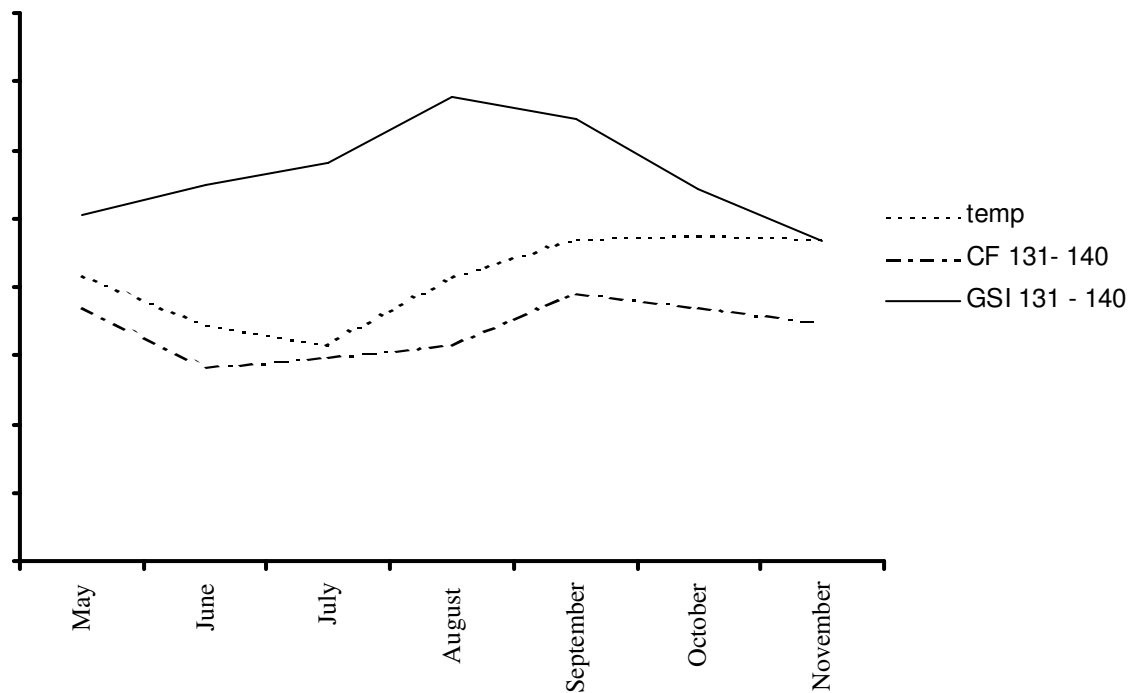


Figure 7: A comparison of the temperature trends with the trends in GSI and CF changes in the 131 – 140 length classes of *L. marequensis* collected in the Xikundu fishway during the period May to November 2004.

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THE EXTINCTION OF BERG-BREEDER WHITEFISH IN THE BERG RIVER, SOUTHWESTERN CAPE: CAUSES AND THE WAY FORWARD

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Whitefish distribution and ecology

- Cape Floristic Region has 19 freshwater fish species, 16 of which are unique (all of these are threatened) including the whitefish or witvis *Barbus andrewi*
- Not a true yellowfish – these are in *Labeobarbus* genus
- Only found in the Berg and Breede River systems of SW Cape
- Prefers pools and riffles of mainstream and large tributaries - very rarely found in small streams, unlike Clanwilliam yellowfish and sawfin.
- Omnivorous, juveniles eating zooplankton and then aquatic invertebrates, adults eat algae and aquatic invertebrates
- Breeds October to December, large schools spawn in knee to waist-deep riffles
- Very slow growing – 1 yr approx. 6cm, 2 yrs approx. 15cm
- Co-exists with Cape kurper, redfins and Cape Galaxias

The Berg River in 1934 and the “witvis pest”

- River unpolluted with large numbers of indigenous fishes
- Whitefish common in mainstream from Groot Drakenstein to Piketberg, but only in tributaries during spawning migrations
- Flyfishers regarded abundant whitefish as a competitor to brown and rainbow trout introduced around 1900
- Largemouth bass introduced around 1928, fared poorly due to river flooding
- Groot Drakenstein Angling Society decided to introduce smallmouth bass in the 1930's to get rid of the “witvis pest”!!! and to provide a gamefish for the middle reaches of the river

The slow decline of the Berg River

- Decline started in early 1900's with the intensification of agriculture and growth of Paarl and Wellington. The river became increasingly canalized and water quality started to deteriorate in summer.
- Rainbow and brown trout were harming indigenous fish but impact was restricted to cooler upper reaches
- Addition of smallmouth bass spread predatory impact throughout river, especially in the mainstream which was the preferred habitat of the whitefish. All whitefish recruitment areas became invaded by smallmouth bass.
- Redfins and Cape kurper gone within 10 yrs from bass areas
- Whitefish longer lived with adults reaching 3 kg, so impact of bass took several decades to become evident
- Habitat degradation also a major problem, especially in the last 30 years – dams, bulldozing of rivers, pesticides, treated sewerage releases

- Growing numbers of alien plants in riparian zone, such as Black wattle, Pines and Eucalypts, caused bank collapses and increased sedimentation in pools reducing their depth.

Extinction of whitefish in Berg River?

- CapeNature surveys in 1980's yielded very few whitefish, indicating that the species was in severe decline
- Desperate attempts at culture but could only catch 2 fish in mid 1990's from Berg River
- Culture not successful
- Further intensive surveys in 1998, 2003 & 2004 – no whitefish, instead 8 species of alien fishes that have taken the place of whitefish (banded tilapia, carp, mosquitofish, Mozambique tilapia, smallmouth bass, spotted bass, rainbow trout and sharptooth catfish)
- Genetic studies done in 1998 – fortunately no significant genetic differences between Breede and Berg populations
- Mainstream and most tributaries now dominated by alien fishes, sharptooth catfish now also illegally in river

Present status of whitefish

- Whitefish are in crises – presently Vulnerable, will become Critically Endangered
- Only large population in Brandvlei/Kwaggaskloof Dam
- For every 1 whitefish there are at least 1000 largemouth yellowfish, a yellowfish species receiving a lot of attention from anglers and conservation authorities. Whitefish have received comparatively little attention from the Yellowfish Working Group.
- Only recruiting riverine population now is in the Hex River
- Several refuge populations have been established in alien fish-free farm dams by CapeNature and breeding is taking place in shallow rocky bays of dams

