

ANNEXURE F

**IMPACT OF THE INUNDATION OF THE INCHBRAKIE FALLS ON TROUT FISHING IN
THE UPPER MOOI RIVER**

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1. INTRODUCTION

The presence of the bass species and the Scaly which are in the Mooi River below Inchbrakie Falls, but which are not all present above the falls, has implications for the existing trout fishery in the river above the falls. Since the Spring Grove Dam would inundate the falls, the various fishes would be afforded access to the river above the falls and the trout there will be affected. Any impacts would be felt in the river as far upstream as the Reekie Lynn Falls, which are high enough to be a total barrier to further upstream movement. This waterfall is situated a very short distance downstream of the lower boundary of Kamberg Nature Reserve and the length of river between it and Inchbrakie is about 35 kilometers. The trout fishery along this length of river is of considerable traditional value and, as the economics of conventional farming deteriorate, is increasingly seen as a source of supplementary income. The impact on the trout differs somewhat for each of the other species and so each is given particular consideration.

2. IMPACTS OF THE VARIOUS FISH SPECIES ON TROUT

2.1. SCALY

The Scaly occurs alongside trout in many of the scheduled waters in KwaZulu-Natal. Examples of this include the Umzimkulu, Umkomaas, Bushmans, Injesuthi and Tugela Rivers. In none of these instances is there considered to be any adverse effect or interaction between the two species. Therefore it is considered that there is no cause for concern should the Scaly enter the upper river. To the contrary, flyfishing for the indigenous yellowfish species, of which the Scaly is one, has become popular in recent years and so it may be argued that the movement of the Scaly into the upper river could be a positive (beneficial) impact.

2.2. LARGEMOUTH BASS AND SPOTTED BASS

Two of the three bass species are very similar in most of their characteristics and so may be considered together. The Largemouth Bass and the Spotted Bass are both fishes that have a strong preference for lacustrine (still water) environments and for this reason are in the region only as a result of having been stocked into farm dams. Their presence in the river may be regarded as being incidental as they probably arrived there either through being washed out of dams when small or else when seeking to migrate to new habitat. In addition, they have a preference for warmer waters although they can survive cold conditions. Both the species are able to survive in rivers but tend to remain in areas of slow flowing, calm water. This has certainly been the case in the Underberg area where Largemouth Bass are now resident, although not very common, in the Umzimkulu River.

Largemouth Bass are now known to occur in farm dams on a tributary stream which enters the Mooi River upstream of the Inchbrakie Falls but below the Reekie Lynn Falls. Thus it is very likely that they have moved, or will move, into the river. Because much of the reach between the two waterfalls is fast moving and generally cool to cold, it is not thought that the fish will be able to establish a large population there and so will remain uncommon. The possible exception to this is in the lower reaches near Inchbrakie Falls where the gradient is flatter than in the higher areas.

Experience gained from the Underberg area suggests that these two bass species will have relatively little effect on the trout fishery in the river. They could, however, adversely affect the fishing in dams should they become more widespread.

2.3. SMALLMOUTH BASS

The Smallmouth Bass is a species that is equally adapted to both running and still waters. Unlike the other bass it spawns on a rocky substrate and this is thought to be an adaptation to riverine conditions. For this reason it has the ability to establish a breeding population in the river above the Inchbrakie Falls and, if the dam is built, this will almost certainly happen.

The species is known to compete strongly with trout and, in conditions that are marginal for trout, will displace them completely. This is unlikely to happen above Spring Grove Dam but it is highly probable that the trout population will be substantially depleted by the introduction of the Smallmouth Bass. It is not possible to predict the final outcome of the competition between the two species but it is likely that a dynamic equilibrium will be established. During drought years when the water temperatures are higher the bass will probably have total domination over the trout. However, when conditions are cooler, the trout may be able to make some sort of recovery against the bass. The manner in which the competition will take place is complex but it is thought that the primary mechanism is that the bass is a voracious predator and will out compete the trout for the available prey resources.

