Translocation of indigenous freshwater fishes for conservation and flyfishing: the Boontjies River, Western Cape as a case study

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Introduction

In early 1997, the owners of Bushmans Kloof Private Game Reserve, approached Cape Nature Conservation (CNC) for permission to introduce* indigenous fishes into the Boontjies River (a tributary of the Brandewyn River), upstream of a natural fish barrier, Meidegat waterfall, within the reserve. The Reserve is located near Biedou valley in the Cederberg, part of the Olifants/Doring catchment basin (see 1:50 000 topocadastral map 3219 PAKHUIS, Ist edition). Their proposal had both recreational and conservation objectives. The Reserve owners wished to establish a self-sustaining community of indigenous fishes in the Boontjies River for recreational catch and release flyfishing, in preference to using alien species.

CNC generally opposes fish introductions because many such actions in the past were poorly planned and assessed leading to the establishment of species that have had a devastating impact on indigenous aquatic biota. Examples include the introduction of the smallmouth blackbass Micropteus dolomieu (an alien species) and sharptooth catfish Clarias gariepinus (a translocated indigenous species) into Western Cape rivers.

However, CNC supported the proposed translocation of three threatened Olifants River fishes, the Clanwilliam yellowfish (Barbus capensis), sawfin (B. serra) and Clanwilliam redfin (B. calidus) into the Boontjies River above Meidegat waterfall. The Clanwilliam redfin and sawfin are endangered while the Clanwilliam yellowfish is vulnerable (Baillie & Groombridge 1996). Two conditions were identified for the translocation:

1 The source of fish would be the Boontjies River below the waterfall or adjacent Heuningvlei River, to protect the genetic integrity of fish species in the area.

2 The project would need proper monitoring to determine the impact of the translocated fish on the invertebrate community. The Reserve owners agreed to fund a pre-translocation study by Southern Waters (see Tharme 1998), a consultancy group affiliated with the Freshwater Research Unit of the University of Cape Town.

** An introduced species is one that has been distributed intentionally or accidentally by man to areas beyond its native range of distribution. This includes both introduced alien species (i.e. foreign to South Africa) and translocated indigenous species (a S.A. species translocated into areas where it is not naturally distributed)(De Moor & Bruton 1988).*

CNC agreed to stock the indigenous fish free of charge as the translocation was seen as a conservation exercise that promoted the ecotourism value of indigenous fishes and also would establish a further refuge population of threatened endemic fishes.

Prior to translocating indigenous fish, the following questions should be assessed (see Anderson 1998):

1. Are there indigenous fish in the recipient assemblage that may be adversely affected by the translocated species or may hybridise with them?
2. Are there any other threatened organisms that may be adversely affected?
3. Are there any alternate measures that could be taken within its natural habitat (e.g. river or catchment rehabilitation) that would better preserve the fish species?
4. Will the dietary requirements of both the indigenous and translocated fish be met?
5. Does the translocated site contain the required habitat for the translocated fish?
6. Do land owners, scientists and other affected parties have any objections?
7. Have invertebrate samples from the site been taken to predict possible negative impacts and allow for future monitoring?
8. Are there adequate donor wild stock populations to ensure maximum genetic variability in the source population?