The Future

- Future generations will judge CapeNature, the National Yellowfish Working Group, riparian land-owners and anglers harshly if the whitefish becomes extinct
- CapeNature has established a dedicated whitefish fund
- Whitefish is becoming more sought after as a fish to catch and conserve
- More yellowfish rivers to follow the Berg River if we don't:
 1. Stop illegal stockings of fish
 2. Educate anglers and land-owners about fish and river conservation issues (we all have a duty to do this)
 3. Halt the continued deterioration of habitat and water quality in our wetlands and rivers
 4. Rehabilitate priority rivers through Working for Water and alien fish control programmes

IDENTIFICATION OF CONSERVATION UNITS OF TWO YELLOWFISH SPECIES:
LABEOBARBUS KIMBERLEYENSIS AND *L. AENEUS*

Isa-Rita Russo (talk presenter) & Paulette Bloomer*

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On behalf of the follow-up study team of Roger Bills (SAIAB), Nick Jones (SAIAB), Herman van der Bank (University of Johannesburg) and Paulette Bloomer

The talk reminded everyone of the motivation for the follow-up study on identification of conservation units in the two yellowfish species from the Orange/Vaal system. Emphasis was on the progress since May 2004 and the work needed for completion of the study. AngloGold Ashanti is funding this follow-up study.

Motivation for the follow-up study

The aims of the pilot study conducted in 2002-2003 were to identify conservation units within the two species and to formulate recommendations for the management of these units. In order to achieve these aims genetic variation in maternally inherited mitochondrial DNA was assessed between 71 *L. kimberleyensis* and 145 *L. aeneus* representing sites from the upper and lower Vaal as well as the upper and lower Orange. If two species have been distinct for a considerable length of time one would expect to find distinct genetic differences between them. Furthermore, if this time of separation has been long (hundreds of thousands to millions of years) there would have been enough time for differences within each to develop and one would be able to identify distinct populations that should be managed independently.

The pilot study did not show such a clear distinction between these two species, but found shared genetic lineages between them. This can be explained in two possible ways: (1) The two species are very closely related so that insufficient time has elapsed to distinguish them at this level of genetic variation and both still have the same ancestral lineages or (2) there are instances of hybridization between them (either old or ongoing). The data did indicate the presence of some conservation units, for example, distinct genetic lineages were found in the lower Orange and it was recommended that this area should be managed as a separate conservation unit.

In order to determine whether the two species are hybridizing or recently speciated, the follow-up investigation was proposed in 2003. Roger Bills and Nick Jones (SAIAB) were responsible for field sampling and morphological analysis while Herman van der Bank (University of Johannesburg) has been responsible for allozyme analysis and Paulette Bloomer (UP) for analysis of mtDNA variation. One of the main requirements of the follow-up study was the inclusion of good reference sites for the two species. This is problematic for *L. kimberleyensis*, as it does not appear to occur isolated from *L. aeneus* anywhere throughout its range. As *L. aeneus* appears to be less influenced by colder temperatures, a few sites may exist where this species occurs isolated from the nearest *L. kimberleyensis* population. Due to the unique genetic lineages found in the lower Orange, this area was suggested for sampling of both species. In discussions by the YWG scientific panel at the 2003 meeting, the upper Orange, as close as possible to the Lesotho border, was suggested as a reference site for *L. aeneus*.

Progress and preliminary genetic results:

Sampling in the upper and lower Orange was conducted in January/February 2004 followed by morphological analysis in February/March. Allozyme and DNA analyses were initiated in mid-March. The analysis of morphological measurements found statistically significant differences between the two species. *Labeobarbus aeneus*, however, showed considerable variability. The morphological results could be interpreted as reflecting two distinct species but one has to be cautious with this interpretation due to the known morphological plasticity in cyprinid species.

Samples available for genetic analyses included both species sampled from near Aliwal North and below Augrabies Falls at Onseepkans and Pella. Preliminary allozyme analysis, using eight loci developed by Van Vuuren et al. (1989), found very few “pure” individuals and could not distinguish the two species at Aliwal North. From the lower Orange, seven smallmouth and nine largemouth individuals showed clear differences. Preliminary mtDNA data were added to the data generated in the pilot study and confirmed earlier results that the two species appear to be extremely closely related with shared maternal lineages. Overall there was more variability in smallmouth compared to largemouth yellowfish. Several distinct lineages were identified in both species. Four unique smallmouth lineages from the lower Orange and two from the upper Orange were identified while the Sak, Kraai and upper Vaal may also be distinct populations. Two unique largemouth lineages (one from the upper and one from the lower Orange) could also be distinguished.

Taking into consideration the combined allozyme and mtDNA results, Aliwal North proved to be problematic and a reference site for *L. aeneus* was still required. Through consultation with various scientists, it was proposed that *L. aeneus* should be collected higher up in the system, however, several attempts to collect ultra cold preserved genetic samples from Katze failed. Attempts were finally abandoned early in 2005 and experts suggested that the Sak River should rather be sampled for this purpose. SAIAB is taking responsibility for the latter sampling, scheduled for May 2005. The allozyme and mtDNA analysis of these samples will be integrated into the existing data sets and a final report submitted by the end of September 2005. In an independently funded study, Herman van der Bank and Annemarie Oldewage are investigating the situation further in the Vaal River and Herman has also started with analysis of *L. polylepis*. During 2006, dependent on the success of a funding application submitted to the National Research Foundation, Paulette Bloomer will use nuclear DNA to address the relationships within the small-scaled yellowfish group but with emphasis on the Orange-Vaal yellowfishes.

Preliminary recommendations for management:

No movement of smallmouth and largemouth yellowfish should be allowed.

Rather than movement of fish, habitat should be rehabilitated to allow natural recolonisation. There is an urgent need to identify breeding areas and general ecological requirements of these fish, especially for largemouth yellowfish.

Protected areas should be identified where no disturbance of the fish populations should be allowed (e.g. spawning areas).

If movement of fish is absolutely necessary, it should be done over the shortest possible distance and with taking into account the history of the particular system.

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INVESTIGATIONAL REPORT: ELANDS RIVER CONSERVATION AREA (ERYCA).

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1. The Elands River and aquatic ecosystem conservation.

The Elands River is a small to medium sized river (two to six metres across) in Mpumalanga. The river rises in the vicinity of Geluk in Mpumalanga, progresses onto Machadodorp and to Waterval-Boven, before reaching the Crocodile River at Montrose about 60km west of Nelspruit. This river is one of Mpumalanga's and South Africa's most important rivers, it is ecologically important, supporting a biologically diverse ecosystem, socially important, providing a place of recreation for the people who live in the area, and economically important, providing for the local people and industrial activities in the area.

