POSITION PAPER No. 3

THE POLICY OF THE FEDERATION OF SOUTHERN AFRICAN FLYFISHERS ON THE PRESENCE OF TROUT IN THE FRESHWATER AQUATIC ECOSYSTEMS OF SOUTH AND SOUTHERN AFRICA

ABSTRACT

By virtue of its mandate to promote the interests of fly fishing and conservation of the national fly fishing resources comprising both indigenous as well as alien fish species, the Federation of Southern African Flyfishers ("FOSAF") is strongly supportive of the need for conservation measures for the protection of aquatic environments and their dependent biodiversity resources, especially indigenous fish species.

It views the freshwater fisheries created by the historical introduction of trout into the upper reaches of many aquatic eco-systems as a resource of considerable value. Benefits realised from this resource have the potential to encourage landowners to conserve the aquatic ecosystems present on their properties.

It recognizes that the introductions of trout have resulted in a number of environmental problems. However, they have adapted to become a permanent feature of the rivers which provide favourable habitat conditions for them, and except in a few limited locations, there is no feasible means of eradicating them. Accordingly, landowners are entitled to manage these resources to best advantage, subject to the exercise of sound stewardship and "duty of care" as defined in the Act.

FOSAF subscribes to the principles and need for a zoning system for freshwater aquatic ecosystems, in order to protect the integrity of indigenous biodiversity resources and associated angling opportunities on the one hand, and the need to maintain angling and associated ecotourism opportunities based on alien fish on the other.

FOSAF is strongly supportive of the need to develop measures and controls that will obviate or minimize the possibilities of the further spread of all alien invasive fish species and indigenous fish species outside their present established ranges.

Recommendations

FOSAF promotes fly fishing and sport angling as a sustainable use of all fishery resources. It *recommends* that :

Incentives be provided to land-owners to conserve the aquatic ecosystems and aquatic biodiversity resources present on their properties; and

Wherever feasible, priority be given to the conservation and protection of indigenous biodiversity resources, including indigenous fish species.

FOSAF *recommends* strict compliance of the provisions of the NEM : Biodiversity Act and other relevant legislation and, in particular the need to exercise "duty of care" in relation to the management of alien fisheries, including trout fisheries.

FOSAF strongly proposes the establishment of a zoning system together with a policy framework and management guidelines for the control, conservation and management of aquatic biodiversity resources, in which provision is made for the maintenance of both indigenous as well as alien species.

1. INTRODUCTION

The Federation of Southern African Flyfishers ("FOSAF") is a non-governmental organization (NGO) formed in 1986, to promote fly fishing and the interests of amateur (and more recently, also professional) flyfishers throughout southern Africa (von Holdt *et al.* 2002).

FOSAF has developed a set of Policies and Objectives that advocate an holistic and integrated approach to the management and conservation[1] of aquatic ecosystems and biota. These policies emphasize the need to conserve indigenous aquatic biota, but also recognise that fisheries based on certain alien species have the potential to make significant contributions to local and regional economies, for food production, sport angling and as a tourism attraction.

This holistic approach would normally preclude the development of a specific policy on individual species. However, there has been considerable debate and much ill-informed comment around the status and position of trout (as well as other alien species). The purpose of this document is to articulate the position of the Federation on the role it believes should be played by the freshwater fishery resources that have been created in certain high-altitude aquatic systems of the sub-continent, through the introduction over a century ago of two alien fish species, brown trout (*Salmo trutta*) from Europe, Asia and North Africa, and rainbow trout (*Oncorhynchus mykiss*) from North America[2].

FOSAF takes a pragmatic approach to this situation, which it believes to be environmentally sound and defensible, and which it hopes will provide a rational basis to address at least some of the negative effects of these introductions, as well as to optimize the benefits that have accrued. Its position has remained largely unchanged since its formation (see Skelton & Davies, 1986), but has previously not been fully articulated.

It is a primary aim of FOSAF to promote the sound management and conservation of the fly fishing resources of the sub-continent on a sustainable basis in both fresh- and saltwater environments, of which the trout fisheries form but one of the resources in which it retains a vital interest. While the position outlined below applies throughout the sub-continent, it is principally directed at the situation in the Republic of South Africa, as a contribution to policy formulation and as proposals to meet the requirements of a number of environmental statutes.

