



**WATER
RESEARCH
GROUP**

SOUTH AFRICA FRESHWATER FISH BIOTELEMETRY PROGRAMME

*The use of fish behaviour to contribute
towards the management of our surface
freshwater ecosystems*

WATER RESEARCH GROUP

School of Environmental Sciences and Development
North West North University
Private Bag X6001, Potchefstroom, 2520
Email: Nico.smit@nwu.ac.za



NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

SPONSORS AND STAKEHOLDERS

The study is being undertaken by the Water Research Group in collaboration with Wireless Wildlife:



Stakeholders of the study include SANPARKS and the Diamond

Route:



The study is being funded by the Water Research Commission:



WATER RESEARCH GROUP

School of Environmental Sciences and Development
North West North University
Private Bag X6001, Potchefstroom, 2520
Email: Nico.smit@nwu.ac.za



1 Background:

The continued development of the understanding of the way in which aquatic ecosystems respond to negative anthropogenic activities or pollution is of great importance in the management and conservation of these systems. Historically, various components of ecosystems have been documented and then used to understand how these ecosystems function (Figure 1). Fish are considered to be excellent indicators of the ecological well being of aquatic ecosystems. Fish are known to respond to changes in ecosystems states in response to pollution, through changes in their physiology and behaviour and or populations and community structures (Figure 2). The use of fish behavioural ecology to monitor the effects of altered ecosystem states has widely been used internationally and only limited use locally. The characterisation of fish behaviour in the aquatic ecosystems of southern Africa is difficult due to the hazardous nature of our ecosystems. Biotelemetry is a popular behaviour monitoring method that has widely been used throughout the world to characterise the behaviour of fish. Currently, there are no local suppliers of biotelemetry equipment that can be used on fish, and limited support service for existing approaches.



Figure 1: Aquatic ecosystems such as Schroda Dam will be considered in this study.

This study has been established to test locally developed biotelemetry systems for use on fish in freshwater quality ecosystems in southern Africa. In this study the developed systems will be used to monitor the behaviour of five fish species in different surface aquatic ecosystems including flowing (lotic) and still standing (lentic)

ecosystems. Thereafter comparisons between locally manufactured Wirelesswildlife and existing American Advanced Telemetry Systems equipment will be made and a methodology for the use of digital radio telemetry systems for the monitoring of fish in South Africa will be developed.



Figure 2: This study will involve the monitoring of the behaviour of Orange-Vaal Largemouth Yellowfish

2 Approach

The study will be carried out at four locations including Boskop Dam (North West), Schroda Dam (Limpopo, Mapungupwe National Park), the Vaal River (Wag 'n Bietjie Ekoplaas, Freestate) and the Crocodile River (Kruger National Park). The study will involve the capture, tagging and long-term remote and manual monitoring of yellowfish, tigerfish and cichlids (Figure 3).

Tags include transmitters that allow for the monitoring of the location of individuals, activity and depth of individuals and the temperature of the surrounding water. Optional LED lights are available to visually monitor the location of tagged fish in the study (Figure 4). Remote monitoring of tagged individuals will take place continually during the study period by a network of base and relay monitoring stations or listening stations. Through this network the activity, temperature and depth of individuals (and possibly location) will be sent electronically to a data management system in real time which can be accessed through an internet interface. The manual

monitoring approach includes the active tracking of tagged individuals on regular intervals by behavioural experts who will document the 24 hour behaviour of selected individuals. During these surveys the habitat use, daily and seasonal migration behaviour and other general behavioural aspects of the fishes will be monitored.



Figure 3: Various sampling methods including angling methods will be used to capture fish for the study.

3 Project information

The study is being carried out by the Water Research Group with funding provided by the Water Research Commission. Additional partners of the study include Wireless wildlife, South African National Parks and De Beers Consolidated Mines (The Diamond Route). The study has been initiated in 2011 and will be completed in 2013.



Figure 4: Visual observations of the LED lights on a Bass used in the developmental phase of the study.

For more information contact the project manager: Gordon O'Brien at Gordon.obrien@nwu.ac.za