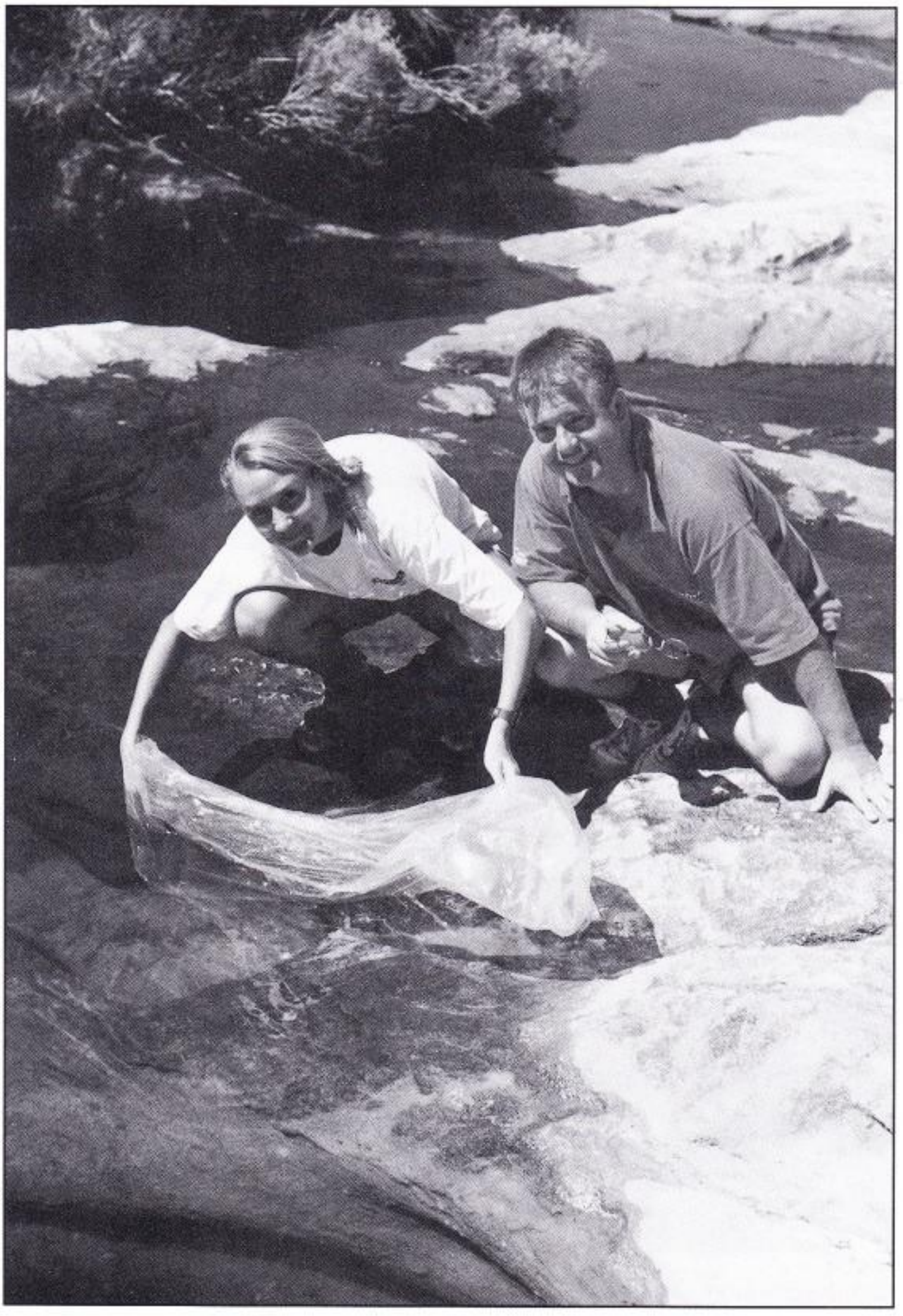
Study Site

The Boontjies and Heuningvlei rivers traverse the Game Reserve, which is positioned between the mountainous Cederberg Wilderness Area and arid Great Karoo and has both karoid and fynbos vegetation. The entire study area is a proclaimed private conservation area and Natural Heritage Site and is stocked with a high diversity of indigenous wildlife. Land use is primarily for the purpose of ecotourism and conservation, and human disturbance is relatively low and localised. The Reserve area receives a highly variable amount of precipitation, with an annual average of only 250 mm. The majority of rivers in the region, including the Boontjies River, are seasonal, ceasing to flow and even partially drying up during the dry season. In contrast, the Heuningvlei River, which becomes the Biedou River further downstream, has a much larger catchment with higher precipitation, is perennial.