Both trout species are opportunistic predators, and as discussed below, are known to have invasive tendencies when introduced into certain high altitude aquatic ecosystems to which

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1 "Conservation", is used in its broadest sense in this paper, to mean the wise use or management of natural resources, as one of the key action strategies that form a part of the philosophical and practical approach to implementing sustainable development (*vide* Enviropaedia 2004).

2 While commonly known as "trout", these two Northern Hemisphere fish are technically known as "salmonids", or members of the family *Salmonidae.* They are only distantly related, with their origins in different continents.

they are not indigenous. Furthermore, despite claims to the contrary, they have become established as a permanent part of the biota in many of the systems into which they have been introduced, in several southern African countries as well as in many other countries world-wide. While it might be possible to remove the trout in some limited river stretches, in practice, there is no feasible known way of removing them from established river systems (de Moor, 1987). See paragraph 2.3.2 below.

However, as with a number of other alien species, in many instances the introduction of trout has resulted in a resource which is of significant economic value as a food source, for recreational angling for local as well as international tourists, and for job creation. FOSAF believes that this resource should be managed and used wisely, but that it is of critical importance that the use and management of this alien fishery resource should be within the context of the urgent need to conserve indigenous aquatic biodiversity resources, with appropriate measures to ensure any negative impacts on indigenous aquatic biodiversity resources are either avoided, or when this is not possible, are minimised.

The views expressed in this document are intended to apply exclusively to streams, rivers and dams on private and communal lands in South Africa, much of which are used for some form of agricultural production. Other considerations apply to the conservation of aquatic biodiversity resources within the protected area system in State ownership, and are not addressed here.

This position is based on two current official FOSAF policy documents:

- "Policy and Objectives", as approved by the Executive Committee, May 2003; and
- The "Principles that Form the Basis for a Policy on the Conservation of Freshwater Fishery Resources", approved by the Executive Committee, June 2004, the purpose of which is to outline the official stance of this organization on the presence of alien fish species in the freshwater systems of South Africa[3].

In particular, this position paper takes into consideration the provisions of the South African National Environmental Management : Biodiversity Act, No. 10 of 2004, ("the Act") but also other relevant statutes.

In defining this position the following considerations have been taken into account:

- Conservation issues, especially the need to conserve indigenous biodiversity resources;
- Historical issues, in view of the length of time that trout have been present in certain river systems and impoundments, and the fact that they appear to have become a permanent component of the biota of many of the high altitude stretches of many rivers;
- The fact that these introductions, unlike many other alien species, have many beneficial aspects, including the traditional role that these two species have played in

[3] Obtainable on request from the FOSAF Secretariat.

the provision of high quality freshwater angling opportunities;

- The principles of Integrated Environmental Management ("IEM") and sound, integrated and sustainable land-uses, appropriate for developed landscapes, and the Precautionary Principle[4];
- Economic considerations, in view of the significant value of the aquacultural and feral or wild fisheries that have been established; their importance as a food source, for recreational angling (by local as well as tourist anglers), all of which are supported by a significant infrastructure (including tourist operators, hospitality providers, tackle shops, etc.) and the associated significant employment opportunities currently provided by the industry; and
- The hitherto little-appreciated opportunities that this resource provides for rural communities resident in high altitude areas to benefit from this resource.

2. BACKGROUND

2.1 Definitions of indigenous, introduced and alien organisms

The Act provides the following definitions, which are used in this paper with the same meaning: [5]

2.1.1 Biological Diversity (or "biodiversity").

"*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 between species and ecosystems*."

2.1.2 Indigenous species

"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."

2.1.3. Alien species

"A species that:

- *Is not an indigenous species; or*
- *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."*

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[4] The Precautionary Principle states that if the consequences of an action are considered to pose significant risk, then the action should not be undertaken, until the consequences are better understood, or appropriate mitigatory measures are possible (1992 Rio Declaration on Environment & Development).

[5] See section 1(1) of the Act.

2.2 The alien and translocated fish species of South Africa

According to Skelton (2001), some 24 alien fish species (or about 9% of all South African freshwater fish species) have been introduced to the sub-continent from elsewhere. While some are little known, others such as the common carp (*Cyprinus carpio*); the two trout species; largemouth and smallmouth bass (*Micropterus salmoides* and *M. dolomieu)*; and kapenta or Kariba sardine (*Limnothrissa miodon*), have become some the best known of all our freshwater fish species.