If one looks at why the river is so ecologically important, in the distant past, a geographical event isolated a segment of approximately 70km of the river. This segment, from Waterval-Boven to just upstream of Montrose is now isolated by two waterfalls (Waterval-Boven and Lindenau falls). This isolated segment has as a result evolved a unique array of animals in the river that in some cases are not found anywhere else.

Governmental and private organisations and institutions in South Africa alike have recently encouraged aquatic conservation. Such initiatives involve the active conservation and management of aquatic ecosystems which can easily be undertaken by both the experienced and inexperienced alike.

Let's now look at why the Elands River is such a good candidate for an aquatic conservation initiative. As we have highlighted the Elands River has an isolated segment which generally confines the ecosystem within the segment. Additional favouring aspects of the Elands River include an exceptionally diverse ecosystem (something to conserve) with some endangered, rare and unique endemic species. Finally the people and their related activities in the area have generally provided the resources that are required to implement and carry out this conservation endeavour.

2. The Bushveld smallscale yellowfish and the Inkomati rock catlet as a flagship species.

An aquatic conservation initiative requires a system or strategy that directs and focuses the efforts of the individuals undertaking the effort. An outcome that can be measured must be incorporated into the system, so that the individuals who undertake this conservation effort can monitor the success of the effort.

The goal of the conservation effort is to maintain and if possible improve on the aquatic biodiversity of the Elands River. One way of maintaining this biodiversity is to select a, or a few, species that are very sensitive to un-natural environmental impacts. These species, called 'flagship species', are selected to act as indicators which will respond to negative,

human activity influenced impacts. Therefore the flagship species acts as a warning system of the health or integrity state of the ecosystem.

The Bushveld smallscale yellowfish, or *Labeobarbus polylepis* to the experts, has been selected as the initial flagship species for the aquatic conservation initiative in the Elands River. Using this yellowfish species as a flagship species the aquatic conservation initiative in the Elands River has been named the Elands River Yellowfish Conservation Area (ERYCA).

Monitoring of the critically endangered Inkomati rock catlet (*Chiloglanis bifurcus*) has become a necessity in the ERYCA, to ensure the survival of this species. As such, this species will additionally be considered as a flagship species in the ERYCA and have specific management efforts focused on the conservation of this species.

3. The Elands River Yellowfish Conservation Area Strategy.

3.1 Aims and objectives of the strategy

The aim of the strategy is to use the unique (endemic) strain of the Bushveld smallscale yellowfish (*Labeobarbus polylepis*) and the critically endangered Inkomati rock catlet (*Chiloglanis bifurcus*) populations, occurring in the Elands River System, as flagship species to conserve the biodiversity of the aquatic ecosystem in the Elands River and associated systems.

In-order to achieve this aim the required steps or objectives are as follows:

- Promote the awareness and understanding of the structure and functioning of the Elands River and associated aquatic ecosystems.
- Develop the knowledge and understanding of the biology and population dynamics of the Bushveld smallscale yellowfish in the Elands River.
- Implement the safe sustainable use of yellowfish to facilitate the management of the flagship species by encouraging the ‘conservation friendly’ practice of the catch and the release of yellowfish.
- Implement a process focused on conserving the critically endangered Inkomati rock catlet population in the ERYCA.
- Promote the single collective effort of aquatic conservation by all relevant custodians and stakeholders of the ERYCA.

3.2 Basic guidelines for yellowfish conservation in the ERYCA.

Be on the lookout for any type of un-natural impact such as signs of water pollution and report this immediately to a relevant ERYCA representative.

Implement the ERYCA Yellowfish Monitoring System in your segment of the ERYCA.

Promote the conservation friendly practice of the catch and the release of yellowfish by ensuring that:

- You promote catch and release fly-fishing angling techniques for yellowfish using barbless hooks only.
- You try not to keep the fish out of water for more than 30 seconds to avoid damaging their gills.

- You practice safe releasing techniques of the 'catch', which includes: (a) trying to reduce the stress of the catch to the yellowfish, (b) you wet your hands before handling the catch and (c) that you release the yellowfish only after it is able to swim away on its own accord.
- Do not keep yellowfish in a keep net for later release – they will not survive.
- Promote the concept of 'take only pictures, leave only footprints to anglers.
- Impose spawning area restrictions to anglers during spawning season (spring to summer).

4. The ERYCA Yellowfish Monitoring System.

The ERYCA Yellowfish Monitoring System is a tool designed to be easily implemented by any experienced and or inexperienced conservationist. The purpose of the monitoring tools is to gather biological and population dynamic related information on the species, to better understand and manage the population in the ERYCA. The system tools which are still in development includes three main components:

1. The day to day monitoring component
2. The ERYCA seasonal habitat component.
3. The seasonal yellowfish population dynamic assessment component.

Component 1: The day-to-day monitoring component.

To implement component 1 carry out the following activities:

1. Explain and encourage the ERYCA concepts to all workers and friends in a manner which will support the ERYCA effort.
2. Promote and manage angling activities in accordance with the aims and objectives of the ERYCA strategy. For more assistance contact an ERYCA segment representative. If possible encourage anglers to complete ERYCA catch cards where the numbers, sizes and condition of yellowfish caught are recorded.
3. Begin to record all interesting activities that occur in and around the Elands River. This would include for example the occurrence of birds and animals in the vicinity of the river and a description of any strange behaviour. Additionally things like the strange activities of people in and around the river are important such as angling, domestic and recreational activities.
4. Be specifically on the lookout for spawning activities of yellowfish in shallow sections of the Elands River, by looking for signs of the congregation of mature fish exhibiting spawning activities. Monitor and report these activities but try not to disrupt or inhibit these activities.

Component 2: The ERYCA seasonal habitat component.

The seasonal habitat component, involves the completion of a seasonal ERYCA habitat assessment sheet once a season. Initially an ERYCA section representative will be available to help you with this assessment. Once you have completed the assessment hand it in to your sectional representative.

Component 3: The seasonal yellowfish population dynamic assessment component.

This component of the ERYCA Yellowfish Monitoring System is the only component of the system that requires many ERYCA representatives to complete. Periodically representatives of the ERYCA will facilitate your implementation of this component. Contact your sectional representative for more information.