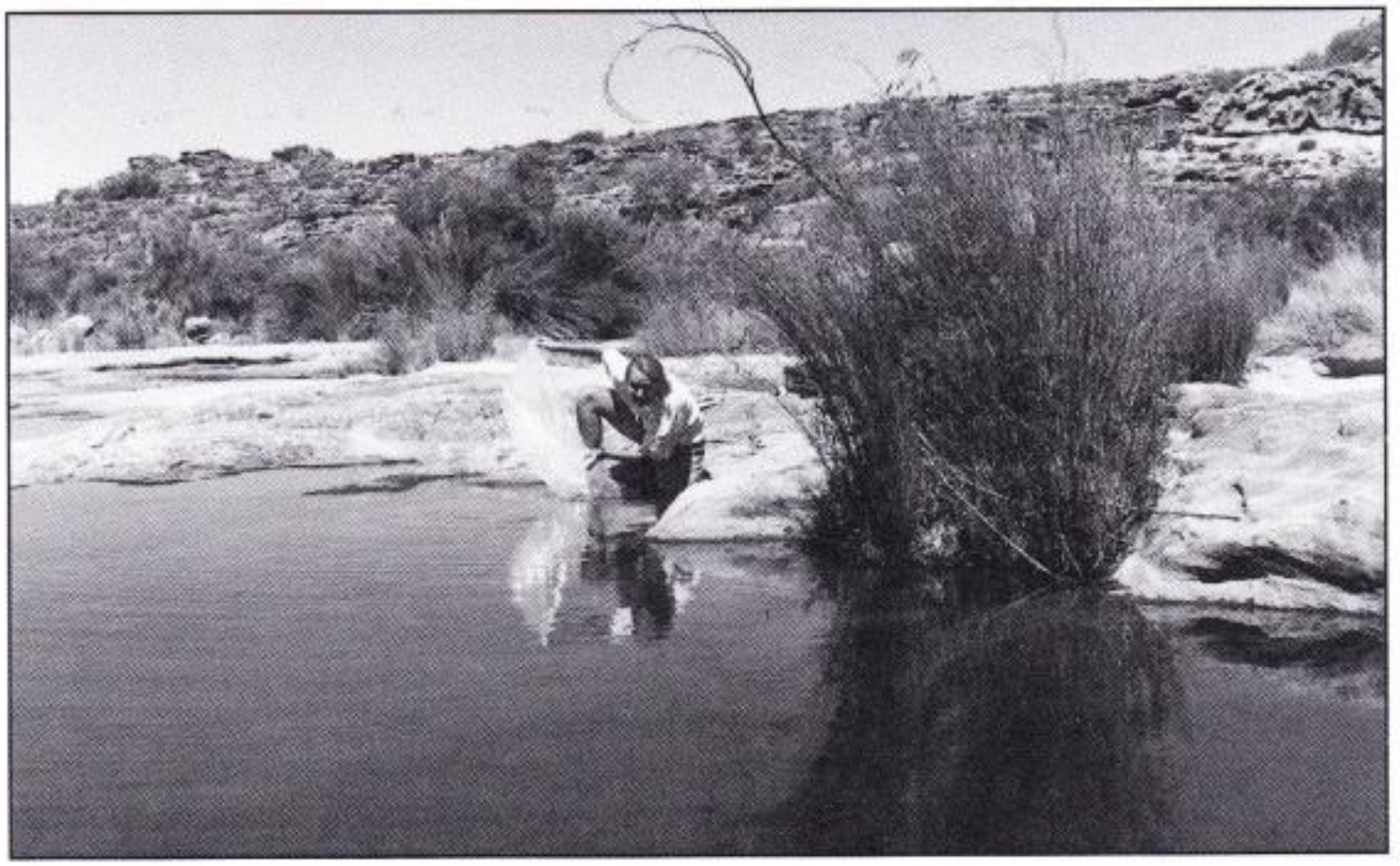
Fish translocation

The translocation complemented work in progress by CNC to conserve the threatened endemic fish species of the Olifants River system. This system is perhaps South Africa's most important river system for fish conservation as eight of its ten indigenous freshwater fish species are endemic (the highest endemicity of any system south of the Zambezi River) and all are threatened with extinction.

The main threats to Olifants River fishes are predation and competition by invasive alien fishes (primarily smallmouth blackbass) and habitat degradation and destruction by unsustainable agricultural development (e.g. excessive water abstraction, instream dams and weirs without fishways, use of pesticides and the bulldozing of rivers).