With the wisdom of hindsight, these introductions have on occasion been described as "unfortunate" or even "irresponsible", because little thought appears to have been given, when the initial stockings were made, to the possible negative ecological and other consequences (such as the introduction of alien parasites and diseases) that might eventuate following the initial stockings (de Moor, *ibid*.). Further, no pre-introductory studies, that would have permitted objective monitoring of these impacts, were made.

While some of the introductions were made by individuals, official agencies must also take responsibility for the majority of the introductions. Previous provincial and national legislatures allocated funds for this purpose in the nineteenth and twentieth centuries. In line with the ethos of the times, some nature conservation agencies were responsible for the introduction of alien fish species for sport angling purposes. Until relatively recently, this was part of their official functions. Other official agencies were also responsible for the translocation of several southern African fish species beyond their natural range, either deliberately, as in the case of smallmouth yellowfish (*Barbus aenus*) and the banded tilapia (*Tilapia sparrmanii*) (by nature conservation agencies), or inadvertently (such as the Department of Water Affairs and Forestry or its agents) through tunnels, canals and pipelines connecting different river systems (Skelton, *ibid*.).

2.3 Alien fish in the context of the introduction of the wide array of other alien organisms

2.3.1 The important role played by alien organisms in the South African economy

It is important that the dynamics between alien and indigenous species in both terrestrial and aquatic environments should be seen in perspective. Almost all food crops and livestock presently maintained for agricultural purposes on private and communal land in this (and most other countries), are alien[6], i.e. did not occur naturally, and have been specifically bred and developed to serve mankind for the production of food, fibre, and many other purposes. Virtually every plant and animal that is employed in commercial agriculture in South Africa, is an organism that has been imported into this country either from other continents, or from elsewhere in Africa. In similar vein, many of the alien fish species that were introduced into the country were brought in to serve specific functions such as food production, cultural or sport angling. They were introduced because they were perceived to possess qualities that

[6] This includes the so-called indigenous cattle species, which apparently were imported from countries to the north of our borders.

were not seen to be present in the indigenous species.

Our economy is highly dependent on the products derived from the wide range of introduced plants and animals in current agricultural use. It must be emphasized, however, that we are also highly dependent on the benefits that are derived from the indigenous African biodiversity resources, in particular for ecosystem services[7].

There is no doubt that many introduced species in both terrestrial as well as aquatic environments bring with them significant environmental costs. Included are negative impacts on indigenous biodiversity resources. However, these environmental costs are commonly traded off against the benefits they bring. The key, in our view, is that the principles of IEM and of sustainable development, must be employed to optimise the benefits, and whenever possible, to obviate the negative impacts, and where this is not achievable, to minimise or mitigate the negative impacts of these costs.

It was commonplace during earlier periods in our history to introduce a wide range of alien terrestrial plants and animals from other countries, in order to serve a variety of purposes. Some of these introductions were made for the most spurious of reasons, and it is unfortunate that as is the case in many other countries, many of these introductions have had the most undesirable consequences. Examples of the most disastrous importations include plants, which are now considered to be some of our greatest problem organisms, were brought in as ornamentals (such as lantana (*Lantana* spp.), hakea (*Hakea* spp.) or as food plants (such as American bramble (*Rubus* spp.). Commercial afforestation has brought many economic benefits, but it has also been responsible for the introduction of some of our worst alien invasive plants. Included are species such as pines and eucalypts which were introduced for timber, pole and fibre production purposes, or, in the instance of wattle, also as a source of tannin for the leather industry. The forestry industry has also been responsible for the introduction or propagation of a regrettably long list of weed species, such as bugweed (*Solanum mauritianum*) and many others, which have brought about equally unfortunate ecological consequences. Included are negative impacts on aquatic biodiversity, and associated stream bed alterations and stream flow reductions.

2.3.2 The introduction of the two trout species to South Africa

In similar vein, alien aquatic organisms (including fishes) have been introduced deliberately or by accident into many of the freshwater systems of this country. With the exception of kapenta, many of the introductions of alien fish were made in the distant past, not in recent times. Ornamental carp (such as goldfish), for example, were introduced as early as the eighteenth century, and common carp in the 1850s. Brown trout were first successfully introduced in 1890, and rainbow trout in 1896 (Skelton *ibid.*).