5. The ERYCA Sectional Representatives.

The sectional representatives include:

1. Mr. Graham Madison. (Elands Riparian Owner) Telephone no 013 734 4406.
2. Mr. Garth Johnson. (Elands Riparian Owner) Telephone no 013 2577007.
3. Mr. Charlie Fripp. (Elands River Conservancy) Telephone no 0828836874.
4. Mrs. Ursula Naaimannand. (Elands River Conservancy) Telephone no 013 7344407.
5. Mr. Dave Hempson. (Elands River Conservancy) Telephone no 0824577004.
6. Mr. Erwin Schroeder. (Sappi) Telephone no 013 734 6199.
7. Miss. Karien de Wet (Sappi) 082 809 0974.
8. Gordon O'Brien (University of Johannesburg) 084 580 4161.
9. Willie vd Westhuizen (Heysbrook Riparian Owner) 082 709 4224.
10. George McAllister (Elands Riparian Owner) 083 419 2541.
11. Dr. Johan Engelbrecht (Mpumalanga Parks Board) 083 626 6303

6. How to angle for the elusive Bushveld smallscale yellowfish in the ERYCA.

The Smallscale yellowfish is a relatively shy fish and as such considered to be very difficult to catch on fly. This is especially the case when the water is clear. When approaching the river do so quietly and do not simply walk up to the bank and start casting. While this will work for trout it will not work for the Bushveld smallscale yellowfish. You may catch one or two small fish as these tend to be more aggressive and go in search of food even close to an angler. I would go as far as stalking up to the bank trying to place some riparian vegetation between the water and myself. Once you are in place move slowly to a good casting position. Once in this position stay still (other than casting) and do not splash into the water. Try not to hit the water with your line. An effective method is to cast upstream and allow the fly to drift downstream.

An intermediate or floating line is fine, especially in the shallower areas. If there are really deep pools and the fish are feeding on the bottom one can consider a sinking line. A 3X tippet tapering off to a six pound leader will work. Ask local guides for the finer details. The leader should be quite thin in this clear water. However do not go too thin if you are aiming at a two-kilogram fish. I missed one (broke off) so they are there. The fly you are using should be relatively small. There are not large numbers of large aquatic insects in this relatively small river. On occasion, depending on what is flying around one can try a larger dragonfly nymph, etc. In other words be observant. The fish will be feeding on what is living and moving in that river at that time. Many Vaal River fly fishers have become well versed in the aquatic life in the Vaal River for this reason.

One can use a size 14 bead headed nymph (dark or light). A tandem rig using a size 16 flashback nymph (dark or light) will work. This gives the fish two sizes of fly to target. I tie my lower fly about 20 to 25 centimetres from the top fly. These fish have a very, very subtle take. One should use a strike indicator or otherwise be in contact with your fly all the time. The strike indicator should be set on your line such that the flies still touch or move very near to the bottom. The strike indicator should be observed continuously. You should strike (lift your rod) at the slightest movement of the strike indicator. I mean the slightest movement as this fish simply mouths the fly and it does not take it and swim away. In other words you are looking for one or two small ripples around your strike indicator. This takes an amazing amount of concentration. A five weight rod is fine. If you use a lighter rod try not to play the fish too long.

This in a nutshell is how to catch a Smallscale yellowfish. Similar techniques can be used to catch the Largescale yellowfish lower down in the Elands system. Remember to quickly take a photograph and release the fish. Please make sure that your hands are wet when handling the fish. Dry hands are rough and also remove the important (protective) slime layer of the fish. If you note spawning activity or poaching activity please report this to your guide or the lodge owner. These records form a critical part of yellowfish and river management in the area.

7. For general information and support please contact:

Mrs. Greta Havermahl

Telephone no: 013
0827793550.

Mrs. Ursula Naumann

Telephone no: 013 7344407
0827895936

Mr. Gordon O'Brien

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REGIONAL REPORT: NORTHERN CAPE

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The Department of Tourism, Environment & Conservation, the Northern Cape Chapter of the YWG and riparian owners mostly drive activities of yellowfish conservation in the province. The chapter has lost two committee members including the chairperson to other commitments and we are currently a very small group, but still with reasonable inputs and initiatives in yellowfish conservation in the Northern Cape.

We have designed and developed yellowfish conservancy signboard, of which five were finished and erected at Christiana (North West Province) and Warrenton (Northern Cape Province).

A Bell's yellowfish festival was hosted at Christiana on 1 – 3 October 2004 in which about 38 attendants came from several areas to share their angling experiences and enjoy some time in the beautiful waters of Vaal River, fishing for yellows. The catch card returns indicated that 547 yellowfish were caught by 34 anglers over the period at 6 different sites. Also caught, were 4 mudfish, 2 common carp and 6 others (unnamed barbs).

Other current initiatives of the chapter are the development of a constitution for the working group and the establishment of conservation areas at Douglas and Smidsdrift. I am also a member of the Northern Cape Yellowfish Working Group and Three Provinces Flyfishing Club.

OCCURRENCE OF *LABEOBARBUS SPP* IN THE NORTH WEST PROVINCE IN
2005

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Introduction

Four yellowfish species occur in the North West Province, namely *Labeobarbus kimberleyensis* and *L. aeneus* in the west flowing Vaal River system and *L. marequensis* and *L. polylepis* in the east flowing Crocodile River system.

Discussion

This report will discuss the occurrence of *L. marequensis* and *L. polylepis* in the Marico River catchment and Crocodile River (west) catchment that feed into the larger Crocodile River system. The presence of *Labeobarbus spp.* in these catchments as recorded in the National Fish Database is represented in **Table 1**. The expected occurrences are based on previous records and habitat assessments.

Table 1: Occurrence of *Labeobarbus spp.* in the Marico River and Crocodile West River catchments

Species	Catchment	River	Expected	Observed
<i>L. marequensis</i>	Marico Catchment	Kareespruit	Yes	Yes
		Klein Marico	Yes	No
		Groot Marico	Yes	Yes
		Middle Marico	Yes	Yes
		Lower Marico	Yes	Yes
	Crocodile West Catchment	Selons	Yes	Yes
		Upper Elands	Yes	Yes
		Lower Elands	Yes	Yes
		Lower Hex	Yes	Yes
		Skeerpoort	Yes	Yes
		Lower Sterkstroom	Yes	No
		Rosespruit	Yes	No
		Magalies	Yes	Yes
		Crocodile Highveld	Yes	Yes
		Crocodile Western Bankenveld	Yes	Yes
		Middle Crocodile	Yes	Yes
		Lower Crocodile	Yes	Yes
		Lower Pienaars	Yes	No
		<i>L. polylepis</i>	Marico Catchment	Groot Marico
Upper Elands	Yes			Yes
Crocodile West Catchment	Skeerpoort		Yes	Yes
	Magalies		Yes	No
	Crocodile Highveld		Yes	No
	Crocodile Western Bankenveld		Yes	No

L. marequensis was collected at most sampling points in both the Marico and Crocodile West systems, except for:

- Klein Marico River - the flow of this river is erratic and it is often dry, which could explain the absence of *L. marequensis* at the time of sampling. The fish may not have had sufficient time to migrate to the sampling sites.
- Lower Sterkstroom & Rosespruit – both pollution and stream flow could explain the absence.
- Lower Pienaars – this rural area is quite densely populated and waste and disturbance may have an effect. The delivery of sewage to water purification plants situated in this river reach also exceeds the capacity of plants resulting in the release of untreated effluents.