3. CONSEQUENCES OF A DECLINE IN THE TROUT POPULATION

Trout fishing is an activity that has very substantial economic value. In the Underberg area the overall value of the trout fishery to the local economy is estimated to be between 20 and 30 million Rand per annum (Avni. 2001). This figure includes not only the direct revenue from the actual lease of waters and the like, but also includes inputs for accommodation, property sales, restaurants, supermarkets, curio outlets, and other incidental sources. While the equivalent figures for the Mooi River fishery will be smaller they could be as high as eight to ten million Rand per annum. This industry would be significantly affected if the riverine trout fishing were to be spoiled by the introduction of Smallmouth Bass. The latter species is not perceived to have the same value as trout and people will not pay as much, if anything, to fish for it. It must be recognised that the trout fishing in small farm dams will be relatively unaffected and that the simultaneous arrival of the Scaly might partially offset the presence of the bass.

Another positive impact that the Spring Grove Dam might have on the fishery in the Mooi River is that deriving from an upstream migration of large trout that have grown out in the dam. There can be no doubt that some trout will take up residence in the dam and, as commonly happens in impoundments, they will grow to a large size there. Competition from the bass will prevent their full potential from being reached but some trout may be expected to attain a mass of six kilogrammes or more. These fish will gather at the river inlet in the autumn and will undertake an upstream spawning migration. This will create an angling opportunity that, although strictly seasonal and short-lived, will be noteworthy. It is not possible to assess its worth in economic terms but it may be considerable. However, it is still thought that the enduring losses created by Smallmouth Bass will lead to an overall loss to the regional economy.

The Largemouth and Spotted Bass could also have some negative effects on the economy should they become more widespread in the dams in the upper catchment. However, because they are already present in the area, it is assumed that the process may already be under way and so it is not in any way related to the construction of the Spring Grove Dam. Because of this it is not considered any further in the present context. Similarly, the fishery that will develop in the Spring Grove Dam itself is ignored here, as it cannot compensate for the losses to the landowners along the river.

4. ASSESSMENT OF THE IMPACTS OF CHANGES IN THE FISHERY

The changes in the fish populations of the Mooi River between the two waterfalls fall into two categories. These are related to ecological issues and to social issues but both are assessed here.

4.1 ECOLOGICAL IMPACTS

The introduction of the Smallmouth Bass, which is a voracious predator, will place additional pressure on the populations of amphibians and aquatic invertebrates in the river. This impact must be considered both in light of the existing pressure from the trout, which have been in the river for over a century and which are also an exotic species, and of the suspected, but unproven, presence of rare mayfly species. Thus it is assessed, with **Moderate Certainty** as being of **Low to Moderate Significance** at the **Regional Level** in the **Permanent Term**. The **Requirement for Mitigation** is **Low**. In practical terms, the only mitigation possible is to prevent the bass from entering the upper river.

4.2 SOCIAL IMPACT

The social impact arising in relation to fish is that relating to the effects of the Smallmouth Bass on the trout fishery. It may be partially offset by the development of new fisheries based on the Scaly and the migratory trout from the dam but is still assessed, with **Moderate to High Certainty** as being of **High Significance** at the **Regional Level** in the **Permanent term**. The **Requirement for Mitigation** is **High**. In practical terms, the only mitigation possible is to prevent the bass from entering the upper river.

5. RECOMMENDATIONS FOR MITIGATION

In order to prevent the Smallmouth Bass from entering the upper river they must either be exterminated from the Spring Grove Dam basin or must be blocked from migrating upstream out of the dam. By using Rotenone, which is a fish specific poison, it would be possible to eradicate all fish, including bass, from the section of the Mooi River between Inchbrakie Falls and the Spring Grove Dam wall. Whilst this would be an expensive exercise (R50 per 1000 m³ of water) it still might not kill every Smallmouth Bass in the area since it is probable that some might take refuge in the smaller tributaries or in channels in the extensive reed marshes where eradication would be impossible. Thus, there is no certainty that the species would be eliminated from the region around the dam. It would also be quite impossible to purge all farm dams and streams of all species of bass. Therefore, the threat posed by bass to trout above Inchbrakie Falls, should the dam be built, will be likely to remain even if rotenone is used. For this reason the method cannot be recommended.

An alternative approach to preventing upstream invasion by bass would be to build an impassable fish barrier at the headwaters of the new impoundment. If properly designed it could also serve as a gauging weir. It may also create secondary, but smaller, ecological impacts and will certainly eliminate the new opportunities based on the Scaly and on the migratory trout. However, these do not exist at the moment and so nothing will be actually lost. Therefore this means of mitigation is the one that is recommended most strongly and should be addressed in the Environmental Management Plan.

6. BIBLIOGRAPHY

Avni, W. (2001) **Personal Communication**. Giants Cup, Underberg, RSA