South Africa is by no means unique in respect to the introduction of a range of alien fish

[7] Ecosystem services, or environmental goods and services, are defined in the Act (Section 1(1)) as the benefits derived from ecosystems including provisioning services (including food, fuel, fibre and genetic resources), regulatory services (including climate regulation, disease, flood control and detoxification) and cultural non-material benefits (of a spiritual, recreational, aesthetic, inspirational, educational, community and symbolic nature).

species. Trout (as well as other species) were introduced into the river systems of at least 82 countries. Included are Lesotho, Zimbabwe and Kenya, in Africa; the United States[8] and several South American countries in the Americas; and Australia and New Zealand in Australasia, to name but a few (Cambray 2003). In many instances, the introduced alien trout have readily adapted to new (to them) favourable habitats and have been present for substantial periods of time, and according to numerous reports, have become a permanent part of the aquatic fauna in these countries.

Regardless of how the introduction of trout into systems in which they are not native is viewed (whether in a positive or a negative light), the reality is that trout at least, but also a number of other alien fish, have demonstrated a strong propensity to adapt to the new habitats into which they have been introduced.

As noted in the introduction, it is generally accepted that it is not feasible to eradicate an alien fish species that has become naturalized in a river system to which it is not indigenous, except in small discrete aquatic ecosystems. It is understood that eradications have been achieved in closed ecosystems of limited extent such as small high altitude lakes, through the use of such radical means as sterilization by use of piscicidal[9] poisons, which are not suitable or appropriate for use in open systems such as an entire river. FOSAF is not aware of effective or acceptable eradication measures which may be employed in extensive open ecosystems[10], which selectively target alien or introduced species, and which do not also have the potential to bring about significant negative impacts on indigenous aquafaunal species. Of the known methods, piscicides such as rotenone are not selective, and often miss small populations in small refuge habitats such as side streams. Electrofishing and nets are very costly to use and are not efficient, and are also not effective in sterilizing refugia. Uncontrolled angling is also inefficient. The major problem with all three is that it is difficult if not impossible, to predict outcomes of any actions and hence the precautionary principle is applicable in all instances. Finally, the ethical problems associated with all three of these possible measures are manifest, and FOSAF is not unmindful of the irony of the situation.

A number of control measures, some of which are discussed below, do however have the potential to be effective in reducing negative impacts on the aquatic biodiversity resources.

2.3.3 The impacts of the introduction of trout into South African aquatic systems

Almost all the introduced fish species, especially opportunistic predators such as trout, are believed to have had negative impacts on the indigenous biota of the systems to which they have been introduced. This is by virtue of the fact that the indigenous species have evolved without the impact of the predatory influence of the introduced species. There are also many

8 Introductions included both brown trout from Europe, but also rainbow trout from inter-continental sources, e.g. from other portions of the North Americas.

9 Fish poison, such as rotenone.

10 Such as in rivers with no barriers to fish movement

examples globally, where research has demonstrated that trout have had significant negative impacts on a range of aquatic organisms.

It is not within the scope of this position paper to attempt to detail the impacts that are considered to have resulted from the introduction of trout to South African waters, but according to several authorities, trout and bass are alleged to have been implicated in the local extinction of populations of indigenous fish species in certain areas. Examples that are cited include the Drakensberg minnow (*Pseudobarbus quathlambae*), and a number of other minnow species of the genus *Barbus* (Skelton 2001; Cambray, 2003).

While there is much speculation in the southern African context[11] on the nature of the negative impacts caused by the presence of trout, there are, however, few published studies which provide substantiated evidence of impacts which may be attributed exclusively to the introductions of the alien trout, since no pre-stocking assessments were made. However, despite this, FOSAF assumes that there can be no doubt that these introductions have impacted on the indigenous biodiversity resources to varying extents, by virtue of the predatory nature of these two species. However, as noted above, such impacts must be seen in the context of the impact of other alien species employed in general agriculture, the prevailing ethos of the times, and be weighed against the benefits they bring. See Sections 2.4 and 3.9 below.

2.4 Other threats to freshwater aquatic systems and biodiversity resources

Skelton (2001) and others have documented the numerous threats that are posed to freshwater aquatic systems and biodiversity, which include landscape transformation and the destruction of wetland habitats, poor quality agriculture and commercial afforestation, water abstraction, pollution (such as by fertilizers and pesticides), and so on. Kemper and Kleynhans (1998) list the relative significance some of the land-use activities and factors that impact negatively on the ecological state of rivers. The values they impute are listed in Table 1 below. From this, it is clear that negative effects of exotic fauna (including fish) are significantly lower than most other land-use activities and factors.