L. polylepis is a cool-water species (Skelton, 2001) which explains its limited distribution compared to the distribution of *L. marequensis*. The species was only collected at two of the six sites where one would expect to find them. Explanations for their absence could include:

- Groot Marico – erratic water flow because of water abstraction from dams and weirs and a lack of fish ways.
- Magalies – erratic water flow and pollution from agricultural chemicals and water purification plants.
- Crocodile (Highveld) – pollution, habitat destruction, flash floods and effluents from water purification plants.
- Crocodile (Western Bankenveld) – this is just below the confluence of the Crocodile (Highveld), Jukskei and Hennops rivers. Pollution from the large metro cities of Johannesburg and Tshwane all accumulate here, while flash floods also affect this river reach.

Other distribution records

Twelve individuals of *L. aeneus* were caught in Molopo Eye (de Villiers, 1993, in Skelton *et al*, 1994). This Vaal River system species was most likely introduced to the eye and has not been recorded since.

Rouhani (2004), in a survey of 10 large dams in the North West Province, recorded *Labeobarbus kimberleyensis* in the Taung dam, *L. aeneus* in the Taung and Koster dams and *L. marequensis* in Lindleyspoort, Vaalkop and Roodekopjes dams.

Labeobarbus spp have not been recorded in Lotlamoeng (Molopo system), Ngotwane (Ngotwane), Molatedi (Marico), Madikwe (Marico) and Bospoort (Crocodile) dams.

Threats

The major threats to yellowfish, and in fact all aquatic biodiversity, are:

- HABITAT DEGRADATION & DESTRUCTION
- Weirs and lack of fish ladders – genetic isolation and obstruction of routes to spawning sites.

- Water abstraction that cause reduced and/or erratic stream flow – industry, agriculture, mining and towns.
- Pollution – sewage, industrial, agricultural and others which impact on water quality and food sources such as invertebrates.
- Alien species – predation, competition and modification of breeding habitat (carp).
- Subsistence, commercial and recreational (non-organised) fishing
- Lack of aquatic ecosystem awareness – both with the public as well as government officials

Conclusions

The major challenges that need attention are:

- More data is required – this will be partially attained through the National River Health Programme, but more specific research on species and systems is required.
- Current conservation & environmental legislation is sufficient, but there is a need for capacity building (more staff and training) within DACET and other relevant departments to enforce the legislation.
- Non-functional weirs must be removed and fishways must be constructed at essential (for human purposes, not biodiversity) weirs and dams.
- The ecological reserve of each river reach must be determined and water flow must be regulated within the requirements of the aquatic ecosystem.
- The current conservation focus is still mainly on the regulation of mammal species suitable for hunting – there is no culture of biodiversity conservation, which includes aquatic ecosystems. The department has to undergo a paradigm shift towards modern conservation biology principles and must adapt a holistic conservation strategy.
- There is a general ignorance regarding legislation pertaining to aquatic systems. An awareness programme must be implemented to inform the public of current legislation and regulations.

Acknowledgement

Dr Neels Kleynhans, Department of Water Affairs & Forestry, for providing data from the National Fish database.

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REGIONAL REPORT: GAUTENG

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Legislation

The existing Gauteng Conservation legislation is to be reviewed and redrafted. This process had already started at a workshop on the 8th of April 2005. The new document will be guided by the following documents:

- NEMA
- The Biodiversity Bill
- The old Provincial Ordinance
- Limpopo Conservation Act

The new Act will cover:

- A review of existing angling licences.
- General legislation relating to the management and control of all wildlife resources in the province.
- Documentation will also cover the management of alien plant and animal's species. Species such as bass, carp and trout will not receive any protective legislation as was the case in the past. Alien species management strategies need to be put in place that will ensure that no further damage to the natural systems can take place. It is not the mandate of any provincial conservation authority to award any alien species special protection.

Review Process will include:

- A comprehensive public participation plan
- Input from other provinces. Five provinces are directly linked to Gauteng and their buy-in will be an important component to the validation of the new Provincial Conservation Act.

Law Enforcement Action

- Law enforcement actions will be increased over the next year to ensure that people abide by the law pertaining to wildlife resources in the province
- The province is aware of illegal transportation of fish and this will be followed up. (Any fish that is being transported requires a permit)

Status of Rivers

- All rivers in Gauteng are in a poor condition as a result of poor catchment/land management practices by agriculture, mining industry and local authorities. It is clear that the average person does not understand the importance of rivers to the economy of the province. Education action at all levels needs to improve.
- The River Health Assessment of the Upper Vaal Catchment has been completed.

General Status of Rivers

The Wonderfontein Spruit is to receive acid mine water from the Randfontein area. Water was to be decanted into the Karst area to the north, which is a World Heritage Site but will now be redirected southwards into the Wonderfontein Spruit and eventually that water will

make its way into the Vaal system. It is clear that the mines have not undertaken an ecological reserve. The mining houses concerned are also not willing to accept responsibility for the pollution that this water is causing.

Most rivers in the province are in a poor condition. Only the upper catchments of some of the smaller streams in the Magaliesberg, Suikerbosrand and the Elands system show a reasonable SASS score.

YELLOWFISH IN THE KOMATI RIVER

Johan Engelbrecht

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The purpose of this presentation is to give a broad overview of the yellowfish and other important angling species populations in the Komati River. The Komati River has three major impoundments (excluding the Lomati River and Driekoppies Dam) which divide the river into four sections

The first section is above Nooitgedacht Dam, which consists mainly of small streams with some large pools. The smallscale yellowfish was quite common in Nooitgedacht and we used to collect them for breeding and restocking. However, lately we have been unable to collect significant numbers of yellowfish as they have been almost completely displaced by carp and largemouth bass. It may be necessary to start a program to eradicate these invasive species in this dam.