Rebecca Tharme and Dean Impson releasing yellowfish in the Boontjies River.



Rebecca Tharme releases fish from the Heuningvlei river in the Boontjies River.

Finding a new home - translocating yellowfish in the Bushmans Kloof Game Reserve.

The source of indigenous fish was the adjacent Heuningvlei River, as few indigenous fish are found below Meidegat Falls on the Boontjies River because of the large bass population there (M. Cowden, Reserve staff pers.comm.). The Heuningvlei River also has a healthy, abundant and well-established community of indigenous fish species which should be genetically similar to conspecifics found in the Brandewyn River. One adult Clanwilliam yellowfish, 17 sawfin and 19 Clanwillian redfin were successfully translocated. According to M. Cowden, Reserve staff had also stocked between 30 - 60 "yellowfish" (probably both Clanwilliam yellowfish and sawfin) from the Heuningvlei River into the Boontjies River prior to this exercise without obtaining stocking permits from CNC. This action was unfortunate as it will prevent the accurate monitoring of the translocation which is an essential component of the project.

Habitat and Invertebrate Assessment

Preliminary assessments of the conservation status and ecological health of the Boontjies and Heuningvlei rivers were conducted in order to address the ability of the Boontjies to act as a sustainable, long-term refuge for the introduced fish species. Both water chemistry sampling and rapid bioassessment using the South African Scoring System, or SASS, were used for this purpose. The latter technique which uses aquatic invertebrates is now routinely employed within the national River Health Programme. Some background knowledge of the known distributions, and habitat and breeding requirements of the translocated species was also compiled to assist with this process.

The Boontjies River differs in several respects from the Heuningvlei River, but it was found to provide sufficient habitat of high quality for the translocated species. It was given a high conservation status of Class 2 (i.e. a largely natural river with few modifications). The reduction in status from an entirely natural system can be primarily attributed to: invasion of the riparian strip by alien species; removal of part of the protective buffer strip of indigenous riparian vegetation; slight alteration in water quality, as a result of diffuse source pollution from irrigation return flows; and physical alteration of the channel by the erection of weirs, dams and road crossings.

The Boontjies River is mostly a single, narrow bedrock channel with occasional multiple channels. Overall, the summer aquatic macroinvertebrate community of the Boontjies River, although of fairly low diversity, is healthy and reflects a seasonal river which is bedrock and sand-dominated. The fauna is dominated by pool and vegetation-dwelling beetles (Coleoptera), dragonflies (Odonata), pool-dwelling bugs (Hemiptera) and other taxa indicative of low flow conditions, like Caenid mayflies. The riparian vegetation comprises about 80% indigenous mountain fynbos characteristic of the northern Cederberg. It includes trees and shrubs such as Brabejum stellatifolium (wild almond) and Erica caffra (sweet-scented heath) while Calopsis paniculata (Cape reed), Elegia capensis and Prionium serratum (palmiet) are also present. Alien riparian species (mainly Australian Acacias) make up about 20% of the flora.

Areas of fish habitat include large bedrock pools and runs, as well as pockets of gravel and sand and backwaters. These habitats should meet the life history requirements of the three translocated species, provided that late spring and early summer flows are sufficient for spawning and larval development.

Concluding remarks

The translocation of threatened indigenous fish into Bushmans Kloof Game Reserve for ecotourism and conservation reasons is a preferable alternative to stocking the same waters with invasive alien fishes such as smallmouth and largemouth bass and carp. However, for the translocation to have long-term value, several criteria must be addressed. Firstly, ongoing monitoring of the fish and invertebrate communities, and of river health, should be undertaken at regular intervals. In the former instance, it is preferable that the monitoring take place at least once every summer. Angling for the indigenous fish should be non-destructive, and only flyfishing on a catch and release basis should be allowed. As the translocated fish species are slow-growing and sensitive to handling, captured fish should be returned to the water as quickly as possible. Cape Nature Conservation must be consulted for legal permission to undertake any future translocation of fishes between the Heuningvlei and Boontjies rivers or any other river systems. Moreover, no alien fish species should be introduced into the river and dams above the waterfall.

References

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