2.5 The need for a zoning system for the national aquatic systems

FOSAF believes that one of the best means of balancing the conflicting demands on the national freshwater aquatic ecosystems would be to develop a zoning system to guide, control and manage the most appropriate sustainable land-uses for these systems. Such a zoning system should make provision to both conserve the indigenous biodiversity and water resources on the one hand; and on the other, to make provision for the need for communities resident on communal, and landowners on private, land to productively utilise their resources. FOSAF envisages that this would best be achieved in a collaborative initiative involving official agencies, interested and affected parties, organizations and individuals with appropriate expertise and experience. Riparian owners, previously disadvantaged

[11] Numerous studies have been undertaken in other countries on the negative impacts of introduced trout species - see Cambray (2003) but the extent to which these may be extrapolated to this country is not known.

communities, user and other specialist interest groups should in particular, should be involved. The intention of this exercise is to achieve an integrated strategic plan, in order to attempt to meet the divergent needs of the environment, affected communities, official agencies, and user groups. This should be framed in legislation or regulations to ensure implementation and compliance.

Table 1. List of the significance of land-use activities and other factors on the ecological state of rivers

INSTREAM ZONE	WEIGHT	RIPARIAN ZONE	WEIGHT
Water abstraction	14	Bank erosion	14
Water quality	14	Indigenous vegetation removal	13
Bed modification	13	Water abstraction	13
Channel modification	13	Water quality	12
Flow modification	13	Channel modification	12
Inundation	10	Exotic vegetation encroachment	12
Exotic macrophytes	9	Flow modification	12
Exotic fauna (including fish)	8	Inundation	11
Solid waste disposal	6	-	-
TOTAL	100	TOTAL	100

Source : Kemper & Kleynhans, 1998.

2.6 Economic value of trout

While there are no published comprehensive studies on the overall economic value of trout in South Africa, it is believed that this is certainly of multi-million Rand proportions, as it is in the many other countries to which trout are native, or into which these species have been introduced. Trout in South Africa are used commercially for food production, especially for the luxury food market; and as a widely-appreciated sport angling resource. In many instances, this is a significant component of the national tourism attractions. Sport angling (for a wide range of salt and freshwater fish species, including trout) is one of the fastest growing tourism attractions in South Africa, which is supported by a significant

infrastructure of tackle manufacturers (now with a significant export base) and tackle retailers, tourist operators, professional guides, hotels, and other providers of accommodation. As is well known, the tourism industry is seen as of major importance for job creation (Davies, 2002 & 2004; FOSAF 2003; KZN Tourism 2004).

Trout fishing was once considered the exclusive preserve of a small affluent elite. However, in recent years, this traditional pursuit has transformed significantly and is now more widely inclusive of the demographics of South Africa. Increasingly, rural communities are using alien trout populations as a source of food, for their own recreational angling, as well as a tourism resource which can become of considerable economic value, for the enhancement of local economies and for job creation (Hlatswako 2000; Town & Regional Planning Commission, 2001; FOSAF 2003).

3. POSITION STATEMENT

FOSAF's position on trout is as follows.

3.1 Trout as an alien invasive species.

There is no doubt that trout have the potential to invade new high altitude waters, and to bring about significant negative impacts on a range of aquatic organisms, although according to Crass (2005), the extent of waters containing trout in the eastern part of the country have declined due to habitat deterioration and other factors. The range of aquatic habitat that is favourable to trout is in any event limited by climatic and other conditions.

FOSAF believes that a cautious, risk-averse approach should be exercised in the management of trout fisheries. In particular, it supports the viewpoint that no further introductions of trout into rivers where they do not presently occur, should be permitted without careful investigation and official sanction, through a strictly enforced permit system.

3.2 The historical status of trout as a permanent component of high altitude aquatic systems.

Trout now occupy extensive portions of the higher reaches of a number of river systems and through natural breeding, have become self-perpetuating populations. Trying to restore the previous *status quo* is not feasible due to a lack of knowledge. In any event, the precautionary principle would preclude this without a clear understanding of all the consequences of doing so. There are no known means of reversing this situation without causing significant negative impacts to the indigenous aquatic biota of these systems.