Below Nooitgedacht Dam several larger streams enter the Komati River and conditions are quite good for both largescale and smallscale yellowfish. but there is evidence that finer sediments are reduced, changing the geomorphological characteristics of the river. There are also some highly sensitive and threatened species in this part of the river. The Gemsbok Weir lower down in this part of the river pumps water back to Nooitgedacht and it has happened that no water passed this weir during low flow periods which is devastating for flow dependant species.

Between Vygeboom Dam and Maguga Dam most of the river falls within a conservation area and it is exceptionally good for largescale yellowfish. This area also contains some highly sensitive and threatened species. There are three old redundant weirs in this section that create serious barriers to fish migration and need to be removed to reestablish fish migrations.

Below Maguga Dam in South Africa the river is basically dammed foot to toe drowning almost all available riffle areas and creating serious obstructions to fish migrational patterns. Flow and water quality has become a serious problem and fish stocks have been notably reduced since the construction of Maguga Dam. Yellowfish have disappeared from this section of the river, possibly related to the migrational and breeding disruption. The distribution of tigerfish has also largely been reduced due to the weirs. Since the construction of the Maguga Dam the temperature has dropped in the Komati River and the flow has become very poor at Komatipoort with noticeable poor water quality. Recently the Komati has largely lost its refuge value for tigerfish during winter as a result of it now being cooler than the Crocodile River.

The way forward is to enforce ecological reserve and re-establish fish migrational patterns. In view of the fact that the large impoundments may eliminate the necessity to use the storage capacity of the weirs, their sizes can be reduced to create some riffle areas and redundant weirs can be removed altogether. The management of these weirs will also be crucial as it has happened that water was released out of the bottom of some weirs, leaving the existing fishways dry during huge migrations, causing massive mortalities.

LIMPOPO PROVINCE: REPORT TO THE YELLOWFISH WORKING GROUP CONFERENCE

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There are a few research projects taking place in the Limpopo Province that are producing information on yellowfish.

Paul Fouche from the Venda University of Science and Technology of has started a project titled:

“An investigation of the habitat preference, trophic niche differentiation and breeding ecology and biology of *Labeobarbus marequensis* in the Luvuvhu River subsystem of the Limpopo River system.”

Paul also has three other projects that are not aimed at yellowfish specifically but are producing data on yellowfish.

These are titled:

1. “Towards an understanding of factors affecting the biotic integrity of rivers in the Limpopo Province: Niche partitioning, habitat preference and microbiological status in the rheophilic biotopes of the Luvuvhu River”.
2. “The ecological status of the Luvuvhu River”.
3. “Developing design criteria for fishways in South Africa”

Wynand Vlok of the Limpopo University has restocked a batch of *Labeobarbus polylepis* into the upper reaches of the Great Letaba River and there are plans to do another stocking during this year.

A full survey was done on the Crocodile West and a survey is currently underway on the Lephhalala River as part of the RHP. A follow up survey was also done on the Olifants River as part of this programme. No yellowfish were recorded in the Crocodile West and so far, few were caught in the Lephhalala River. The Olifants still has significant populations of *L. maraquensis* which are being utilised as a source of protein by the rural people along the banks.

REGIONAL REPORT: KZN

Neil Button

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The KZN Chapter of the Yellowfish Working Group has never really been able to get off the ground and after three or four attempts finds itself without a committee again.

I have been requested by the KZN chapter of FOSAF to consider forming a new committee and make an attempt to revive the YWG in the province. Before considering what the aims and objects of the new YWG will be I first need to identify who needs to be approached to serve on this committee and under what format this committee will operate.

At the moment previous committees were perceived to be an extension of FOSAF and this may have led to the lack of interest. I do not know if this is entirely true and because I am only in the initial stages of this project I cannot comment.

Unfortunately I am unable to furnish any further details save to say that hopefully we can now establish a committee.

THE WINDKNOT CLUB & THE ORANGE/VAAL RIVER CONSERVANCY &
MANAGEMENT ASSOCIATION.

Kobus Fourie

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The Windknot Club is quite active at the moment and is very involved with yellowfish conservation in our area. As everyone knows we offer two Bells festivals at Elgro River Lodge and the festival this coming May will be the first largemouth yellowfish event sponsored by Bells.

Our conservation officer at the club is continuously busy during the year visiting farmers along the river. We believe that the conservancy now comprises 400 km river frontage and that most of these riparian landowners display the yellowfish conservancy sign. There are certainly properties and resorts where we experience problems but we are addressing these matters.

We are currently making a film about the largemouth yellowfish with the help of a student. This project will also involve universities so that we can record as much information as possible about the species on film.

Investigations have commenced on a unique project on yellowfish which will be undertaken and managed by Windknot Club members.

We are also considering appointing a student in a permanent position to carry out conservation work on the yellowfish and the river itself. Students have already been interviewed and later on we will report on our progress. As you can see we have been very busy with the job of training people on yellowfish related work.

SUMMARY OF COMMENT AND DISCUSSION FOLLOWING EACH PRESENTATION.

Session 1 – Presentations by Dr Gert Willemse, Dr Bill Bainbridge & Neil Button

In answer to Johann Grobler's observation that licence fees were not used to the benefit of anglers Ingrid Coetzee explained how these funds were channelled through the various departments. After collection by DEAT they were remitted to the central fiscus. They then had apply to the Treasury for their allocation and this was usually a difficult, lengthy and frustrating task.

Bill Mincher noted that there were now very few aquatic scientists employed by the conservation agencies. KZN Wildlife which had been well staffed in the past now had none which created problems for the anglers. Bill Bainbridge was also concerned about the lack of capacity by these agencies and asked whether they were the correct people to handle freshwater resources.

Dr Wolhuter asked who took responsibility for the aliens in the Vaal and Dr Willemse said it was not the landowner as "he was not in possession or control" as these fish traversed borders. The landowner only had to report their presence if a directive was issued. Furthermore the State needed to build up a database with the help of the landowners and once this was available action could be taken. Regarding the use of alien fish Dr Willemse said that the use of new technologies such as sterilization might enable us to deal with the problem in future.

Dean Impson said that the 'zoning' proposal was an excellent one and he was glad that it had come from an angling organisation. Western Cape was a good example where protection had been removed for trout and the responsibility had been given to the Cape Piscatorial Society for certain rivers. The result was that angling had improved.

Gert Willemse stressed consultation was very important and the Act specified that the Minister could not act without consultation. In addition it was important that the inputs were received from interested parties right at the beginning.