Trout fisheries also provide a wide range of social and economic benefits, the use and enjoyment of which has a significant traditional base throughout the developed landscapes in which they occur. There do not appear to be logical or defensible reasons for impacting on this resource except where they pose a threat to indigenous biodiversity.

FOSAF believes that these populations should be managed to best advantage, subject to the exercise of "duty of care" as prescribed in the NEM : Biodiversity Act[12].

It also subscribes to the views of de Moor and Bruton (1988) in the following quotation.

***"Trout … are well established in the upper reaches of many South African river systems. An important recreational angling industry has developed around the two trout species, which also provides healthy recreation for a large number of people. Trout farming is also well established in South Africa and has the highest yield of any one species in the aquaculture industry* (Safriel & Bruton, 1984). *Clearly trout have a permanent place in the economy and ecology of South Africa. We must not, however, lose sight of the fact that they are alien fishes, and that it is our unique and primary responsibility to safeguard the future of our own indigenous fishes.*"**

3.3 The need for a zoning system for the national aquatic systems.

FOSAF proposes that a planning exercise should be undertaken to develop a zoning system, together with a policy framework and management guidelines, as a means of balancing the conflicting demands on the national freshwater aquatic systems. The proposed zoning system should both address the need to conserve the indigenous biodiversity resources, as well as the need for communities resident on communal lands, and owners of private land, to derive income from various land-uses, including the provision of sport angling opportunities. The zoning system could be employed to guide and control appropriate sustainable land-uses for these systems. It should form a component of the overall approach to the conservation of the aquatic environment and national river system.

FOSAF proposes that priority be given to the development of a zoning system together with a policy framework and management guidelines for the control, conservation and management of aquatic biodiversity resources, in which provision is made for the maintenance of both indigenous as well as alien species such as trout, for realization of a range of potential and actual benefits. The system should make provision for allocation of a range of sustainable uses, such as conservation of sensitive indigenous aquatic biota, and sport fisheries based on both indigenous as well as alien fish species, including trout.

3.4 Precautions to prevent further invasions by alien fish species and indigenous species outside their natural range.

FOSAF believes that careful consideration should be given to the need to develop measures and controls that will obviate or minimise the possibilities of the further spread of all alien invasive fish species, and indigenous species outside their present established ranges, including limitations on the spread through introductions, as in 3.1 above.

FOSAF encourages the angling community to provide support for the achievement of

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[12] Sections 69 and 73 of the Act.

these aims.

3.5 Management of the freshwater fishery and aquatic resources.

FOSAF believes that the inland fishery resources which comprise both indigenous as well as introduced fish species, should be protected and managed on an holistic, integrated and sustainable basis.

The Federation has defined a set of principles to form the basis for a policy on the conservation of freshwater fishery resources (FOSAF, 2004) which is proffered as a contribution towards policy formulation at national and provincial levels.

FOSAF believes that the aquatic environment should be managed on four key principles: sustainable development (*vide* UNCED 1992 and WSSD 2002); sustainable fisheries resource management; IEM (*vide* the Environmental Conservation Act No. 107 of 1998) and Integrated Catchment Management (*vide* the National Water Act No. 36 of 1998).

3.6 The rights and responsibilities of riparian and land owners.

By far the greatest extent of the national river systems and freshwater fisheries resources occur outside the protected areas administered by the nature conservation agencies. The freshwater fishery resources are thus chiefly located in the developed landscapes on private and communal land, which are predominantly managed for commercial and subsistence agriculture, but also for a range of other land uses. Riparian owners in these landscapes have the right to manage the fisheries to their advantage, subject to the principles of responsible stewardship and legal restrictions controlling land use, such as the "duty of care" as defined in Sections 69 and 73 of the Act, which would include appropriate controls and limitations on introductions and re-stockings, as in Sections 3.1 above and 3.9 below.

Trout require very specific conditions for breeding, which include the presence of gravel substrates, cold, mobile, and highly oxygenated waters. They are consequently unable to breed in impoundments except under exceptional circumstances, such as in situations where streams with favourable micro-habitats discharge directly into the impoundment. Therefore, under normal circumstances, trout populations in impoundments are ephemeral by nature. Dams may thus be employed for the establishment of trout fisheries, *but* only with the exercise of the requisite "duty of care".

FOSAF believes that the management of fisheries of alien fish, including trout, is thus a valid land use but subject to the principles of responsible stewardship, the "duty of care" and the provisions below.

3.7 Conservation and protection of indigenous aquatic biodiversity resources.

Priority should be given, where appropriate, to the conservation of indigenous aquatic biodiversity resources, including indigenous fish species, in such a comprehensive

management system. This implies that wherever possible, the conservation of indigenous aquatic biota should take precedence over measures that might be designed to manage or protect populations of alien fish species.

FOSAF will continue to promote the conservation and protection of indigenous freshwater fish species and their aquatic habitats through its education and awareness publications and projects, encouraging compliance with all relevant legislation and through promotion of the fisheries provided by indigenous fish species.

3.8 Recognition of the importance of aquatic biodiversity resources, their conservation, management and protection.

Recognition should be given to the economic importance of aquatic resources, comprised of both indigenous as well as alien biota (such as trout) as a source of food, for recreation, tourism and other economic purposes.

FOSAF will encourage authorities to continue to provide legal protection from unauthorised, non-sustainable, harmful and wasteful utilization of aquatic biodiversity resources, as in the past.

3.9 Control measures related to the prevention of translocation and restocking of aquatic biota.

Legal provision is made in most provincial nature conservation legislation empowering conservation agencies to regulate the translocation or introduction of biota into freshwater aquatic systems. These statutes prescribe that such translocations or introductions may only be made following the issue of a permit by the relevant agency.

Chapters 5 and 6 of the Act, will be critical in relation to these matters, and provide for, amongst other things, the listing of alien and invasive species and a system of prohibited activities involving such species, and the possible permitting and exemption of certain activities "*after a prescribed assessment of risks and potential impacts on biodiversity* [has been] *carried out*." The "duty of care" is also applicable[13]. In view of the critical importance of these provisions, they are explored in more detail in the Annexe, in order to more fully contextualise FOSAF's position[14].

There is thus now a comprehensive legal regime in place to effectively prevent, control and manage the conservation of biodiversity, indigenous as well as alien, including those species regarded as invasive. FOSAF believes that this framework, if applied rationally and

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13 The Act provides for the listing of invasive alien species and then prohibits certain activities (which would include inter alia, activities like introductions and translocations) without prior prescribed assessment of risks and potential impacts on biodiversity. See also sections 69 and 73 of the Act which outline the "duty of care".

14 It is also important to understand that the Act provides for the listing of varying degrees of endangered species and the listing of prohibited activities in relation to such species. Thus e.g., the stocking of trout may in appropriate circumstances be declared a prohibited activity in certain areas or nationally depending on the degree of proven or perceived threat it may pose to endangered indigenous biodiversity.

pragmatically through management strategies like the zonation of appropriate areas and a proper application of the "duty of care", would more than adequately meet the needs of its members, nature and biodiversity conservation interests, user groups, and other interested and affected parties.

FOSAF supports the rational and pragmatic implementation of the NEM : Biodiversity Act, and other relevant national and provincial legislation to prevent unauthorised translocation and restocking of aquatic biota.

4. CONCLUSIONS

The mission of FOSAF is to promote the interests of fly fishing and the conservation and management of the national fly fishing resources, comprising both indigenous as well as alien fish species. It is strongly supportive of the need for conservation measures for the protection of aquatic environments, and their dependent biodiversity resources, including indigenous fish species.

FOSAF views the freshwater fisheries that have been created by the historical introduction of trout into the higher reaches of many South African aquatic systems as a resource of considerable value, as described in Sections 1 and 2.6 above. It believes that benefits realised from this resource have the potential to encourage riparian owners to conserve the aquatic ecosystems present on their properties.

FOSAF also recognises that introductions of alien fish species such as trout, have resulted in a number of environmental problems, as indicated in Section 2.3.3 above. However, as in many other countries to which trout have been introduced, they have adapted to become a permanent feature of the stretches of rivers which provide favourable habitat conditions for them and that, except in a few limited locations, there is no known feasible means of eradicating them without causing significant damage to indigenous aquatic biodiversity resources. Accordingly, it would appear that landowners are entitled to manage these resources to best advantage, subject to the exercise of sound stewardship, and "duty of care", as defined in the Act.

FOSAF subscribes to the principles and need for the formulation and implementation of a classification and zoning system for freshwater aquatic ecosystems. This is in order to protect the integrity of indigenous biodiversity resources and associated angling opportunities on the one hand; and the need to maintain angling and associated ecotourism opportunities based on alien fish species on the other. Such a zoning system will also facilitate the formulation of effective policies and regulations for the protection of freshwater fisheries of both indigenous as well as of alien species, by the use of restrictions such as bag limits, fishing methods, and closed seasons.