Peter Mills queried the term 'biodiversity' as used in the new Act with regard to aliens and Dr Willemse said that for example trout could be considered as part of the biodiversity of South Africa but not the natural biodiversity.

Ms Coetzee said it was not the duty of conservation bodies to conserve alien species, but to ensure that aliens did not impact on the environment. In addition NEMA was everybody's responsibility.

Gordon O'Brien asked about policing of the Act and Dr Willemse stated that the Minister had the power to appoint any official as an inspector and that in future more resources and training would be available.

Session 2 – Presentations by Johann Grobler, Eugene Kruger & Morné Viljoen

Peter Mills said that we had to use terminology correctly. For example we could only refer to aliens as being 'naturalised' if they filled a niche and were not invasive and had no impact on the environment. Trout, bass and carp obviously did not fall into this category. Gert Willemse said that certain definitions were changing as we were only now recognising the impacts that certain invasive aliens were having, and the term 'aliens' would include certain translocated indigenous fish. He said that certain aliens could be eradicated, and that the benefit must be weighed against the detriment when evaluating aliens.

Gordon O'Brien mentioned that catfish were alien to the Elands River Conservancy area and created a major problem.

Dean Impson said we needed a page of definitions in the Proceedings and Johan Grobler pointed out that there was such a list in the Act.

Dean said that bass like tigers learnt to hunt as a pack or follow other predators such as catfish which were hunting as a pack. Horst Filter said that catfish were not present above a certain point in the Phongola and Paul Fouche answered that altitude determined the range of this species.

Horst Filter asked who at DWAF should be contacted in the case of irregularities. Morné Viljoen said in theory this should be the regional director but in practise this was not effective and frequently it was best to take action against the relevant municipality. For example in the case of the pollution of the Mooi River (Potchefstroom) by the mines action was taken against the municipality. The problem was lack of capacity but he was encouraged by Dr Willemse's statement that capacity was being built at DEAT.

Dean stated that it was good to have Morné's legal expertise available at the conference and pointed out that groupings such as a conservancy were usually more effective than individuals in taking action against authorities.

Andries Maree was of the opinion that if an individual lost a case against the authorities he/she would not have to bear the costs providing that it could be proved that all other avenues had been exhausted and that it was not out of vindictiveness. Dr Willemse agreed and pointed out that there was much legislation that was not even tapped into.

Dr Bainbridge asked whether state departments had lists of interested and affected parties. Morné said one could register and this should be done immediately, and Gert Willemse said that DEAT had such a register which included FOSAF, and that they were building on their lists. Ms Coetzee said that staff changes at NGO's or new organisations being formed made it difficult to maintain lists.

Morné asked how we should respond to draft legislation and whether we should do it individually or as a cooperative. Dr Willemse replied that it depended on the type of organisation and the quality of the submission, and although they could not respond to all individuals he assured the conference that all submissions were read and filed.

In summary Peter Mills said there was a place for all in the new legislation and we had to acknowledge that aliens had an impact and therefore had to be correctly managed. Furthermore we needed to avoid emotion in our communications and coordinate communications correctly and interact with the state who had stated that it was their responsibility to consult.

Session 3: Presentations by Terrence Collier, Paul Fouche, Dean Impson & Isa-Rita Russo (Prof. Paulette Bloomer).

Johann Grobler stated the initiative by CapeNature was excellent as it was performance based and Bill Bainbridge said it was an excellent model for provinces like KZN where the liaison committee had been defunct for three years despite the fact that KZN Wildlife's magazine claimed that it was still functioning.

Ramogale Sekwele asked Dean Impson how they handled finance. Dean explained that CNC was a Trust and therefore there was a dedicated fund into which licence monies flowed.

Paul Fouche stated that in their study on the fishway they did not pick up larger fish and possibly these remained in the large pools. Dr Engelbrecht noted that there was a 2° C difference in the temperature cue for commencement of breeding between *L. polylepis* and *L. marequensis*. Horst Filter said that in the last summer the upstream migration from Heyshope Dam, which comprised only males, only commenced in March and asked whether the extremely high mid-summer temperatures had caused this delay.

Ms Russo stated that all that was required to complete the Orange-Vaal pilot study were *L. aeneus* samples from the Sak River system. Prof. Bloomer was proposing further studies on other yellowfish species with funding coming from the NRF. Peter Arderne said the samples of *L. natalensis* collected by Horst and other volunteers would be used in this study.

Dean Impson stated that the temperatures in the lower Orange River seldom dropped below 16° C and thus there were different adaptation pressures on the yellows from this stretch of river.

Dr Wolhuter asked about the accuracy of the mitochondrial DNA method and Ms Russo said it was an excellent method but was based only on the female lineage. In answer to a question from Eugene Kruger, Ms Russo said that a haploypete was a unique DNA sequence.

Session 4 – Presentations by Gordon O'Brien, Ramogale Sekwele, Daan Buijs, Peter Mills (Piet Muller), Dr Johan Engelbrecht, Stan Rodgers, Neil Button, Kobus Fourie

Gordon O'Brien stated that in order to make the Conservancy a success they needed guides to show visitors how to catch yellows but they would not encourage locals to catch fish for resale. They also wanted to set aside areas for breeding and collect some more samples for genetic study.

In answer to a question from Dr Wolhuter, Ramogale Sekwele said they were still waiting to hear whether prospecting rights were to be granted in the Smitsdrift area while Dean Impson said North Cape must consider the beautiful Richtersveld area of the Orange as a flyfishing destination.

Regarding the dams and weirs that caused obstructions to migration patterns on rivers like the Marico, Daan Buijs explained that most of these were legal as they were constructed prior to the new legislation.

Dean pointed out that one should expect the conservation agency in a wealthy province like Gauteng to be well resourced and together with Louis Wolhuter asked why industry was not paying towards the cost of repairing the damage done by mines etc. Peter Mills said nobody was taking responsibility as most of the mines were closed. Johan Engelbrecht said they had the same problem with acid water in Mpumalanga and this could not be corrected by the addition of lime as the conductivity does not change.

Regarding the many weirs on rivers like the Komati, Dr Engelbrecht said they were planning to remove some of them, a couple with the help of the military, and they were also negotiating with the Irrigation Board on the Lower Komati. Several weirs had been removed in the KNP.

Kobus Fourie stated that they had contacted Rand Water a number of times about the large volume of water being released at the Barrage every weekend which represented a major problem for recreational users. However, despite repeated appeals there had been no response.

Dean Impson stated that alien trees like the blue gums were spreading in the Vaal River riparian zone and urgent action should be taken. Kobus said Working for Water had been active in the past but were no longer removing these aliens.

Andries Maree and several other delegates raised the matter of tagging and Bill Mincher pointed out that now that there was a prospect of getting a student (Bernard Mackenzie) appointed to do research work there was an excellent opportunity to carry out various studies.

2005 WORKSHOP

A workshop is held on the last day of every Yellowfish Working Group symposium. The following is a summary of the contents and outcomes of the workshop session held at Elgro Lodge on the 10th of April 2005.

Summary: 2004 Badplaas Workshop

There were four focus areas that were addressed by the Working Group at Elgro in 2003 and last year at the Badplaas work session. They were:

- Media/Education – promoting the work of the Working Group.
- Management – the management measures required for yellowfish and river conservation.
- Legislation – with regard to freshwater angling and how this relates to conservation of riverine habitats.
- Administration – of the Working Group.

Issues Addressed at Elgro 2005:

Questions put to the group were:

1. What is the way forward for the YWG?

The workshop participants were split into four groups. Each group was expected to answer the following questions.

- Cooperation between anglers.
- Response to Government and the Biodiversity Act?
- Licensing: Each group had to express their views about the current state of licensing in the country.
- What research needs to be done with regard to yellowfish and river conservation?

2. Report Back

Each group had to respond to the questions and report back according to the following points.

- List issues for each of the above four points
- Solutions or way forward if problems were identified

Side issues:

- Theme for next year
- Venue for next years conference

Summary of Feedback from each Group:

Cooperation between anglers:

- The Working Group should work towards eliciting buy-in from other angling groups. There needs to be better communication between the various organisations and more

information about the sport and the environment must reach the anglers. All groups identified the need for better cooperation between the different angling groups, not just fly fishers. The idea of a national forum was suggested that should aim to address broader angling and conservation related issues.

- Although the Working Group does good work there is poor feedback, not only to members, but also to other organisations and interest groups.
- There was a feeling that the Working Group has exclusive membership and although this is not true the Working Group should communicate with the broader angling community.
- The workshop delegates felt that the lack of a formal structure will remain a reason why the Working Group is not able to achieve more. Members also felt that the YWG does not have enough authority to address serious river conservation issues.
- Others felt that the YWG might lose its identity if it were to go too broad in approach or become affiliated to another more structured organisation like the Endangered Wildlife Trust.

Proposed solutions.

- The YWG needs to enjoy a higher public profile. As far as communication was concerned workshop members agreed that the promotion of the YWG should look at a broader range of communication mechanisms than just the fishing magazines.
- The YWG requires a formal mandate before it will have enough teeth to be effective. The executive should investigate the establishing a formal structure.
- The YWG should look at developing partnerships with other angling groups.

Biodiversity Act

- The Biodiversity Act does not have regulations that will put into effect what it proposes. This needs to be developed and the YWG should be part of this process.
- Most of the groups had no real negative feelings or criticism of the Act.
- The listing of threatened species and that of aliens is a process undertaken by DEAT and is due to be completed by the end of October 2005. The YWG should also take an active part in this process and should ensure some kind representation at workshop sessions.
- Anglers are poorly informed about the Act and there is a lot of misinformation within this community. They should be informed through clubs and angling magazines.
- The fact that most of the people in the country were not diligent citizens when it came to keeping the law was identified as an issue. To be effective the angling community must buy into the objectives of the Act and should be meaningful to those who are affected by it.

Proposed Solutions

- Anglers should become involved in the development of legislation and should be constructive in doing so.
- Most delegates agreed that some kind of zoning system needs to be introduced as a measure to control alien fish and in so doing prevent the negative impact that they might have on the countries river systems.
- YWG has an important role to play in ensuring the conservation of indigenous species takes place.
- DEAT should consider of publishing a layman's guide to the Act. This would allow everyone the opportunity to get to grips with its contents. In its current form most

people do not understand it. The Internet should also be used to make the Act more accessible.

Licence

- Licences are difficult to obtain and as a result most anglers do not have them.
- It was also noted that anglers were guilty of not trying to get licences and this culture needs to change.
- There was strong support for one national licence and the authorities should consider introducing a recreation and a subsistence licence to cater for the different groups in society.
- Money from licences should be ploughed back into river management and conservation action. A mechanism should be developed that ensures that each province receives a fair allocation from a “central” fund. The importance of law enforcement by the authorities was also stressed.
- Bag limits for various species were seen as an important management tool and should be introduced by the Conservation Authorities through their respective legislation.
- The importance of establishing conservancies was stressed.
- Some groups also stressed generating awareness of conservation and river systems. More money should be made available for education and research. An NGO could be appointed to manage this process.
- Excise tax should be introduced to raise revenue for conservation management. The country should look at a system similar to the Duck Stamp programme that is so successful in the USA.

Research

- More research needs to be done on the behaviour of both the smallmouth and largemouth yellowfish. A better understanding of their ecology will help with the management these species.
- The scientists at the meeting agreed that enough research had been done around the genetics of the yellowfish and further work should not be considered as a priority. Research programmes should focus more on telemetry and the impact of aliens and anglers should receive more attention.
- A further suggestion was that there needs to be a national research strategy for freshwater systems so as to prevent the duplication of work. In this way it will also be easier to prioritise important research projects. Further, a database of academics and of priority projects should be established. This will also ensure that there is better cooperation and coordination between all stakeholders interested in river and fish conservation. Academic institutions should encourage honours and master students to do smaller studies that will contribute to the shortfall in research on fresh water systems.
- The YWG Scientific Panel should improve their communication between themselves and other organisations and institutions.
- Multi-disciplinary studies should be encouraged and the Vaal could be used as a starting point. The feeling was that although much work had been done on this system it had not been co-ordinated to form a coherent picture of the issues.

SUMMARY OF THE MAIN RESOLUTIONS TAKEN DURING THE CONFERENCE.

1. That the 2006 YWG Conference to be held at Sterkfontein Dam, Harrismith.
2. That all provincial nature conservation agencies be requested to employ at least one aquatic scientist and that they have a competent and well-funded River Health team.
3. That there be a single freshwater licence for the country and all funds collected be invested in research and conservation of our freshwater resource.
4. That the zoning principle as proposed by FOSAF form the basis of the management of alien species.
5. That the YWG through FOSAF and together with other angling organisations immediately commence negotiations with the authorities regarding the development of the recent environmental legislation. (Biodiversity Acts etc)