Finally, FOSAF is strongly supportive of the need to prevent the spread of alien invasive fish species.

5. RECOMMENDATIONS

The key recommendations of this position paper are the following.

5.1 FOSAF promotes fly fishing and sport angling as a sustainable use of all fishery resources. It *recommends* that :

Incentives be provided to land-owners to conserve the aquatic ecosystems and aquatic biodiversity resources present on their properties; and
Wherever feasible, priority be given to the conservation and protection of indigenous biodiversity resources, including indigenous fish species.

5.2 FOSAF *recommends* strict compliance of the provisions of the NEM : Biodiversity Act and other relevant legislation and, in particular the exercise of "duty of care", in relation to the management of alien fisheries including trout fisheries.

5.3 FOSAF strongly proposes the establishment of a zoning system together with a policy framework and management guidelines for the control, conservation and management of aquatic biodiversity resources, in which provision is made for the maintenance of both indigenous as well as alien species.

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It is available on the following website: www.fosaf.co.za.

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ANNEXE

PROVISIONS OF THE NEM : BIODIVERSITY ACT No. 10 of 2004 RELEVANT TO THIS POSITION PAPER

The principal provisions of the Act relevant to this position include the following.

Section 64 outlines the purposes relevant to this position paper as:

> "*(a) to prevent the unauthorized introduction and spread of alien species and invasive species to ecosystems and habitats where they do not naturally occur;*
> *(b) to manage and control alien species and invasive species to prevent or minimize harm to the environment and to biodiversity in particular;*
> *(c) to eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats;*"

From this it will be evident that the primary objects of the provisions that follow include prevention of unauthorised activities, the management and control of problem species and the eradication of those alien or invasive species deemed to be harmful. The Act also differentiates between those species that are alien and those that are invasive, with different provisions being applied in respect of each aspect.[15] Trout would in all likelihood be covered by both sets of provisions. FOSAF has no difficulties in principle with this approach and welcomes the integrated and holistic manner in which the Act seeks to address these issues by balancing the concern for conservation and protection of indigenous biodiversity and ecosystems on the one hand, while at the same time recognising that other biodiversity has a role, and can, subject to appropriate controls and "duty of care", be permitted. However, it will be necessary to carefully monitor the manner in which the provisions of this statute are implemented, and to participate fully in public consultation processes, to ensure that its interests are not compromised.

A closer look at the provisions of the Chapters referred to above, follows:

A "*restricted activity*" is defined in the Act "*in relation to a specimen of an alien species or listed invasive species, means-*
(i) importing into the Republic, including introducing from the sea, any specimen of an alien or listed invasive species;
(ii) having in possession or exercising physical control over any specimen of an alien or listed invasive species;
(iii) growing, breeding or in any other way propagating any specimen of an alien or listed invasive species, or causing it to multiply;
(iv) conveying, moving or otherwise translocating any specimen of an alien or listed invasive species;

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[15] Thus sections 65 to 69 deal with alien species and sections 70 to 77 deal with invasive species.

(v) selling or otherwise trading in, buying, receiving, giving, donating or accepting as a gift, or in any way acquiring or disposing of any specimen of an alien or listed invasive species; or (vi) any other prescribed activity which involves a specimen of an alien or listed invasive species;"

It will be evident that this covers almost every kind of relevant activity.

Section 65 provides that no restricted activity may be carried out without a permit. Section 66 provides for certain exemptions from these provisions. Section 67 provides for the listing of "*those alien species in respect of which a permit ... may not be issued.*" It follows that where a species is listed in this respect, no restricted activity may be carried out in relation to it under any circumstances.

The "duty of care" entails complying with the conditions pertaining to the permit and taking all required steps to prevent or minimise harm to biodiversity. Failure to comply with this could result in a competent authority directing the person take such steps as may be necessary to remedy any harm to biodiversity caused by the actions of that person. If that person fails to comply with the directive, the competent authority may implement the directive and recover from that person all costs incurred. If the person's actions result in an alien species establishing itself in nature, as an invasive species, the responsible person may be held liable for any costs incurred in the control and eradication of that species. [16]

Similar provisions are provided for in relation to alien invasive species.

[16] See Section 69 (1), to (4) of the Act.